Mapping Beyond Cartography:
The Experimental Maps of Artists Working with Locative Media

_____

Submitted by Daniel James Frodsham to the University of Exeter
as a thesis for the degree of Doctor of Philosophy in English in April 2015

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: …………………………………………………..

Abstract

The experimental maps produced by artists working with locative media both bear witness to and participate in a radical reworking of the way in which space is conceived and encountered that destabilizes longstanding assumptions about the nature of representation, knowledge, and power. These mapmaking practices, it is argued, operate at the juncture of a cartographic tradition that entails distinctively modern ways of seeing, knowing, and acting in the world, and digital technologies and software operations that propose alternative ways of linking the world up. The thesis charts how these art maps engage in a critique of cartography, the extent to which they remain indebted to it, but also their use of coded operations to pioneer novel apprehensions of space that mark a decisive 'break' with a modern worldview. The map works of locative media are accordingly positioned in relation to what is seen as a paradigmatic shift from Cartographic Space to Code Space, and the analysis of case studies supplies a means of comprehending this ongoing transformation, demonstrating that mapping survives *beyond cartography* but entails a tearing apart of the cartographic surface and the representational epistemology that accompanies it. Gone are the compass, scale and fix-points by which, for centuries, a sense of place was anchored and the world made knowable, yet to be set adrift in this way is not to be left 'all at sea'. Working with the novel intuitions, forms and geometries that arise from the operations of software code, post-cartographical mapping practices continue to supply a sense of orientation. However, they also pioneer novel forms of territory, and power over territory, that call for new strategies of counter-mapping and, with it, a 'post-cartographical' reframing of the study of locative media. Now pictured as a site of contestation between

antithetical spatial paradigms, locative media is rehabilitated as a vital force,

operating at a pivotal moment, in a broadly epoch-defining reshaping of space

and spatial representation.

Table of Contents

Table of Figures

10

Introduction

The arrival at the beginning of the 21st century of novel locative technologies appears to be the triumphal culmination of a centuries-old endeavour to finally determine the question of location: to know at all times where one is and where one is headed. It begins in the ancient world, but gathers momentum with the birth of the modern nation-state, the development of scientific methods of survey, and a geometrical ordering of space. In crossing the final frontier of manned flight into space, that God's eye view of the world was not only humanly realized, but the satellites that followed supplied a means of definitively fixing positions within the grid of coordinates that had been laid down by cartography.

However, within a few short years those same technologies were also being used by a handful of artists to question the nature of that gridded space, reopening the issue of location and suggesting novel apprehensions of space in which secure notions of proximity, scale and orientation are unfixed and made precarious. In the hands of these artists, the triumph of cartographic science becomes also the moment at which that assiduously-constructed worldview begins to fall apart. This research attempts to chart its unraveling and point towards what lies beyond it. It argues that the experimental maps produced by artists working with locative media both bear witness to and participate in an on-going transformation in the way that space is conceived and encountered. This fundamentally reshapes how the world and our place in it is seen and

understood, and accordingly brings into question assumptions about the nature of 'knowledge', 'representation', and 'power' that have stood for centuries.

However, the idea that the mapping practices of locative media might testify to, or even play a pivotal role in such a sweeping transformation was in no way clear at the outset of the research. By 2011, artistic engagements with locative media had mostly been written off as a failed experiment, one hopelessly contaminated and constrained by the technologies of surveillance that they sought to appropriate and repurpose. The rather mundane starting point for this research was simply the idea of paying more attention to the maps produced by artists working with locative media. There was something intriguing about this conjunction of an old cultural form and emerging digital technologies, and the field was also accompanied by an appealing rhetoric that promised all kinds of possibilities to reimagine and reshape spaces. However, although the map is a central and inevitable component all works of locative media, it is also an aspect of these works that has received little concentrated attention. Working from the premise that their maps could and should be taken seriously as maps, rather than just a decorative motif, a number of things became apparent.

Firstly, there was often a mismatch between what artists, and commentators, thought they were doing with maps and what the maps actually seemed to be doing. The field abounded with paradoxes, outright contradictions, and sometimes rather woolly claims about the nature of their engagement with matters of space and spatial representation. Detailed scrutiny of their maps seemed to offer a way of getting beneath or filtering out the rhetoric (and sometimes hype) that surrounded these works.

Secondly, as study of these maps got underway - and informed by work in the field of critical cartography - there was a growing recognition of the *extra-ordinary* nature of maps. Maps were not just a navigational tool, but a distillation of fundamental beliefs about the nature of the world: what can be said to exist, how these relate to one another, and how they can be known. It was impossible to talk about maps without also talking about their ontological and epistemological foundations. Furthermore, since maps are never impartial representations, but actively shape the world in ways that typically serve powerful interests, there was a need, also, to account for 'the power of maps'[1]. In other words, the experimental maps of locative media (whether wittingly or not) could not help but be engaged in weighty questions about the nature of space, knowledge, representation and power, and an analysis of these maps should take seriously the way in which they addressed these.

Third, it was clear that what these maps held in common was their critique of scientific cartography and a desire to move beyond it, or at least redeploy it to alternative ends. Indeed, many of these maps were explicitly presented as works of 'counter-mapping'[2]. There was a need, then, to develop a fuller understanding of the target of their critique by exploring the history of scientific cartography, and the ideas and beliefs that accompanied it. This suggested that the model of scientific cartography could be taken as a reference point by which to judge whether and how the maps of locative media diverged from and reworked its portrayal of space. However, examination of these maps indicated

---

[1] A phrase that it has its origin in the title of Denis Wood's (1992) pioneering work of critical cartography, *The Power of Maps*.
[2] 'Counter-mapping' was coined by Nancy Peluso (1995) as a strategy for affirming indigenous land rights, but has since been used to describe any use of maps to counter dominant power structures. See (2010) for an extended discussion of various counter-mapping practices.

that they were working and experimenting with not just one, but a number of different and competing conceptions of space, these also coalescing around particular theoretical approaches to issues of space and spatiality. Taken as a whole, these works seemed to represent a concerted and sustained effort to rethink the issue of space and spatial representation that had its parallels and explicitly made connections with on-going theoretical discussions. In other words, the counter-mapping of locative media could be seen as part of a broader reevaluation of space and thus as a way of *doing theory*, or what Jussi Parikka calls 'practice as theory' (2011). Locative media is thus seen as a site in which artists experimentally deploy competing conceptions of space and therefore a fruitful place in which to look for clues about the changing nature of space.

Fourth, taking cartography as a spatial model that is historically-specific to modernity, the question became not just the degree to which the maps of locative media diverged from this, but *towards* what might they be headed. This question - the question of what lies *beyond cartography* - initially arose out of the need to sift and sort the case studies and their competing and often jumbled senses of space, some of which reached back to a pre-cartographic era, some of which appeared substantially mired in cartographic ways of seeing and thinking, and others that seemed to reach towards something genuinely novel and apparently inexplicable. In order to produce some measure of the extent to which they moved beyond cartography, it became necessary to construct a conjectural model of what they might be headed towards.

Examination of the case studies suggested that as these works moved further from a cartographic model of space, the role of software code came to the fore and began to shape the way in which they portrayed and conceived of space, producing novel forms of maps and senses of spatiality. Informed by recent discussions of the role of code in the production of space, a heuristic model of the 'space of code' was pieced together as a reference point that lies beyond and presents itself as the antithesis of cartography. This conjectural leap is key to the work of the thesis. It allows the case studies to be sorted and grouped, and sense made of their differing approaches to space and mapping, according to their position between the more familiar landmark of what I call 'Cartographic Space' and the conjectural landmark of what I call 'Code Space'. This device, as well as producing a provisional taxonomy of these works, allows them to be viewed as part of an on-going re-evaluation and transformation of space, and for more to be said about the nature of this transformation.

The steps discussed above provided a starting point for the research and led to the formulation of a thesis, which is now stated in outline before proceeding to a discussion of theoretical and methodological approaches, and then to a more detailed statement of how the thesis is developed from chapter to chapter.

Outline of the Thesis

The *counter* and *post-cartographical* mapping practices of artists working with locative media contribute to a radical reworking of the way in which space is conceived and encountered that transforms understandings of *knowledge*, *representation*, and *power*. It is argued that these experimental maps operate at the intersection of a cartographic tradition that entails distinctively modern

ways of seeing, knowing, and acting in the world, and a new set of conditions in which novel software operations both precipitate a crisis in cartographic representation, and propose novel forms of space and spatial representation that are antithetical to a modern worldview. The map works of locative media are accordingly positioned in relation to what is seen as a paradigmatic shift from Cartographic Space to Code Space, and a taxonomy based on the strategies and extent to which these maps move *beyond cartography* supplies a means of comprehending the nature of this ongoing transformation.

Within this framework, locative media's critique of cartography and its reevaluation of space and spatial representation begins with the attempt to reinvigorate and repurpose the cartographic map by introducing experiences and dimensions that have traditionally been excluded from its purview. It moves on to attempt the mapping of phenomena that result from coded operations and which precipitate a crisis in cartographic representation by defying unequivocal location within the cartographic surface. It eventually leads to a breaking apart of that surface as coded operations and the properties they introduce are employed to pioneer novel apprehensions of space that make a decisive break with modern cartography.

The analysis of case studies demonstrates that the shift from Cartography to Code[3] entails a reworking of the modern dichotomies of representation and reality, map and territory, the abstract and the lived. Code not only reconfigures the world that is to be mapped, but fundamentally changes what it means to

_____

[3] Where 'Cartography' and 'Code' are capitalized in this thesis, they refer specifically to my paradigmatic models of Cartographic Space and Code Space. Where they are not, they retain their common meaning: 'cartography', for example, simply denoting the science or practice of mapmaking.

16

map. Mapping becomes non-representational and propositional and, rather than asserting epistemological truths, a means of exploring multiple ontologies. The analytic geometry of cartography, in which positions are plotted within an *a priori* field of co-ordinates, gives way to synthetic and living geometries in which intuitions and forms, and thus senses of orientation, arise from perpetual processes of invention. Along with this, the disciplinary 'power of the map' yields to 'the power of code', exemplified by contemporary location-based platforms like Google, in which new forms of territory produce novel forms of control that, in turn, demand fresh approaches to the practice of 'counter-mapping'.

The post-cartographical mapping practices of locative media call for a post-cartographical reframing of its study and a reevaluation of the field's significance. The framing of locative media as a site of contestation between antithetical spatial paradigms not only cleaves through the dizzy euphoria that once greeted it, but also dispels the cynicism with which it was too hastily written-off as a failed experiment. In seeking to rehabilitate the role of locative media, it is argued that the break with cartography achieved by some of the works included in this study bears comparison with the break with perspectival illusionism achieved by an earlier *avant-garde* of non-representational artists. Locative media is thus reconfigured as a vital force, operating at a pivotal moment, in a broadly epoch-defining reshaping of space and spatial representation.

Theory and Methodology

Having briefly introduced the main arguments of the thesis, I now consider the way in which the case studies have been approached, and the nature of the framework within which they are ordered and understood. I firstly address the difficulties involved in studying these complex and multifaceted works, arguing for the necessity of an interdisciplinary approach, and discuss the way in which interviews and other sources have informed the research. I then elaborate on the framework for this study, essentially consisting of a heuristic device[4] by which a proposed model of Code Space is juxtaposed with, and presents itself as the antithesis of, a model of Cartographic Space. This framework, within which a movement away from cartography is charted, is treated as a form of mapping in its own right. However, it is one that specifically takes inspiration from the *post-cartographical* mapping practices that are the focus of this study. In these, a sense of orientation emerges from speculative and inexact processes of wayfaring, or dead reckoning, rather than scientific practices of navigation in which positions are definitively fixed within a pre-existing grid or framework. Integral to the argument that such frameworks no longer pertain in the post-cartographical conditions of Code Space, is the argument, also, that the path beyond cartography can only be charted by adopting a post-cartographical approach to its mapping.

Before further discussing the rationale for this framework, I first consider some of the difficulties involved in studying the maps of locative media, and particularly the tasks of identifying and reading these maps. To begin with,

---

[4] Here, I take a 'heuristic device' to be '[a]ny procedure which involves the use of an artificial construct to assist in the exploration of social phenomena' (Scott and Marshall, 2009: 305).

simply identifying 'maps of locative media' as an object of study is far from straightforward. First, and for a number of reasons that are later dealt with, not all the works included here identify themselves with 'locative media' and so it has been necessary to demonstrate that these at least share similar concerns, or contribute something to, the more narrowly (self-) defined field of locative media. Second, the category of 'map' is even more problematic in relation to these works since they take many forms (including conventional printed sheets, projections, interactive webpages and mobile apps), exist within a wide variety of contexts (from street and gallery to 'cyberspace'), and result from diverse practices (including walking, computer programming, graphic design, and the organization of participatory events). Some of the maps addressed by this research are not readily recognizable as such, while other works included here ostensibly produce no map at all. The research, not wanting to close itself to novel forms of mapping, leaves open-ended any definition of 'map' so as to include works that, even if they do not result in a map, are clearly engaged in mapping activities or express a desire to map. In a number of case studies, for example, the work of mapping takes place below the surface of visibility, often at the level of computer code: for example, the 'sound maps' included in chapter 4 which map spatial data to a 'soundscape' rather than cartographic surface. However, it should be made clear that 'map' really does mean 'map', rather than a catch-all metaphor for any kind of survey or diagrammatic schema, in so far as all of those addressed by the research are, in one way or another, concerned with charting *spatial* arrangements, distributions or relations. The selection of case studies has, then, been far from unambiguous. The majority have been included because they make maps the focus of their work, though this is not true of all, while a small minority produce no map at all,

but nevertheless deal with issues that are judged to be pertinent to discussion of the representation of space.

Having identified the 'maps' that are to be studied, there is then no straightforward way to read them. Whereas an Ordnance Survey sheet, for example, is a discrete and fully formed object that may be read in isolation, the maps of locative media rarely present themselves as such. They are most often processes rather than finished products and take place within an evolving context that draws on diverse practices and performances; not just those of artists and participants, but in conjunction with these, the performances of the technologies they employ. There is therefore a need to situate the maps of locative media, which may or may not be the sole focus or prime output of these works, within the wider context of the work and its diverse components and activities. These include: the artist's conception and design of the work; the programming of software; the human-computer interactions that result; the social dynamics of user participation; methods of visualization; the documentation of the work, and the performances of artists, users, and software. Study of these maps thus requires drawing on disciplines as diverse as cartography, human geography, anthropology, performance studies, human-computer interaction, art history, architecture, and media studies, as well as wider debates and theoretical frameworks from fields such as sociology and philosophy. Each of these carries with them specific concerns, debates, terminologies and methodologies, none of which, alone, are capable of adequately accounting for the maps of locative media. Critical cartography, for example, offers a number of ways to approach the study of maps, but geared as they are towards the interpretation of conventional printed maps, these

mostly assume the map to be a relatively stable text that may be *read* in isolation[5]. Even recent discussion of maps in terms of performances of mapmaking and map-reading[6] continue to assume this stability: the map remains an object of these performances rather than being seen, as is suggested by this research, as an active participant.

However, and despite the notorious propensity of maps to lie[7], there is some 'truth' to be found in 'reading' these maps as something like a 'text' - however diffuse, context-bound and unstable that text may be. That truth lies not in their veracity in relation to an external reality, but in revealing the often hidden and taken-for-granted assumptions with which they make statements about the world, and which they continue to make, regardless of the ways in which they are used or performed or promoted. It is therefore possible to analyse these statements and to unmask contradictions and inconsistencies that are either internal to the text of the map, or in relation to the claims made of them by artists and others. The research therefore both recognizes the extra-ordinary nature of these maps, and the concomitant need to work across, adapt and amalgamate different approaches and disciplines in order to adequately address them, but also recognizes that, like all maps, they contain statements of belief about the nature of the world that may be subjected to scrutiny.

Another barrier to the study of these works is that they are conceived and performed as an *event* that has now passed and can no longer be experienced

---

[5] See, for example, Denis Wood's (1992) reliance on semiotics or John Pickles' (2004) use of discourse analysis.
[6] See, for example, Kitchin, Perkins and Dodge (2009) and Del Casino and Hanna (2011), both discussed in Chapter 5.
[7] See, for example, Mark Monmonier's (1996), *How to Lie with Maps?*

first-hand. Analysis of the case studies is therefore almost entirely dependent on the artist's own documentation of the work and their written accounts, these occasionally supplemented by first-hand accounts by participants. Some of these works are also frequently referenced in the literature on locative media, but then again, few authors write from first-hand experience, while other case studies have received little or no attention[8].

The artists' own documentation is necessarily selective, incomplete, and therefore partial. More often than not, these materials are collected on the artists' own webpages, but many of these sites have fallen into disuse, have been archived (or not), and frequently contain broken links. In order to get as close to the works as possible, interviews were conducted with many of the artists and these interviews, on occasions, also provided access to personal archives and thus additional documentation of the works.

The interviews were conceived primarily as a method for fact checking, to ensure that whatever interpretation was arrived at, it was at least based on an accurate understanding of the functioning and dynamics of the work. It also presented an opportunity to 'test' these interpretations against the artists' own. In many cases these tallied, though not all, and the interview therefore provided a spur to reconsideration and revision of these interpretations. However, it was never considered necessary that these interpretations corroborate one another. From the start, it was apparent that what artists thought they were doing with their maps was not always borne out by closer examination. The artists often had a different or additional focus to that of mapmaking, or were working to a

---

[8] Pete Gomes's work, for example, has received scant attention in the literature on locative media, while attempts to find secondary materials relating to more recent works such as those of Petra Gemeinboeck and Awan & Langley have proven entirely fruitless.

22

particular theoretical agenda, and these shaped their assessment of their own work[9]. However, where these interpretations do significantly diverge, this is always acknowledged.

Interviews with the artists were requested wherever it was deemed necessary to clarify aspects of the work, and the vast majority of these requests met with a positive response[10]. The interviews were, wherever possible, conducted face-to-face[11] and took between one-and-a-half and, in one instance, three hours. They can best be described as semi-structured: structured to the degree that there were always specific questions about how the work functioned, as well as more open-ended questions to elicit the artists' own account of the work, but also, in part, unstructured and conversational in nature to allow for a mutual exchange of ideas surrounding their work *and* the research. In some cases, this conversation has extended beyond the interviews through an ongoing exchange of emails[12].

In summary, the multifaceted nature of the maps of locative media requires a flexible, adaptive, and reflexive approach to their study and interpretation that draws on many disciplines and perspectives, rather than suggesting any one methodological or theoretical approach. There is also, however, a more fundamental reason, implicit in the argument of the thesis, why no ready-made lens through which to view these works was considered appropriate to the

---

[9] For example, Christian Nold has recently recast his *Biomapping* works as an experiment in 'reassembling the social' that is informed by Actor Network Theory, and thus accords less importance to the nature of the maps that he produces than this research does.
[10] Regrettably, there was no response to repeated requests for an interview with Petra Gemeinboeck.
[11] All except the interview with Daniel Belasco Rogers as he is based overseas.
[12] In particular, Nishat Awan and Phil Langley, and Pete Gomes.

study. I now move on to elaborate on the framework that underpins the thesis and how it was arrived at.

Theory and Method Beyond Cartography

In following the convention of establishing a framework for this study at the outset, here in the Introduction, I want to make clear that I am doing something deeply cartographical that runs ahead of and counter to the argument of the thesis. I am presenting a map that purports to offer an overview of the territory ahead and a guide to its navigation. Such a map establishes an a pre-existing grid or framework into which phenomena are then placed, and ordered, and categorized, and the relations between them plotted. It asserts the viewing position, establishes the boundaries, fixes the scale, and pinpoints the landmarks by which the study is oriented. The problem this creates is that a cartographical structure is being called upon to chart a movement *beyond cartography* and towards a set of conditions in which, I argue, such analytic frameworks no longer pertain. Thus, although I *will* be outlining the 'framework' for the research here, I also use this as an opportunity to explore the conundrum this creates, to propose an alternative means by which to map the path beyond cartography, and to explore the conceptual framework that *arises* from this, but which should never, in practice, precede it.

In drawing attention to the map-like qualities of conceptual frameworks, I am doing more than suggesting an analogy between maps and theory. As the chemist and social scientist, Michael Polanyi argues, 'all theory may be regarded as a kind of map extended over space and time' (1958: 4). Likewise, cartography can be seen as a particular way of doing theory. The cartographic

theorist, John Pickles (2004), for example, sees it as a form of discursive practice and these, in the words of Michel Foucault, are 'characterized by the delimitation of a field of objects [and] the definition of a legitimate perspective for the agent of knowledge' (Foucault and Bouchard, 1977: 199). In other words, both maps and theories - or, at least, a peculiarly modern form of theory - are concerned with framing views of the world and finding positions from which knowledge of it may be asserted.

This correspondence between map and theory raises a number of issues for the research since it suggests that the task of building a framework within which to chart changing mapping practices may entail making a *map of maps* or, indeed, a *theory of theories*. There is thus a circularity involved in the theorization of maps. As David Turnbull (1989, n.p) observes, 'it is difficult to explain the nature of maps without resorting to map-like structures in the explanation'. This confluence of map and theory is evident in the way that discussions surrounding and the claims made about the map works of locative media have drawn on particular theoretical models. These theories, rather than offering a view of these maps from somewhere above and outside them, tend to be coextensive with the view offered by the maps they survey. For example, I later make the argument (in Chapter 1) that a raft of theoretical frameworks (including those of Michel de Certeau and various phenomenological approaches), that are drawn on by artists to support the claim that the qualities of lived experience may be integrated into the abstract representation of the cartographic map, are themselves derived from cartographic ways of seeing and thinking that create this dichotomy in the first place. In other words, these frameworks offer no privileged view of these maps because they are already

framed within and contained by a particular mode of thinking and mapping. What this suggests is that existing theoretical frameworks need to be approached with caution. They may be treated as landmarks *within* the field of study, and are thus as much an object of study as the maps of locative media themselves. Indeed, the parallels between the two are explored throughout the thesis. However, the field that they map cannot be adopted *as* the field of study, since this would preclude any understanding of maps and mapping practices that fall outside their field of vision.

There is, then, a difficulty in finding a position from which to make a *map of maps* that is not already positioned within one map or another, and, as a result, blind to the way in which the very nature of mapping and, with it, ways of thinking and seeing, are being transformed. For example, theoretical frameworks that stress a distinction between space as it is lived and space as it is conceived[13] find a fit with the case studies of Chapter 2, while those that account for networks that exist outside of geographical space[14] provide conceptual support to some of the works of Chapter 3, yet neither one of these approaches is well-suited to accounting for both these categories of map and the transition that occurs between them. The driving argument of the thesis is that the map works of locative media evince a fundamental shift in the way in which views of the world are framed. This uneven and halting transformation involves a radical re-evaluation of how we picture the world, from what position we view it, by what means we can claim to know it, by what scale we measure it, and how we are to engage with and navigate it. It would, then, be

---

[13] For example, writers including Michel de Certeau, Lefebvre and phenomenological approaches.
[14] In particular, Bruno Latour's Actor Network Theory.

inappropriate and counterproductive to adopt from the outset any 'map' that attempted to chart this shift from a fixed viewpoint, within a fixed frame, and according to a fixed scale. Indeed, one of the arguments that is developed throughout the course of the thesis is that a clearer view of what lies beyond cartography, and the way in which the maps of locative media chart this course, has been obscured precisely because these works have been viewed through a *cartographic* lens, with the expectation that their maps conform to those of cartography and produce knowledge in the same way. This will become clearer as the nature and significance of cartographic reason and representation are explored in Chapter 1 and throughout the thesis. However, one of the key arguments is that cartography is integral to a modern worldview, and therefore that post-cartographical mapping practices can be seen as an exploration of post-modern conditions. Thus, the call for post-cartographical approaches to the mapping of these practices broadly situates this research within a post-modern tradition of thought that is also suspicious of the overarching frameworks, privileged points of view, static categories, and fixed positions of modern *high* theory.

The framework for this study, its *map of maps*, thus proposes a different way of proceeding that takes inspiration from some of the post-cartographical mapping practices that form part of this study, and which stress movement and dynamic process over what Turnbull (1989) has called 'map-like structures'. Though these maps operate without fixed and stable frames, scales and senses of position, they nevertheless continue to provide some sense of orientation. What they demonstrate is that, beyond cartography, mapping must proceed

synthetically rather than *analytically*[15]. That is to say, instead of plotting positions within a prior-existing field of coordinates, whether these be cartographical or theoretical, the field or framework is synthetically constructed through movement. It is, in social anthropologist Tim Ingold's terms (which are later more fully developed), a process of 'wayfaring' rather than 'navigation' (2007). Finding a way, as opposed to plotting a route, consists, firstly, of always already being in position, then tentatively and speculatively moving towards a destination that cannot be fixed in advance, since it always lies over the horizon and there is no high ground, no privileged point of view, from which to sight it. By analogy, this thesis begins the work of mapping the spaces of locative media by starting out from the more familiar position of Cartographic Space, but speculatively sighting another landmark towards which to head – the landmark of Code Space that, like a cairn, must be synthetically constructed, stone by stone, but according to which some sense of position might then be triangulated.

Thus the 'framework' for the thesis is not its starting point, but arises from the act of going along, and resembles a cognitive map that is pieced together throughout the course of a journey. It is, then, really no more than a heuristic device - an artificial construct that provides a means of *dead-reckoning* by which to explore what lies beyond the *dead-certainties* of cartography. Within and by means of this model, the art maps of locative media are seen as moving, or attempting to move, beyond Cartography and towards novel

---

[15] This distinction between 'analytic' and 'synthetic' refers to the distinction between analytic geometry, in which points are figured within an a priori field, and synthetic geometries, in which points are figured without recourse to a pre-existing co-ordinate system. This distinction and its implications for the shift from Cartography to Code that is witnessed in the maps of locative media is developed at length in Chapter 5.

conceptions of space in which these ways of thinking, seeing and acting are radically altered. Code Space is the conjectural point towards which they are seen to be heading and provides both a model for what may lie beyond cartography *and* a means of grasping the manner and extent to which artists working with maps and locative media have made that journey. In practice, this has been a reflexive process. Firstly, the case studies supply evidence for and are used to elaborate on a proposed model of the way in which space is more generally being reworked and rethought. Secondly, this model provides a means by which the case studies can be sorted and classified, with the purpose of more fully understanding how works of locative media address issues of space. These two projects have developed in tandem, with the case studies informing the model, the model informing the examination of case studies, and each being used to interrogate and test the other.

However, this journey is not quite the heroic foray into uncharted territories that may have been implied. Though less well travelled, these territories *have* been explored by others - including artists, geographers and philosophers. Their 'maps' litter the landscape and provide a number of waymarks by which to find a path. These have been crucial to the discussion and have been charted as meticulously as possible. However, to reiterate my point about the dangers of adopting or incorporating existing maps, it should be made clear that these are to be seen as themselves positioned *within* the landscape rather than offering a view *over* the landscape by which positions can then be determined. They are encountered along the way, and provide useful pointers, but do not define the journey.

However, perhaps the most salient feature of this landscape is Cartography itself. In speculatively scoping the territories that lie beyond Cartography, the research necessarily keeps a firm foothold in the secure ground of cartographic reason and representation; in other words, a common sense understanding of what space is and what a map does. In fact, even if it were desirable, it is almost impossible to shake free of this. Here, I should acknowledge that, as someone who was brought up using a map and compass to get around, but didn't use a computer until the age of twenty-five, the Code Spaces that I describe run counter to my own intuitions about how the world is joined-up, and I inevitably retain an utterly cartographical desire to definitively know where I am, and to want to point to it on a map. It is, in part, for this reason that the final chapter presents a 'map' of the move *beyond cartography* that is itself a highly cartographical construct, and therefore somewhat contradictory. However, these contradictions simply go with the territory, and the artists who produce post-cartographic maps struggle with them no less. It is the age-old problem of how to think something new and inevitably that must entail working with what is already to hand. Post-cartographic thinking can only emerge from, and be understood in relation to, cartographic modes of thinking. Code Space is built out of that which is surplus to and exceeds Cartography and thus presents itself as its antithesis. In this sense, Code Space remains a palimpsest of Cartographic Space.

However, it is only by remaining somewhat rooted that it becomes possible to see what is being uprooted and how. Just as it is suggested that the map works of locative media operate between Cartography and Code, this research also

inevitably straddles the two and, like those works, sometimes uncomfortably. There is no neutral position or privileged perspective from which to view this transition. The best that can be asked is that one remain constantly alert to the way in which one's thinking is constrained and may place constraints on the phenomenon being studied and, along with this, an openness to alternative possibilities. It is this openness that the philosopher of science Isabelle Stengers (1997) describes as 'being at risk' and which she recommends as the proper pursuit of 'science'. For Stengers, the goal is not to arrive at *true statements* that are gained from an epistemological high-ground, but, rather, working down at an ontological level, to build *well-constructed propositions* that remain open to the world as it makes itself known[16]. As Bruno Latour puts it, in his introduction to a collection of essays by Stengers, the task is one of 'deciding, *on the spot*, what is the good proposition that does justice to an event' (in Stengers, 1997: xii, my emphasis). In trying to look over the horizon, scoping out new and unfamiliar territories, there is no other way to proceed. It *is* a 'risky' business and the results may be sketchy. However, the alternative is to remain blind to changes that are afoot and which suggest a radical reworking of fundamental questions about how we know the world and find our way about it.

The utility and limitations of this framework are further explored in the final chapter of the thesis - which, being a point of arrival rather than of departure, is in any case a more appropriate place for this discussion. However, having produced a rough guide, if not a definitive map, of the journey ahead, I now turn to the way in which this framework informs the structure of the thesis and the content of its chapters.

---

[16] Whatmore (2003) provides a useful discussion of the implications for the social sciences of Stengers' approach to issues of methodology.

Thesis Structure

The thesis is structured according to the framework that has been described above and thus charts the movement from Cartography to Code across its chapters. Chapter 1 introduces locative media and discusses it primarily in relation to Cartography, although also laying the foundations for its later discussion in relation to Code. The following three chapters consist of case studies: those most closely tied to Cartography featuring in Chapter 2; in Chapter 3, pulling further away; and in Chapter 4, making a decisive break with Cartographic Space to more fully embrace the conditions of Code Space, these thus also supplying materials with which to build a model of Code Space. Chapter 5 builds on the analysis of case studies to more fully explore the nature of the transformation that occurs between Cartographic Space and Code Space, and the implications of this for discussions of representation, knowledge, mapping, and power. In the Conclusion to the thesis, these discussions are refocused on the field of locative media to reevaluate its significance.

Chapter 1: Locative Media, Cartography and Code

The chapter introduces the field of locative media and builds the case for examining these works in terms of their relationship to Cartography and Code. It reviews how these works have been theoretically positioned, their relation to issues of power, and their indebtedness to modern cartographic practices. The history of cartography reveals it to be implicated not only in the emergence of capitalism, and activities of nation and empire building, but also to be a cornerstone of distinctively *modern* ways of seeing, thinking and acting. The

weight of this inheritance must be taken into account as artists working with locative media attempt to appropriate and repurpose the form of the map. How they might break free of cartography is discussed in terms of the complex relationship between art and maps, and in relation to other avant-garde movements. However, it is suggested that the key to this 'break' lies in locative media's use of software code. Coded processes generate novel forms of spatiality that challenge and thus hasten an on-going crisis in cartographic representation. Furthermore, code begins to take-on the functions of a map, and it is proposed that these novel forms of mapping are reshaping our understanding of the world, much as Cartography once did for a modern era. The discussion thus provides the underpinnings for the development throughout the thesis of a model for Code Space that is juxtaposed with Cartographic Space.

The subsequent three chapters are devoted to case studies, these being grouped into chapters according to the strategies by which they seek to move beyond cartography, and the chapters being positioned between the models of Cartographic Space and Code Space, these progressively moving further from Cartography and towards the space of Code.

Chapter 2: En/Countering Cartographic Space

One of the strategies by which artists have sought to move beyond cartography is to introduce to the cartographic map those qualities that are conventionally excluded from it. These maps incorporate the movement of bodies, their everyday experiences and affective responses, along with the parameter of time, in order to counter cartography's abstraction of space with the lived

experience of place. However, the chapter demonstrates, both through an analysis of these map-works and the way in which they are theoretically positioned, that they remain indebted to and constrained by cartographic ways of seeing and thinking. Their valorization of the lived experience of place is, paradoxically, deeply cartographical. Furthermore, they remain largely oblivious to the way in which code is remapping the world and the crisis in cartographical representation that this hastens. Thus, although these works aim to move beyond cartography, they are seen as occupying a position that is closer to Cartography than Code.

Chapter 3: The Limits of Cartography

The chapter explores an ongoing crisis in cartographic representation that is hastened by the novel spaces and senses of proximity that arise from the coded operations of information technologies. These invisible, intangible and fluid spaces do not readily conform to Euclidean notions of space and are therefore less susceptible to representation within a cartographic frame. The case studies of this chapter demonstrate the ways in which artists working with locative media have attempted to account for and map these novel spaces. However, the analysis of these works demonstrates that although they directly address the *space of Code* and explore, and often precipitate, a crisis in cartographic representation, their maps ultimately cling to the secure ground of cartography. Accordingly, these works are seen as occupying an ambivalent position, somewhere midway between Cartography and Code.

Chapter 4: Adventures in Code Space

Code not only changes the world that is to be mapped, producing spaces that resist and defy cartographic representation, but also fundamentally changes what it means to map. It is in breaking with cartography that maps may supply a fuller account of the world as it is currently taking shape. The case studies included in this chapter employ code to pioneer novel mapping practices that fundamentally refashion the way in which space is conceived, encountered, and navigated, and work towards a decisive break with cartographic reason and representation. These post-cartographical mapping practices occupy a position that is distant from Cartographic Space and closely aligned with the space of Code. The case studies thus inform a fuller account of the emerging conditions of Code Space.

Chapter 5: Mapping Beyond Cartography

The final chapter discusses how the case studies demonstrate the role of locative media in an on-going reconceptualization of space that is broadly epoch-defining, and which may be conceived of in terms of a transition from Cartographic Space to Code Space. The nature of these spaces and the shift between them is further clarified, particularly in relation to ideas of 'representation' and 'knowledge'. They are also discussed in terms of their distinctive *geometries*, and this allows the maps of locative media to be situated within a broader history of art and in relation to other avant-garde movements. The chapter further explores the changing nature of mapping, arguing that the *post-cartographical mapping* practices of artists working with locative media demonstrate that *the map*, and its role in shaping understandings of the world,

survives *beyond cartography*. Finally, the chapter discusses how the nature of power is changed in the shift from Cartography to Code and the implications of this for practices of 'counter-mapping'.

Conclusion

In this Introduction to the thesis, I have described my initial thoughts, the steps by which the research gained focus, and outlined the main arguments of the thesis. I have explained how the case studies were approached, the framework within which they are ordered and understood, and I have specified the structure of the thesis and the content of chapters. However, I would finally urge that such maps of the route ahead are best folded away, since they only perpetuate the cartographic myth that the journey can be all mapped out, even before it has begun. This thesis is not that kind of map.

Chapter 1

Locative Media, Cartography and Code

1.1 Introduction

In this chapter, I propose that the map works of locative media, and the ways in which they address issues of space, be examined in terms of their relationship to Cartography and Code. This prepares the way for a re-mapping of these works that positions them as operating between models of Cartographic Space and Code Space, and as participating in an on-going process of transformation from one towards the other. This 'framework' has already been outlined in the Introduction to the thesis, but in practice emerges from the examination of the case studies, and so is built piece-by-piece throughout the thesis and only fully elaborated in the final chapter. In this chapter, therefore, I am not seeking to establish a fully formed model of this transformation, but only to prepare the ground and signpost the way ahead.

The chapter consists of three parts. In the first, I discuss the key debates within the field of locative media and the centrality of mapping (and counter-mapping) to its practices. In the second, I establish that cartography is more than just the activity of mapmaking, but foundational of distinctively modern ways of seeing and thinking, and formative of modern capitalism, the nation-state and empire. The question then becomes the extent to which locative media can break free from the tremendous weight of cartography to make the map its own – a task that is more Goliathan than has often been supposed. This question is discussed in terms of the ambiguous relationship between art and maps, as

well as in relation to other art movements that have broken away from what Martin Jay (1988) calls the 'scopic regimes of modernity'. During the course of this discussion, I also introduce the idea that alternative geometries play a role in such breaks. However, the chapter also charts a crisis in modern cartographic reason and representation and the role of information technologies in this. In the third part of the chapter, I discuss the role of software code in the mapping practices of locative media, arguing that code not only threatens a cartographic conception of space, but also actively produces new forms of space and senses of spatiality. The discussion prepares the way for the development in chapters 4 and 5 of the model of Code Space that is juxtaposed with Cartographic Space.

1.2 Mapping Locative Media

In preparing the ground for a remapping of locative media, I first examine existing accounts of the way in which it addresses issues of space. I provide an overview of the mixed influences, theoretical approaches, and claims to pedigree that have been applied to locative media's production, practice and representation of space, and reveal them to be diverse and often contradictory. I also establish the centrality of mapping to its practices and I examine how the field has been seen as either rich with radical potential or, in Andreas Broeckmann's words, as 'an *avant garde* of the "Society of Control"' (2000: 167). I conclude this review of the field with the suggestion that greater attentiveness to the maps of locative media, and the way they conform to or deviate from 'cartography' proper, may clarify the nature of its engagement with

issues of space. I thus also identify a need to more thoroughly understand the history and nature of cartography and this is pursued later in the chapter.

1.2.1 What is Locative Media?

Defining locative media is no easy task since the label has been used to describe such a wide range of practices and forms. Ronald Lenz (n.d.) includes in his survey of the field examples of '"psychogeographic" streetwalking', context-specific storytelling, geo-blogging, locative games, 'mobile social software', 'spatial annotation', 'geodrawing', and a range of 'location based services'. In addition, locative media has received attention from a wide range of academic disciplines, including Human Computer Interaction (HCI), games studies, geography and especially media geography, performance studies, and social anthropology, each with their own particular agenda and stance[17]. Although this is not the place to conduct a thorough history of the genre, it is also clear that the meaning of locative media is not fixed, but has changed over time. Andrea Zeffiro (2012: 249), in producing a 'geneology of locative media', describes it as 'a field of cultural production that is perpetually evolving and continuously reproduced vis-à-vis struggles between technological interpretation and different visions of future use'. However, as Rowan Wilken states, in the editorial for a locative media special issue of *Convergence*, the term 'locative media'[18] has endured because it is 'economical and expansive but also precise [...] [in that] it captures a lot in two words' (2012: 243). His own definition of the genre is simply and succinctly extrapolated from its title as 'media of communication that are functionally bound to a location' (Ibid: 243)[19].

---

[17] See Rowan Wilken (2012: 244) for a summary of these approaches.
[18] The term 'locative media' is attributed to Karlis Kalnins and was coined in 2003.
[19] The definition, though not attributed as such, appears to be paraphrased from the Wikipedia entry for 'locative media' ('media of communication functionally bound to a location'), a definition

Others have expressed this relationship between media and location in terms of a convergence, layering or dynamic relationship between 'real'and 'virtual' or, for example, between 'geographical and data-space' (Hemment, 2006: 349).

Although, as a 'field of cultural production', the 'meaning of locative media cannot simply be derived from its technological components' (Zeffiro, 2012: 259), the emergence of locative media is clearly tied to the availability of technologies such as GPS, Wi-Fi, Bluetooth, and RFID, many of which became available at the inception of locative media in the early 2000s, and which created 'a clear articulation between the physical and the informational' (de Souza e Silva & Sutko, 2011: 24). These technologies made possible and signalled a move away from the desk-bound screen towards information in the environment (Harrison & Dourish, 1996), or what became described in HCI literature as 'ubiquitous computing' and which has been seen variously as 'either synonymous with locative media, a related field, or its technological infrastructure' (MacDonald, 2012: 22). However, locative media began its life as an artists' movement that grew out of net art and remains 'anchored within the field of new media arts' (Wilken, 2012: 243).

Although there are examples of GPS-based works in the 1990s[20], it was not until the arrival in 2000 of domestic Wi-Fi services and the ending of 'selective availability' by the US government, thus allowing public access to accurate, non-degraded, GPS signals, that such works began to proliferate. In the same year, Ben Russell published the first version of his *Headmap Manifesto*

that has, according to Tuters, remained unchanged on the Wikipedia website since the article first appeared in 2005 (2011: 248).

[20] Laura Kurgan's *You Are Here* (1994) and Masaki Fujihata's *Field-Works* (1994) are notable early examples.

(Russell, 2000/2003), seen by some as 'the ur-text on locative media' (Tuters & Varnelis, 2006: 357). By 2003, the term 'locative media' had been coined and an identifiable group of artists had begun to meet, collaborate, share notes and discuss their work. A key event in that year was the Locative Media Workshop, held in Karosta, Latvia, and often cited as a founding moment[21]. Among those attending were several artists whose work feature in this thesis (including Pete Gomes and Estha Polak), as well as leading commentators and theorists of locative media (including Marc Tuters, Drew Hemment and Brian Holmes). A mailing list set-up for this workshop grew into the *[Locative] listserve* (2003-2005)[22] which became a focal point for discussions of locative media and for a series of workshops held between 2003-2004. It is perhaps around the activities of the mailing list, workshops, and the community of artists and researchers that participated in these, that a body of work is most clearly identifiable as belonging to the field of locative media.

From the start, artists working with locative media were interested in the social, political and theoretical implications, and not just the aesthetic possibilities, of their experiments with media and location, data and space. Many of the projects studied in this thesis are conceived of as research-led or a conjunction of art and research; critical interventions that are capable of informing theory and social practice as well as producing social and political change. Research questions have been framed around a range of issues concerning space, media, and technology that include: how 'smart' technologies and playful encounters may change urban experience and practice; the exploration of novel forms of public space, community, and collective action; and the critique of

---

[21] See, for example, Drew Hemment (2006: 350).
[22] See Andrea Zeffiro (2012: 251) for a discussion of this.

cartography and production of counter-maps. This practice-as-research stance is borne out by the close association of locative media projects with academia. Centres such as Nottingham University's Mixed Reality Lab, Goldsmith's Digital Studios, and Bristol's Pervasive Media Studio[23] have built many of their research activities around artist residencies and collaboration.

These centres have often entered into collaborations with commercial interests (for example, the Pervasive Media Studio's long-standing relation with Hewlett Packard), and have promoted the development of entrepreneurial as well as creative talent, and this may in part have facilitated the development of locative media as a mainstream and commercial activity. Certainly, artists in the field of locative media report that communications corporations were closely watching their work to see how locative technologies could be developed for commercial gain[24]. In any case, the latter half of the 2000s, particularly with Google's adoption of geo-location services and the arrival of the first smart phone (Apple's iPhone) saw the growth of commercial location-based services. This 'second phase of locative media' (Wilken, 2012: 245) moved locative media away from a 'specialized preoccupation' towards its current day ubiquity (Ibid: 243). It is tempting to distance the media arts strand of locative media from this commercialization; however, although the work of locative media artists was primarily driven by a desire to experiment with the political, social and creative, rather than the commercial possibilities of emerging locational technologies, neither were they entirely immune from such considerations or unaware of their possible role as 'prime movers' in the development of the geospatial web (Tuters & Varnelis, 2006: 359). Tuters and Kazys Varnelis note, 'it appears that

---

[23] The Pervasive Media Studio is managed by the Watershed arts charity in collaboration with the University of Bristol and University of the West of England.
[24] See, for example, accounts given by Pete Gomes (2014) and Christian Nold (2014).

[...] a fair number of locative media producers seem content to collaborate with industry and government' and 'often embrace the possibility of commercial application' (2006: 359).

It should be apparent from this brief introduction to the field of locative media that, from the start, it has been characterized by a diverse, ambiguous and sometimes contradictory agenda. On the one hand, for example, it is seen as a tool for making critical interventions, and on the other, it happily embraces commercial interests. As I will go to discuss, this has provoked an ambivalent response from commentators whose views polarize around the issue of *power*, seeing the field either as laden with radical potential or as reinforcing state and corporate power. Before returning to these issues, I first want to establish the centrality of mapping to locative media, and to explore the different ways in which it has addressed issues of space and how these coalesce around certain traditions and theoretical frameworks.

1.2.2 Locative Media and Maps

While this research specifically focuses on the maps of locative media, and selects its case studies accordingly, this should not be seen as producing a narrow or biased view of the genre since maps are, as Tuters and Varnelis put it, 'fundamental manifestations of locative media' (2006: 358). This is easiest to argue in relation to the use of GPS as this technology generates locational data that is expressed in degrees of latitude and longitude and can be readily plotted to a map. Even when they are *not* visibly plotted, the cartographic framework remains implicit in the use of GPS. Each GPS point (a measure of time and position) carries with it an unseen map of the world. As Tristan Thielmann puts

43

it, 'locative media functions as a map even without cartographic representation' (2011: n.p.).

Alongside GPS, or even slightly preceding it, Wi-Fi has also been a key technology in the development of locative media. The 2003 Karosta workshop, for example, devoted equal weight to the exploration of these Hertzian spaces[25] as it did to the use of GPS (rixc, 2003). Though WiFi less obviously produces or works with maps since they are unnecessary to its functioning, mapping is still important to locative media's use of WiFi. The desire to locate and navigate to areas of WiFi connectivity, and the exploration of the relationship between these Hertzian spaces and physical spaces, necessarily entails the impulse to map, to picture where things are, even when recognizable maps are not produced. Even though, for example, the work of Pete Gomes[26] does not result in the production of maps, for the artist, 'it was always about mapping' (2014: n.p.).

The interrogation of cartography and the production of alternative maps has been a preoccupation since the early days of locative media. For example, the 2004 *Transcultural Mapping* volume that came out of the Karosta and Riga series of locative media workshops devotes an entire chapter to maps (Smite & Tuters, 2004). Mapping is also often cited as the basis for taxonomies of locative media. Tuters and Varnelis organize their (frequently referenced[27]) taxonomy specifically around two alternative modes of mapping: 'Broadly

---

[25] The phrase 'Hertzian space' was coined by Anthony Dunne (2005) to describe the material but invisible and indistinct spaces created by electronic products that communicate using electromagnetic waves.
[26] The work of Pete Gomes is discussed at length in Chapter 3
[27] For example, see Olga Paraskevopoulou, Dimitris Charitos, and Charalampos Rizopoulos (2008).

speaking, locative media projects can be categorized under one of two types of mapping, either annotative—virtually tagging the world—or phenomenological—tracing the action of the subject in the world' (2006: 359). Annotative works involve the *in situ* 'placing' and reception of media by participants. An example would be *Urban Tapestries* (2003-2004) by Proboscis, in which participants were able to annotate a location with personal responses to that location via a GPS-enabled PDA[28], and make these annotations accessible to other users visiting the same location, thus augmenting an environment with 'virtual' experiences. While annotative works may not always make a map accessible to users, they are nonetheless map-dependent in that the annotations are geo-referenced and normally represented on a map as part of the production process[29]. For Tuters and Varnelis, works that employ the 'tracing' or phenomenological mode of mapping more typically 'resort to the map' to represent the movement of bodies, as in Esther Polak's *Amsterdam Realtime (2002)*, or sometimes things, as in her 2004 project *Milk* (2004). A map of one sort or another serves to frame these tracings, even when this framing is unconventional (for example, in Jen Southern and Jen Hamilton's weaving of traces into textiles in *Running Stitch* (2006). These works of 'tracing' have frequently been allied with walking as an artistic practice and particularly the Situationist practice of the *dérive*[30] (Tuters & Varnelis, 2006: 59), the significance of which for locative media is further discussed later in this chapter.

---

[28] The Personal Digital Assistant (PDA) was an early portable device, most often with internet connectivity and the ability to play media, and was a precursor to the Smart phone, which eventually made PDAs redundant.

[29] For example, HP Lab's (now discontinued) Mscape software uses imported maps as an interface for the placing of media, whether or not it is made available to end users. This software has been used in many annotative works including *'Scape the Hood* (2005) and *The Tower Game* (2006).

[30] Pioneered by the Letterist International and adopted by the Situationist International, the *dérive*, or 'drift', is an unplanned journey through a (mostly) urban landscape that is directed at generating novel and more authentic experiences of the landscape. These journeys were sometimes later mapped. See, for example Guy Debord and Asger Jorn's *The Naked City*

The claim that mapping has been central to locative media is also supported by its parallel and linked development with more specifically geographic and cartographic movements. These include community mapping projects, critical cartography, and novel uses of maps promoted by Geographic Information Systems (GIS) that have been grouped under the term 'neogeography'[31]. These appear in taxonomies of locative media (Hemment, 2006: 349-350), while works of locative media are frequently included in accounts of 'neogeography' (Fernandez & Buchroithner, 2014: 72), 'community mapping' (Perkins, 2007: 128) and 'critical cartography' (Crampton & Krygier, 2006, 18). Gavin MacDonald argues that 'Locative Media and the more practically inclined cartographic interests now represented by the concept of neogeography were intimately associated for a point, perhaps indistinguishable' (MacDonald, 2012: 95). What locative media and neogeography hold in common is a concern with mapping from below and the possibility that people might represent their lived and everyday experiences.

Maps, then, are important to locative media in a number of ways. First, they very obviously feature in many works of locative media and are otherwise either at work in the background, or have yet to be fully realized, but are nonetheless expressed as an impulse to map. Second, a critique of scientific cartography and the exploration of alternative mapping practices has been a central theme since the early days of locative media, and this also draws on mapping practices that precede it, notably those of the Situationists. Third, locative media developed alongside and has been closely linked with a wider 'neogeography'

(1957), which maps a *dérive* through Paris. The relationship between Situationist practices and locative media is more fully explored later in this chapter.
[31] See Gavin MacDonald (2012), for example.

movement that also explores opportunities for 'bottom-up' mapping. However, as was outlined in the Introduction, this thesis also wants to place the mapping activities of locative media centre stage in another sense; namely, that the maps of locative media provide a means of evaluating its engagement with space. The next section reveals that the way in which artists working with locative media have talked about their engagement with space consists of a very mixed and often confused bag of ideas and influences. By subjecting its maps to closer scrutiny, informed by a critical cartography that sees maps as productive of worldviews that make very particular epistemological and ontological claims, it is possible to disentangle locative media's talk about space and make more precise sense of it.

1.2.3 Locative Media and Space

Here, I provide a brief overview of the key theoretical positions and influences that have been brought to bear on discussions of locative media's engagement with issues of space. These always have something to say about the role of maps in producing and representing space; accordingly, I also take the opportunity to align these theoretical positions with the discussion of maps that is developed throughout the thesis.

The vast majority of accounts of locative media, particularly until recently, have been framed within a number of different, but not incompatible responses to what might be perceived of as the ills of modernity. This, in the broadest terms, consists of a perception that modernity is characterized by an increasing rationalization and abstraction from the everyday, lived experiences of people. Thus bodies, their movements and perceptions and relationships with places,

become subsumed and contained by a lifeless abstract space to which the cartographic map is the chief document.

The most fully developed version of this, though quite rarely referenced[32], is Henri Lefebvre's (1991) account of *the production of space* that sees the essentially embodied and social nature of space veiled by an abstract space that arises with the advent of modern capitalism. Drawing inspiration from Lefebvre's work, Marxist geographers such as Edward Soja, David Harvey and Doreen Massey have elaborated on the way in which space produces and is produced by power relations and suggested ways in which spatial actions –and particularly those that show attentiveness to the particularity of places –might challenge this[33]. A less politically-engaged approach, reference to which is almost compulsory in the field of locative media, is that of Michel de Certeau (1984), who contrasts tactical operations at the level of the street (the ways in which people actually engage with space on an everyday basis) with the '"geometrical" or "geographical" space of visual, panoptic or theoretical constructions' (1984: 93) - a strategic view from above that (literally and figuratively) *overlooks* these everyday spatial tactics. From a very different perspective but one that is often blended with these more obviously spatial accounts[34], phenomenological approaches also inform discussions of space within the field of locative media, particularly the writing of geographers and philosophers of place such as Yi-Fu Tuan[35] and Edward Casey[36], as well as the

---

[32] See Jason Farman (2012: 18), for example.
[33] For example, Soja's concept of 'thirdspace' (1996).
[34] For example, Farman's 'mobile interface theory' integrates Merleau-Ponty's phenomenology with Lefebvre's account of the production of space (along with the post-structuralism of Derrida).
[35] See Yi-Fu Tuan (1977), for example.
[36] See Edward Casey (1993), for example.

social anthropology of Tim Ingold[37]. From these phenomenological

perspectives, the lived/abstract space dichotomy is played out as an ontological

question about what it means to *be* in the world. To take Husserl's formulation,

the 'life-world' - the grounded 'world of things as we experience them in our pre-

and extra-scientific life' (Husserl, quoted in Slowik, 2010: 299) - is contrasted

with a 'mathematization of nature' into abstract geometrical forms. With

Heidegger, this becomes a more overtly spatial issue. *Dasein* dwells in the

world in a spatial manner but one that is quite distinct from and cannot be

located within physical Cartesian space[38].

Ingold's (2007) distinction between 'wayfaring' and 'navigation' has already

been introduced as a way of distinguishing this study's approach to the

'mapping of maps' from a Cartographic approach in which the map precedes

the journey. However, this distinction, which features prominently in recent

accounts of locative media[39] and is employed extensively in the next chapter,

also conforms to the lived/abstract dichotomy that characterizes so many

discussions of space and mapping, and in this I later diverge from Ingold's

position since the examination of what I describe as 'post-cartographical

mapping practices' reveals that, in these at least, this dichotomy is collapsed.

However, Ingold's distinction remains useful since it makes explicit the

connections between modes of finding a way through the world, modes of

mapping the world, and modes of knowing the world. So, in 'wayfaring',

knowledge of 'the world is apprehended from within' (Ingold, 2000: 240) and

results from movement through the world: 'we know as we go, not before we go'

(Ibid: 230). Any maps that emerge from this process are simply sketches that

---

[37] See Tim Ingold (2000; 2007).
[38] See Michael Wheeler (2013).
[39] See Steve Benford and Gabriella Giannachi (2011), MacDonald (2012), for example.

help to relate the experience of a journey. In 'navigation', on the other hand, the map precedes the journey and claims knowledge from a privileged position above. Maps are 'end-products of projects of spatial representation' (Ibid: 234) and produce a static 'bird's eye view' that flattens and freezes the landscape and erases 'the practices and itineraries that contributed to its production' (Ibid: 230). My appeal to 'wayfaring' over 'navigation' as a method for conducting this research thus emphasizes 'practices and itineraries' over maps, or frameworks, as 'end-products'.

For all the above accounts, the removal of the parameter of time is seen as a key component in the abstract representation of space. So, for de Certeau and Ingold alike, maps remove all elements of narrative - including the story of the map's production - while for Lefebvre, 'Space and time are sundered' by abstract space (1991: 218), so that '[o]ur time [...], this most essential part of lived experience […] is no longer visible to us, no longer intelligible' (Ibid: 95). Not surprisingly, one area of experimentation for the mapmakers of locative media has been the reintroduction of time as a parameter, either producing maps that evolve over time[40], or maps that can only be experienced in the moment[41], or by supplementing static maps with narrative elements supplied by participants in the mapping exercise[42].

In addressing and proposing antidotes to what are seen as thoroughly modern, western and mostly urban conditions, it is worth noting that all these accounts either reach back in time (often rather nostalgically) to what is perceived to have

---

[40] For example, Esther Polak's *Amsterdam Realtime* (2002), discussed in Chapter 2.
[41] For example, Chris Speed and Jen Southern's *Comob* (2009-), discussed in Chapter 3.
[42] For example, in some of Christian Nold's 'Emotion Maps' , discussed in Chapter 2, and in Nishat Awan and Phil Langley's mapping of diaspora territories, discussed in Chapter 4.

preceded these conditions or reach forward in time to speculate on what might come after (post-) modernity, but tinged with the same nostalgia for a time when a sense of place was more firmly rooted and felt. Thus Lefebvre's prophecy of an emerging 'differential space' (1991: 352-400) is shaped by ideas about seasonal rhythms and festivals, gleaned in part from his own sociological studies of rural France[43], while all of Ingold's anthropological examples of wayfaring either precede or exist outside modern western culture. This propensity to reach into the past, which is frequently mirrored in accounts of locative media that draw on these positions, is raised here in order to highlight the paradox that such retrospection should accompany experiments with emerging digital technologies. What it overlooks is the possibility that what counts as lived experience is itself changing, not least as a direct consequence of the way in which these technologies intervene in our everyday lives, and that this may also produce new forms of territory and senses of place.

There are marked differences between the above accounts of space offered by the likes of Lefebvre, de Certeau, and Ingold, but they are congruent for the purposes of this discussion in that they have all been used, often interchangeably or in combination, within the literature on locative media to support the idea that works of locative media might critique the abstract representation of space and supply opportunities to reinstate the lived, embodied and quotidian, not least through a critical or counter-cartography. In particular, de Certeau's distinction between the writing and reading of the city has been used to support the idea that locative media might provide a means to *rewrite* the city, from the bottom up[44]. However, none of these theoretical

---

[43] See Stuart Elden (2004: 127-139).
[44] See, for example, Petra Gemeinboeck, Andy Dong and Francesca Veronesi (2007).

underpinnings support the idea that the lived can be mapped. For Lefebvre, maps are part of a visual regime that abstracts from lived and embodied experience to produce 'a space reduced to blueprints, to mere images – to that "world of the image" which is the enemy of imagination' (1991: 361). De Certeau even more specifically excludes the possibility of capturing tactical everyday practices within the strategic view of the map. The map produces 'traces' that are substituted for these practices, thus 'making invisible the operation that made it possible' and instead producing only 'a relic set in the nowhen[45] of the surface of projection' (Certeau, 1984: 97). It suggests that in substituting traces for practices, the artists of locative media are erroneously conflating the drawing of maps with the 'writing' of the city. Similarly, Ingold sees cartographic practices as fundamentally at odds with knowledge of the world as it is experienced in passing through it and leaves only the possibility that some sketch maps might achieve this since they are 'formed through the gestural re-enactment of journeys *actually made*' (2007: 84, original emphasis). There is a paradox at work, then, between the claim frequently made of locative media that it might reinstate the lived and embodied in its representations of space and the theoretical positions that are drawn on to support this view and which specifically preclude it. It is this paradox, one that lies at the heart of locative media practice, which is explored through the case studies of Chapter 2.

Other key influences on locative media can also be situated within this thoroughly modern debate as responses to the rationalization and abstraction of space. Chief amongst these, in terms of the frequency with which they are

---

[45] The temporal equivalent of 'nowhere'.

referenced, are the walking and mapping practices of the Situationists. The Situationists' use of the *dérive* to reawaken the ambiance of 'singular places' (Sadler, 1999: 69) can be seen as a direct response to modernizing, rationalist urban planning, specifically the work of Le Corbusier, which was seen as suppressing the life of the street (Ibid: 49-50). Site-specific art, though rarely spoken of in the same breath as locative media[46], also shares its emphasis on the way in which place is performed through participation and practice, rather than being located within abstract structures, whether those of the map or architecture[47]. Similarly, Rosalind Krauss sees Land Art[48], which is frequently cited as an influence on locative media[49], specifically as a reaction against the *placelessness* of modernist abstraction through its reintroduction of 'ideologically prohibited' forms that create places as 'both landscape and architecture' (Krauss, 1979: 38).

The discussion of locative media has in recent years turned away from the above theoretical positions and influences: in part, because of a failure to resolve the paradox between the desire to valorize the lived experience of place and a reliance on abstract modes of representing space, and, in part, in recognition of the changing nature of both lived experience and place, and particularly the way these are now mediated by communications networks. More broadly, the 'spatial turn' in the humanities has been partially overtaken by

---

[46] For a rare example, see Minna Tarkka (2010: 135).

[47] See, for example, Nick Kaye's (2000: 41-52) discussion of Brian Tschumi's *La Villette*, in which a 'grid' is used to produce an 'excess of rationality' that 'is not rational' but instead highlights the way in which place is realized through practice (Tschumi [1987: viii], quoted in Kaye [2000: 49])

[48] Land Art is an artistic movement that arose out of the wider conceptual art movement of the 1960s and 1970s and which, rejecting the commercialization of art and moving outside the gallery, used materials found in the landscape to create site-specific works of art. 'Land Art' was coined by Robert Smithson whose *Spiral Jetty* (1970) is considered exemplary of the movement.

[49] See, for example, Hight (2010: 323); Hemment (2006: 349).

an 'object turn' in which relations between things are not primarily considered in spatial terms. These approaches include Actor Network Theory and various versions of philosophical realism and object-orientated ontology that have been seized on by both artists and commentators in the field of locative media[50]. The import of these theories, the shift in thinking that they occasion, and the way in which they suggest novel ways in which the world might be mapped, is discussed in relation to the case studies of chapters 3 and 4. For now, it is sufficient to note that, whereas discussion of locative media has been caught within a *modern* debate framed by the binaries of *lived* place and *abstract* space, debate is now moving on to explore more fully what space (and cartography) might mean in *post-modern* conditions.

In summary, my aim has been to establish, firstly, that the way in which the field of locative media draws on various theoretical and other traditions situates it within a wider debate about the nature of space, and, secondly, that this, for the most part, remains rooted in a modern (Cartographic) discourse. This, as I suggested in the Introduction, may have obscured a view of the way in which space is being reworked. It also provides support for the argument I have made that existing theoretical frameworks cannot provide an overview of such a transformation as they are themselves positioned within, and are a part of, that changing landscape. In the course of the next two sections, concerning the way in which locative media is permeated by a particular view of 'power', and its concomitant appeal to the practices of the Situationists, I further develop the

---

[50] Nold has recently begun to discuss his work in terms of Actor Network Theory (see discussion in Chapter 2), while Tuters also draws on Latour's ANT to provide locative media with an expanded understanding of 'proximity' that is 'redefined in terms of tracing the connections of networked objects' (Tuters, 2012: 267).

argument that locative media has been largely framed within a thoroughly modern discourse.

1.2.4 Locative Media and Power

This section seeks to establish as a key feature of locative media that its works engage in a discourse on power. In large part, this can be seen as a product of the genre's reliance on maps, which, for critical cartography theorists such as Denis Wood (1992), are always expressive of power[51]. The maps of locative media may thus be seen as either supportive of hegemonic representations of space or, alternatively, as proposing radical, counter-hegemonic representations[52]. The political nature of locative media also resides in its potential to instigate new forms of collective social action[53]. Howard Rheingold (2002), for example, writes of a 'social revolution' led by 'smart mobs' that employ mobile devices and their 'collective intelligence' to coordinate their movements and to gather in urban public spaces. Discussions of power and control in locative media have also centred on their reliance on technologies such as GPS that are state-sponsored, have a military pedigree, and may be deployed as instruments of surveillance[54]. Brian Holmes, for example, has elaborated on the military origins of the Global Positioning System, which he describes as a 'hyper-rationalist grid of Imperial infrastructure' (2003: n.p.). As has already been noted, concerns have also been expressed about the genre's close ties with corporate interests, on whose technologies and funding it has

---

[51] This tradition of critical cartography, which addresses the power of maps, is discussed later in the chapter.

[52] The idea that maps operate hegemonically is complicated later in the thesis through a discussion of the way in which power may operate 'intensively' (Lash, 2010), suggesting that the discussion of locative media has operated with what may be a rather outdated version of what power means.

[53] For example, Southern and Speed talk about the potential of their *Comob* (2009) project to co-ordinate new forms of collective action, while Nold's works are informed by an earlier interest in the behaviour of crowds of street protesters (Nold, 2001).

[54] See, for example Coco Fusco (2004) or Brain Holmes (2003).

often been reliant. In this view, locative media 'could almost be described as little more than a marketing wing for this branch of the control society' (Hemment, 2004, n.p.). In stark contrast, locative media has also been viewed as creating progressive technological imaginaries that are capable of resisting the 'totalizing tendencies and closure of ubicomp spaces' that are dominated by military and corporate imperatives (Tarkka, 2010: 132)[55]. Views on locative media's relation to power thus tend to polarize around two extreme positions: seeing it either as a radical instigator of new spaces for collective action, or, as in Broeckmann's formulation, as 'an avantgarde of the "Society of Control"' (2000: 167).

Tuters and Varnelis write of this polarization, 'there's something peculiar, even comical, in how the movement is "the Next Big Thing" to some and a capitalist apocalypse to others' (2006: 361). This thesis accepts neither position uncritically, and neither does it aim to steer a path between them. Rather, it sees this polarization as further evidence that locative media is a site of contestation over the power to define, represent and control space. It remains open, therefore, to the possibility that locative media may demonstrate aspects of both resistance and control, even within the same work. However, neither the arguments for resistance nor those for control are especially clear about how power operates through locative media. Both positions are largely rhetorical in nature, making a case either *for* or *against* locative media by drawing on a mélange of theoretical insights and claims, for or against, about its artistic and activist pedigree. Nowhere is this more clearly demonstrated than in the way in which the Situationists are referenced in the literature on locative media. In

---

[55] Also see Jordan Crandall (2005).

56

turning to the relationship between locative media and the psychogeographic practices of the Situationists, it also becomes clear that locative media has, for the most part, uncritically adopted a model of power that is distinctively modern in character.

1.2.5 Psychogeography and the Rhetoric of Empowerment

The literature on locative media frequently associates and makes comparisons with the Situationists, and their use of the *dérive* to produce a psychogeography, in order to situate itself within a tradition and bolster claims to a radical pedigree[56]. Ben Russell's *Headmap Manifesto* devotes an entire section to 'Situations' in which the parallels are mapped out (2003: 44-47). Tuters and Varnelis, although sometimes sceptical of the relevance of SI to locative media[57], themselves frame locative media around the 'twin Situationist practices of *détournement* and the *dérive*' (2006: 59), while Conor McGarrigle argues that 'there is an identifiable strand of locative art works which, through their contingent re-appropriation of Situationist techniques can be thought of as being involved in the "construction of locative situations"' (2009: n.p.). Among these, he includes Teri Rueb's *Drift* (2004) and Christian Nold's *Biomapping* (2003-) - case studies that are addressed in chapters 4 and 2, respectively. At the same time, those critical of locative media's radical credentials have sought to undo these connections, highlighting points of departure between the two practices. The debate has tended to revolve around whether or not locative media remains true to the tradition of psychogeography, and particularly to its

---

[56] For example, Social Fiction's .walk, which the group describe as a 'generative psychogeography', and Middlesex University/Active Ingredient's 'Ere Be Dragons (2005): 'The Situationist project [...] is implemented in 'Ere Be Dragons' (Freidrich von Borries, Steffen Waltz & Matthias Bottger, 2007: 296).
[57] Varnelis, in a blog posted in 2009, writes: 'Situationism encourages this aestheticized consumption of the city, only it does so in the guise of political progress' (Varnelis, 2009).

radical political aspirations. As Simon Pope writes, the influence of psychogeography on locative media 'has become something of an orthodoxy, with the requisite dissenters and historical revisionists' (Pope, 2005: n.p.)[58].

On the one hand, it is easy to see why the comparison with psychogeography has been made. As Pope writes, '[i]ts methods are readily available - the dérive, for example, is described in enough detail and in enough places for it to be an off-the-shelf solution - so it would be more surprising to find it absent from the field' (2005: n.p.). Both employ walking practices as a means to produce fresh encounters with the city, and both use maps to interrogate the nature of the spaces they represent and/or the nature of cartographic representation itself. However, these correspondences often fail to stand up to closer scrutiny. Firstly, the extent and nature of locative media's engagement with the city diverges significantly from Situationist practices. The city is not the only focus of works of locative media[59], and although urban works have predominated, locative media has tended to see the city largely as a backdrop for its activities[60], these taking place in the spaces between buildings and mostly unconcerned with the built environment. By contrast, the Situationist movement in large part developed in reaction to the rationalization and modernization of many Parisian neighbourhoods in the 1960s by architects and urban planners

---

[58] See, for example, the debate surrounding Social Fiction's .*walk* which received the 2004 Transmediale festival's Software Award. Described by the group as a 'generative psychogeography', it made use of computer-generated algorithms to produce random walks through the city. Whereas, for example, David Pinder finds a close affinity between .*walk* and the Situationist's use of the *dérive* (2005: 397), Saul Albert sees its '[a]lgorithmic psychogeography' as 'not just a development, but actually a fundamental reversal of the critical use of this Situationist tool', since '[i]mposing an arbitrary rule set on decisions to turn left or right removes the critical/analytical basis for this practice' (2004).

[59] For example, Esther Polak's *Milk*project (2005).

[60] Mary Flanagan, for example, argues that many location-based games are in fact 'location free' in the sense that they might be played anywhere (2008: 3). Flanagan claims, specifically in reference to the work of Blast Theory, that the city simply becomes a backdrop for spectacular play: 'landmarks and streets become mere spaces on an existing game board, without meaning or history in their own right' (Ibid: 4).

such as Le Corbusier (Sadler, 1999: 49-50). Unitary Urbanism was conceived as an, albeit unorthodox, form of urban planning that might counter what the Situationists saw as the suppression of the life of the street[61]. By contrast, the idea that locative media might influence planning decisions is rarely expressed, and at best rather wishfully[62]. As Pope writes, '[t]here's a wilful skimming of the surface of psychogeography - taking it to mean an unconstrained movement in the streets - and apparently less of an alignment with the wider project of anti-urbanism' (2005: n.p.). Locative media has also been criticized for the *quality* of its engagement with the city. Whereas the Situationists sought to immerse themselves in the ambiances of the city, locative media can be seen as creating distance by, in Hemment's words, 'presenting the challenge of roaming the environment while squinting at a tiny screen and clunky menu, separated from the world by a barrier of bad usability' (2006: 351). It was also important to the Situationists, in principle at least, that their drifting should bring about extraordinary encounters with ordinary people, yet the works of locative media routinely exclude non-participants, rendering them bemused bystanders to a spectacle that they can neither access nor comprehend (Flanagan, 2008: 7). Writing of the 'GPS mapping practice of modern psycho-geographers', Martin Rieser comments that '[p]articipants seem to have more in common with the practice of the *Flâneur*[63] - the alienated outsider enjoying the frisson of other lives' (2005: 4). This sense of detachment, rather than critical engagement, has

---

[61] Unitary Urbanism even spawned a speculative architecture in Constant Nieuwenhuys's plans for a New Babylon - a labyrinthine city geared to nomadic drifting and the production of 'situations'. See Mark Wigley (1998) for a full account of Constant's New Babylon, as well as Sadler (1998) and Francesco Careri (2005a; 2005b).

[62] Geographer Chris Perkins, for example, writes of Christian Nold's Biomapping projects that they are 'cast as useful art, showing objective, consensual, community feelings about an area that might inform the planning process' (2007: 128).

[63] A *Flâneur*, or 'stroller', is a person who explores the streets of a city at leisure, popularly associated with the literary scene of 19th century Paris and emblematic of the modern urban experience.

led many commentators to question the 'orthodoxy' that locative media has its roots in the practices of the Situationists. Tarkka dismisses these links as 'the familiar romance with the 'new' in media; a passionate fumbling where a temporary loss of historical sense is combined with a search for antecedents and originators' (2010: 133), while Gavin MacDonald describes them as 'often overplayed' (2012: 35). Even early proponents of the genre have been forced to reassess the significance of Situationism: Marc Tuters, for example, has urged that artists move beyond what he calls a 'Mannerist Situationism' (Tuters, 2012).

The position taken by this thesis in relation to the 'orthodoxy' of locative media's roots in Situationist practices is neither one of faith nor atheism, but rather agnosticism. The problem in associating works of locative media with psychogeography is not just that it sometimes reveals their lack of political engagement, but also that it traps locative media into a very modern discourse that is focused on modern conditions, discontents and remedies. This is particularly evident in the way that locative media largely adopts what are essentially 19th century notions of the city as a locus of power and the street as a site for political action. What that fails to acknowledge is the way in which communication technologies, including those of locative media, have created new forms of power and territory and new forms of political action. The adoption of a Situationist rhetoric has tended to channel locative media into a rather outdated critique of modernity; answering old questions with new technologies rather than recognizing that those technologies create new questions. However, not only is comparison with the Situationists unavoidable, but it often remains instructive, if only because it provides some benchmark by which to assess

these works. Moreover, the practices of the Situationists may yet prove freshly relevant, with several writers[64] finding in the Situationists' arsenal of artistic and political tactics weapons that might be deployed in current conditions where power, rather than being sited and visible, works 'intensively' (Lash, 2010) through the operations of code.

However, had this research found that locative media was entirely constrained by modern concerns, it would have been forced to concur with a now widely held belief that the field has little more to offer. That categorically not being the case, I nevertheless want to explore how that perception has arisen.

1.2.6 The Demise of Locative Media?

The history of the demise of locative media is almost as long as the history of locative media itself. As the above account of its relation to issues of power has shown, it has always been accompanied by cynicism as much as euphoria, and that cynicism extends to proponents as well as detractors. Hemment is founder and curator since 1995 of the Manchester based-FutureEverything Festival, which has regularly showcased works of locative media, yet he wrote as early as 2004 of a 'locative dystopia' in which:

> [L]ocative media operates upon the same plane as military tracking, State and commercial surveillance, [...] forcing a consideration of how locative media might challenge, or be complicit with such forms of social control, and of the point at which the locative utopia rubs up against the dystopian fantasy of total control. (2004, n.p.)

Scepticism about the ability of locative media to effectively appropriate and re-function tracking technologies has only deepened in the intervening years with

---

[64] Scott Lash (2010: 146) insists on the relevance of the *dérive* as a tactic for the 21st century, while Alexander Galloway (2009) interprets Debord's *The Game of War* as a model (or training method even) for radical activism in the 21st century.

the widespread perception that the locative media arts movement failed to live

up to its early promise and was in any case quickly overwhelmed by the

proliferation of commercial location-based services:

> [l]ocative media remained the stuff of demos and art-technology festivals until 2008 when Apple released the GPS-enabled iPhone 3G. Paradoxically, the mass realization of locative media seems to have taken the wind out of its sails as an art form. [...] [T]he promise of locative media seems to remain just that: a promise. (Cornell & Varnelis, quoted in Zeffiro, 2012: 249)

While, according to Tuters, '[l]ocative media had been much anticipated within

the media art world, notably at the ISEA conferences in 2004 & 2006' (ISEA

2011), by 2011 many commentators were ready to pronounce the end of

locative media. At the 2011 ISEA conference in Istanbul, a panel entitled

'Beyond Locative: Media Arts after the Spatial Turn' considered the future of

locative media after the demise of a 'locative avant-garde': Tuters urged a

rethinking of 'the networked city beyond locative media'; Tristan Theilmann

pointedly spoke of locative media in the past tense as having 'failed as a social

media, disguised as a new, hip, mobile must-have', while Mark Shepard

considered whether it might be 'time to simply FORGET Locative Media - that

the creative, theoretical and aesthetic possibilities of location as contextual filter

have been exhausted' (ISEA, 2011). This bid to move *beyond* locative media is

in part a response to the perceived failure of locative media to live up to the

radical promise that was suggested, not least, through its association with

Situationist practices, but is also part of a wider shift from a 'spatial' to 'object

turn' in cultural theory. Writers[65] and artists[66] have found conceptual tools for

the reframing of locative media in object-centred approaches, such as Bruno

Latour's Actor Network Theory (2005), that place emphasis on networks within

---

[65] See Tuters (2012) and Theodore Mitew (2008).
[66] Nold, for example, has recently begun to reconceptualize his work in terms of Actor Network Theory (2014). This is further discussed in Chapter 2 in relation to his *Biomapping* project.

which relations have little to do with spatial position or proximity. Tuters (2010), for example, calls for 'post-locative practices' that move beyond a 'mannerist situationism' to emphasize 'situated' rather than located media. This requires replacing 'the concept of geographic location as the core concept of locativity, with the more relational notion of proximity, not only in relation to place but also in relation to matters-of-concern' (2012: 275). This shift is advantageous in that it allows that locative media (or some successor form of it) might address relations and phenomena that are not fixed to terra firma, but it also suggests that space has become completely irrelevant, that geographic maps might, as Tuters suggests, be replaced by cognitive maps (2012: 274). Accordingly, many artists working with locative media, including Tuters, have turned their attention towards Citizen Science and the Internet of Things, suggesting that the experiment with space and location is finished with. In contrast, this thesis argues that artists working with locative media continue to productively engage with issues of space and its case studies attest to this. What may be changing, however, is the way in which space is conceived as locative media explores non-Euclidean spaces and produces maps that move significantly beyond the conventions of cartographic representation. Accordingly, it is argued that reports of the demise of locative media have been greatly exaggerated.

The continued vitality of locative media only becomes fully apparent as works employing *post-cartographical* approaches are encountered in Chapter 4 of the thesis. These works are a culmination of experimental practices that have long grappled with the possibility of moving beyond a modern, cartographical legacy, and I shall now explore in more depth the weight of that inheritance.

1.3 Cartographic Space

In the above discussion of locative media, I established that it has been largely contextualized in terms of distinctively modern concerns, and particularly through the dichotomy between lived place and abstract space. This carries with it very particular ideas about what a city is, where power resides and what opposition might consist of; many of these informed by the Situationist rhetoric that I have described. I shall now elaborate on this modern framing of locative media by exposing locative media's indebtedness to the specifically modern practices of cartography. I propose that Cartography be understood as modernity's foundational ontology, productive of distinctively modern ways of seeing and thinking, upon which have been built capitalism, the modern nation state and empire. I then go on to assess the extent to which the maps of locative media can free themselves from the weight of this tradition to provide a critique of cartography and to invent alternative ways of mapping the world.

As the case studies in the chapters that follow attest, locative media has been adventurous in its use of the map; using novel forms of visualization, discarding the trappings of traditional cartography, introducing time as a parameter, and experimenting with novel surfaces. Implicit in many of the works is the claim to have appropriated, subverted or *détournée* the form of the map, certainly to the degree that professional cartographers might hesitate to recognize these as works of cartography. Yet, in important respects, they remain true to the conventions of scientific cartography and largely uncritical of the cartographic project, particularly in the way they use GPS. Some of the trappings of cartography may be missing but, looking beyond their flamboyant disregard for

cartographic propriety, the use of GPS continues to order and scale and create relations between locations according to coordinates of latitude and longitude that constitute an abstract grid imposed on what is assumed to be the continuous, measurable and knowable space of the world. While artists working with locative media have paid considerable attention to the way in which GPS may be used as a surveillance technology, little attention has been paid to the way in which their use of GPS signals their adoption of a very particular mode of engaging with and representing space, and the ideological implications of this world view.

Whether the cartography of locative media is to be viewed as uncritically adopting the modern scientific map, or appropriating and subverting it in some way, it is important to develop a clearer understanding of such maps. There is a need to look more critically at what a map is, how the map as we understand it is the product of specific times and embodies particular ways of seeing and knowing.

1.3.1 The Modern Cartographic Map

There is a need, firstly, to make a distinction between the category of 'map' and those maps that emerge specifically in the modern period and are here categorized as 'cartographic maps'. As Denis Wood puts it, '[c]onflating the history of mapmaking with that of cartography is like conflating the history of walking with that of the automobile' (2003: 4-5). A brief outline of the arrival of scientific cartography will help to make clear this distinction between mapmaking and cartography. Prior to the early modern period (c.1500), European maps displayed a chorographic understanding of space – 'a

qualitative and semiotic mapping of specific region or place' (O'Sullivan, 2010: 3) that did not rely on scientific measurement and mathematical models (Dourish, 2006: 3). Their oblique bird's eye portrayal of places inscribed them with narratives such as the routes of pilgrimages, of battles won or lost, of myth and legend, or of the story of the map's production (see, for example, Fig.1.1). Thus, writes Michel de Certeau, 'the sail ship on the sea indicates the maritime expedition that made it possible to represent the coastlines' (1984: 121).

This image has been removed for copyright reasons
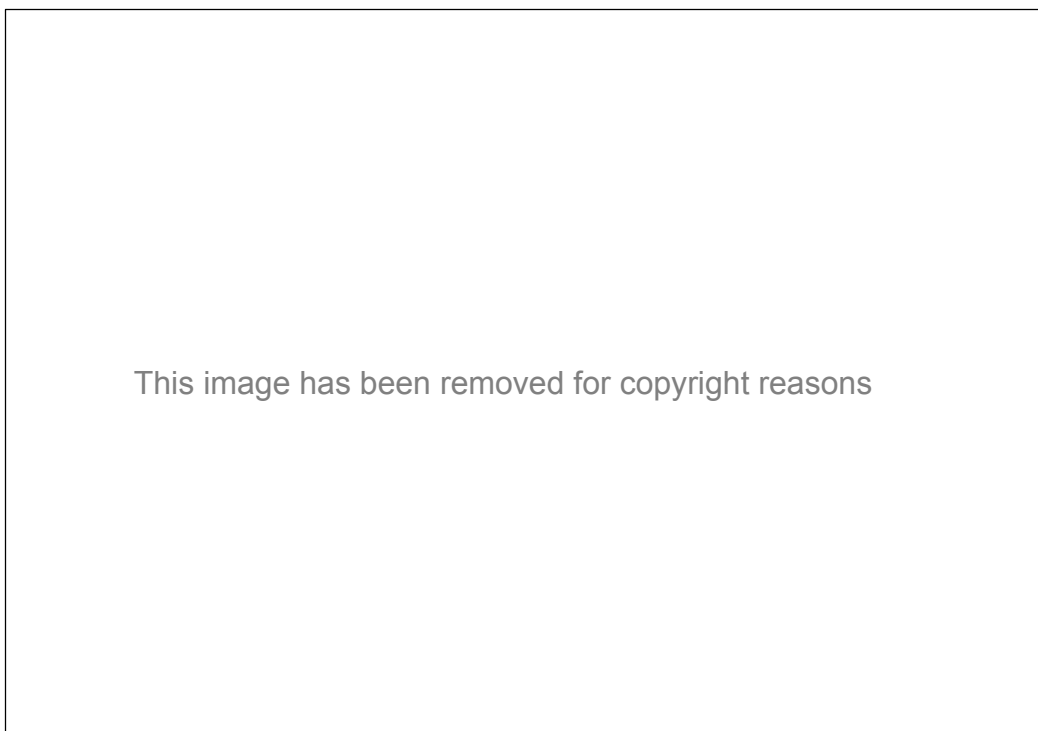
Figure 1.1: George Braun and Frans Hogenberg, Map of Famagusta, Cyprus.
From Braun and Hogenberg's *Civitas Orbis Terrarum*, 1572.

However, in the early modern period of 15th and 16th century Europe, these pictorial figurations are slowly eliminated. The modern map that emerged during this period is concerned not with narrative, but with the scientific representation of space. Between 1400 and 1600, writes geographer John Pickles, 'a revolution occurred in the drawing, distribution and use of maps' (Pickles, 2004: 98). This was spurred by technological innovations including the use of

triangulation, plane table and theodolite, as well as the development of printing, and the introduction of devices such map legends and a standardized scale (Ibid: 98). This outbreak of cartographic fervour was not spurred by technological advances alone, but took place within the context of wider transformations, particularly in the development of Enlightenment ways of seeing, in the growth of capitalism and in the emergence of the modern nation state. Maps were needed that could define the borders of these nations, give identity to their citizens, and facilitate the defence and administration of their territories. Maps established rights of ownership and facilitated the levying of taxes.

This image has been removed for copyright reasons
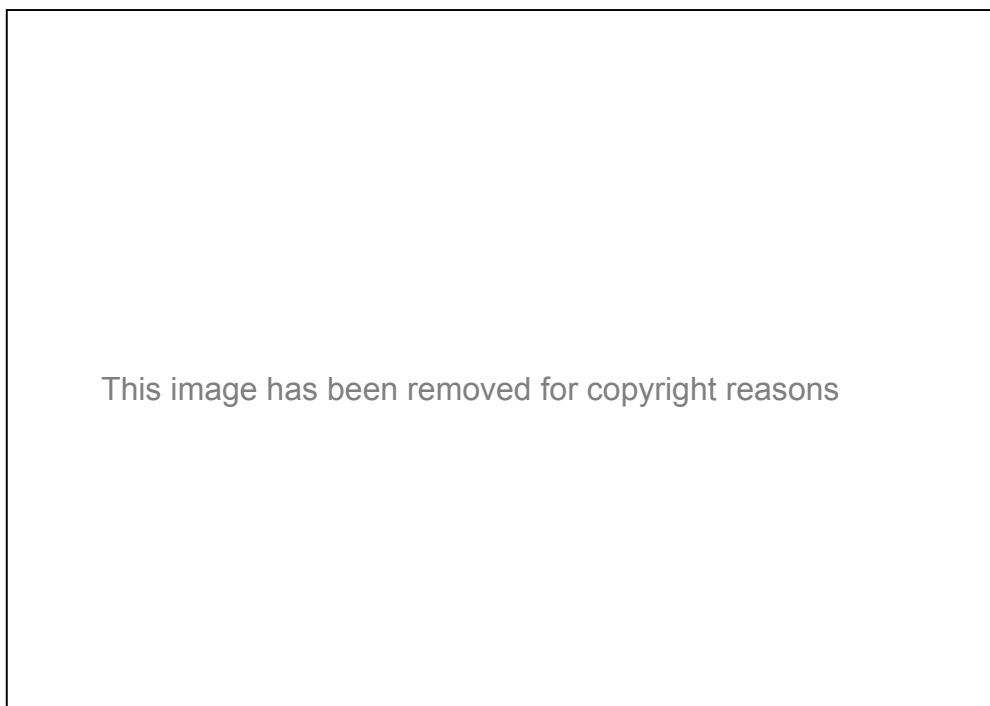
Figure 1.2: Cadastral map of Ayii Trimithias, Cyprus (1924). Detail.
Department of Lands and Surveys, Republic of Cyprus.

The development of cadastral maps that measured and parcelled land as a commodity was integral to the shift from feudal to capitalist relations of production. As Jowett, Kain and Baigent write, 'the cadastral map was a highly

67

contentious instrument for the extension and consolidation of power, not just of the propertied individual, but of the nation-state and the capitalist system which underlies it' (Jowett, Kain & Baigent, quoted in Pickles, 2004: 100). Scientific cartography shaped the city not only by affirming property rights, but also by managing and controlling urban populations and development. The urban plan became, alongside the parallel development of statistics, 'a diagnostic tool for social analysis, and in the process recoded social life and reworked the spaces of the city' (Ibid:126). It did so not least through the urban master plan that sought to manage and control issues including population growth, hygiene and social unrest, but also through the creation of *zones* of centrality and periphery, work and play, movement and stasis, wealth and poverty (Soderstrom, 1992: 262). Pickles writes, 'mapping and statistics made citizens visible in particular ways, rendering them subject to public administration' (Pickles, 2004: 131). By such means, the individual was, in Foucault's terms, 'fabricated by this scientific technology of power that I have called "discipline"' (1977: 194). Later, in the 18th and 19th centuries, as nation-states turned their attention to colonial expansion, the map again became a logistical tool, in the service of the state, for creating territories, identities, and economic and political relations[67]. As a result of this use of maps to define both political and economic rights, 'local knowledges and valuations, regional systems of *topophilia*, and alternative mapping opportunities were eradicated or sublimated under the universal logic of law, administration and measurement' (Pickles, 2004: 107).

This brief history of the modern cartographic map serves to demonstrate that these maps are historically specific and ideologically charged. Whether

---

[67] See, for example, Winichakul Thongchai's (1994) study of the role of maps in the creation of colonial Siam.

adopting, referencing, or subverting the modern map, locative media artists are necessarily engaging with a project that is deeply rooted in the emergence of the modern city, the nation-state, capitalism and empire, and their attendant modes of knowing and *seeing*.

1.3.2 The Cartographic Gaze

Cartography, the science of mapmaking, did not simply provide logistical support to the nation-state, empire and capital but contributed to a distinctly modern way of seeing the world. Pickles (2004: 75-91) describes this as the 'cartographic gaze', characterized by a Cartesian privileging of vision as the means to 'direct' knowledge of the world, or what Heidegger described as modernity's 'conquest of the world as picture' (1950/2002: 71). This conquest is achieved through the representation of nature, space and social life within an abstract mathematical framework. It masters both nature and society by representing them within an ordered parametric space. Crucially, by virtue of the way the cartographic gaze adopts a Cartesian logic, it presents this view of the world as a self-evident truth, a matter of scientific fact. As David Harvey puts it, cartography 'depends heavily upon a Cartesian logic in which *res extensa* are presumed to be quite separate from the realms of mind and thought and capable of full depiction within some set of coordinates (a grid or graticule)' (Harvey, 2000: 220).

For Pickles, following Martin Jay and Svetlana Alpers[68], the cartographic gaze is jointly constituted by two (geometrically-structured) scopic or visual regimes that emerged in parallel in the Enlightenment (2004: 84-86): 'both the view from

---

[68] Martin Jay (1988); Svetlana Alpers (1983).

above, an elevated two-point perspective bird's-eye-view, and an all-seeing eye that views everywhere at the same time' (Ibid: 80). The two regimes most obviously combine in 'pictorial' maps of cities (see Fig. 1.3, for example), as well as in some Dutch landscape paintings of the 17th century[69].

This image has been removed for copyright reasons
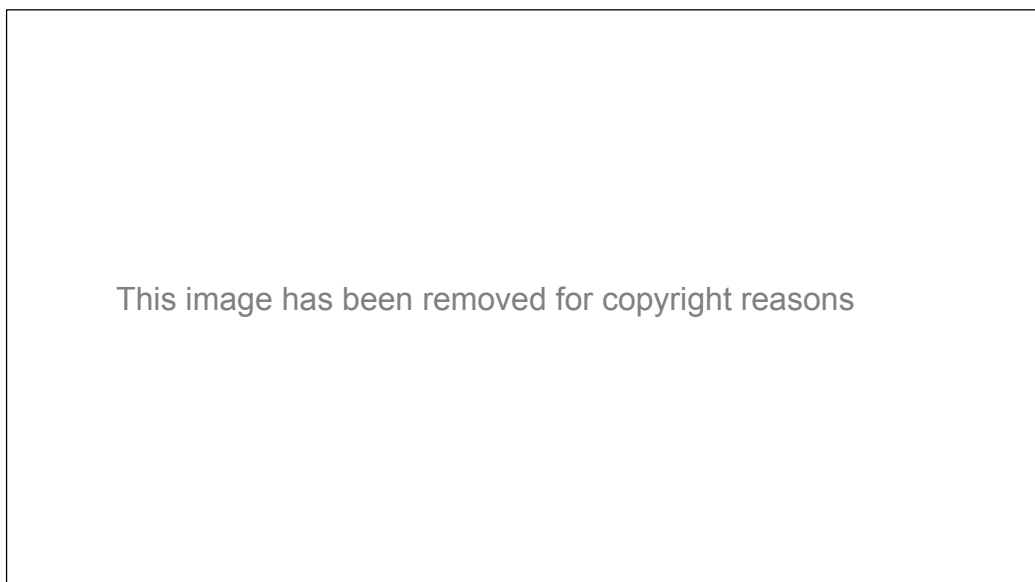
Figure 1.3: George Peltier, *Plan de Paris à vol d'oiseau* (1920) Detail.
Bibliothèque National de France.

While 'perspectivalism' produced a frame through which the positioned viewer could view the depth of the world as real, 'projectionism' created a view from nowhere that presented 'knowledge' of the world arrayed across a depthless surface. This 'God's eye view' - 'an all-seeing eye that views everywhere at the same time' (Pickles, 2004: 80) - is one of surveillance and control, imbued with political intent and consequences, but performs what Donna Haraway describes as 'the God trick' by claiming transparency, neutrality and universal knowledge (1991: 191). The cartographic gaze is also, for Gillian Rose, 'the perspectival

---

[69] See Svetlana Alpers account (1983: 119-168).

space of the masculine subject' (1995: 761-81), a visual regime that genders modernity.

Acknowledgement of the coexistence of two distinct scopic regimes in modernity, and of their propensity to combine, allows for some parallels to be drawn between maps and art; these are pursued in a later section of this chapter. As Alpers (1983), in particular, has shown, the history of art and the history of cartography are often closely entwined. However, for now staying with the history of cartography, the next section argues that cartography not only produced a distinctively modern way of *seeing* the world, but also distinctively modern ways of *thinking* and *knowing.*

1.3.3 Cartographic Reason

More than just representational models, maps should be seen as conceptual models (Board, 1967). As Pickles puts it: ' To ask what a map is and what it means 'to map' is also to ask about the epistemological and ontological structure of the world in which we live and map' (2004: 76). For the Italian geographer Franco Farinelli, maps do not simply reveal or reflect those structures but constitute them:

> western thought (reason) is nothing else than the protocol of geographical presentation, that is of the cartographic image. Further, this would imply that our rationality is determined from a cartographical point of view, that it is already contained and produced by the cartographic image. Western thought is nothing but cartographical reason [...]. (1998: 135, my emphasis)

This image has been removed for copyright reasons

Figure 1.4: Possible Rendering of Anaximander's world map by Bibi Saint-Pol (2006), based on an image by John Mansley Robinson (1968).

Farinelli locates the birth of cartographic[70] reason in the cosmology of Greek philosopher Anaximander and his production of the *pinax*, 'the first map according to Western tradition' (1998: 135). For Farinelli, it is his drawing of lines depicting spatial relationships (rather than the structures of language) that form the foundation for Western reason. He develops his argument through a re-reading of Heidegger in which the oblivion of *Being* is attributed to the metaphysics of the map: 'Being [...] becomes that which shuns from (sic) the map, that which does not appear on it' (Ibid: 142). He argues that Heidegger came close to acknowledging the cartographical nature of reason in his later

---

[70] Farinelli uses the term '*cartographical* reason' and this was also adopted by Gunnar Olsson in an early essay on this theme (1998), though in his major work on the subject (Olsson, 2007) Olsson uses the term '*cartographic* reason'. I follow Olsson in using 'cartographic reason' since it suggests a stronger meaning: that Western reason not only resembles cartography but is fundamentally cartographic, is 'of the map' rather than 'like the map'. However, in discussing Farinelli's work, I defer to his use of 'cartographical reason'.

works: '[s]cience, Heidegger says, presupposes nature as a specific, measurable sphere of beings. Nature is grounded on measurability and its measurability is in turn made possible by the homogeneity of space and time' (Ibid: 143). Thus, for Farinelli, ''[t]he Time of World-as-Picture' is literally the time of World-as-Map' (Ibid: 143).

Gunnar Olsson, the Swedish geographer-philosopher, has developed Farinelli's concept of 'cartographical reason' by focusing on its manifestation in the thinking of Emmanuel Kant, thinking that 'makes him more of a geographer than [...] a philosopher' (Olsson, 1998: 145). Olsson usefully summarizes the cartographic nature of Kant's reason as follows:

•Understanding is an exercise in translation, an application of the epistemological operator 'as-if';

•Objects conform to our modes of (re)presentation;

•The favoured mode of (re)presentation is geometric;

•Geometry is the formalization of the intuition of the tactile, the taken-for-granted constructed, the constructed taken-for-granted. (1998: 148)

In other words, for Kant, reality is knowable only through reason: through processes of abstraction ('a', 'b'), translation ('a' = b'), and geometric representation. This abstraction is 'thingifying' in that it treats the non-material 'as-if' it were material. That it is taken-for-granted rests on 'the thesis of the necessary unity of consciousness', that our own consciousness entails a consciousness of other things outside us, allowing us to share and understand the world ('I' = 'We'). Thus, acts of translation and the unity of consciousness build a shared world, what Dagmar Reichert calls a 'stable means for community-building' (1998: 159). However, they also construct 'a prison, a cave, a Cartesian meditation room or a fly bottle' (Ibid: 163) from which there

would appear to be no escape. For Olsson, thought is bounded and structured by the same set of parameters as the map - it produces lines and surfaces and provides our compass, scale, legend and sense of direction. It is the map, rather than language *per se*, that builds the 'prison house'.

The necessary unity of consciousness is also, for Olsson, a 'political thesis' that explains 'how and why we become so obedient and so predictable':

> The thesis of the necessary unity is consequently a thesis of and about power, a specification of the coordinate net by which the cartographical reasoner captures the world, the conceptual tool that helps him determine both where he is and which way to go. But whose way? Everyone's or no one's? Yours or mine? (1998: 150)

For Farinelli, the map produces the political sphere in a very direct way through its geometrical modelling of the ancient polis - the sculpting of the city as a material substrate for, and symbolic expression of, citizenship, political participation and, specifically, democracy. It produces a politics that is 'endowed with all the properties of Euclidean space, that is continuity, homogeneity and isotropy' (Farinelli, 1998:142).

So, cartography is not just a set of practices and technologies, an instrument of power, and a particular way of seeing the world, but also a way of thinking and a foundation for knowledge. What this suggests is that the weight and history of the cartographic project is not one that can easily be thrown off, appropriated or subverted by artists who engage with the form of the map. However, two arguments militate against such a totalizing view of cartography: first, that the power of maps and of cartographic thinking was never as total as the likes of Olsson and Farinelli seem to assume; and, second, that cartographical reason no longer holds such a vice-like grip on us, that cartographical reason and the

project of cartographic representation has entered a period of crisis that may

lead to new modes of reason and representation[71] - an argument that Olsson

also makes, though he is unable to see what might replace it (1998: 149).

These two arguments are dealt with in the next two sections: the first surveying

and drawing on theories of cartography to ask what kind of power is invested in

maps; the second examining the nature of what Pickles describes as

cartography's 'crisis of representation' (2004: 27).

1.3.4 The Power of Maps

In working with maps, artists 'claim the power of the map to achieve ends other

than the social reproduction of the status quo' (Wood, 2006: 10). Instead they

seek to enliven the map with lived experience by allowing participants and

communities to map from below, and this sets their work apart from and in

opposition to a scientific cartography in which views are imposed from above.

However, the previous discussion suggested that the straitjacket of cartographic

reason and representation leaves very little room for manoeuvre. For a number

of key thinkers, all of whom are frequently referenced in the literature on

locative media to support their 'radical' claims, the idea that cartography might

somehow be turned against itself to challenge a world view shaped by

rationality, capitalism and the power of the nation state is distinctly odd. De

Certeau (1984), while he highlights the possibilities for tactical interventions in

space, specifically excludes the use of maps to achieve this. Similarly, from a

phenomenological perspective, Ingold (2000; 2007) sees the map as utterly at

odds with a sense of Being-in-the-World while, from a quite different perspective

but with clear parallels, Henri Lefebvre regards maps as constructive of an

---

[71] Dagmar Reichert goes as far as to announce the death of cartographic reason in his
'Obituary' (Reichert, 1998).

75

abstract, geometrical, homogenous space in which: 'lived experience is crushed, vanquished by what is "conceived of"' (1991: 51).

However, there is a need to consider more carefully just where the power of maps resides and what 'wiggle room' this might provide and this is an issue that has been addressed in different ways by scholars working in the field of critical cartography. While early accounts of the power of maps questioned the *veracity* of their representations, more recent accounts have more fully interrogated their epistemological and ontological foundations. Brian Harley, a pioneer of critical cartography, sought to *deconstruct* the map to reveal the way that maps are shaped by powerful interests (1989). In this view, it is the *way* in which maps represent reality that is ideological. Since cartography involves the making of decisions about what to include or exclude, what map projections to employ, what scales to work at, issues of design and presentation, and so on, these processes cannot be considered as neutral and purely scientific. However, the representational nature of maps remains unquestioned. As Jeremy Crampton puts it, Harley's work 'remains mired in the modernist conception of maps as documents charged with "confessing" the truth of the landscape' (2003: 7). In other words, ideology is seen as a layer on top of essentially neutral maps: it was about 'the bad things that people *did* with maps' (Wood, 1993: 50, *original emphasis*). It may be that some of the mapping projects of locative media are also still operating at this level, in the belief that it is possible to do 'good things' with maps[72], but the argument of this chapter has been that there is a need to move beyond this to question the project of cartography itself.

---

[72] For, example, in the way that a project like Proboscis's *Urban Tapestries* (2002-2004) repurposed utterly conventional maps to enable 'a community's collective memory to grow organically, allowing ordinary citizens to embed social knowledge in the new wireless landscape of the city' (Urban Tapestries, 2005).

A number of cartographical theorists, including Crampton (2003), Edney (1993), Pickles (2004) and Wood (1992; 2009) have sought to interrogate the ontological and representational framework of the map. For these theorists, maps do not simply represent the world (accurately or not), but produce it. They are a constituent part of the social, political and historical contexts in which they are produced and thus operate within 'a certain horizon of possibilities' (Crampton 2003: 51). The modern map is prescribed, in particular, by a 'foundational ontology' consisting of the belief that that 'the world can be objectively and truthfully mapped using scientific techniques' (Kitchin, Perkins & Dodge, 2009: 11). However, these theorists also allow for some degree of latitude within this 'horizon of possibilities', and this may be instructive in assessing some of the radical ambitions of locative media.

Pickles, in particular, is critical of what he calls 'power talk' in the discussion of maps: the assumption that ideology can be identified and fixed in the text of the map. Rather, maps are unstable and complex texts and 'meaning is dialogic, polyphonic and multivocal – open to, and demanding of us, a process of ceaseless contextualization and re-contextualization' (2004: 174). He points to the way, for example, that the two thoroughly modern but quite distinct scopic regimes of 'linear perspectivalism' and 'mathematical projectionism' arose in different parts of Europe in response to 'different purposes, positionalities and powers at work' (Ibid: 85), suggesting that it might be more valid to speak of plural modernities and capitalisms (Ibid: 87). He also points to the way in which 16th century maps were pieced together and interpolated from fragments of existing maps to produce a *bricolage* that 'bore the traces of past mapping

practices, local systems of representation and internally contradictory forms'
(Pickles, 2004: 88). For Pickles, then, cartography is open to transgressive
moments, lines of flight, alternative ontologies and counter-mappings (Ibid:
194). This isn't to diminish the power of maps to shape the world, and doesn't
detract from the broad thesis that cartography is integral to the development of
Western thought and the rise of capitalism and the nation-state (Ibid: 91), but
provides a guard against totalizing accounts, and allows that artists working with
locative media may at times expand the 'horizon of possibilities'.

Cartographic theory has recently taken a 'performative turn' that diminishes
further the representational power of the map and instead places emphasis on
processes of mapmaking and map use that are embodied and dynamic. In this
vein, Rob Kitchen, Chris Perkins and Martin Dodge argue that, '[m]aps [...] are
understood as always in a state of becoming; as always mapping; as
simultaneously being produced *and* consumed, authored *and* read, designed
and used, serving as a representation *and* practice; as mutually constituting
map/space in a dyadic relationship' (2009: 17). For these writers, the map is not
ontologically secure but is '(re)made *every time*' through 'a mix of creative,
reflexive, playful, tactile and habitual practices' (2009: 21, original emphasis).
The idea that maps are always in a state of *becoming* through their
performance is an appealing one when applied to digital mapping, in general,
and, in particular, to the mapping practices of locative media in which maps are
actively produced, evolve and are collectively authored through the participation
of mobile users. However, the ontogenetic model proposed by Kitchin *et al*
implies that mapmaking is entirely unfettered by cartographic convention and
cartographic ways of seeing and thinking, and therefore that the power of the

78

map can be readily claimed and redirected. Perkins, for example, goes as far as to claim that all mapping is 'called into being to meet particular human needs, flowing from action, instead of being grounded in power' (2009: 7). While these theorists of the map are insightful in proposing that the map can no longer be, and should never have been, treated as an object, but as subject to performances of mapmaking and map-reading, there is a danger that they overlook its relative stability as a form, its ontological security, and the endurance of cartographical regimes of reason and representation. It is one thing to question the representational logic of cartography (as much of this chapter has endeavoured to do), but quite another to claim that this logic has no bearing on the map. It is as though they have transposed a critique into an actually existing state of affairs. As the case studies that follow will demonstrate, the map is not entirely '(re)made *every time*', but, on the contrary, displays a stubborn resistance to change and continues to make representational claims that order and scale spatial experience.

This discussion has tried to open-up 'wiggle room' in which art cartographers might expand 'the horizon of possibilities', against totalizing accounts of the power of maps, but at the same time insists that proper weight be given to the way in which cartography and cartographical reason have shaped ways of seeing and thinking. How this balance might be achieved will be returned to through a discussion of Henri Lefebvre's writing on space (1991). Prior to that discussion, I consider another way in which 'the horizon of possibilities' may be expanding.

1.3.5 The Crisis of Cartographic Representation

The above section has already partially outlined what Pickles describes as 'nothing short of a "crisis of representation"' in cartography (Pickles, 2004: 27). It consists of an unpicking of representational thinking to question cartography's truth claims. It also consists of an acknowledgment that cartography may be open to appropriation and repurposing. Evidence for this lies in a resurgence of interest in mapping and its use across academia and by grassroots community and artistic projects, including locative media. The use of digital mapping technologies, including GPS and GIS, has fuelled these activities and forced a rethinking of maps and what they do. A sense of this reappraisal has also entered the popular imagination with the recent publication of books such as Jerry Brotton's *A History of the World in Twelve Maps* (2012) and his BBC television series (*Maps: Power, Plunder and Possession,* 2010), along with Simon Garfield's *On the Map* (2013), which was also produced as a BBC Radio series (*On the Map*, 2012).

However, the crisis in cartographical representation should also be seen as part of a wider crisis of representation - involving the dissolution of the binary categories of subject and object, representation and reality, map and territory - that is associated with the demise of modernity and its transformation into something different, something 'post-modern' - hard as that has been to define[73]. However, a defining characteristic, particularly in accounts by geographers, is a change in the way in which space is encountered and understood, this being driven both by a process of globalization and the

---

[73] See Jean Baudrillard (1981), David Harvey (1990), Fredric Jameson (1991) and Jean-François Lyotard (1979) for competing versions.

development of new information technologies and networks that, in place of

phenomena that are fixed to the ground and therefore readily map-able,

produce 'flows' that have a more ambiguous, less map-able, relation to material

location (Castells, 2000: 407-459). These flows alter the experience of both

space and time through 'time-space compression' (Harvey, 1992: 284-307), and

promote relations across space that are characterized by temporal simultaneity.

Near and far, here and there, become unfixed. The local and global become

inextricably entwined, producing what Erik Swyngedouw (1997) describes as

'glocalization'. The boundaries between the material and informational, the 'real'

and 'virtual', become blurred to create hybrid spaces in which relations are no

longer grounded in fixed places and physical distance is no longer the sole

measure of proximity. In short, the defining characteristics of post-modernity all

point to a setting adrift of the experience of space from a straightforward,

tangible connection to ground and locality. As Barney Warf puts it, 'to an ever-

increasing extent the geographies of postmodernity are defined by mobilities,

flows, and networks rather than isolated, discreet [sic] locales' (Warf, 2009: 69).

Where exactly, for example, do we *locate* the electronic flows of capital that

shape the world in nonetheless very real and tangible ways? Crucially, flows do

not simply exist *between* places, but actively layer and fragment the experience

of place itself. 'Time-space compression' is not evenly experienced by those

sharing the same geographical location, but creates 'power geometries' in

relation to which some are included and some excluded, some wield power and

others are subjected to it (Massey, 1993). The city is perforated by networks

and flows of information and capital that challenge its integrity as a distinct and

bordered space, as a centre of power, and as an architectonic organization of

public and private spaces of production and consumption. It becomes more

difficult to identify *places* as distinct and bounded, securely grounded in terra

firma, and readily locatable within a graticule of coordinates, and therefore to

speak of sharing the same ground, the same city, or even the same country.

The ground beneath our feet, the shared foundation for knowledge provided by

cartographical reason, and the cartographic surface that represents it, lose their

stability and begin to shift and fracture, threatening to plunge us into the 'abyss'

in its fullest figurative sense (Olsson, 2007).

The maps of scientific cartography, specifically a product of a modern period in

which power, identity and knowledge could all be fixed to physical territory,

become unequal to the task of mapping fluid, irregular, multi-surfaced and multi-

perspectival 'post-modern' spaces in which there is a 'loss of stable co-

ordinates' (McQuire, 2008: 24). A model that represents movement only in

terms of the distance and compass direction between two points is unable to

represent the 'invisible' channels that create new relations of proximity. Indeed,

for Fredric Jameson, post-modernity's 'un-map-ability' is its key defining

characteristic: 'this latest mutation in space—postmodern hyperspace—has

finally succeeded in transcending the capacities of the individual human body to

locate itself, to organize its immediate surroundings perceptually, and

cognitively to map its position in a mappable external world (1991: 83). This

crisis of representation in cartography calls for new kinds of maps; for Jameson,

a form of 'cognitive mapping' that might allow the individual to locate

themselves not just spatially, but economically, culturally and politically.

For Olsson, the crisis of cartographical reason is the 'price for fitting the world

into the geometrical mode' (1998: 147). This mode, he argues, is unable to

picture the invisible, non-material forces and relations that shape our experience of the world. His example is the immaterial relations created by money, but could equally be invisible flows of information, networks of communication and the novel forms of proximity that these create. There is a mismatch between conventional cartographic reasoning and human perception such that '[a]ttempts to map the current world of intangibles by the means of pure reason are [...] not only obsolete but often seriously misleading' (Ibid: 147). It brings into crisis the representational mode supplied by the proposition a=b (informative but not necessarily true) and its replacement by the proposition a=a (true but never informative), leading to the loss of 'the solid ground of understanding' (Ibid: 146) through which cartographic reason allowed knowledge of the world to be shared. Thus, for Olsson, the cartographic project is not only showing its cracks, but is already broken:

> [The] project of mapping is shaken at its foundation, like a Humpty Dumpty tumbling down from its elevated position. And all the King's horses and all the King's men may never put that broken egg together again. To make an omelette takes some cracking. (1998: 152)

That cartographic reason no longer holds such a vice-like grip, that cartographic reason and the project of cartographic representation has entered a period of crisis, may also signal opportunities to expand the 'horizon of possibilities' that Crampton (2003: 51) spoke of, but, as Olsson puts it, '[t]he impossible question is what to do instead' (Olsson, 1998:149).

The model of Code Space that is constructed throughout the course of the thesis, as it charts the ways in which artists working with locative media have attempted to map *beyond cartography*, is a direct response to Olsson's 'impossible question'. However, before going on to explore what the role of artists might be in challenging or renegotiating cartographic ways of seeing and

thinking, the next section first establishes one possible model for the way in which the weight of history (particularly the lingering presence of cartographic reason) and the opportunities to think and act differently (opened up by a prolonged crisis in that mode of thinking) might be held in balance.

1.3.6 Abstract and Differential Space

Lefebvre's (1991) account of the production of space provides a useful model for grasping the broad sweep of historical change while at the same time allowing for the contingent, the specific, the prescient and the anachronistic. For Lefebvre, the history of space is to be seen in epochal terms, moving from an 'absolute space' that is structured by religious belief (Ibid: 240) to a geometrically-ordered 'abstract space' that relies on the triumph of vision over all other senses:

> [w]herever there is illusion, the optical and visual world plays an integral and integrative, active and passive, part in it. It fetishizes abstraction and imposes it as the norm. It detaches the pure form from its impure content – from lived time, everyday time, and from bodies with their opacity and solidity, their warmth, their life and their death. After its fashion, the image kills (Ibid: 97).

Lefebvre's abstract space is, then, very precisely the space of cartographic representation and reason and is similarly one that arises in and governs ways of seeing and thinking in the modern period. For Lefebvre, however, '[a]bstract space is *not* homogeneous; it simply *has* homogeneity as its goal, its orientation, its 'lens'' (Ibid: 287, *original emphasis*). It falls short of this goal because it is deeply fragmented by the tensions, divisions, disparities and contradictions inherent in the capitalist mode of production and by the discrete disciplines and specializations (Ibid: 107) that accompany its activities, not least cartography which through its representational regime works to conceal

difference through the maintenance of illusions of transparency and realism

(Ibid: 28-29):

> This reality is concealed by the widely promoted image of a hierarchy of levels, a neat ordering of variables and dimensions. A logical implication, a purely formal conjunction/disjunction, is thus substituted for the concrete relationship between homogeneous and broken up (Ibid: 317).

Nevertheless, the contradictions that lie behind the mask of homogeneity

threaten its stability and 'foster the explosion of abstract space and the

production of a space that is other' (Ibid: 391). In other words, alternative

spaces and spatialities are imaginable, and Lefebvre finds the seeds for these

in, variously, the work of artists, in specific historical moments such as the Paris

Commune of 1871 (Lefebvre, 1965), and in marginal locales such as the shanty

towns of South America (Lefebvre, 1991: 372). He describes the route to

creating this 'differential space' in terms that resonate with some of the work

carried out in the field of locative media, and particularly the way in which these

straddle art and science:

> [b]y seeking to point the way towards a different space, [...] this project straddles the breach between science and utopia, reality and ideality, conceived and lived. It aspires to surmount these oppositions by exploring the dialectical relationship between 'possible' and impossible', and this both objectively and subjectively (Ibid: 60).

For Lefebvre, straddling this breach requires a return to *lived* experience

through spatial practices that reinstate the body (Ibid: 200), and again this

echoes in the works of locative media: the way in which they highlight the

movement of bodies, their sensory experience of landscape, and invoke the

concept of 'lived experience' - for example, in Jason Farman's account of

'sensory-inscribed bodies' moving in an 'embodied space' (2012: 18). What

these accounts tend to omit, however, and Farman's is no exception, is the role

of abstract 'representations of space' (very prominently including maps), in 'the

elimination of the body' (Ibid: 110). It is the tension between these two projects that many works of locative media grapple with in their use of maps. However, Lefebvre's vision of a 'differential space' does not involve a triumph of the 'lived' alone but the restoration of a 'lost unity' (Ibid: 175) between the 'lived', 'perceived', and 'conceived' (Ibid: 423) – including representations of space – suggesting that 'appropriation' of the map may be one way in which the 'lived' can 'lay hold of what is dead' (Ibid: 348). It is this *possibility*, balanced against the *constraints* imposed by Cartography, that this research has endeavoured to open to as it examines the case studies.

Lefebvre's analysis is also useful because it does not necessarily set the lived and abstract apart. Lefebvre's ire is reserved for a particular form of abstraction (one could accurately name it 'cartographic abstraction') that has as its sole aim the expulsion of the lived. It leaves open the possibility (taken-up later in the thesis in relation to the abstractions of software code) that a 'lost unity' between abstract and lived might be restored through an exploration of alternative forms of abstraction and modes of mapping, and specifically through the creation of what philosopher John Rajchman calls 'geometries of living' (1998: 91-108). For Lefebvre, and for Rajchman too, it is art that is best able to explore these possibilities. It is in art, which 'puts its faith in difference' (Lefebvre, 1991: 175), that Lefebvre identifies a utopian alternative: '[o]n the horizon, then, at the furthest edge of the possible, it is a matter of producing the space of the human species –on a model of what used to be called 'art'' (Ibid: 422). It is thus to artists that he entrusts the task of exploring the 'possible' through a practice that draws together the conceived, the perceived and the lived: '[i]t is by taking

representational spaces as its starting-point that art seeks to preserve or restore this lost unity' (Ibid: 175).

Similarly, Olsson sees in art a practical way to handle the 'as-if' problem of cartographical reason in which 'the only way of knowing the world is to treat it as if it were other than it actually is' (1998: 149). For Olsson:

> [t]he creative arts frequently offer a way out, for it is in the nature of the arts to explore the boundary zones between genres, to transgress categorical limits, to baptize novel conventions. And in this important sense the limits of the arts and of knowledge are the same: they coincide with the limits of the body. For not only do I have a body, I am a body. [...] at the crossroads of *topos* and *kairos*, art can no longer be distinguished from truth. (Ibid: 149)

As with Lefebvre, art is seen as a means of attaining practical wisdom (*phronesis*) through an exploration of lived experience: *topos* and *kairos*, space and time as concrete and meaningful, as opposed to the abstract space and measured time of *chora* and *chronos*.

Farinelli also allots art a special role in the unpicking of cartographical reason. Anaximander's *pinax*, the 'philosphical sculpture' (1998: 139) on which cartographical reason is founded, is for Farinelli perhaps the 'originary work of art' (Ibid: 142) since, in the Heideggerian terms that Farinelli employs, it realizes the distinction between *being* and *Being.* Though shaped out of clay by human hands, the *pinax* comes in-to *being* as the clay sets and solidifies while *Being* becomes 'that which shuns from the map, that which does not appear on it, even though it is imprinted in the geometrical order implied in the very materiality of what functions as basis and concrete support of its representation' (Ibid: 142). In other words, art is always already present in the map. However, cartographic reason functions by forgetting the moment of creation, the hand of

the artist at work in it, suggesting perhaps that the task of remaking the map might also fall to artists. Also implied in Farinelli's argument is the particularly telling suggestion that this might be achieved by producing the kind of 'philosophical sculpture' (Ibid: 139) that does not solidify but remains fluid and mutable, a map that is always in the making; the relevance of which will become clearer as the thesis progresses.

There is, then, an essential relationship between art and the map, and the possibilities for remaking it. The next section reviews how artists have engaged specifically with the map, as well as suggesting a parallel that might be drawn between the map works of locative media and an earlier avant-garde.

1.3.7 Art and Maps

The engagement of artists with maps has steadily intensified from the 1920s to the present day, featuring in the works of Dada, Surrealism, Lettrism, Situationism, Pop Art, and Fluxus, and perhaps most notably in the work of conceptual artists including On Kawara, Richard Long, and Douglas Huebler, as well as the *nonsite* works of Robert Smithson (Wood, 2010: 189-230). For Wood, the explicit intention of these works is 'to question, undo, or dissolve the authority of the map' in order to reveal it as a myth (Ibid: 216). This critique of the map is certainly shared by many artists working with locative media but, on closer inspection, there seems to be no clear lineage, primarily because most art maps have used maps as subject matter and content (often as a material for collage, as with the Dadaists), but have not ventured to produce counter-mappings or suggest alternative modes of mapping. As Wood notes, 'there is

no interest in maintaining any kind of footing in the world of maps' (Ibid: 218)[74].

They also, for the most part, lack locative media's focus on the participatory

production of maps, one that it more obviously shares with the grassroots neo-

geography movement. However, both locative media and earlier art maps can

be seen as part of a general renaissance in artistic engagements with the map

over the last ninety or so years, and particularly since the nineteen-sixties.

This renaissance has contributed to a reassessment of the 'conventional

historiography of cartography's evolution from art to science' (Cosgrove, 2005:

35). This sees art as central to the production of pre-modern maps, but

progressively expelled by scientific cartography in the early-modern and

modern periods (Woodward, 1987). De Certeau, for example, notes how

through geometrical abstraction the modern map 'eliminates little by little the

pictorial figurations of the practices that produce it' (1984: 121). However, the

supposed separation of art and scientific cartography has been challenged on a

number of levels: that the scientific map remains a cultural object (Harley,

1989), that science itself embraces aesthetic considerations in its visualization

of knowledge (Corby, 2008), that popular artists (newspaper illustrators, for

example) as well as *avant-garde* artists have engaged with the map and made

it their own (Cosgrove, 2005). Behind these lies a broader critique of the

separation of art and science. In its most radical version, presented by Bruno

Latour in *We Have Never Been Modern* (1993), that separation never existed

except in the imagination of modernity. However, given the 'conventional

historiography' of scientific cartography's separation from art, it is interesting to

---

[74] Wood does, however, go on to name artists that he finds 'promising' because of their
politically-motivated interest in 'counter-mapping', including Lize Mogel, Kanarinko, Lauren
Rosenthal, and Suzanne Slavick (2010: 218-230).

note that one of the ways in which the map works of locative media have been positioned is in terms of a return to or restoration of pre-modern 'chorographic' representations of space –that is, maps that supply a picture of place that figures not just the physical features of its landscape but also the emotions, beliefs, stories and myths that are attached to that place. Jill O'Sullivan, for example, sees in works like Christian Nold's *Biomapping*, the 're-configuration and re-coding of a chorographic [...] visual literacy' through 'quasi-cartographic modes that rely on subjective or qualitative experience of place, rather than the logical exactitude of geographic spatial measurements' (2010: 4). The analysis of *Biomapping* presented in Chapter 2 takes issue with the degree to which the work escapes this 'exactitude', but, nevertheless, the engagement of such works with the idea of 'place' as it is experienced and imagined is a distinctive feature of locative media, as well as those artistic movements that prefigure locative media in their use of maps, and are often supposed to supply it with a historical lineage: specifically the Situationists, and work within Surrealism, Land Art and Site Specific Art.

Outside of these connections with other artistic movements, and the simple fact that they also engage to some extent with maps, there is another way in which locative media's engagement with space might be positioned in relation to the broader history of art. What follows is offered tentatively since it is beyond the scope of this thesis to establish such a historiography for locative media. Yet it offers another way of thinking through its engagement with issues of space by allowing some parallels to be drawn with other artistic movements outside of those that obviously and directly engage with maps. One starting point is the

assertion by Lefebvre that Picasso's cubism, a 'crucial moment' he dates to

1910, marks the 'shattering' of abstract space as:

> the space of common sense, of knowledge, of social practice, of political
> power, [...] the space, too, of classical perspective and geometry,
> developed from the Renaissance onwards on the basis of the Greek
> tradition (Euclid, logic) and bodied forth in Western art and philosophy,
> as in the form of the city and the town (1991: 25).

In these paintings, the single-point perspective is collapsed to the surface of the

canvas and with it the position of the viewing subject. At the same time, the

object loses its three-dimensionality and regains it in the form of multiple,

simultaneous perspectives. Although this purification of form marks an

intensification of the abstraction of space - for Lefebvre, one that is marked by

violence - it also, through its fragmentation of space, reveals it to be

contradictory and thus hastens its demise and beckons to a future in which

space becomes 'differential':

> Picasso [...] inevitably glimpsed the coming dialectical transformation of
> space and prepared the ground for it; by discovering and disclosing the
> contradictions of a fragmented space [...] the painter thus bore witness to
> the emergence of another space, a space not fragmented but differential
> in character (1991: 302).

Thus although, for Lefebvre, avant-garde artists occupy an ambiguous position

in relation to abstract space, Stuart Elden suggests that he sees their work as 'a

means of challenging the geometrical representation of space' (2004: 182).

However, as Lefebvre puts it, '"common sense" space, Euclidean space and

perspectivist space did not disappear in a puff of smoke without leaving any

trace in our consciousness, knowledge or educational methods' (1991: 25) - or

notably, it should be added, in the maps of cartography. Cartographer Mark

Denil argues that a truly radical cartography has yet to mount a similar

challenge to the 'persistent, conservative nature of the cartographic schema'

(2011: 20), but that analytical cubism[75] provides the model for such a 'seismic break' (Ibid: 21). In it, he sees the possibility for a radical cartography in which 'the schema itself must be broken and reformed' to produce the same 'sense of dislocation, of jumping the rails and taking off on another track, and of having new vistas open' (Ibid: 23).

This image has been removed for copyright reasons

Figure 1.5: Pablo Picasso, *Portrait of Ambroise Vollard* (1910),
oil on canvass, (92 x 65 cm), Pushkin Museum of Fine Art.

This thesis argues, through its examination of case studies, and particularly those of chapter 4, that the maps of locative media begin to make such a paradigmatic break with the cartographic schema. The suggestion is that useful parallels can indeed be drawn with the work of artists such as Picasso and that the birth of non-representational painting may in some ways be mirrored today by the development by locative media artists of a 'post-representational

---

[75] Denil specifically cites the works of Pablo Picasso and Georges Braque.

cartography' (Pickles, 2004: 160). As with an early 20th century avant-garde,

this is achieved through the reintroduction of the dimension of time, but also of

higher spatial dimensions, particularly through the introduction of non-Euclidean

geometries, as charted in Linda Dalrymple Henderson's *The Fourth Dimension*

and Non-Euclidean Geometry in Modern Art.[76] Republished in 2013, after many

years out of print, an updated introduction notes that this exploration of higher

dimensions is currently undergoing a renaissance, fuelled not least by the

capacity of computer software to incorporate higher dimensions and to picture

space in novel ways, producing a multiplication of planes, frames and

perspectives that is reminiscent of analytical cubism (20*13*: 9, 76-91). While, in

the 1983 edition, Henderson explored the connections between modern art and

developments in mathematics, in the 2013 edition, she notes how current

developments in mathematical theory, and particularly string theory (Ibid: 73), is

informing the work of contemporary digital artists like Marcos Novak, whose

'liquid architectures' are strongly suggestive of some of the maps of locative

media. She also discusses the work of Tony Robbin who, informed by Albert

Einstein's Special Theory of Relativity, 'created multiple layers of spaces that

refused to cohere into a single spatial system' (Ibid: 76)[77], much like the maps

of Petra Gemeinboeck, and Nishat Awan and Phil Langley that are discussed in

Chapter 4. This 'sense of space as folded and animate' is, for geographer Nigel

Thrift (2004: 584), not only a product of alternative mathematical models, but

also of a general increase in calculative activity brought about by new

information technologies and which produces an ontological shift towards 'a

new sense of the world and new forms of representation' (Ibid: 587). These new

forms emerge, as with Cubism in the early 20th century, during a period of rapid

---

[76] See also Stephen Kern (1983: 147).
[77] See also Tony Robbin's *Shadows of Reality: The Fourth Dimension in Relativity, Cubism, and Modern Thought* (2006).

change and technological innovation that challenges safe assumptions, particularly through the creation or discovery of phenomenon that are invisible to conventional modes of representation. Whereas, as Henderson shows, exploration of the fourth dimension at the beginning of the 20th century was in part a response to ethereal phenomenon such as X-ray, radioactivity and wireless telegraphy (1993: 25), artists working with locative media respond to other Hertzian[78] phenomenon, such as WiFi and GPS, as well as the invisible connections and networks produced by mobile telecommunications technologies, all of which arise at the beginning of the 21st century. Denil's (2011) appeal to the model of analytical cubism in postulating a 'radical cartography' is, then, a highly thought-provoking one and suggests that any claim to a post-modern, non-representational cartography might be usefully measured against the 'seismic break' of cubism. However, there is an important difference to be noted between the two projects, and one that helps in answering an obvious question that arises: namely, why does the artistic reappraisal of space, of its representation and framing, which was begun almost a century ago, only very recently engage with maps in this way? In other words, in what way can the art-maps of locative media possibly be thought of as avant-garde?

One way of addressing this is in terms of what Pickles, following Jay (1988), describes as the 'twin scopic regimes' of modernity (Pickles, 2004: 84-86). Both 'perspectivalism' and 'projectionism' are founded on mathematically gridded modes of representation that assume a Euclidean space; that is, space seen as 'geometrically isotropic, rectilinear, abstract, and uniform' (Jay, 1998: 6).

---

[78] Hertzian phenomena are those occupying the farther reaches of the electromagnetic spectrum. They may be invisible and indistinct but have physical properties.

However, the position from which they represent an external reality is quite different. Albertian perspectivalism, as Alpers points out, assumes a single point outside the frame of the picture: 'a plane serving as a window that assumed a human observer, whose eye level and distance from the plane were essential' (1983: 138). By contrast, Ptolemaic projectionism, Alpers notes, implies a view from nowhere that, instead of producing 'a window through which the external viewer looks' (Ibid: 138), produces 'a surface on which to inscribe the world' (Ibid: 138) - a view that is outside the perception of a single viewing subject and, in this sense, beyond human measure. Rather than the frame being a window onto the world, it is an 'enframing' (Heidegger's '*Gestell*') that creates 'an organized whole of computable forces' (Heidegger [1954], quoted in Farinelli, 1998: 141). It is this enframing that Farinelli likens to Foucault's 'timeless rectangle' in which, 'beings bear only their names and are represented through their visible surfaces. They are placed one beside the other, and ordered according to their physical features, which alone serve to analyse them' (Ibid: 141). This 'rectangle' remains, for Farinelli, an 'unsurpassable definition of the cartographical image' (Ibid: 141).

These scopic regimes have different origins, arising in different parts of Europe at different times (Jay, 1998; Alpers, 1983), and served different purposes: perspectivalism being more concerned with creating realistic images while projectionism served to create 'public knowledge' – a shared and consensual view of the world (Pickles, 2004: 84). Though overlapping and converging in many respects (for example, in the elevated bird's eye perspective of 'pictorial' maps), they have continued to lead separate lives, and so what is tentatively suggested here is that the 'fracturing' of these respective scopic regimes may

also have taken place at different times and in different ways. The avant-garde of the early 20th century was concerned with the representational space of *perspectivalism,* whereas the rethinking of *projectionism* that is witnessed in some of the maps of locative media only takes place almost a century later. A number of reasons for this might be briefly suggested, although it is beyond the scope of this thesis to develop these more fully. Chief amongst these is that *if*, as has been argued, modern ways of seeing and thinking are founded on cartography, then it is to be expected that the maps of cartography would be the site of a 'last stand' against such scrutiny. Allied with this is the observation that, in the modern division of art and science, mapmaking found itself within the bastion of 'science' – the walls of which only began to crumble later in the 20th century. However, it is sufficient for current purposes to note how the 'fracturing' of cartographic projectionism would need to be different in kind from that of perspectival illusionism. In Cubism, the conventions of perspectivalism, which rely on the production of a window through which the depth of the world is conjured from a single point of view, are undone by simultaneously collapsing that depth to the surface of the painting and creating multiple points of view. In projectionism, by contrast, it is not the position of the viewer that is at stake, but the surface of the map, the depth of which has already been removed. It suggests that, rather than a collapsing of depth or repositioning of the viewer or viewers to produce multiple perspectives, a 'seismic break' from modern, scientific cartography requires an interrogation of the surface of projection; and it is indeed to actions of stretching, ripping, and stitching that recent locative media maps have turned, or else the multiplication of its *surfaces* (rather than *viewing positions*) precisely in order to endow that surface with a depth that has hitherto been denied. While in both cases the 'break' is achieved by dismantling

an ordering of the world by mathematical grids, these grids are employed quite differently by the two scopic regimes, and their breaking apart calls for quite different strategies.

Returning now to Denil's suggestion that a radical cartography must emerge in the way synthetic cubism once did, certainly there are useful comparisons to be made but an essential difference must also be acknowledged. One way in which this informs the examination of the case studies that follows is, paradoxically, in acknowledging that the two regimes do not remain pure, in either Cubist paintings or works of locative media, but interpenetrate and contaminate one another. As Pickles (2004: 84-86) asserts, the 'cartographic gaze' is an amalgam of the two regimes (so that, for example, the shading of contours represents the shape and depth of mountains in an illusionist manner). There is also good reason to believe that these scopic regimes may have become even more closely entwined in recent years. Whereas, in the modern division between science and art, perspectivalism fell on the side of art and projectionism on the side of science, Alpers notes that '[w]e are witnessing a certain weakening of these divisions and the attitudes they represent' (1983: 124). Lev Manovich, drawing on Alpers, sees in human-computer-interfaces the operation of both perpectivalism and projectionism: '[t]he computer screen [...] functions both as a window into an illusionary space and as a flat surface carrying text labels and graphical icons', these 'image-instruments' marking the return of the mapping impulse described by Alpers (Manovich, 2002: 96). This return has been noted in predominantly perspectival forms such as computer games (Lammes, 2008) and film (Conley, 2007), while the influence of perspectivalism on mapmaking itself can be seen, for example, in Google

Earth's ability to 'blend [...] perspectival and projectionist views of the world' by moving from a God's-eye view from above, to an elevated bird's eye view, and down to the perspectival 'street view' below (Lukinbeal, 2010: 27). This reintroduction of a perspectival view also takes place in some of the maps of locative media: for example, in Tomas Apodaca's *Fly Cab* (2006-) and in some of Christian Nold's 'Biomaps'[79]. Strictly speaking, the mathematical model of projectionism, its production of a surface rather than a window onto the world, remains the predominant mode of representation in all works of locative media. However, if perspectivalism and projectionism are more loosely defined as representational 'dispositions', these works can be seen as tending towards one or the other, providing a useful means of cleaving apart two distinct approaches. On the one hand, a 'perspectival disposition' is more concerned with the position of the viewing subject, with points of view, with subjectivity and, as Alpers suggests, with narrative: the picture 'as a stage for significant human actions' (1983: 137). It is a disposition that informs the works discussed in chapter 2, particularly, and chapter 3, where the attempt is to inject lived experience into the sterile territory of the map by producing multiple and situated perspectives and creating narratives of 'significant human actions'. It raises a question, however, and one I will return to, about whether these 'perspectival' critiques of the map, which most often take for granted the surface of projection, are appropriate to the task of interrogating a mode of visual representation that is founded on projectionism. By contrast, a 'projectionist disposition' is concerned with objects and objectivity more than subjects and subjectivity, with description rather than explanation or narration, and with

---

[79] See especially *The Stockport Emotion Map* (2007) as well as images produced using Google Earth as part of the *Greenwich Biomapping* project (2008), both of which are discussed in Chapter 2.

surfaces rather than perspectival frames. This disposition is at play predominantly in the works discussed in chapter 4, where the focus is on rethinking the surface of projection as a foundation for shared knowledge of the world, rather than on accounting for different perspectives on the world or seeking to integrate new qualities within conventional cartographic projections. For these works, accordingly, the radical promise lies not in life, lived experience of the world, gaining entry to the sterile territory of the cartographic map but rather in the prospect that the map itself, its surfaces, might come to life.

1.3.7 From Cartography to Code

The broad sweep of the discussion of 'Cartographic Space' in this chapter has been to suggest that cartographic reason and representation have been integral to modernity. An analysis of mapping practices, including those of locative media, must take the weight of this history into account. Further, it has been suggested that a crisis of cartographic representation and cartographic reason is a defining feature of this epoch's transformation into something other – something *post*-modern in the simple sense that it comes *after* modernity. The source of its 'un-map-ability' lies in the invisibility and intangibility of phenomena, the effects of which are perceived as real and material, but which are themselves not readily assignable to the cartographic surface. These phenomena chiefly consist of flows of data within networks that are mediated by software code. These coded operations increasingly mediate social and economic life, creating new connections and new measures of proximity that do not readily conform to Euclidean space and Cartesian models of representation. However, in the next section of this chapter, it is argued that code should not

simply be seen as a *disruption* of Cartographic Space, but rather as an active

producer of spaces in its own right. The operations of code do not lie off the

map and outside of space but gouge into and reshape it in very distinctive

ways. They introduce new modes of seeing and thinking and acting by

'decomposing and recomposing the world in their own image' (Thrift, 2004: 587)

and, in so doing, they also change the nature of power. What, however,

becomes of the map? The works of locative media begin to answer this

question precisely because, as the next section shows, their work is as much a

product of code as cartography, and because they persist in using the form of

the map to address the space of code. Code not only poses a challenge to

cartographic representation, but also suggests entirely new modes of mapping.

1.4 Introducing Code Space

In the previous section, I established that locative media is, through its use of

GPS and its production of maps, deeply indebted to cartographic reason and

representation, even as it attempts to move away from and beyond these. It is

also, however, inextricably tied to the operations of software code. Here, I want

to briefly establish the role of code in the map works of locative media. I

propose that code, like cartography, can be seen as a producer of spaces, that

it might also contribute to new forms of mapping or even be seen as a form of

mapping in its own right, and that 'the power of code' bears a likeness and

might be seen as a successor to 'the power of maps'. In this way, I am seeking

to lay the foundations for my development of Code Space as a model of the

way in which space is increasingly produced and mapped, and which is steadily

eclipsing Cartographic Space. The discussion here, however, is necessarily

embryonic since the role of code is primarily elaborated through the discussion

of case studies in Chapter 4, and the model of Code Space only fully takes

shape in Chapter 5.

As Tuters and Varnelis put it, 'Locative media […] is virtually unthinkable except

as a question of code' (Tuters & Varnelis, 2006: 359). Artists producing maps

with locative media rely on software programmes and often write their own

code, or otherwise work with programmers, in order to realize their work. It is

through coded operations that these artists create and map novel spatial

relations and realize them as visualizations of one sort or another. A prime

meeting point between cartography and code in these works is in their use of

GPS, an assemblage of coded operations that include mobile devices, wireless

communications and an infrastructure of communications satellites - in

conjunction with a cartographic model of space, with its gridded lines of latitude

and longitude. This meeting is also, however, in many senses a point of

departure. It was, in any case, never a seamless fit. While the World Geodesic

System on which GPS is based mirrors cartographic lines of longitude and

latitude, it has always set itself apart and adrift from this model: the zero

meridian of the WSG84 datum used by GPS runs 102.5 metres east of the

Greenwich Meridian. Adrian Mackenzie has also shown how the way in which

time informs the operation of GPS (via synchronized atomic clocks aboard

communication satellites) subtly but profoundly alters the way in which

navigation is achieved in comparison to that based on the time of the

chronometer (2002: 87-115). More profoundly perhaps, the automated

production of locational data and the ability of software to process this at speed

has allowed for locational data to be readily brought into alignment with other

data-sets, creating new kinds of relations and possibilities. Compare, for example, the daily mappings of On Kanwara for *I Went* (1968-1979)[80] and those of Daniel Belasco Rogers for *The Drawing of My Life* (2003-), which is discussed in Chapter 2. Both involve the plotting of their movements over an extended period and documenting these in the form of maps. On Kawara worked with paper maps, producing around four-and-a-half-thousand in total, which were later bound together, in chronological order, as a twelve-volume set. By contrast, Belasco Rogers plots his movements and produces maps using GPS data. While he also uses maps to present his movements over time, the same data can be expressed in many different ways; as, for example, in *My Life as a Birch Forest* (2012) which visualizes not movement but gaps in data[81].

However, while coded operations clearly create new possibilities, the broader argument of this thesis is that the meeting of cartography and code that is witnessed in the map works of locative media marks more than just a qualitative shift, but a fault line of tectonic proportions that runs between antithetical spatial paradigms, each one of which is defininitive of their age. It is not just that code modifies Cartographic Space, or even that it begins to disrupt and fracture that space. Rather, code actively produces its own spaces and its own forms of spatiality, and these not only reconfigure the world that is to be mapped, but also redefine what it means to map. To begin making that case, I shall firstly establish that code is a producer of spaces.

---

[80] See Wood (2010: 204) for an account of On Kawara's mapping practices.
[81] See Chapter 5 (5.2.1), for a discussion of this work.

1.4.1 The Space of Code

The advent of the internet produced a view, one that persists, that 'cyberspace' exists outside of material space, and so the 'virtual' was juxtaposed with the 'real' or material. The advent of ubiquitous computing and mobile, location-aware technologies has forced some modification of this view, but only to the extent that locative media are seen as sitting somewhere between the material and immaterial, reintroducing one to the other by layering the virtual and real. This section questions and complicates that view by suggesting that code produces its *own* space or spaces and its own forms of spatiality.

The attempt to put the operations of (software) code back into space, and space back into code, has, unsurprisingly, been led by geographers - cynically, one might say, in an attempt to reclaim lost territory for a discipline founded, like no other, on cartographic ways of seeing and thinking. As Kitchin and Dodge (2011: 13) note, much of this work has focused on ICTs[82], showing how, through the speed of their communications, they produce space-time compression (Harvey, 1992: 284-307), and create networks that cut across spatial scales to alter the geographical patterning of business and capital, to reconfigure cities and regions, and to create new senses of place and identity. However, there has more recently been an emphasis on the spatial dimensions of software code itself, or what Nigel Thrift and Shaun French, in their early 'audit' of the geography of software, call 'new landscapes of code' (2002: 309). The fullest account of these landscapes to date is Kitchin and Dodge's *Code/Space: Software and Everyday Life,* which sees a 'dyadic relationship between software and space' in which, 'the production of space is increasingly

---

[82] The abbreviation for 'Information and Communications Technologies'.

dependent on code and code is written to produce space' (2011: viii). An

example they give is the Code/Space[83] of the airport check-in that depends

entirely on code for its spatiality:

> [i]f the software crashes, the area reverts from a space in which to check
> in to a fairly chaotic waiting room. There is no other way of checking a
> person onto a flight because manual procedures have been phased out
> due to security concerns. (Kitchin & Dodge, 2011: 17)

These geographies of software code are largely invisible and, being 'infused

into the very fabric of life' (Thrift & French, 2002: 313), go largely unnoticed and

taken-for-granted. Nevertheless, this 'technological unconscious' (Thrift, 2004c)

continually works away in the background to automatically produce spaces,

making decisions and judgments without human oversight (Kitchin & Dodge,

2011: viii). The agency of code is further extended by the use of artificial neural

networks, generative algorithms, and fuzzy and evolutionary methods that

stress 'the situatedness of action, the importance of interaction and adaptation,

and emergent properties' (Thrift & French, 2002: 320).

In recent work, there is also an increasing awareness of the spatial nature of

processes that are *internal* to the operations of code, and how these spillout

into the 'real' world and reshape it. Casey Alt, for example, has demonstrated

how Object Oriented Computing (OOC) solves problems by first mapping

spatial relations between 'virtual' objects, but how these then go on to

'recode[...] all aspects of the noncomputational world in very real ways' (Alt,

2011: 298)[84]. In other words, 'virtual' spaces produce 'real' spaces, and do so in

---

[83] Kitchin and Dodge's (2011) 'Code/Space' can be distinguished from my use of 'Code Space'
in the following way: that whereas Code/Space denotes a dyadic relationship in which the
elements 'code' and 'space' interact with one another, my 'Code Space' denotes a spatial
paradigm that is characterized by, and thus inseparable from, code. It is a model for a worldview
that is shaped by code, rather than a model of the way in which discrete elements *within the
world* interact with one another.
[84] Casey Alt's analysis of Object Orientated Computing is discussed at length in Chapter 4 (4.6).

their own image, thus introducing new spatial forms and senses of spatiality. Similarly, Adrian Mackenzie charts the complex ways in which 'digital signal processing (DSP) algorithms organize spatial relations' (Mackenzie, 2009: 1299). These algorithms allow geographically located wireless network users to 'co-habit narrow bands of spectrum' by dynamically responding to 'the incompatibilities and mismatches between spectrum allocation and inhabited space' (Ibid: 1298) – or what might otherwise be described as 'virtual' spaces and 'real' or 'geographical' spaces. They resolve the mismatch between the two by treating space as 'intrinsically multiple' (Ibid: 1301) and always in movement: 'movement that cannot be indexed or referenced to anything apart from itself (such as the point of reference, geographical coordinates [...])' (Ibid: 1298). In other words, DSP algorithms produce spaces that do not fit within a cartographic frame but are nevertheless very real in their effects. Chapter 4 returns to these microscopic examinations of code and their implications for the maps of locative media. The point for now is simply that code neither sits outside space, nor exists as a 'virtual' layering of cartographic space that sometimes conforms with and at other times disrupts this space, but is productive of (radically) new kinds of spaces and forms of spatiality that, if we wish to account for them, arguably call for new kinds of maps.

1.4.2 The Power of Code

Here, I make the argument that a successor to 'the power of maps' might be identified in 'the power of code'. I begin to make that argument by outlining how Code has been linked to 'power' in ways that mirror discussions of 'the power of maps'. The chief source for this is Thrift who, like no other, makes these links explicit, showing how space as it was once cartographically conceived is being

reshaped by code and, with it, the nature of power and the opportunities to counter it. In outlining his arguments, which are further elaborated throughout the thesis, I quote extensively from his work, and do so quite deliberately. Thrift supplies a vocabulary where none existed and with which the emerging conditions of what I call Code Space may be described. My aim, therefore, is also to introduce his vocabulary, which I will later make use of but also embellish upon.

Thrift also sees the spatial effects of code as producing an epochal shift towards a new spatial ontology. The following lengthy paragraph is worth quoting in full not only because it distills so much of what will follow but because it provided something of a 'Eureka moment', supplying a point of reference and source of validation as this research, through its examination of the case studies, moved hesitantly towards the idea that an epoch-defining shift between a world shaped by cartography and a world shaped by code could be witnessed in these works. In it, he describes GPS and the 'capacity to track movement' as a meeting point between two different kinds of world: an old world that arose out of scientific cartography and led to a gridding of space, and a new world that emerges out of new forms of information technology and is characterized by dynamic movement:

> I have described the way that the proliferation of Euclidean calculation has produced a new kind of world not once but twice. In each case, what started as an epistemological shift transmutes into an ontological one. In the first pass, the Euclidean model of numbered and angled space produced a grid over the world. That process took some 400 years to complete, if we date it as beginning with the first large-scale surveys and as carrying on through the advent of chronometers in the early 19th century and *ending with the advent of global positioning systems* based on satellites [...]. The second pass overlapped in that it *began with the introduction of new forms of information technology that produced a generalised capacity to track movement* and is likely to end with a

redefinition of the world of persons and objects as constituent elements of a mutually constitutive moving `frame', which is not really a frame at all but more of a fabric that is constantly being spun over and over again as position becomes mobile, sometimes producing new patterns. (Thrift, 2011: 6, my italics)

So, for Thrift, too, GPS and the capacity of information technologies to track movement marks a meeting point or transition between two kinds of world, and it is no accident that he frequently turns to artists working with maps and locative technologies for examples of the exploration of 'new apprehensions of space and time' (2004: 583). However, the import of these is never developed to any great degree, and so these references remain tantalizing rather than informative[85].

Thrift builds his characterization of a 'second pass' over a series of articles (2004, 2011, 2012, 2014), acknowledging from the start that this is a largely speculative exercise (2004: 601). To summarize, Thrift sees information technologies and the operations of software code -'the birth of a new information age' (2011: 6) - as producing a rapid expansion of calculation into all aspects of everyday life. Yet this 'enhanced calculativity' (2004: 596) is not simply a rationalizing force but creates new qualities (Ibid: 583) – a capacity he terms 'qualculation'. These 'new practices of organizing, analyzing, displaying, storing, and communicating information' also bring about a transformation in the production of space (2011: 6), creating 'a new sense of space as folded and animate, one that assumes a moving point of view, a "nomadologic" rather than a monadologic' (2004: 584). This 'movement-space' produces spaces as 'relative', not through the abolition of abstract frames or grids, but through their

---

[85] See, for example, Thrift (2014: 58-60).

multiplication and intensification to produce 'an array of different co-ordinate systems, different kinds of metric and new cardinal points' (2004: 596). In combination, these produce what Thrift, borrowing from Erin Manning (2009: 187), describes as a 'resonant grid' that, unlike the Cartesian grid of cartography, 'can itself shift shape' (Thrift, 2011: 7). Crucially, this shaping of the world by code and calculation has nothing to do with *representing* the world but is about being immersed in it. It is a 'phenomenology machine' (2011: 15) in which 'feeling and the abstraction of calculation are threaded together' (2011: 14) in such a way that we remain mostly unaware of this 'new calculative background' (Thrift, 2004: 585).

Thrift identifies in these conditions an 'opportunity for people to re-define/re-cognise their environments' (2011: 23) in novel and creative ways, not least through alternative mapping practices (Ibid: 22). However, his portrayal of this new phenomenology as 'Lifeword Inc.' is a predominantly dystopian one. In the emergence of movement-space he identifies a shift from a *military-industrial* complex to what Sterling (2009, quoted in Thrift, 2011: 7) calls the *security-entertainment* complex in which both war and entertainment become 'permanent and pervasive' and increasingly intertwined (Thrift, 2011: 11). This new mode of capitalism employs information technologies to create 'a continual experiment in experiment', a performance of space stimulated by both fear and desire, in which 'the supposed authenticity of the lifeworld becomes a market value' (Ibid: 15). The stable ground and fixed positions of Cartography give way to 'a generative phenomenality [that] depends upon the construction of the world as a surface in continuous motion, [...] a world almost always there, [...] a world of infinite mobilization' (Thrift, 2011: 8). It is in the creation of such a

world, I will go on to argue, that artists working with locative media may, contrary to their stated aims, have played the role of unwitting pioneers.

Thrift, of course, is not alone in painting such a bleak picture. It owes much to Giles Deleuze's depiction of the 'societies of control' (1990) which, for Thrift and French, best approximates to 'the governmentality of software' (2002: 326), and in which discipline from above is displaced by (self-) modulation from within. How code operates to achieve this is revealed in, for example, Alexander Galloway's *Protocol: How Power Exists after Decentralization* (2004). Similarly, Rob Coley and Dean Lockwood draw on many of the same writers to paint a bleak picture of 'The Cloud' (the culture of cloud computing) in which the affective, creative and performative potential that is contained within the *virtual* is entirely enclosed, pre-emptively *actualized*, and harnessed to the interests of capital, to the extent that there is 'no "Escape" key' (2012: 63). For these writers, too, it is 'under the control of protocol and algorithm [that] life is re-established as 'performance'' (Ibid: 64). Thrift's depiction of movement-space is also informed by Michael Hardt and Antonio Negri's scenario of *Empire* (2000), in which 'diagrams' of power create a pervasive security threat in the service of a global elite, while the connection between code and the production of security crises is also addressed by Adrian MacKenzie and Theodore Vurdubakis (2011).

This heavy-handed talk of 'the power of code', as with talk of 'the power of maps', should be qualified to allow that artists working with locative media may, from time to time, disrupt the power of both and in doing so expand the 'horizon of possibilities' (Crampton, 2003: 51). Thrift calls for a reworking of Lifeworld

Inc. that explores its creative possibilities and seeks out its 'undoubted treasures', (2011: 23), while writers such as Matthew Fuller (2005; Fuller & Goffrey, 2012) and Jussi Parikka (2010; 2012) are, against totalizing accounts, keen to stress the open-ended, contingent and processual nature of coded environments. Kitchin and Dodge (2009), who were, as previously noted, keen to see mapping as an 'ontogenetic' process, also, in their analysis of code (2011), stress the way in which code's production of space is performative and therefore open-ended and ripe with possibilities. What this may overlook, however, is that the ontogenetic performance of space may serve powerful interests, and this is an argument that I later put forward in the closing chapter.

Although discussion of the power of code is extensive, few writers focus on its spatial nature and Thrift is alone in drawing attention to its map-like qualities. Kitchin and Dodge *imply* a parallel between cartographic maps and code, but never spell out the connections. Their work has addressed, in analogous ways, the way in which both maps and code produce spaces and, although 'map' and 'code' are brought into close proximity through their work on the mapping of cyberspace (Kitchin & Dodge, 2001), the two are never conceptually aligned. It seems unlikely, however, that these authors, having written extensively about the 'power of maps', would be unaware of the implications of introducing the phrase 'the power of code' to discussions of software (Kitchin & Dodge, 2011: 9-11).

The idea that code might be considered as a 'map' of sorts is further explored through the case studies of Chapter 4, and the implications discussed in Chapter 5. For now, similarities and differences are briefly suggested in order to

establish this as a line of enquiry. Firstly, code is, like cartography, a 'descriptive regime' (Thrift, 2011: 8) that organizes relations between people and things in space and thus displays what Alpers (1983) describes as a 'mapping impulse'. Both rely on the 'construction of the world as a surface' (Thrift, 2011: 8), albeit that the nature of these surfaces may differ markedly. They construct these descriptive surfaces through processes of abstraction, calculation and encoding (including the application of geometrical models) that rely on various metrics, standards, and 'system[s] of addresses' (Thrift, 2011: 586), not least of which are co-ordinate systems (Thrift, 2004: 598-9). They both construct a 'space-time background' that goes largely unnoticed and unquestioned because of the way that these are presented as 'timeless arrangements of perception' (Thrift, 2011: 5).

Secondly, they are both ontological in nature in that their logic becomes 'the logic of the world' (Thrift, 2011: 586). They enframe the world by making 'inferences about how the world is connected' (Ibid: 8), although the nature of this enframing is very different as '[s]tatic representation becomes subordinated to flow' (Ibid: 590) and cartography's 'extensive' view from above cedes power to code's 'intensive' view from within (Lash, 2010). Implied in this is also a shift from maps as representational artifacts to non-representational processes.

Thirdly, the practices and technologies of both mapping and coding develop with and are mobilized in support of specific forms of governance. Both cartography and code are logistical tools that develop out of military ambitions and concerns for security. If code is taken as the basis of a *security-entertainment* complex, the cartographic map may be said to have functioned

similarly for the *military-industrial* complex that preceded it. They create

exclusion and inclusion by both identifying threats and creating senses of

belonging and identity.

This speculative claim that code might be considered as a map of sorts clearly

raises more questions than can yet be answered. In what way, for example, can

the invisible and non-representational processes of code be considered as

maps in the way we currently understand them? The point, however, is not to

establish that 'code is the new map'. Clearly, there are many coded operations

that bear little resemblance to anything like a map. Rather, this conceit provides

a means of exploring the possibility that just as the cartographic project

produced distinctive ways of seeing, thinking and acting, so too might code.

However, the meeting of Cartography and Code in works of locative media

presents an opportunity to address this issue as a question about mapping, and

specifically the possibility that Code may supply a means of mapping beyond

Cartography.

1.5 Conclusion

In this chapter, I first established that counter-mapping, and thus a critique of cartography, is a central feature of locative media. However, I also pointed to the constraints that cartography places on this project, showing how cartography is formative of a peculiarly modern mindset that continues to exert a hold over these works of counter-mapping. There is, then, a paradox at work, and it is this paradox that is the focus of Chapter 2. However, I also pointed to a protracted crisis in cartographic representation, one that is further explored through the case studies of Chapter 3 and which signals that artists might yet find a means of mapping beyond cartography. A possible model for this was identified in the 'break' with perspectival illusionism, and the role of alternative geometries in this was briefly introduced. What I shall later be arguing is that these geometries are also at work in the coded processes that are extensively employed by those artists discussed in Chapter 4. For now, I have restricted my discussion of Code to the idea that, like Cartography, it is a producer of spaces, that its shaping of spaces has implications for discussions of power, and that parallels may therefore be drawn between maps and code or, more specifically, between the role of cartographic maps in shaping the modern world, and the role of code in *post-cartographical mapping practices* that demonstrate how the world is being reconfigured.

Chapter 2

En/Countering Cartographic Space

2.1 Introduction

The increasing accessibility of locative technologies in the early 2000s presented an opportunity to do something different with maps. Rather than a skeletal portrayal of built and natural structures, maps could be used to show how people moved through and inhabited space, and express their experience of space and the stories and memories associated with it. The case studies grouped in this chapter explore how the map can be repurposed and reworked by introducing to it those qualities that are conventionally excluded. By countering cartography's abstraction of space with the lived experience of place, these artists engage in a critique of cartography and express a desire to move beyond it. However, the chapter also demonstrates the extent to which they remain indebted to and constrained by cartographic ways of seeing and thinking. Paradoxically, their valorization of the lived experience of place is deeply cartographical. Furthermore, they largely overlook the way in which code is remapping the world and the crisis in cartographical representation that this hastens. Accordingly, these works are seen as occupying a position that is closer to the model of Cartographic Space than that of Code Space.

The case studies in this chapter[86] attempt to introduce to the map those qualities and perspectives that conventionally fall outside or, to use Farinelli's

---

[86] With the exception of Simon Faithfull's *Navigation 0'00* (2009), which is included as a counterpoint to Belasco Rogers's *The Drawing of My Life* (2003-)*.

term, are 'shunned' from the map (1998: 142). Daniel Belasco Rogers's *The Drawing of My Life* (2003-) reinstates the body and the quotidian by tracing his own movements through the space of a city, Estha Polak's *Amsterdam Realtime* (2002) introduces time to the map by showing the unfolding of movement in 'realtime', while Christian Nold's *Emotion Maps* (2003-) incorporate affective and subjective responses to the urban environment. In doing so, these works, it is argued, participate in a very modern debate that pits the lived, embodied, experience of place against modern cartography's production of an abstract and disembodied space. This is reflected in the theoretical underpinnings that the artists draw on, particularly de Certeau's (1984) writing on walking and the city and his distinction between the strategic view of the map and everyday tactics of the street, as well as phenomenological perspectives such as Ingold's (2000, 2007) celebration of 'wayfaring' over the map's promotion of 'navigation'. They also find a strong affinity with the Situationists, their use of the *dérive* and the mapping of these to contest the rationalizing tendencies of modernity. There is also support for their endeavours in the literature on locative media with writers including Jason Farman (2012), Eric Gordon and Adrianna de Souza e Silva (2011), David Pinder (2005), and Mei-Po Kwan (2007) identifying in the technologies and practices of locative media a means to reinstate the body in representations of space. In all of these, there is often a turning back to and even nostalgia for a time when, it is supposed, a non-abstracted sense of connection with ground and place could be more deeply felt.

In attempting to reintroduce to the map those qualities and perspectives that cartography makes invisible, the case studies of this chapter implicitly (and

often explicitly) participate in a critique of cartography by calling into question the way in which cartography refuses to see and denies knowledge of the 'lived'. By introducing alternative perspectives and points of view, and particularly those that emanate from 'below' rather than 'above', they call into question the singular perspective of an all-seeing 'God's eye'. This critique is also evident in the visual representation of their maps and particularly in the way they remove or make play with facets of conventional cartographical representation: for example, in Belasco Rogers's reduction of the map to the lines of his movement alone, or in Nold's appropriation of contours to delineate levels of emotional response rather than heights above sea level. The unconventional content and appearance of these maps, and the critique of cartography that this implies, would seem to suggest that the unravelling of cartography has already begun. Certainly, they raise questions about what counts as knowledge and from whose perspective. There is the promise of new hybrid forms of knowledge and representation that build on, but exceed cartography by encompassing that which the map made invisible, un-representable and therefore unknowable. These artistic engagements with the scientific map, particularly through their use of data visualization techniques, also go some way towards blurring the line between art and science and their respective modes of knowing the world.

However, much of this chapter is devoted to demonstrating the extent to which these works remain deeply indebted to and embedded within the cartographic project, even as they critique it. At best, they occupy an ambivalent position between their reliance on a distinctively modern, cartographical conception of space (as evinced primarily in their largely unquestioned adoption of GPS) and

their desire to incorporate precisely those qualities and perspectives that the scientific map of modernity succeeds in erasing. While they aim to introduce lived, embodied, everyday, tactical, and nomadic experiences of space, they paradoxically attempt this through the lens of modern scientific cartography that, conversely, cannot help but work towards the production of an abstract and disembodied space. One way to picture this paradox is to position these works as operating somewhere along a vertical axis between the ocularcentric, God's-eye view from above and the situated view from the below. In this, they display what was described in Chapter 1 as a 'perspectival disposition' - a desire to create views of the world that incorporate and depend upon the position of viewing subjects. Yet in their desire to map subjectivities and points of view they fall back on 'projectionism' as the dominant mode of representation. While they may incorporate new data or even qualities into their representations, these do not disrupt the surface of projection - a singular and continuous Euclidean plane into which all other perspectives are collapsed and rendered flat. While the works in this chapter are nostalgic for and attempt a return to something like a pre-modern, chorographic spatiality that is local, subjective and cannot be organized into a whole, it is argued that they remain largely stuck within modern ways of conceiving of space.

What these case studies demonstrate, then, is not a move *beyond cartography*, but an exploration of the space of cartography that sometimes pushes against and blurs its boundaries, occasionally suggesting ways to cross them, but which ultimately remains confined within cartographic ways of seeing and thinking. These case studies provide, however, an opportunity to develop a better understanding of what Cartographic Space is and how it continues to exert such

a hold. In these works, *counter-cartography* becomes an *encounter with cartography* that is, nevertheless, a productive one in that it brings cartography into question.

2.2 Performing the Map/Mapping Performance

This section explores, through two case studies, a contradiction in works of locative media between their attention to the local, lived, and everyday, and their reliance on a singular and authoritarian representation of time and space. Simon Faithfull's *0 ° 00 Navigation* (2009) draws attention to the nature of this abstract representation of space, while Daniel Belasco-Rogers's *The Drawing of My Life* (2003-) claims to thwart it. The analysis of the two works also brings into question an assumption that is prevalent in the discourse on locative media that any artistic activity involving walking and maps can be readily seen as a reinstatement of the 'lived', against the abstraction of cartography. Greater attentiveness to the continued role of cartography in the framing of these art maps, and the ways of thinking that accompany them, reveals that this is often not the case. Rather, it highlights a danger that any attempt to appropriate cartography may end up being enslaved by that which it seeks to master.

2.2.1 Performing the Map: Simon Faithfull's *0 ° 00 Navigation*

Strictly speaking, the first case study, Faithfull's *0 ° 00 Navigation* (2009), does not fit in this chapter. Unlike the other case studies, it does not explore the lived experience of place, but, rather, is a work that deftly unmasks the cartographical construction of space and the iron-like grip of cartographic reason. Further, though it makes use of GPS and therefore arguably counts as

119

a work of locative media, it does not produce a map but instead a film. However, it provides the perfect foil, a mirror image even, to Belasco-Rogers' *The Drawing of My Life*.

0 ° 00 Navigation sees the artist, guided by a handheld GPS device, walk the 0º00'00" line of longitude, the Greenwich Meridian, as it crosses the British landmass. The walk took place in stages, over several months, and was recorded on Super 8 film, in black-and-white and without sound, and later transferred to video. Three edited 'excerpts', each of around three minutes in duration, were uploaded to the Web during this period, though there is no evidence that a longer film ever existed. Faithful, dressed in black, is followed by the camera, always filmed from behind, as he relentlessly and obsessively negotiates whatever obstacles lie in his path (a house, a backyard, fences, a ditch, a small lake, a hospital) in order to stay as true to the line of longitude as possible. The film begins at Peacehaven in Hampshire, where Faithful swims ashore and proceeds to climb the sea cliff, before setting out towards London and then the East Midlands, and ending in Cleethorpes in Lincolnshire, where Faithfull returns to the sea.

The work contains a number of fairly obvious cultural references. In the grainy and sometimes flecked (whether for effect or not) black-and-white cinematography, there is a clear nod to the slapstick comedies of the silent film era. The absurd refusal of the film's figure-in-black to circumnavigate obstacles produces a physical comedy of crawling, leaping, clambering and splashing that is nimbly performed by Faithfull. Another stated influence is the work of Land Artists such as Richard Long, and particularly his *A Line Made by Walking*

(1967): '[a]rtists such as Smithson or Richard Long were big influences for me particularly for the more performative side of my practice. The video work *0º00 Navigation* you could say is a cross between Richard Long and Buster Keaton' (Faithfull, 2009: n.p.).

This image has been removed for copyright reasons
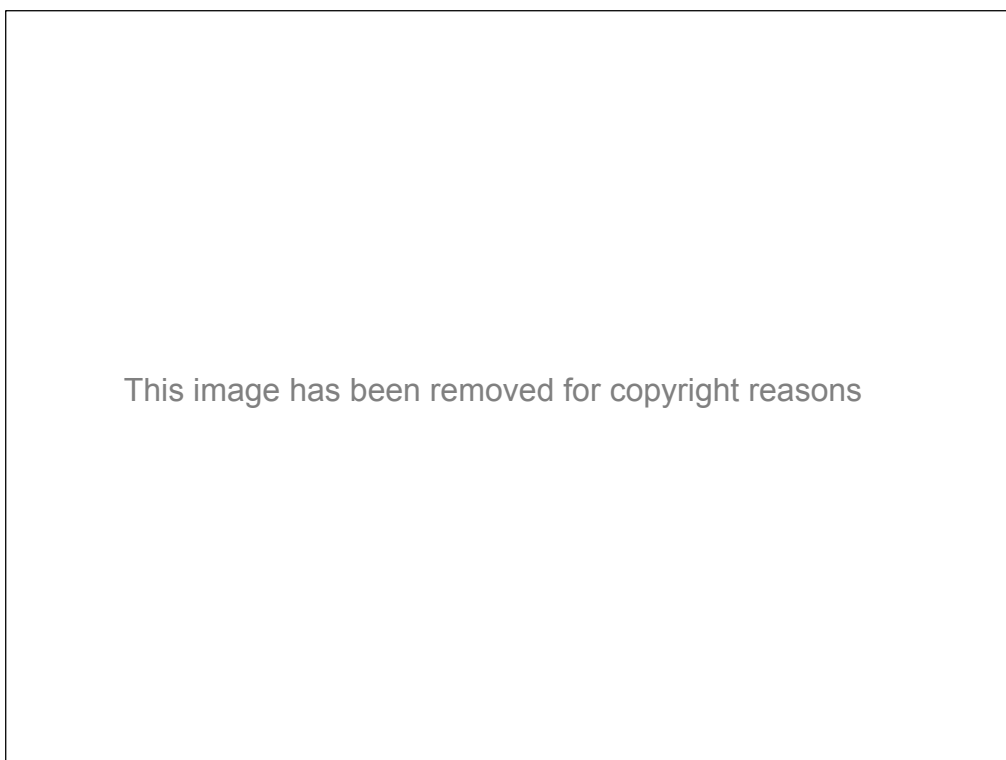
Figure 2.1: Simon Faithfull, *0 º 00 Navigation* (2009). Still frame from video.
Courtesy of the artist.

Jason Farman describes *0 º 00* Navigation as 'a performance of the lived practice of life along the Prime Meridian as it contrasts with the many imaginaries around this space' (2012: 95), and it is tempting to endorse this view of the work as following in a tradition of walking practices that explore, expose or create meaning in the landscape, a tradition that often sees the pyschogeography movement as one of its starting points. Guy Debord and his cohorts would often employ an abstract motivation, such as an algorithm or instructional sequence ('second right, second right, first left, repeat', for

example), to determine the route of a *dérive* (McGarrigal, 2009: 2). Faithfull's use of the meridian might be viewed in much the same way, as arbitrarily cutting a route through the landscape to generate fresh encounters in pursuit of a heightened awareness of place. Farman, for example, describes how Faithfull's 'practice of space' succeeded in interrogating his own 'imaginaries of this space' by revealing that British streets, rather than respecting the north-south line of the Meridian, 'took odd angles' (Ibid: 95). Rather odder is the idea that a meridian might be thought of as being or having a 'space', but of this, more later.

The first task is to take issue with the idea that *0 ° 00 Navigation* is about 'the lived practice of life along the Prime Meridian' (Ibid: 95). Whatever experiences the walk may have generated for the artist, the film of his walk reveals very little. Because we only ever see the back of the artist, any reactions to the environment that his face might reveal are hidden from view. (As an aside, it is interesting to note that to move the camera to a position facing the artist would involve a manoeuvre referred to in film parlance as 'crossing the line', and so it is in a double sense that we might talk of the camera following rather than crossing the line). The focus of attention is always on the actions performed by Faithfull in surmounting physical obstacles. The inhabitants that he might be expected to encounter on such a journey are either part of the backdrop or inexplicitly absent. Though people briefly pass through frame as they, for example, walk about the streets of Guildford, they are noticeably absent from the houses and gardens that he walks and climbs through: the front door is open, no-one is at home, no invitation is required or resistance encountered. Nursing staff at an en-route hospital in East Grinstead fail even to notice the

sight of a strange man in black, followed by a camera operator, let alone challenge what they are doing in the hospital. While the resistance offered by the physical landscape of walls, fences, hedges and cliffs is clearly central to the performance, what is surprising is the (possibly practised) ease with which Faithfull surmounts these: the nimbly leapt fence, the rapidly shinned cliff-face, the dense but easily penetrated hedge; these take on the quality of props in a performance rather than real-life obstacles. Onwards, unstoppable, relentless, oblivious to the landscape and its inhabitants, Faithfull maintains his stride, marches the route, traces a path across the terrain like the orbiting satellites that pinpoint his position from above. Rather than a lived, embodied spatial practice, this is the performance of an automaton or foot soldier.

The role of film in *0 ° 00* Navigation also needs to be scrutinized to consider whether it is to be treated as a documentation of, or integral to, the performance – this ultimately being a question about the nature of representation, and one that applies equally to cartography. From the above discussion it is clear that the film is not a fly-on-the-wall documentation of spontaneous encounters, but rather a carefully staged piece of filmmaking that would have required careful reconnaissance and planning or, at the very least, the advance securing of permissions to film on public and private property. Farman appears to miss the planned and constructed nature of the film when he writes that '[a]t times [...] the single cinematographer cannot follow Faithfull's journey down steep ledges or wading slowly across canals [...], [i]nstead we watch from far' (Ibid: 95). This suggests that any break from an observational mode of filmmaking, from pure documentation, is simply a matter of practical, unavoidable contingency. However, the film betrays its constructed nature in the way it builds simple, but

what are nonetheless unmistakable as, 'sequences'. How else, for example, could the camera operator who has been 'left behind' at a door to a hospital corridor suddenly overtake Faithfull to film him emerging from the other end of the corridor? This would have required a cut in filming and either a halt to the walk while the camera operator found a new position to continue filming or else a repetition of the action of walking from the other side of the corridor, once the camera operator had moved to the new position. Although elsewhere 'jump-cuts' do appear in the film, betraying the passage of time, in this as in many other instances in the film, an appearance of temporal continuity is maintained by allowing Faithfull to 'leave frame' at the end of one shot, and 'enter frame' at the beginning of the next. The final effect, this studied stitching together of time and space, is achieved through the measured editing-together of the two shots. In this way, a journey performed in stages, over several months, becomes less than ten minutes of coherent narrative in the final cut. Of course, all of this is simply to say that the film is 'film-like'. As with any film, questions can be asked about the veracity of its portrayal of events; about whether scenes or 'takes' have been removed, and whether events that are supposed to have taken place, did in fact do so. In particular, there is the question of whether Faithfull actually walked the entire 186 miles of the route or just those that feature in the film. However, these questions, being concerned either with the veracity of the film's representation of events or the nature of these events, do not bring into question the categories of 'representation' and 'reality' themselves and the Cartesian dualism that underpins them. It is not just that the practicalities of filming the performance required a degree of planning that stifled opportunities for unpremeditated encounters. It is not just that Faithfull's performance can only be witnessed via its filmic representation or that this representation

124

sometimes reveals its constructed nature, raising questions about its veracity. More than this, it is the filming of the walk that necessarily determines the nature of the walk itself. Much as cartographic representation actively produces space, the film does not simply represent the performance of a walk, but actively constructs it by making it subservient to the requirements of its temporal and spatial conventions. The film, then, should be seen not as a documentation of the work, as Farman describes it (Ibid: 95), but as primarily constituting the work.

Faithfull's walk, then, is not some kind of raw psychogeographical encounter with the landscape, but is highly constructed, rule-bound and conventional, and fundamentally oblivious to the 'lived practice of life along the Prime Meridian' (Ibid: 95). Not only is the walk constructed by Faithfull's subjection of it to the logic of filmmaking, but more fundamentally, it is in the first place constructed by the geometric abstraction of the prime meridian. Returning to the comparison with Richard Long, the point here is that the line of Faithfull's journey is not 'made by walking'. The meridian line pre-exists the walk and determines its path by providing its only logic, a logic that makes no reference to the landscape itself and takes no account of the agency of the walker. Rather than a man-made inscription into the landscape, it is a tracing of the abstraction of the map onto the landscape.

A useful frame of reference for this discussion is Ingold's (2007) distinction between 'wayfaring' and 'navigation', and their corollaries of 'mapping' and 'map-making'. While 'wayfaring' describes a way of knowing that is founded on experiences of being in and moving through the world, 'navigation' is consistent

with cartographical ways of knowing that erase such practices to produce an abstracted view-from-nowhere. Following Farman's suggestion that *0 ° 00 Navigation* is 'a performance of [...] lived practice', the work might be seen as an exploration of the relationship between the lateral process of 'mapping' a way through the world and the process of 'map-making', involving the vertical imposition of an abstract spatial representation. If this was the case, however, Faithfull might have chosen to explore this relationship by contrasting the abstract line of the meridian with the kind of embodied practices that Farman suggests, but he clearly chooses not to do this; 'chooses' because, in other work, he engages very directly with processes akin to 'wayfaring'. Faithfull's *Palm Pilot Drawings* (2003-) consist of more than five hundred digital sketches of scenes from his travels around the world. In contrast to the map's view-from-nowhere, and the claim to objectivity that accompanies this, these simple sketches represent a subjective and perspectival view-from-below that is grounded *in* the world that is depicted. As Faithful puts it, '[t]he practice is an entirely subjective filtering of the world though the wet folds of my brain' to produce 'a record of a human standing in front of something' (Faithfull, 2009: n.p.). Unlike the map, these sketches also present vistas that unfold over time, from one sketch to the next, and sometimes through the use of animation, as in Faithfull's short film, *13* (2004). The drawings are akin to the sketch-maps that Ingold associates with 'wayfaring', not only in that they represent the world as it is known by moving through it but also because they are characterized by inscriptions that are gestural in nature (Ingold, 2007: 84). The digital processes behind these drawings only emphasize this gestural quality by producing lines that, unlike those of the map, are 'unattached to a surface' (Faithful, 2009: n.p.).

126

This image has been removed for copyright reasons

Figure 2.2: Simon Faithfull, *Palm Pilot Drawing # 204 ConesNcrane* (2003).
Courtesy of the artist.

In *0 °00 Navigation*, by contrast, Faithfull navigates a route rather than finds his way. His impersonal guide is a GPS device, linked to satellites overhead, which together locate him within an abstract grid of co-ordinates. In suppressing any sense of encounter with the landscape and its inhabitants, and in subjecting the walk to the representational conventions of filmmaking, he deliberately rejects processes of 'wayfaring' and embraces the logic of 'navigation' in order to point more forcibly to the constructed, rule-bound, and rule-making nature of maps. In *0 ° 00 Navigation*, Faithfull is emptied, disembodied, and possessed by the map which then performs the meridian through him. It is, in the words of a programme for an exhibition of the work, 'an obsessive and deranged journey' (Artsway, no date). Its absurdity points to just one central question: if not a line made by walking, then just what is this line?

First of all, 0° does not define a 'space', as Farman describes it (2012: 95). This 'zero' line lacks physical substance or dimension and is therefore devoid of space. Neither does the Meridian represent or refer to any tangible space or feature of terrain. Rather, it is an abstraction, within a field of abstract relations (a grid made of lines of latitude and longitude), within which maps are produced, locations fixed and time regulated. As the Prime Meridian, it represents a cornerstone in that abstract structure: arguably its ultimate abstraction - much as the zero of the vanishing point functions in perspectivalism. Whereas lines of latitude are fixed to the equator and therefore bear witness to the movement of the earth in relation to the sun, the positioning of lines of longitude is entirely arbitrary. The passing of the Prime Meridian over the observatory at Greenwich is nothing more than an accident of history or, more properly, a product of British imperial power and, specifically, its naval supremacy.[87] The meridian is also the cornerstone of a systematization of time that spans the globe and ties time to space in the form of 'time zones'. In other words, the Prime Meridian forms an axis around which is co-ordinated an abstract system for organizing both time and space, literally a 'world view', which is then projected onto the globe; structuring our maps and locating us within them.

In choosing this particular line on the map, and in naming the work after it, Faithfull draws attention to the abstract nature of cartographic representation

---

[87] Though other lines of longitude had claimed primacy since Mercator's mid-Atlantic meridian in the 16th century, by 1884, over two thirds of all ships had adopted the Greenwich line as the reference meridian on their maps and so, at the International Meridian Conference of that year, delegates from 25 nations agreed to adopt it as the official Prime Meridian, and although there were dissenters (France continued to use the Paris Meridian for several decades!) it was soon universally adopted (see Klinghoffer, 2006: 49-52 for an account).

not by way of an appeal to lived experience, but by immersing himself in cartography's own logic. In other words, it does not reach out to a reality that is beyond the power of maps to represent but treats reality and representation as one and the same. The line that Faithfull chooses to walk is in no way representational, as would be, for example, the route of an underground gas main plotted onto a map. To walk such a route might have allowed him to question the quality or accuracy of the map's representation of the pipe. However, the zero meridian refers to nothing on or in the ground. It is purely an abstraction that arbitrarily serves to frame a system of spatial and temporal representation. To implement this line on the landscape through a performance of its walking is to specifically draw attention to the constructed nature of this framing, revealing it (step by step) through the absurdity generated by its implementation on a human (walked) scale.

Choosing to represent his performance of the walk through the medium of film is a very appropriate and, perhaps, purposeful strategy. Certainly, in choosing a highly stylized mode of filmmaking, mimicking the era of silent films with the use of black and white cinematography and the graininess of film rather than digital video, Faithfull is careful to leave us in no doubt that what we are watching is 'a film'. Much like cartography, the way in which film frames views of the world is dependent on conventions that remain largely out of view and taken-for-granted, and Faithfull draws attention to both in an attempt to unmask them. These conventions, for both cartography and film, serve to hide the processes that are at work in their fabrication of space and time. The line of the meridian on the map does not readily give up its history as the product of power, negotiation, and contingency. Likewise, film conceals the temporal gaps in its

making; the long-winded, stuttering processes of filming and editing, of reshoots and outtakes, that result only in a semblance of continuity. They also hide the decision-making processes of their makers as they determine what is to be included in and excluded from the field of representation, whether the partial views that result are rationalized as either editorial or scientific 'good practice'. They can thus both be thought of as 'powerful ideological tools' that, for Tom Conley, are 'strangely co-extensive' (2007: 1) and may 'work in consort with each other' (Ibid: 2). Drawing parallels and finding an affinity between the 'languages' of cartography and cinema, Conley writes that, 'a film, like a topographic projection, can be understood as an image that locates and patterns the imagination of its spectators' and 'encourages its public to think of the world in concert with its own articulation of space' (Ibid:1). The cartographic nature of cinema can also be understood in terms of Ingold's characterization of cartography as 'navigational'. Like cartography, film organizes and constructs space and time to produce a coherent representation through which the viewer navigates a linear path from point-to-point, beginning to end, marching the film-makers 'route-plan' (Ingold, 2007: 75), rather than meandering along, with no end-point in mind, as the story and fresh vistas perpetually unfold.

Faithfull's movements are, then, doubly fixed in time and space, both by the cartographical apparatus of map and GPS, and by the film that also orders his movements, and it is to these 'powerful ideological tools' (Conley, 2007: 1) that *0 °00 Navigation* calls attention. As with Faithfull's work, the analysis here, rather than appealing to lived experience as a reality that lies beyond representation, urges that greater attention be paid to the power of the map (and in this case film) to frame the experience of time and space. The case

study, then, has provided a means of exploring just how cartography does this, as well as calling attention to the danger that is prevalent in many analyses of locative media of overlooking or underestimating the power of maps. The emphasis in the existing literature has been to focus on the users' experience of mobile locative technologies and how it produces meaning. To stick with just one case in point, Farman takes a phenomenological approach that stresses processes of embodiment: 'the body as sensory and body as sign system' (2012: 93) that is produced both in and through space. In this way, Farman is able to account for the novelty of 'virtual' encounters that span time and space and yet seem to be very real and meaningful; but missing from this rather localized analysis is an adequate account of systems on a global scale that produce, organize, and structure time and space, fixing positions and wielding power as they do so. Brian Holmes (2003) makes a similar critique in elaborating on the military origins of a Global Positioning System that, for Holmes, acts as a 'hyper-rationalist grid of Imperial infrastructure'. He argues that an awareness of the nature of this 'infrastructure' has been eclipsed in contemporary debates about locative media by a rhetoric concerning 'the aesthetic form of the dérive' (Ibid: n.p.). Farman's account of 0 º00 Navigation might be seen in this light, his emphasis on embodied spatial practices imbuing Faithfull's meridian walk with a sense of meaningful encounter, while overlooking the ways in which the walk is constructed, firstly by the representational conventions of filmmaking but, more importantly, by a system of spatial representation that structures space and time in ways that work against processes of embodiment. Whereas Farman sees in 0 º00 Navigation another example of locational works that play with 'asynchronous time', thus 'challenging the temporal nature of presence' (2012: 96), the analysis offered

here suggests that, quite above and beyond these local idiosyncrasies, the work reveals the constructed nature of time itself.

Another way to think about this shift in emphasis is in terms of Henri Lefebvre's theory of the production of space. Farman, for example, uses Lefebvre to argue for his notion of 'embodied space' (2012: 18) - the idea that, in Lefebvre's words, the body 'produces itself in space and it also produces that space' (1991: 170). But Farman omits from his account of embodiment Lefebvre's description of an abstract space that is dominated by 'representations of space' (very specifically including maps and their grids) that tend towards 'the elimination of the body' (1991: 110). Space and time are regulated, homogenized and quantified, while the lived experience and rhythms of the body are 'crushed, vanquished by what is "conceived of"' (1991: 51). A shift in emphasis towards the framing that is performed by cartography, rather than the performances of agents on the ground, leads to a fuller acknowledgement of the power of maps to both reflect and create world-views, and leads to an analysis of these works that focuses on the ways in which artists have either supported, internalized, modified, subverted, confronted or sought to replace these world-views. In the case of Simon Faithfull's *0 º 00 Navigation*, for example, a more serious appraisal of the maps and mapping practices at play in the work has led away from its interpretation as an exploration of 'lived practices' and towards its interpretation as a critique of abstract representations of space.

2.2.2 Mapping Performance: Daniel Belasco Rogers's *The Drawing of My Life* (2003-)

If Faithfull's *0 ° 00 Navigation* is a performance of the map, Daniel Belasco Roger's *The Drawing of My Life* can be seen as inverting this to become a mapping of performance. Instead of walking a line made by the map, it maps lines that are indeed 'made by walking' –or at least very apparently so. In drawing these lines, the work expressly attempts to overcome the abstractions of cartography in order to represent something of an individual's lived experience.

This image has been removed for copyright reasons
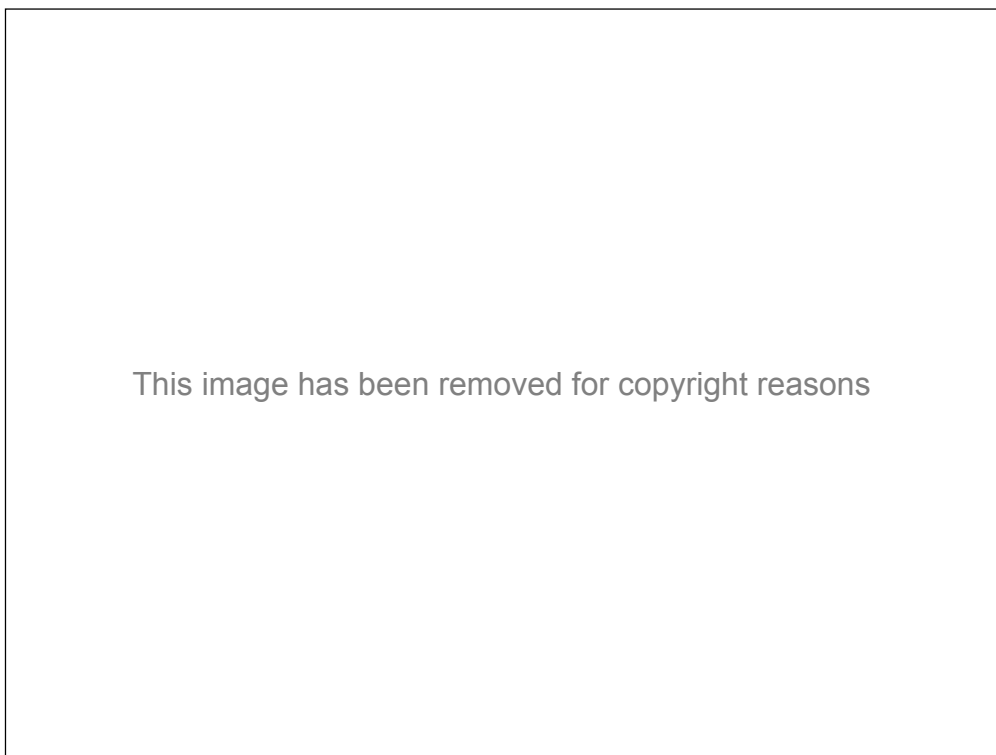
Figure 2.3: Daniel Belasco Rogers, *The Drawing of my Life, Berlin 2003-2004* (2009). Courtesy of the artist.

The Drawing of My Life is an umbrella title for Daniel Belasco Rogers's practice of recording GPS data of all his movements and presenting this data in the form of maps (Belasco Rogers, 2004). The project was initiated in 2003 in order to

better understand the way in which he was getting to know the city of Berlin, which he had moved to in 2001: 'I have this idea that you 'join a city up' when you start to spend time in it and all the isolated places you visit at first start to form a related network' (Belasco Rogers, 2008). These recordings of GPS data continue to the present day and have been used to produce a series of composite maps, each usually depicting a year or more of data, and most often printed on paper but more recently also rendered as computer animations. Since 2007, his partner Sophie New has also recorded and plotted maps of her movements, their maps often being exhibited alongside each other.

This discussion of *The Drawing of My Life* begins, through a comparison with Simon Faithfull's *0 ° 00 Navigation* (2009), by making a rhetorical argument that it represents what Ingold (2007) describes as 'wayfaring' - a way of moving through the world that is embedded in lived experience, everyday tactics, and draws on nomadic traditions. However, this argument is later turned on its head in order to highlight how *The Drawing of My Life* is unable to escape the navigational grid it appears, at first, to challenge. It is in paying greater attention to the framing that is performed by cartography that the strength of its hold becomes more fully evident - even as, and especially because, the artist attempts to pull away from it. The purpose of offering two contrary interpretations of the work is to again demonstrate how these works can all too easily be read as an exploration of lived experience, as well as to provide an opportunity to further explore the nature of cartography, the way in which it operates in works of locative media, and the barriers it presents to those who attempt to surpass it. In Chapter 5, I return to this case study and offer yet

another interpretation of the work, one that places less emphasis on its production of maps and more on the data that inform them.

I first discuss *The Drawing of My Life* as a form of wayfaring, and as an inversion of the processes involved in Faithfull's *0 ° 00 Navigation*. In this view, while both projects use GPS-enabled mobile devices to locate the artist and plot movement, the paths they walk respond to quite contrary motivations. *0 ° 00 Navigation* begins with the map, projecting its panoptical view down onto the ground, where it is performed by the artist. *Drawing*, on the other hand, begins with the quotidian performances of the artist and maps these from bottom up. While Faithfull's performance is a walk made by lines (a performance of the map), Belasco Rogers's is a line made by walking (a map of his performance).

In Faithfull's walking of the meridian line, all agency is ceded to the logic of the grid. By contrast, the line drawn by Belasco Rogers responds entirely (and, thanks to GPS technologies, quite accurately) to the agency expressed in the artist's everyday movements. These are driven by necessity as well as desire, pragmatism as well as emotion, and shaped by restrictions as well as freedoms, but they are his movements and no-one else's. Anyone can walk the abstract universal of the zero meridian, but only Belasco Rogers can walk his life: 'I do not consider the drawing of my life more important or more interesting than anyone else's', he writes, 'I want to record mine because it is mine' (2004: n.p.). The line he produces carries his signature, bears testimony to his lived, embodied experience, and to the social relationships and networks in which he is entangled. This becomes even more apparent in the maps created since 2007, when his partner, Sophie New, also began to track her movements. What

it produces is a record of a relationship, the intertwining of their lives and therefore their paths, revealing times spent together and apart (New and Belasco Rogers, 2010: 23).

This image has been removed for copyright reasons
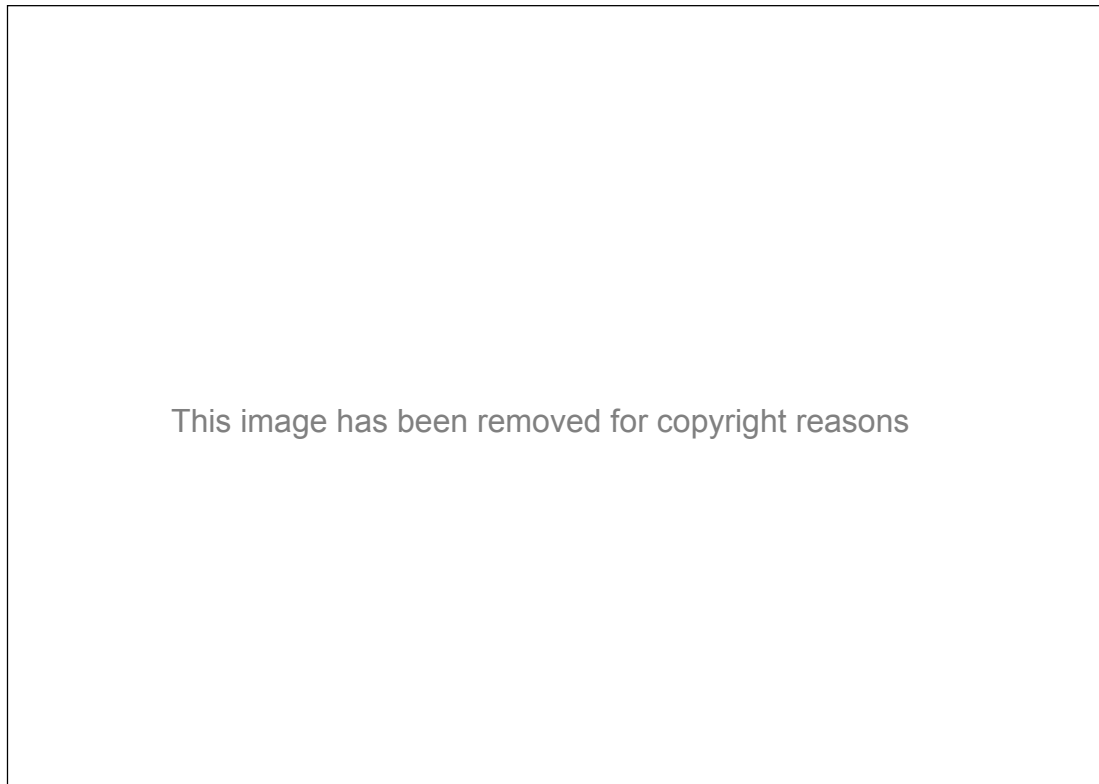
Figure 2.4: Daniel Belasco Rogers, *The Drawing of My Life* (2003-). Side by side comparison of maps of Berlin produced contemporaneously by Daniel Belasco Rogers and Sophie New. Courtesy of the artists.

The works also take antithetical positions in relation to the terrain. Faithfull, in performing the abstract line of the meridian, becomes a foot soldier commanded to march across the landscape, oblivious to its features and its obstacles. This marching, to follow a distinction employed by landscape theorist Kenneth Olwig, 'presupposes an "open", placeless space - a utopia' which 'obliterates the places it leaves behind' (2002: 23). By contrast, Belasco Rogers's 'peripatetic walking' is 'topian' (Ibid: 23). It takes heed of the landscape and tactically adjusts to it; taking shortcuts, negotiating obstacles, crossing roads with care, heading for cover when it rains.

The 'maps' entailed in the two works, the one producing the performance, the other a product of performance, stand in stark contrast to each other. The 'map' in *0 ° 00 Navigation* consists of a single abstract line, albeit one that stands in relation to other, unseen, geodesic lines. Ideally, the 'maps' of *The Drawing of My Life* would also consist of a single continuous line, although in practice this is sometimes broken by lapses in the recording of GPS data. However, in their significance, these sparse lines are diametrically opposed to one another. The line of *0 ° 00 Navigation* removes all trace of landscape and feature to draw attention to cartography's abstract gridding of space. *The Drawing of My Life*, on the other hand, dispenses not just with the cartographic grid, but with other visual conventions, such as a legend and the use of symbols, to isolate the line of movement of just one human being on the face of the earth. While one map denies the human activities that must ultimately have led to its construction, the other sees the appropriation of the map by one human actor and the expulsion of all other facets to highlight a very personal, lived and evolving representation of space. For Alison Sant, this rejection of the base-map provides new opportunities to think of the city as a 'space of events' rather than one 'defined by Cartesian coordinates, the road system, and the block plan' (2006: 6). It allows people to 'repopulate the map to emphasize the rhythms of urban life rather than just the spaces in which they occur' (Ibid: 2). However, perhaps the most radical challenge to cartography lies in Belasco Rogers's introduction of temporality. Whereas the scientific map denies time, freezing all movement to an abstract moment, *The Drawing of My Life* charts not just positions in space, but the progression of time. The line of Belasco Rogers' movement is also a timeline of the rhythms, cycles, and changing velocities of his life. Scaled-up to

include the traces of entire urban populations, such maps might fulfill Sant's call

to produce:

> a new form of mapping that represents the city as a temporal system, characterized by both transitory and enduring "spatial events." By referencing the city through the use patterns that shape it, the conventions of mapping will be transformed from those that depict urban structure to ones that amplify urban life (Ibid: 6).
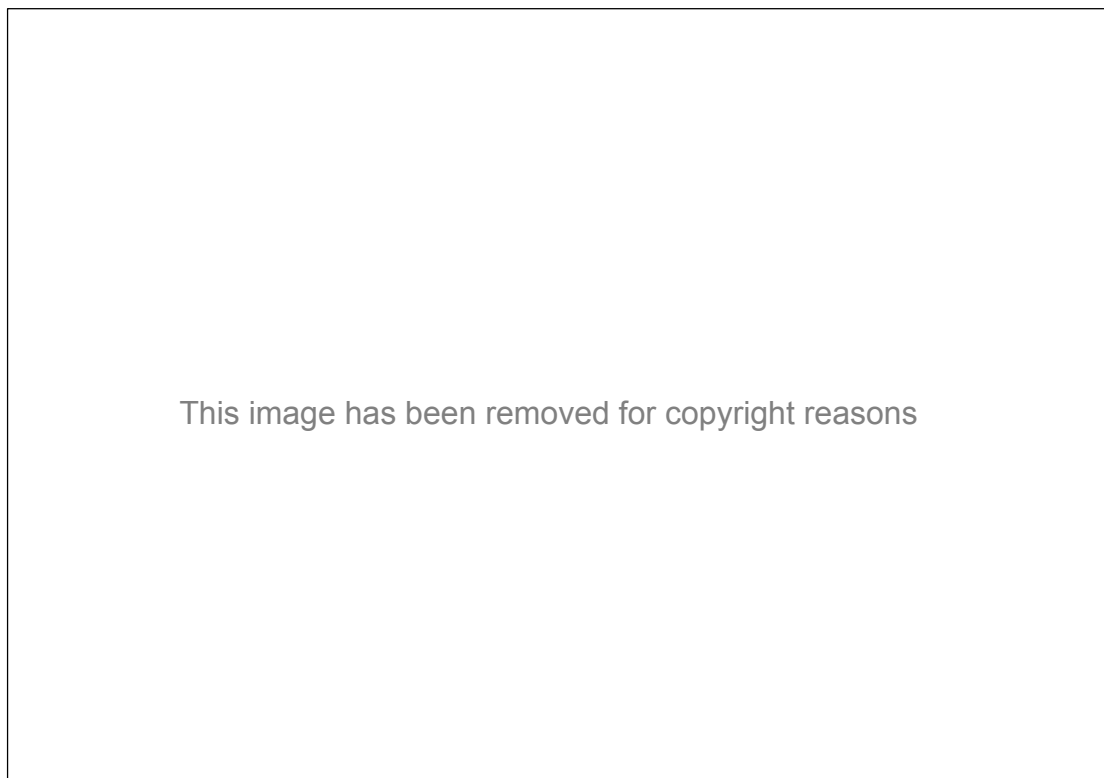
Figure 2.5: Daniel Belasco Rogers, *Nine Year Drawing Berlin 2003-2011* (2011).
Courtesy of the artist.

Building on the above discussion, Ingold's (2007) distinction between

'navigation' and 'wayfaring' usefully describes the differences between the

mapping practices of *0°00 Navigation* and *The Drawing of My Life*. The 'ghostly

line' of the prime meridian in *0°00 Navigation* may appear as a trace on maps,

but has 'no physical counterpart in the world that is represented on these maps'

(Ingold, 2007, 49). This geodesic line, a product of 'imperial ambition' (Ibid: 77),

facilitates point-to-point navigation and transport along routes (Ibid: 75). It

produces a network of lines within which time and space are regulated and human activity is coordinated and circumscribed. The lines of Belasco Rogers's maps, by contrast, are the traces of a human gesture, the thread of his life, by which he also comes to know the world. Rather than producing a network within which life takes place, wayfaring produces a *meshwork* that *is* the living of life. As Ingold puts it: 'The lines of the meshwork are the trails along which life is lived' (Ibid: 81).

For Ingold, these lines of navigation and wayfaring produce very different kinds of maps and, in turn, represent very different ways of knowing the world. The scientific, cartographical map that is performed through Faithfull's *0 ° 00 Navigation* creates knowledge by rising vertically above the terrain to connect points in the landscape. By contrast, the maps of Belasco Rogers's can be seen as what Ingold describes as 'sketch maps', representing a lateral knowledge that is formed in 'the passage from place to place and the changing horizons along the way' (Ibid: 88). The sketch map, as with Belasco Rogers's maps, is not a tool for navigation from one location to another. Rather, 'the lines on the sketch map are formed through the gestural re-enactment of journeys actually made' (Ibid: 84). They are the retelling of a story.

Ingold frequently draws on pre-modern, non-western cultures for examples of wayfaring, and specifically nomadic cultures. Many of these examples bear a striking resemblance to the work of Belasco Rogers. Firstly consider Belasco Rogers's early statement of the intentions that lay behind *The Drawing of My Life*:

to catalogue every trip I have made, to read the story of my life, to see my personal map, written by my aging body through time and on the surface of the earth, this drawing that takes a lifetime to make. (2004)

Compare this with a description, quoted by Ingold, of the significance of tracks for Aboriginal Australians:

the life of a person is the sum of his tracks, the total inscription of his movements, something that can be traced out along the ground (Wagner, 1986: 21, quoted in Ingold, 2007: 79).

There are numerous accounts of pre-modern, pre-scientific modes of map-making that accord with Ingold's description of wayfaring and sketch maps. Examples include medieval maps that tell stories of journeys made (de Certeau, 1984: 120), the use of star compass and *etak* by Micronesian navigators (Turnbull, 2000: 131-160), Tibetan maps that chart 'cultural fields' rather than physical landscape (Huber, 1999: 59-60), and the art of Aboriginal Australians which can be seen as maps of the Dreaming (Turnbull, 2000: 37). There is a temptation to conclude that Belasco Rogers's drawing of maps somehow marks a return to these pre-modern ways of encountering and mapping the landscape. However, the next section will argue that *The Drawing of My Life* is a thoroughly modern endeavour that is, as hard as it tries, unable to escape the 'hyper-rationalist grid of Imperial infrastructure' (Holmes, 2003: n.p.).

I have so far characterized *The Drawing of My Life* as an act of wayfaring that produces a sketch map of the lived experience of the artist. This was achieved by way of comparison with *0 ° 00 Navigation*, whose 'navigational' credentials had previously been established. However, the distinction between the two works may not be so clear-cut, and I now want to put the case that *The Drawing of My Life* also embraces a navigational logic. While it holds true that *0 ° 00*

Navigation and *The Drawing of My Life* move in opposite directions between the God's-eye-view of the map and quotidian experience on the ground, what they share in common is that at one end of this spectrum is the same 'cartographic gaze' (Pickles, 2004: 75-91). Although the geodesic grid, along with all other cartographic conventions, do not appear on the maps of *The Drawing of My Life*, they nevertheless continue to frame their representation of space. To erase them, to make them transparent, is not to escape them. The same panoptical view as that which motivates the performance of *0 ° 00 Navigation* is also present in the maps of Belasco Rogers. Such a view belongs to the practice of what Ingold (2007) calls 'map-making', and to a way of knowing that he characterizes as 'navigation'. At ground level, Belasco Rogers finds his way through the city of Berlin, forging a knowledge of his surroundings 'in the passage from place to place and the changing horizons along the way' (Ibid: 88). However, as soon as he attempts to produce a map of that experience, shifting from processes of 'mapping' to those of 'map-making', he introduces another form of knowledge that is 'integrated not by going along but by building up' (Ibid: 88). More than just living and experiencing his life, Belasco Rogers seeks to survey it - or as Belasco Rogers (2014) puts it, to 'externalize it and see it' - from a viewpoint that is much like the one described by de Certeau from the top of the World Trade Centre:

> It transforms the bewitching world by which one was "possessed" into a text that lies before one's eyes. It allows one to read it, to be a solar Eye, looking down like a god (1984: 92).

De Certeau warns that this 'lust to be a viewpoint and nothing more' produces a 'fiction of knowledge' (1984: 92): the kind of knowledge that is claimed by urban planners, architects, and cartographers, and which overlooks everyday practices. For de Certeau, these practices remain 'foreign to the "geometrical"

or "geographical" space of visual, panoptic or theoretical constructions' (1984: 93). Belasco Rogers (2004), in writing about *The Drawing of My Life*, repeatedly references the 'practice of everyday life', yet in seeking to explore the everyday, he draws on a form and system of knowledge that, for de Certeau, obscures these practices.

In my previous characterization of *The Drawing of My Life* as a form of wayfaring, Belasco Rogers' maps were distinguished from those of scientific cartography by appealing to Ingold's category of the 'sketch map': an extension of gesture in which 'the "walk" of the line retraces your own "walk" through the terrain' (2007: 84). Belasco Rogers (2014) talks about his work in a similar vein, stressing that these are drawings rather than maps and that the city is revealed only through a 'performance of its streets' and 'the experience of moving through it'. However, these maps are not in fact drawn, but result from the very precise digital machinations of mobile device, computer software and inkjet printer. The lines that these produce are not executed with the sketch-map's gestural flourish as 'traces of movement' (Ingold, 2007: 79), but, quite to the contrary, are made through the joining up of dots, the same linking of 'point-to-point connectors' (Ibid: 79) that Ingold identifies as the defining characteristic of a navigational mode of map-making. The GPS device that Belasco Rogers carries with him takes readings at set intervals of time of discrete points in space that are defined by reference to a Cartesian grid. They can be written as follows, each line representing a point in space and time:

```
H  LATITUDE  LONGITUDE  DATE     TIME
T +51.4567100 +000.0844500 01-APR-07 08:27:55
T +51.4558800 +000.0883100 01-APR-07 08:28:09
T +51.4543100 +000.0949200 01-APR-07 08:28:32
T +51.4527300 +000.1013900 01-APR-07 08:28:55
T +51.4513900 +000.1071800 01-APR-07 08:29:15
```

Only through the joining-up of these space/time coordinates does a continuous line emerge. It produces knowledge of Belasco Rogers's movements not through a journey *along*, but like the work of the surveyor, by building up from 'the array of points […] into an integrated assembly' (Ibid: 90). Whereas sketch maps unfold the story of a journey, step-by-step, the maps of *The Drawing of My Life* are frozen in time, the lines revealed all at once, and, in themselves, tell no story. The substance of Belasco Rogers's lived experience of Berlin is lost, leaving behind just the ossified traces of his movements. At best, they provide a record of movement alone, but they do not reveal anything of the motivations and agency behind these movements or of the landscape and environmental conditions in which they were performed. Ironically, a commercial application such as Foursquare, by virtue of the annotation that accompanies the plotting of location, might actually say more about the 'lived experience' of its participants.

De Certeau deals very directly with the possibility of making maps of urban mobility and is quick to identify the way in which cartography works against any such attempt. The following excerpt is worth quoting at length because it so

aptly, if damningly, describes many of the difficulties and contradictions that are involved in *The Drawing of My Life*:

> Surveys of routes miss what was: the act itself of passing by. The operation of walking [...] is transformed into points that draw a totalizing and reversible line on the map. They allow us to grasp only a relic set in the nowhen of the surface of projection. Itself visible, it has the effect of making invisible the operation that made it possible. These fixations constitute procedures for forgetting. The trace left behind is substituted for the practice. It exhibits the (voracious) property that the geographical system has of being able to transform action into legibility, but in doing so it causes a way of being in the world to be forgotten. (1984: 97)

In this passage, de Certeau affirms the significance of projectionism's production of a surface onto which the world is arrayed, noting how 'the geographical system' reduces 'walking' to a 'relic set' specifically by transforming movement into fixed points on a 'surface of projection'. A similar point is made by Ingold, who asserts that 'for the wayfarer the world has no surface' since '[t]o go along [...] is to thread one's way through the world rather than routeing from point to point across its surface' (2007: 79). To borrow Ingold's terminology, we might easily think of Belasco Rogers's movements through the city as a 'thread'. However, 'it is in the transformation of threads into traces [...] that surfaces are brought into being' (Ibid: 52). By tracing his 'thread' onto a map, Belasco Rogers produces, or reproduces, a cartographic surface. Conversely, Ingold states that, 'it is through the transformation of traces into threads that surfaces are dissolved', and this is a thought that resonates in some other works of locative media, including Petra Gemeinboeck's *Urban Fiction* (2007)[88], which produces a map made of (virtual) threads, and in Jen Southern and Jen Hamilton's *Running Stitch* (2008-2010), in which threads representing movement are embroidered by hand into the weft and warp of a fabric.

---

[88] Petra Gemeinboeck's *Urban Fiction* (2007) is discussed in chapter 4.

It is also worth noting, in passing, that it is in terms of a 'fabric' that is 'constantly being spun over and over again' that Thrift describes the framing of movement in what he calls 'Lifeworld Inc.' (2011: 6), with the implication that this stands in stark contrast to the rigid, gridded surface of cartographic projectionism. Indeed, Thrift makes direct reference to the thread-like quality of what he describes as Ingold's 'wandering, wayfaring line' (2011: 7). However, and this becomes more relevant later in the thesis[89], Thrift rewrites Ingold's phenomenology by insisting that threading a way through the world, rather than standing in juxtaposition to navigation, now depends on an intensification of abstraction and calculation and a proliferation of grids and coordinate systems (Thrift, 2011: 7).

This image has been removed for copyright reasons
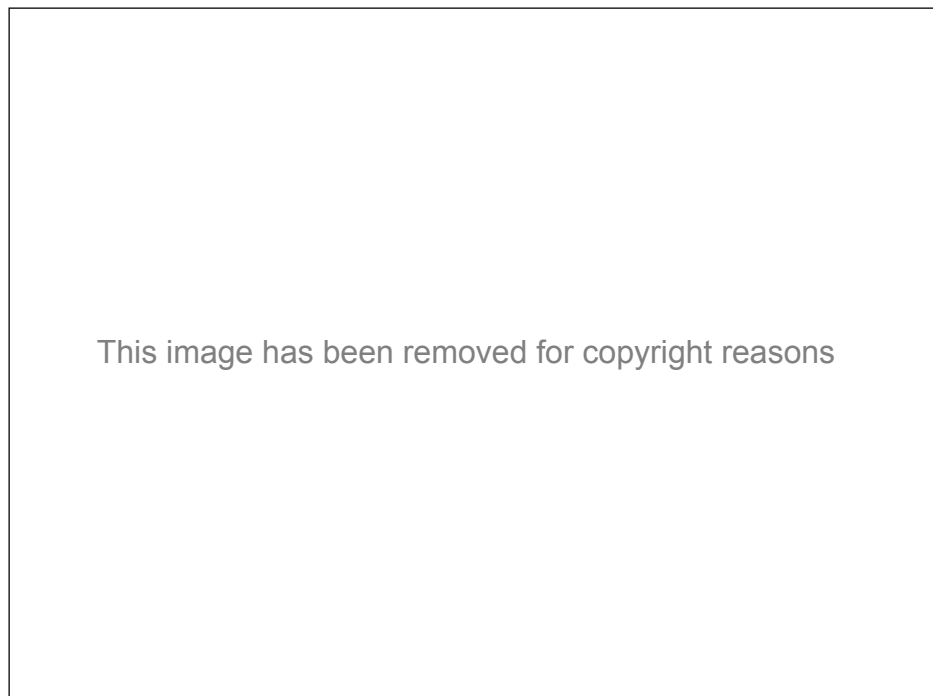
Figure 2.6: Jen Southern and Jen Hamilton, *Running Stitch*, Yokohama (2008).
Courtesy of the artists.

---

[89] See Chapter 5 (5.3.3).

In interview, Belasco Rogers shows himself to be in part aware and in part caught-up in some of the contradictions involved in substituting traces for practices. On the one hand, he says that, 'GPS doesn't know anything about the world, it just throws numbers at you' (2014). He recognizes that the lines of his 'drawing' are 'pathologically flat' and accord 'exactly the same weight' to 'memorable, life-affecting journeys' (such as returning from hospital with a newborn child) as they do to 'a daily trip to get a loaf of bread' (Ibid). However, he differentiates his practice from cartography by stressing that, whereas 'maps are very top-down, very hierarchical', the drawings 'work from the bottom up' (Ibid). Though he recognizes that 'if you examine the cartographical process, what's happening is hundreds of people are going out into a city [...] then measuring and recording, so it is a similar process', the difference, for Belasco Rogers, is that in his drawings, 'the map and the city emerges in a way that with cartography feels like an imposition', though he adds that 'I haven't really thought that vigorously through this' (Ibid). In his practice, however, the artist does seem to respond to and grapple very directly with some of these contradictions, particularly in more recent iterations of *The Drawing of My Life*. The laser engraving of his maps onto the rear of clear acrylic sheets, for example, might be seen as an attempt to add depth and liberate the lines of his movement from the flat surface of projection (New & Rogers, 2014)[90]. Since 2009, Belasco Rogers and Sophie New have also been collecting daily 'mood measurements' with a view to introducing this affective data into their maps (Plan B, n.d.). The maps also have restored to them the power to tell stories in *Narrating Our Lines* (2010), a pilot film for a planned dual screen projection of

---

[90] See Figure 2.8.

animated maps and 'talking-head' commentary on the memories evoked by the maps for Belasco Rogers and New (Plan B, no date). In this short film, the retelling of the story of the map's production reanimates and enriches it with some of the lived experience that the map alone fails to reveal. Further, in their more recent projects, *A Day in the Life* (2010-11) and *Crossing Paths* (2012), the artists have introduced temporality into their maps through the animation of the GPS tracks of participants across the cities of Birmingham and Leuven, in Belgium. As will be explored in the next section, this reintroduction of time may militate against cartography's production of 'the nowhen of the surface of projection' (de Certeau, 1984: 97).

This image has been removed for copyright reasons
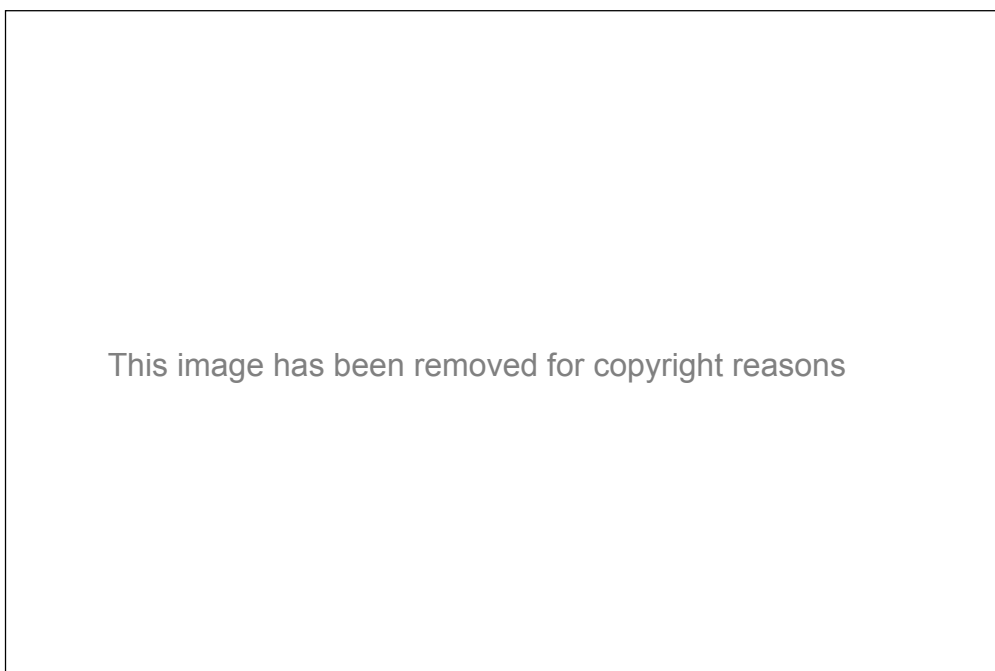
Figure 2.7: Daniel Belasco Rogers and Sophie New, *All Our Traces in Berlin 2011* (2012), laser engraving in acrylic, 42 x 60 cm, Detail. Courtesy of the artists.

Very recently, Belasco Rogers has turned his attention to ways of representing the vast pool of locational data he has collected since 2003 in ways that are distinctly un-cartographical, and this avenue is more fully explored in Chapter 5. However, the analysis of *The Drawing of My Life* that is offered here suggests

that it remains substantially indebted to cartographic ways of seeing and thinking. Although the aim is to portray a personal journey through the city rather than to represent Berlin as a whole, the project imports the representational logic of cartographic projectionism through its use of GPS. What the work does do very successfully, through its long-sustained exploration of mapping practices and what Belasco Rogers (2014) describes as 'a constant practice of reflection', is to draw attention to the way in which maps result from processes that remain largely out of view, and in doing so it contributes to a critique of cartography. As Belasco Rogers puts it:

> It's made me realize that maps, cartographical maps, are imprecise snap shots of the past. They can only be that [...]. I think I get very seduced by maps [...] and their authority and what I've realized is that that authority is partial and human and contingent and so I've realized that these cartographical maps are quite like my drawings (2014).

This becomes clear if you look at the end result of mass participatory mapping projects like Open Street Maps. These, too, result from individuals surveying 'from below' and contributing their partial and contingent traces. However, as a collective representation, these partial views aggregate to produce just another cartographic map. Although Belasco Rogers's maps remain personal to him, in the end, they are not so different.

2.3 Temporal and Affective Mapping

In the previous section, a fundamental contradiction was identified between the attempt to account more fully for lived practices and reliance on a cartographical mode of representation that works against this. Belasco Roger's daily practice of collecting GPS data begins as an attempt to chart the embodied experience of his meanderings through the streets of Berlin, but ends

in their abstraction and reduction to the flat representational plane of the map. This section examines a number of strategies by which artists making maps with locative media have attempted to overcome these abstracting and reductive tendencies to more adequately represent lived experience. Estha Polak's *Amsterdam Realtime* (2002) addresses the atemporality of the cartographic map through the introduction of movement over time, while Christian Nold's *Biomapping* (2003-) seeks to map emotional responses to urban environments.

2.3.1 Mapping Time: Estha Polak's Amsterdam Realtime (2002)

As the name suggests, this much-discussed work of locative media produces its map of Amsterdam - or, rather, of the *movements of people in* Amsterdam - in *real time.* To better understand the significance of introducing the parameter of time to the map in this way, I firstly want to briefly review a number of accounts of the relationship between time and the map, and to point to some precedents for incorporating time into the map.

A number of historical accounts of the relationship between time and space (Harvey, 1990: Lefebvre, 1991; Speed, 2011a; Thrift, 1996) describe a pre-modern era in which, in Lefebvre's words, 'time is apprehended within space' (1991: 95) and is intimately tied to the rhythms of the body and of nature. In these accounts, modernity and the development of capitalism bring about a divorce between time and space, and time becomes something external, commodified, and therefore universal: '[s]pace and time are sundered, but space brings time under its sway in the praxis of accumulation' (Ibid: 218). As a result, put simply, time is no longer our own, or, as Lefebvre puts it, 'this most

149

essential part of lived experience […] is no longer visible to us, no longer intelligible' (Ibid: 95). One way to counter the abstraction of space might therefore be to reintroduce time to space by producing maps that make lived time visible and intelligible.

The attempt to relate time to space through the map is not entirely new. Charles Joseph Minard's 1869 flow map of Napoleon's disastrous Russian campaign is a notable historical example. *Carte figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813*[91], combines time, geographical coordinates, the size of the army, and weather conditions, in a single visualization that goes far in representing the changing fortunes and suffering endured by Napoleon's troops[92].

This image has been removed for copyright reasons
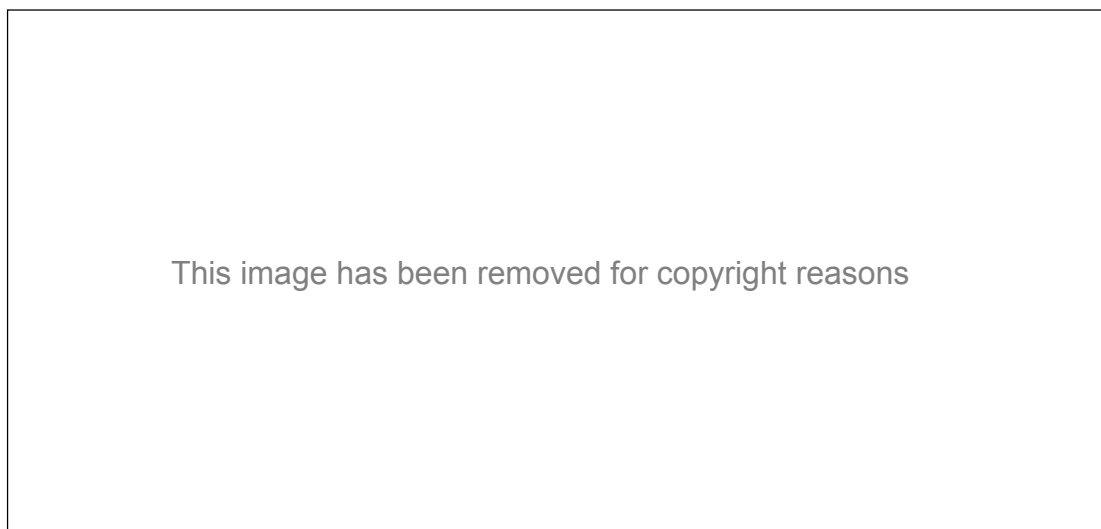
Figure 2.8: Charles Joseph Minard, *Carte figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813* (1869).

During the 1970's, Torsten Hagerstrand brought time within the realm of geography and cartography with his model for a Time-Geography that plotted

---

[91] Trans.: 'A figurative map of the serial fatalities sustained in the ranks of the French army during the Russian campaign 1812-1813'.
[92] See discussion by Edward Tufte (2001: 40).

temporal as well as spatial co-ordinates to represent the everyday passage of subjects, and the connections between them. Time-Geography's aim is to 'demonstrate how society as a whole is constituted by the unintended consequences of the repetitive acts of individuals' (Rose, 1993: 75), achieved through a resolution of the Cartesian separation of time and space (Speed, 2011a: 240). However, as Chris Speed notes, the success of this graphical stitching together of time and space remains questionable: 'Hagerstrand's models remained highly calibrated perspectives. Time and space were not integrated but remained charted against each other' (2011a: 240).

This image has been removed for copyright reasons
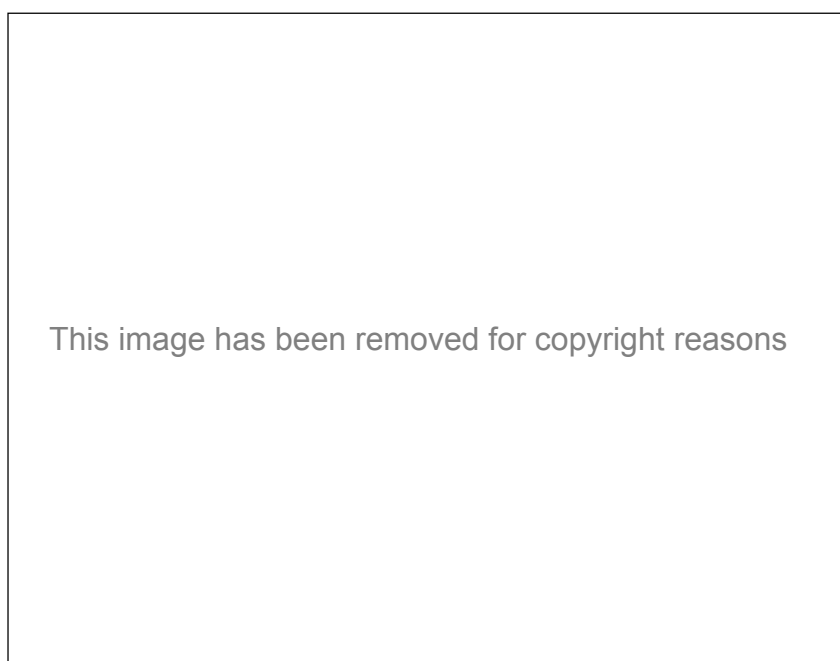
Figure 2.9: An example of a time-geography map, from Carlstein, Parkes and Thrift (1978).

An obstacle to better integrating time into maps has been the need to express time in spatial terms, as one vector of a graphical image, but new technologies have opened up other possibilities. *Amsterdam Realtime* (2002) is a work that explores the potential of GPS to introduce time to the map, not as another vector, but measured out and experienced in 'real time'. The project was driven

more by curiosity about the creative possibilities presented by emerging or newly accessible technologies[93] than any clear conceptualization of, or agenda for, alternative mapping practices. However, the work has become much discussed (Holmes, 2006: Hopman, 2005; Kwan, 2007; Ross, 2006) because of the temporal nature of its map and the potential this would seem to hold for more rich and nuanced accounts of everyday urban life.

Amsterdam Realtime emerged from a collaboration between artist Estha Polak and The Waag Society, an Amsterdam media-lab whose goal is to produce 'creative technology for social innovation' (Waag Society, no date). The work was designed for and exhibited at *Kaarten van Amsterdam: 1866-2000*, an exhibition of maps of Amsterdam by the city's Municipal Archive. This context was crucial to the project since it set it alongside and provoked comparison with more than 130 years of cartographical history. The concept for the project came from Polak's curiosity at the tracks that could be plotted onto a nautical chart using information from a simple GPS device aboard a friend's sailing boat and, with the commission from the Amsterdam Municipal Archive, turned to ways in which this technology could be used to map cities in real time (Hopman, 2005: 50). This was before the widespread availability of wireless networks and the advent of smart phones that neatly combine both GPS and internet capabilities in a lightweight, mobile device, and so there was a need to develop, adapt and combine available technologies and test these over several months (Ibid: 52). When the project finally emerged from this period of iterative development, the 'portable trace unit' consisted of a PDA attached to a GPS device and external

---

[93] The United States government made GPS available for widespread civilian use only in 2000.

antennae, and used GPRS[94] to transmit information about the wearers' co-ordinates to a server at The Waag Society (Ibid: 52, 54). This information was then processed, using specially designed software, to produce a visualization of participants across Amsterdam, projected in real time onto one wall of the exhibition space.

This image has been removed for copyright reasons
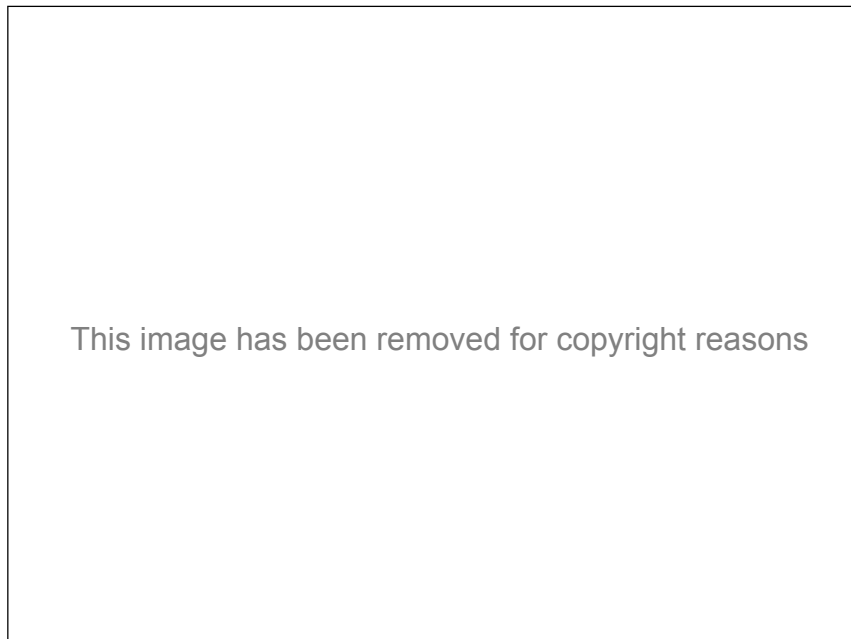
Figure 2.10: Estha Polak/Wagg Society, *Amsterdam Realtime* (2002), at *Kaarten van Amsterdam: 1866-2000* (2002). Courtesy of the artists.

The participants for the project had been selected from volunteers responding to newspaper advertisements and came from all walks of life, including a tram driver, a marathon runner, and even a gravedigger, in an attempt to capture different routines and styles of movements from a cross-section of inhabitants (Ibid: 54). In all, sixty people were invited to participate in the event, for around a week at a time, across the three weeks of the exhibition (Ross, 2006: 185), at

---

[94] General Packet Radio Service (GPRS) is a form of mobile data service that facilitates internet access.

the end of which they were each presented with a map of their own personal journey.

The first visitors to the exhibition would initially have seen just a blank, black 'screen'. Slowly, as transmissions were received from the mobile participants, faint white lines tracing their movements began to appear on the screen. As the lines on the maps began to build, the shape of Amsterdam (recognizable at least to its inhabitants) began to emerge from the blackness. Where routes were shared, the lines would thicken. Where they crossed with increasing intensity, these were shown as 'hot spots', glowing from white to yellow and then red.

This image has been removed for copyright reasons
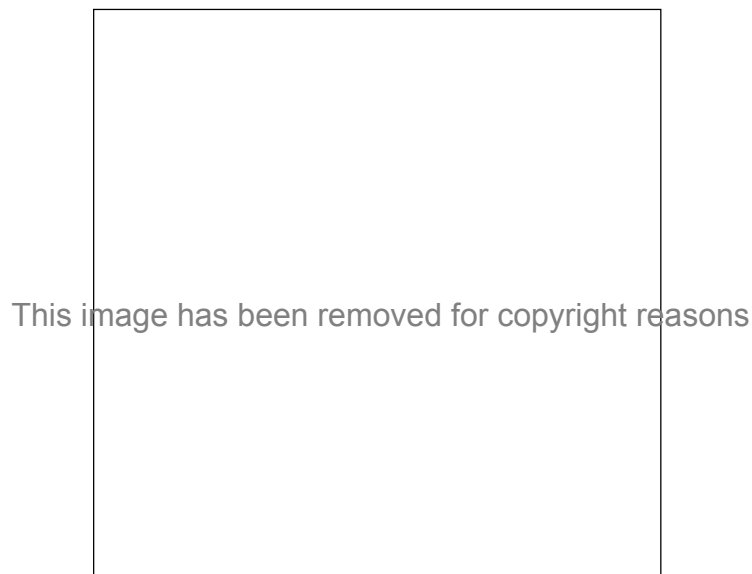
Figure 2.11: Estha Polak/Wagg Society, *Amsterdam Realtime* (2002). Detail showing dense areas of participant movement in yellow and red. Courtesy of the artists.

The use of lines and spots of light on a black background is reminiscent of the view of a city from an aircraft at night, the lights mimicking streetlights coming on, or the beam of headlights. Rebecca Ross, alternatively, likens the appearance of the map to medical X-rays, carrying with it the implication that the map might reveal something hidden beneath the skin of the body of the city

154

(2006: 186). Especially set alongside more traditional maps at the exhibition, *Amsterdam Realtime* appeared quite un-map-like, not only in the way it built up over time, but in the way it reversed the normal convention of black or opaque lines on a white or lighter background. Since the black background is depthless, in that it has no contours and no shading, it is instead the lines of the map that stand out in relief and, as such, appear not to be confined to a flat plane, but, rather, are suspended in an empty space. In fact, since the image is projected across the gallery space, the surface of the screen is only the place that these lines of light come to rest by default, since anything standing in front of the projector will intervene in the beams of light to take on the role of map surface. It is a map, in other words, that appears to be independent of surface, or at least any one surface, and therefore free-floating and irreducible to a purely two-dimensional plane of representation. The use of this visual device, in which luminosity emerges from a dark, fathomless space, works to reinforce the idea that this map does not represent a space into which people insert themselves, locating their position in reference to an abstract system of representation, but a space that only comes into being through their actions: their movements, their everyday routines and encounters, their lived experience. As Gordon and de Souza e Silva write, it is highly significant that the work begins with a blank map: '[t]he maps in these pieces did not pre-exist the artwork. Rather, they were constructed through the participant's contributions and experiences of physical space' (2011: 45). It is a map that ceases to exist and provides no point of reference as soon as its last inhabitant ends transmission and metaphorically 'turns out the light'. The message it conveys is that space is a blank page until it is lived.

Perhaps, then, this is the elusive representation of lived experience that Belasco Rogers's *The Drawing of My Life* appeared, ultimately, unable to deliver? However, even though the cartographic grid is made doubly transparent through the clever use of a visual device that resists the reduction of trace-lines and base-map to a single plane, it remains the map's organising principle, and this reduces the representation of lived experience to the plotting of points in space by means of an appeal to a universal time and space. On the other hand, two factors militate against this abstracting tendency: the introduction of temporality, and particularly contemporaneity, along with the participatory and reflexive nature of the work. Outside of military applications, the project's ability to map movement in real time was genuinely novel. Visitors to the Amsterdam exhibition were, as they looked at the map, witnessing a unique moment in time - the real-time confluence of multiple individual trajectories through the city that might be replayed, but could never be repeated. The trace lines on the map held that moment only briefly before fading to black: gone. Such a map, in contrast to scientific cartography, does not claim stability or permanence, only the fleeting knowledge of a moment that will soon pass and be replaced by something else. The map, its claim to knowledge, its very existence, remains all the while dependent on the performance of participants out on the streets. In this sense, the map can claim to be generated by lived experience, even if its representation of lived experience must always fall short of capturing its full richness because of the way it abstracts from it. A little of this richness, the qualitative experience of the city, does however seep through. Some of the trace-lines on the map, although not identified in any way, would have been recognizable: for example, the tram-

156

driver volunteer was easily identified by his repetitive movements, at a greater velocity than foot traffic, along trajectories that those with local knowledge could readily correlate with city tramlines. Other participants even found a voice, a means to speak to those viewing the map in the exhibition space. One performed a GPS-drawing of a pigeon by walking a pigeon-shaped route through the city, while another spelt out her son's name across the city as a surprise birthday gesture to be read when he visited the exhibition (Hopman, 2005: 54).

This image has been removed for copyright reasons

Figure 2.12: Estha Polak/Waag Society, *Amsterdam Realtime* (2002).
GPS-drawing of pigeon by participant, 'Duif'. Courtesy of the artists.

This creative appropriation of novel mapping tools indicates the degree to which participants were involved in actively mapping, rather than simply being mapped. By design, the participants became actors and agents within the work, instead of objects of the work. Reflexivity is built into *Amsterdam Realtime* in the way that it encourages participants to view and reflect on the maps of their passage through the city, inviting them to reassess 'their relationship with urban space by recording and exposing its patterns of use' (Tarkka, 2010: 137). For Gordon and de Souza e Silva, this active participation in the process of map-

making in *Amsterdam Realtime* 'could be transformative of the user's experiences of urban spaces' (2011: 45).

The injection of time, real-time, along with grassroots participation in the mapmaking process, has led some to claim that *Amsterdam Realtime* succeeds in overcoming the abstracting effects of cartography to incorporate and represent lived experience. Farman, for example, writes that '[h]ere, mobile devices show the lived space of the city through the bodies navigating through space. Such a map can serve to represent the lived and embodied nature of that space' (2012: 47). However, *Amsterdam Realtime* occupies a much more ambiguous position than this would suggest. As has already been noted, it remains tied to a cartographic grid and relies on the adoption of a uniform space and universal time; what Paul Ricoeur refers to as the 'time of the world', rather than the 'time of the soul' (1984, 12-22). The lived time and space of participants in *Amsterdam Realtime* is quantified, abstracted and inserted into this spatio-temporal grid. While they engage in mapping, they are also mapped, and though they willingly consent, they are nevertheless placed under surveillance. In this ambiguous situation, much depends on how the data they generate is conceived of and used, and by whom. For the project's authors, it is a tool with which to promote reflection, by both observers in the gallery and participants out in the streets, on different modes of inhabiting and traversing the city. It points to the way in which cities are made not just of streets and buildings, but of human activity and events. However, it may also take on a 'radical' political function, absent in Polak's account of the project, by revealing 'forms of community behaviour which may challenge official understandings of such behaviour' (Straw, 2010: 19). In turn, this kind of knowledge may inform

urban planning practices, 'compel[ling] administrators to revise their understandings of how a city is inhabited and used' (Ibid: 19) - a possibility that is explicitly downplayed by Polak (Ross, 2006: 186). The same information may, however, be put to more malefic use, becoming a tool of the powerful with which to spy on people, tracking their movements and noting their social contacts in order to exert social and political control. It is this possibility that Polak herself points to and sees the project as explicitly addressing (Amsterdam Realtime, 2002). It draws attention to and explores the potential of technologies that threaten to map our every moment, but, at the same time, resists this by engaging the mapped in the process of mapping as well as by making that mapping momentary (or, time-specific) and thus unstable. As Will Straw writes of the work, '[t]he gap between the random variability of the participants' transmissions and the network's drive towards cartographic stability is overcome with time' (Straw, 2010: 18). In other words, the routines and repetitions of everyday life, if continuously mapped, build up to become patterns, and ultimately something like an immutable structure (as might be argued of Belasco Rogers's *The Drawing of My Life*), but the contemporaneity of *Amsterdam Realtime*, the fading to obscurity of its timelines, undermines the building of such structures.

In de Certeau's terms, the 'gap' that Straw refers to is that between the street-level operations of everyday urban life and the elevated view of the city's structures (1984: 19). For de Certeau, the tactical and strategic viewpoints are incommensurable. As previously noted in relation to the discussion of Belasco Roger's work, de Certeau summarily dismisses the attempt to represent lines of pedestrian movements from the elevated viewpoint of the map. Such lines are

only 'traces' and have 'the effect of making invisible the operation that made it possible' and therefore 'constitute procedures of forgetting' (Certeau, 1984: 97). However, *Amsterdam Realtime* may call for a reassessment of this view as the map that it produces, however inadequate its representation, does seem to capture something of the lived, embodied experience of everyday urban life. As Lone Hansen writes of the ambiguous nature of the project, it 'seem[s] to facilitate an informed (re)engagement with space and spatial narratives in ways that *both echo and resist* de Certeau's ideas' (2012: n.p., my emphasis). Returning to the ambiguous position occupied by participants in the project as both mapped and mapping (both 'objects' and 'subjects' of mapping), de Certeau's distinction between 'reading' and 'writing' the city is revealing. For de Certeau, the practitioners of the city 'write' as they walk its streets, but are unable to 'read' the text they produce.

> The ordinary practitioners of the city live 'down below,' below the thresholds at which visibility begins. They walk - an elementary form of this experience of the city; they are walkers [...] whose bodies follow the thicks and thins of the urban 'text' they write without being able to read it. […] The paths that correspond in this intertwining, unrecognized poems in which each body is an element signed by many others, elude legibility. It is as though the practices organizing a bustling city were characterized by their blindness (1984: 93).

On the one hand, *Amsterdam Realtime* would seem to refute this by supplying a map that is not only written by, but also legible to, its participants, thus promoting a reflexive relationship with their city. It makes visible life 'down below', even as it adopts an elevated view and so, arguably, brings tactics and strategy into a new kind of relationship. As Hansen writes, '[b]y design, mobile technologies [...] are able to simultaneously make explicit the structures of strategy and the traces of tactics' (2012: n.p.). However, it is difficult to refute de Certeau's assertion that a 'writer' of the city cannot at the same time be a

'reader'. The participant on the street and the participant later viewing his or her map occupy different positions and, crucially, these are also separated by time. Even if projects such as *Amsterdam Realtime* render these viewpoints no longer mutually exclusive (their participants continually moving between the two), because they cannot be held simultaneously, they cannot be said to have been fully reconciled.

In conclusion, *Amsterdam Realtime* does not, cannot, fully integrate lived experience or resolve the tension between tactical and strategic approaches to the mapping of cities. However, in the way it creates instability through a momentary, real-time experience, and in the way it empowers participants to map their own city, it does create ambiguity, does blur lines, and in doing so highlights the relationship and interplay between the binaries of writer/reader, subject/object, performance/representation. The next section discusses another case study that also blurs the lines between these binaries, but whereas *Amsterdam Realtime* achieved this through the introduction of time, Nold's *Biomapping* (2003-) explores the potency of mapping emotion. It, too, treats mapping as a participatory, ground-up, process, but in contrast to the case studies that precede it, it more directly confronts the nature of cartographic knowledge by playing with and between the juxtaposition of art and science.

2.3.2 Mapping Emotion: Christian Nold's *Biomapping* (2004-)

Christian Nold's *Biomapping* (2004-) takes tools of cartographic and scientific measurement that are associated with practices of surveillance and interrogation and redeploys these within the context of a participatory process

that explores how groups of people make sense of place. In mapping these places from below, there is an attempt to invert the authority that these tools normally exert over spaces and bodies, yet the project's relationship with science and cartography remains ambiguous. On the one hand, there is a desire to valorize a sense of place that emerges from people's embodied, lived experience and, alongside this, an implied critique of, in Nold's words, 'technologies that are designed to pin you [...] into a particular narrative' (2014: n.p.). On the other hand, in making use of these technologies to explore alternative narratives, the project imports some of the thinking that accompanies them, particularly the desire to make visible and to represent shared knowledge of the world. Like the projects of science and cartography, Nold's use of technologies of observation and, indeed, surveillance, to produce biometric and geographic data that is then visualized in the form of graphs, charts and maps implies that both the body and its place in the world are open to investigation, measurement and representation. Though the maps that the project produces do not claim a universal and timeless knowledge, instead offering only partial views that emerge as snapshots from an on-going process, these views are nevertheless shaped by cartographical ways of seeing and thinking. The following analysis explores this ambiguous relationship with science and cartography, and particularly how this ambiguity might be thought of in terms of the relationship between art and science, especially as it is negotiated through the practice of data visualization.

By Nold's own account, the *Biomapping* project began not with the idea of mapping, but with his experiments in the use of a 'lie-detector' device and the idea that data from this might be married to GPS data (Ibid). The subjects of

early experiments were thus sent out in to the field to produce and record both streams of data and the results analysed to explore the correlation between location and emotional state. It was only when Nold tried to compare the results of multiple individual journeys that he began to produce 'physical maps' as a useful way of 'trying to look at commonalities' (Ibid). However, given the propensity of maps to lie (Monmonier, 1991), there is a satisfying aptness to the idea that a 'lie-detector' might be used to interrogate cartography.

To September 2014, there had been more than 25 iterations of the *Biomapping* project, involving 2000 participants across 16 countries (Nold (b), n.d.; Nold, 2014). Though the projects are carefully tailored to specific locations and circumstances, there is a well-established methodology (copyrighted and trademarked by Nold) in which the production of maps is a key component. Participants are equipped with a mobile device that, at four-second intervals, simultaneously records their GPS co-ordinates and Galvanic Skin Response (GSR). The GSR reading is taken from a biometric sensor that fits on the user's fingers and measures their level of emotional arousal or stress, using the same technology as a polygraph machine, or 'lie-detector'. In addition, participants are able to use the mobile device to make notes that are attached to the GPS and GSR readings, and thus annotate their journey as they navigate on foot through these urban areas. The data and notes are collected on the users' return and visualized as 'emotion maps' (Nold, 2009: 4), sometimes featuring individual participants but most often aggregating data to reflect the moods and responses of an entire 'community' of participants.

This image has been removed for copyright reasons
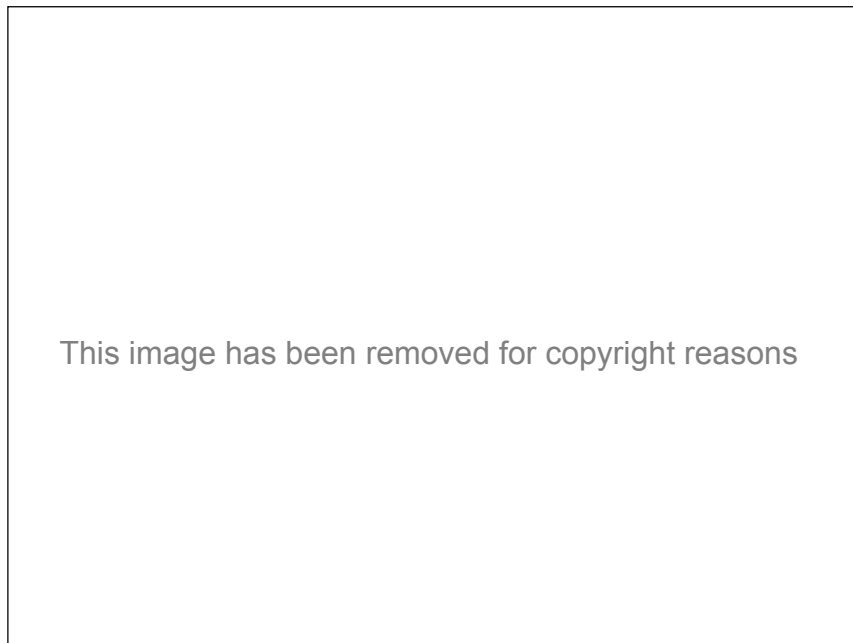
Figure 2.13: Christian Nold, *Biomapping*, Greenwich (2006). An example of the use of Google Earth images, showing GSR measures along the path of one participant's walk and an annotation made by the participant. Courtesy of the artist.

The GSR data is variously represented by coloured dots, shaded contours, three-dimensional columns and, in the case of Google Earth projections, a wall-like line graph that rises and falls along the route taken by the participant, indicating their level of physiological arousal at any given location. The annotations made by participants are added to the maps as text, revealing something of their subjective experience at particular points along the way and providing a means to interpret the bald GSR data which, on its own, indicates nothing of the quality or cause of arousal. The same GSR measurement might indicate, for example, anxiety at approaching a busy traffic crossing or, alternatively, a moment of elation at meeting a long-lost friend. It is these annotations, rather than the GSR data alone, that work against the tendency to reduction and abstraction observed in, for example, Belasco Rogers' *The Drawing of My Life*. A selection of these taken from the *San Francisco Emotion Map* (2007) would seem to express exactly the kind of transitory, tactical, peripheral everyday practices and experiences that de Certeau believed could

164

not be represented by maps (1984: 97): 'dirty people walking by and I tried to dodge them', 'ran into my friend here', 'a dog scared me', 'we split up now I am on my own', 'had a shot of whisky at the bar here', 'Got harassed by teenagers', 'creepy back alley', 'watching a hawk fly'.

This image has been removed for copyright reasons
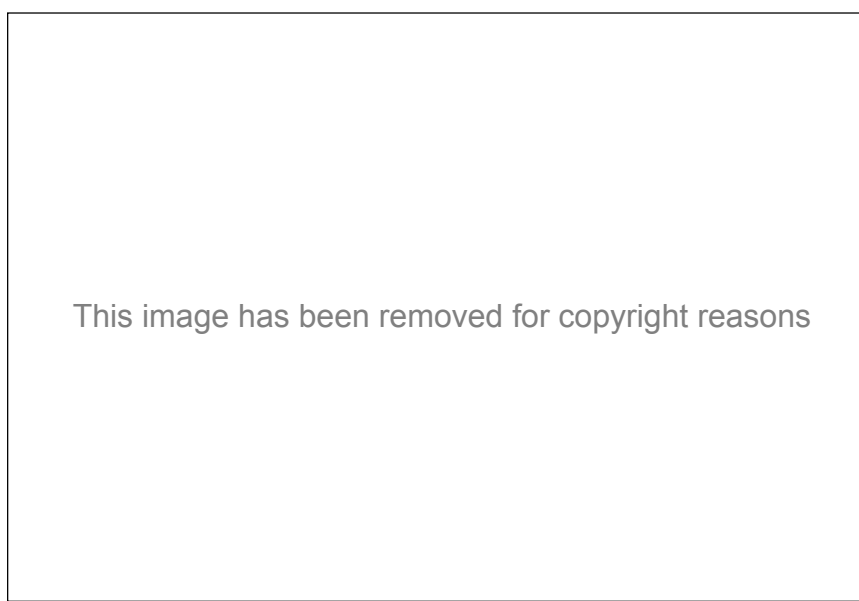
Figure 2.14: Christian Nold, *San Francisco Emotion Map* (2007). Detail. Courtesy of the artist.

This re-incorporation of lived experiences into representations of space carries political import. For Farman, it allows 'a collective revisioning of lived space' (2012: 52), while for Tom Corby, it makes 'visible hidden social, environmental and political realities' (2008: 466) to produce 'alternative narratives or perceptions of the world' (Ibid: 467). Alongside the appellations of 'artist, 'designer' and 'educator', Nold also describes himself as a 'cultural activist', his role being 'to work with collectives, education as well as the political crowd to re-imagine and re-structure cities' (Nold, n.d.). Such overtly political aspirations are held in common with other traditions of mapping practice, including community mapping movements such as those described by Dennis Wood in the United States (2003: 2-7), and David Pinder in the UK (2005), but most

obviously those of psychogeography. Indeed, Nold specifically claims to be pioneering 'a new kind of psychogeography' (2009: 5), while Brian Holmes (rather mischievously) describes *Biomapping* as, 'psychogeography goes automatic' (2006: 25). Nold's maps also bear comparison with urban planner Kevin Lynch's (1960) incorporation of subjective experience into the process of mapping urban spaces, in his investigation of cognitive mapping. Lynch's maps are also concerned with levels of arousal and stress in that they seek to show how and why urban environments may at times produce a clear sense of orientation and at other times an anxiety-inducing state of disorientation (Ibid: 4).

Nold's maps also appear to move beyond cartography in the way that they emphasize the processes involved in, and inspired by, the activity of mapping over maps as an end product. Though he acknowledges that the maps 'became some kind of representation of the place' (2014: n.p.), emotion mapping is primarily seen as a 'reflexive and participatory methodology' (2009: 4) and the maps themselves as a means of capturing 'processes that lots of people participated in' (2014: n.p.). Corby (2008) writes about his experience of one iteration of *Biomapping* that was conducted with student volunteers as part of an exhibition at the University of Westminster. This took place in a workshop environment, with participants being briefed and fitted with the *biomapping* device before going out onto the streets. On their return, 'students were debriefed and asked to notate and analyze the subsequent visualization of their journeys' (Ibid: 465), adding their own comments and explanations. A 'bio-map' of the aggregated results was then projected onto a wall of the gallery as a spur for further group discussion. Corby notes how the participatory nature of the

event took 'analysis and information-gathering out of the hands of experts' and passed it to 'persons normally considered as "subjects" of study' (Ibid: 465). Their involvement as interpretive agents in the work meant that, rather than getting at a fixed 'truth', in the manner of science or cartography, they engaged in 'an open-ended discursive event whereby meanings emerge[d] from the shared subjective responses of groups of users' (Ibid: 465). For Nold, it is 'people's interpretation and public discussion of their own data [that] becomes the true and meaningful record of their experience' (2009: 5). The role of the map is to act as a catalyst and 'memory trigger' (Ibid: 5) for conversation, disclosure, the sharing and comparison of feelings, a 'co-storytelling' (Ibid: 6) that may possibly lead to some consensus, or even a new-found sense of community[95].

The nature of data-gathering and its representation in the form of maps in *Biomapping*, can be considered in terms of what Nold characterizes as a 'bottom-up' rather than 'top-down' movement (2009: 10). While the map view remains 'top-down', there is an attempt to integrate the view from 'bottom-up', both through participatory processes of data generation and interpretation, and in the addition of subjective textual annotations that, in Nold's words, combine 'objective data' with 'subjective story' (Ibid: 5). Nold's claim is that in

---

[95] For Nold (2014), the way in which collectives form has recently become more central to his assessment of his work as part of ongoing doctoral studies. This is framed within Actor Network Theory (ANT) which, in place of an assumed 'society', accounts for the social by following the networks of connections between both humans and non-humans to establish how collectives are 'assembled' (Latour, 2005). Of interest to the account of *Biomapping* offered here is ANT's refusal of the modern separation of the realms of nature and society, respectively the provinces of science and politics. In Bruno Latour's words, 'we have never been modern' (1993). In this view, to be more fully discussed in chapter 3, the 'weight' of cartography is no more than that which it has accrued through collective use – what matters is how it is used – and this fits well with Nold's use of the map. The argument made in the analysis of *Biomapping* offered here is, by contrast, that we most definitely *have* been modern and continue to be so, to the extent that modern (cartographical) ways of seeing, thinking and knowing still exert a hold.

appropriating some of the methods, technologies and conventions of science

and cartography, and repurposing these in ways that allow for the incorporation

of subjective lived experience, 'a new type of knowledge' (Ibid: 5) is produced

that straddles the objective and subjective, or what Lefebvre describes as the

'conceived and lived' (1991: 60). Thus, the authority or 'truth' of these maps is

not imposed from above, from a position that claims neutrality and objectivity,

but emerges from the processes and performances of its making and results in

representations that incorporate multiple perspectives and 'truths'. Farman

endorses this view, going one step further in arguing that *Biomapping* succeeds

in unifying the embodied experience of space and its cartographical inscription:

> The map in Nold's project represents a lived locale, the practice of space
> that transforms it into lived place. These representations go far in
> dismantling the separation of the sensory body in space and the cultural
> inscriptions of that space. The map and the body are *unified* in a
> sensory-inscribed experience of urban space. (2012: 49, my italics)

This might be seen as a restoration of what Lefebvre describes as a 'lost unity'

(1991: 175) between the 'lived', 'perceived', and 'conceived' (Lefebvre, Ibid:

423), but it would be odd, particularly for Lefebvre, to attribute this restoration to

a map. To couch Farman's claim in terms of Farinelli's description of

cartographical reason, this is to claim that *Being*, the expulsion of which, very

precisely, brings the map into existence, is somehow restored to and reunited

with the map[96]. In the process, 'science', which relies on the map to produce the

'homogeneity of time and space' that makes nature measurable and

representable, is apparently expelled (Farinelli, 1998: 143). Yet, in all manner of

ways, Science and Cartography continue to inhabit Nold's work. At a superficial

---

[96] A scenario which can, perhaps, be likened to Jorge Luis Borges's description of a map as big
as the territory in his short story, *On Exactitude in Science*. Being no longer useful as a map,
the 'tattered ruins' of it drift around a desert as the only remaining 'Relic of the Disciplines of
Geography' (1946).

level, the project sufficiently displayed the characteristics of a scientific experiment with claims on the 'truth' that he was variously approached by 'estate agents in California wanting an insight into the geographical distribution of desire; car companies wanting to look at drivers' stress, doctors trying to re-design their medical offices, as well as advertising agencies wanting to emotionally re-brand whole cities' (Nold, 2009: 4). This empirical function of *Biomapping* is also envisaged by some academic writers: For geographer Chris Perkins, for example, the project is 'cast as useful art, showing objective, consensual, community feelings about an area that might inform the planning process' (2007: 128). Indeed, though Nold is wary of 'people who [see] these processes as a way of slicing people's heads open to see what [is] rolling around inside', the *Biomapping* project has, as well as operating in the contexts of art and community development, been applied to 'science research, architectural planning and large scale political consultations' (Nold [b], n.d.: n.p.).

There are, however, much more substantial ways in which his work can be identified with the broader scientific enterprise. Although the aim is to introduce to the map subjective lived experiences and multiple points of view, this map still operates with distinctly cartographical assumptions about the nature of knowledge and representation. It persists in playing the 'god-trick' (Haraway,1991: 189) of surveying the world all-at-once, taking its measure from a singular but disembodied point of view, and flattening all other perspectives to a surface of projection, on the common ground of which is built shared knowledge of the world or, as Nold puts it, 'a shared vision of place' (2009: 7, my italics). In this projection of the world onto a representational plane,

169

'knowledge' and 'vision' become synonomous. Lefebvre refers to it as 'an illusion of transparency' in which 'the known and the transparent are one and the same thing' (1991: 28). For Gillian Rose, moreover, this illusion lies at the heart of cartography: 'The geographical imagination thinks space can always be known and mapped, and that's what its transparency, its innocence, signifies: that it's infinitely knowable; that there are no obscure corners into which the geographical vision cannot penetrate' (1993: 70).

At a different scale, but with the same desire to be all-seeing and all-knowing, the GSR biosensor probes the body to lay bare, measure and quantify its symptoms, producing what Thrift describes as 'micro-geographies' of the body (2004: 67). Writing in Nold's *Emotional Cartography*, the Raqs Media Collective (making an argument that runs parallel to the critique of cartography) see this mapping of the body as complicit in 'its governance, and in the subjugation of its boundaries to regulation and control' (2009: 16), a view that echoes Michel Foucault's description of *bio-power* as 'an explosion of numerous and diverse techniques for achieving the subjugation of bodies and the control of populations' (1976: 140). The reverse argument, again stressing the 'bottom-up' nature of the project, is that, rather than being a form of *biopower*, it contributes to a radical *biopolitics* that reinstates 'the claims of bodies, pleasures, and knowledges' (1998: 157). Nevertheless, to the extent that Nold adopts scientific and cartographic modes of investigation, measurement and representation, these cannot help but work against such a biopolitics by abstracting from lived, embodied, experience in the pursuit of transparancy. As Hemment writes about the use of GSR data in *Biomapping*, '[h]ere the body is brought into the equation only to be abstracted and left behind' (Hemment, 2006: 353).

It would be all too easy to downplay the weight of this cartographical inheritance on the grounds that Nold's engagement with science and cartography is playful and used to parodic effect. Nevertheless, Nold is well aware that in repurposing scientific and cartographic technologies, they do not easily shed their context but, rather, carry these with them. In what appears to be a reference to Polak's *Amsterdam Realtime* he says:

> In locative media there was a lot of things where people were using GPS traces and totally removing the map layer and totally treating them as random numbers [...] and like squiggly lines in abstract space and I felt that ignored some of the materiality of the GPS. I mean it does pinpoint something in quite a crude way. It pinpoints an activity into a [...] particular coordinate system and I think that is definitely a material fact that you can't ignore [...] it's not enough to dislodge it by making it into some abstract, black space. (2014: n.p.)

Acknowledging that the attempt to 'dislodge it' is 'a complicated process that I'm trying to work on', Nold says that 'I think the only way you do that is actually by engaging with these technologies' [Ibid). It suggests that rather than collecting data in a parody science and producing representations that make light of cartography, Nold takes on the full weight of these and, in the manner of a martial art[97], seeks to unbalance them to his own advantage. Specifically, while GPS and GSR are seen as 'pin[ning] you into a particular narrative', he plays with the mismatch between the scales at which these operate to 'open up new possibilities':

> I think that almost by combining the two there is a kind of rupturing that happens [...] this way in which you can get this kind of weird change of scale between things inside your body and then suddenly things at the satellite scale. Things swing between them in a kind of uncontrolled way [...] They don't map against each other and for me I think that's why they undermine each other (Ibid).

---

[97] For example, the principle of *kuzushi*, or the unbalancing of an opponent, in Japanese martial arts.

Thus, in what he describes as the 'mastering' or 'inverting' of the 'control paradigm of biometric technologies' (Nold [b], n.d.: n.p.), these technologies may be 'staged in different ways' (Nold, 2014: n.p.), but there is no suggestion that the paradigm is simply swept aside. Science and cartography are not displaced but are enfolded within the work. The opposing movements from 'top down' and 'bottom-up' are not resolved, one way or the other, but are held in tension. On the one hand, Nold adopts technologies and techniques from science, along with its desire to see all and know all, and represents this knowledge, albeit knowledge that seeks to incorporate subjective responses, from a disembodied view-from-above. On the other hand, he sees the collection and mapping of data as subservient to the processes it inspires; the personal and collective appraisal and annotation of data that is owned by the participants and which celebrates 'complexity and diversity' (2009: 10). Nold himself is very aware of this tension and consciously plays with it. Writing about science in terms of its technologies, he describes them as 'a heady and unstable mix of authoritarian control and anarchic mischief', and continues, '[m]y approach is to slip into the gap between these two poles and use it as my medium by combining the freedom offered by the art world with the agency obtainable through design and technology' (Nold (a), n.d.: n.p.). This notion of the freedom of the artist has real purchase when referenced back to writers including Farinelli and Olsson, who see art as holding a very unique and specific relationship with cartography. In Farinelli's terms, cartographical reason is founded on the 'philosphical sculpture' (1998: 139) of the pinax and works by forgetting the hand of the artist that made it. The map is art solidified. In these terms, art holds the possibility of reanimating the map, of drawing attention to the moment of creation and the hands that work it to reveal the art in its

production. Although Nold's maps do ultimately solidify as they are printed to a sheet of paper, Nold is 'artful' in the way he keeps meanings in flux. He achieves this not only by emphasizing 'process' over 'representation', but also in the way he continues to hold art and cartography in tension in the finished map in ways that do not, in his words, 'lead towards an easy reading' (2014, n.d.: n.p.). Specifically, he achieves this through techniques of data visualization that, significantly, he describes as speaking neither a language of science nor of art but, quite distinct from these, 'the language of Adobe' (Ibid). I now turn to the consideration of what this 'language' of data visualization consists of, how it relates to cartography, and how it holds art and science in tension to produce ambiguous readings of the map.

The use of geographic data in Biomapping produces images that are recognizable as maps, but, particularly as these images also incorporate other data, they can more generally be considered in terms of data or information visualization. For Edward Tufte, computer-generated visualizations of data are simply the latest iteration of a brand of 'cognitive arts' that includes maps, alongside mathematical projects, scientific charts and diagrams, and even MRI scans (1990: 40). Alternatively, for Manovich, 'Visualization [...] can be thought of as a particular subset of mapping [...]' (2002: n.p.). More fundamentally, both maps and data visualization can be seen as manifestations of cartographical reason. For Farinelli, the pinax, or map, and the 'table' are one and the same thing: 'model [s] for reality' (1998: 142) that result from the reduction 'of things to surfaces, that is smooth and flat tables' (Ibid: 138).

Information visualization has, as with cartography, traditionally been the preserve of scientists, an integral 'part of the scientific discovery process' that allows for 'an intuitive identification of structures, which would not be available if presented in purely numeric form' (Corby, 2008: 462). However, as Corby notes, 'an increasing number of independent artists have begun to explore the aesthetic and critical potentials of IV' (Ibid: 462). Amongst these, Corby includes Nold and his *Biomapping* project. Through an examination of such works, Corby explores how 'models of image production derived from processes of scientific inquiry expand possibilities for the visual arts to develop new types of hybrid images that consist of data grounded both in material realities and in symbolic and aesthetic elements' (Ibid: 461). Of course, in information visualization as in mapmaking[98], aesthetic elements have always played a part, but it is in the denial of this that science and cartography make their knowledge claims and so a deliberate reintroduction or highlighting of these elements is a strategy by which artists might question, supplement, or move beyond these modes of producing knowledge. In relation to Nold's *Biomapping*, it provides a way of assessing just where the work stands in relation to science and the project of cartography.

Nold's Stockport and Greenwich emotion maps, to take two examples, appear to occupy an ambiguous zone between art and science by, alternately, both appealing to the standards and conventions of science and cartography, and by making use of aesthetic elements that pull away from these. A comparison of the two maps reveals that, although they are produced from the same

---

[98] See, for example, David Woodward's discussion of the connections between art and cartography (1987).

174

component data of GPS, GSR, and participant annotation, the way in which they choose to visualize data shifts the weight of their argument towards one or the other. Nold's *Greenwich Emotion Map* (2006), produced using GIS software, is pointedly map-like and scientific in appearance. It follows many of the conventions of cartographic representation and the overall impression is of a rational and rigorous presentation of data that carries with it some authority. Indeed, Nold deliberately had the map printed by the Ordnance Survey's own printers so as to retain the size, look and feel of a regular map (Nold, 2014: n.p.).

This image has been removed for copyright reasons
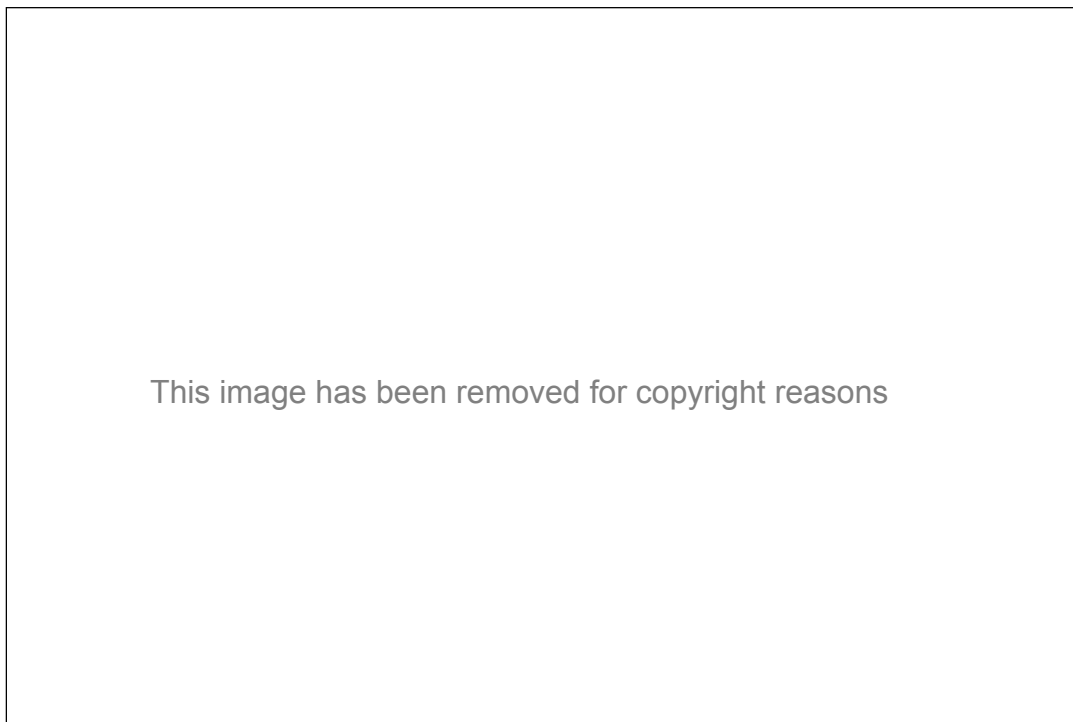
Figure 2.15: Christian Nold, *Greenwich Emotion Map* (2006). Detail. Courtesy of the artist.

At first glance, the coloured contours appear to indicate a mountainous terrain in which black lines show the routes of roads, perhaps, and text suggests the names of towns whose locations are marked by black dots. The map also specifies a precise scale of 1:3530 and contains a key. However, according to this key, the 'mountains' in this landscape are formed not by physical elevation

but by heightened emotional states, the 'arousal contours' - colour-filled from red to blue - indicating a high to low 'communal arousal gradient'. The black lines are indeed routes but not necessarily roads or even paths, simply 'participant tracks', while what at first appeared to be place names turn out to be the annotations of participants: 'Nice View', 'Good for Picnics', 'Felt Bored', 'Wasp Attack', the black dots indicating only the location of the participant when these notes were recorded.

This image has been removed for copyright reasons
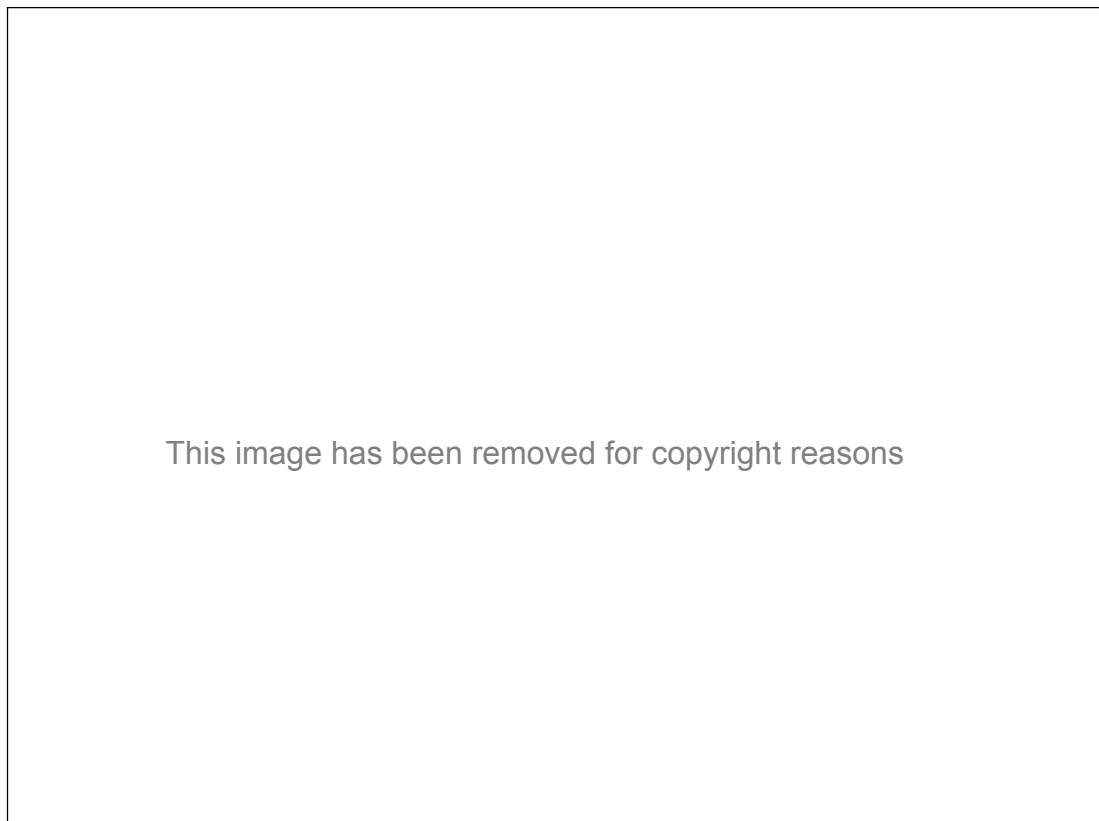
Figure 2.16: Christian Nold, *Greenwich Emotion Map* (2006), printed map. Courtesy of the artist.

Arrayed around the map, other information deviates more obviously from conventional cartographic representation. In particular, a block of text explains how and when the map was produced, how it differs from other maps and how it might be read and used; for example, as a spur to discussions of local

176

redevelopment plans. In other words, the map reveals the nature of its own production in a way that is conventionally hidden, or taken for granted, as well as revealing itself as a text that is open to multiple readings and to alternative uses, outside those conventionally associated with point-to-point navigation. Along with photographs taken by participants that are indexed to the map by way of numbered icons, the border of the map also includes a number of Google Earth views that show the peaks and troughs of individual participants' paths. These introduce, alongside the map's projection, a three-point perspectival expression of the participant's 'view' of Greenwich. This is not to say that projectionism is set aside in these 'perspectival' views as positions remain fixed and scaled by way of GPS readings that are referenced to a cartographic grid. However, it is also a map that is substantially constituted by the movements, responses and observations of its participants, and one that, particularly through the artful parodying of cartographic conventions, brings into question those conventions and the kind of knowledge they produce.

Stockport Emotion Map (2007), produced in collaboration with designer Daniela Boraschi, takes the same type of data, but presents it quite differently. The only variation in inputs to this map are the sketch drawings made by participants in response to 'provocations' including 'what really annoys them about Stockport, where they meet their friends, as well as who are the most important and dangerous people in town' (Nold and Boraschi, 2007: n.p.). The use of childlike, non-perspectival drawings of houses (and appropriately Lowryesque stick-figures[99]) creates something much closer to a sketch-map or pictogram. Locations remain fixed by their geographical coordinates, but because the

---

[99] L.S. Lowry painted many scenes in Stockport, including *Stockport Viaduct* (1958).

drawings are not to scale, they can only be placed in their approximate position, and this produces a looser fit between geographical location and its representation.

This image has been removed for copyright reasons
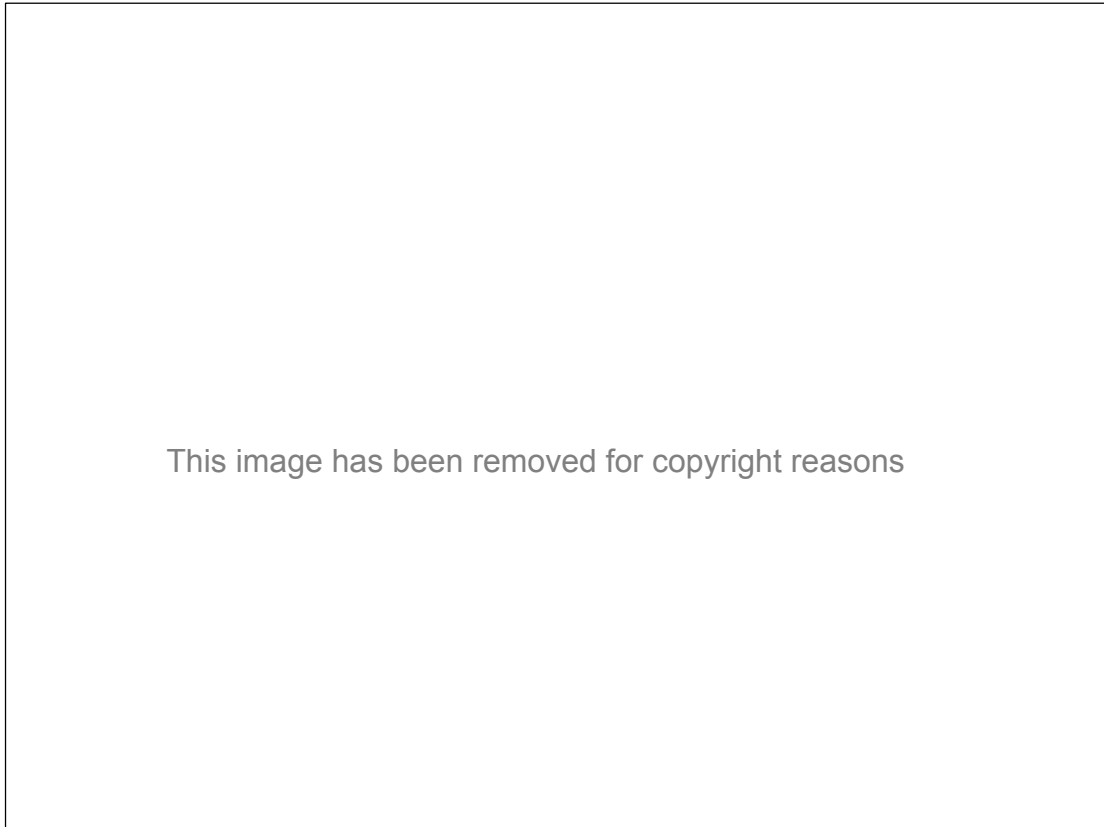
Figure 2.17: Christian Nold, with Daniela Boraschi, *Stockport Emotion Map* (2007), printed map. Courtesy of the artists.

The GSR data, quite incongruously and in contrast to the otherwise monochrome image, is represented in 3D projection by metallic red columns, the heights of which correspond to specific locations. The framing of the map utilizes different visual cues altogether. The intricate litho-print styled border, the elaborate font of the title-text, and large ornate compass reference the 18th to 19th century industrial heyday of Stockport. The map is also orientated, in keeping with 'historic maps of Stockport' (Ibid), so that the River Mersey runs

across the middle of the page[100]. The incongruity of the various graphic elements (historic map, metallic columns, naive sketches), whether by design or not, defies their easy assimilation into a whole. The anachronistic style of cartography, computer-generated visualization of data, and amateur self-representation of a community of participants, remain in dynamic tension, begging questions about what kind of knowledge is being presented and what status it carries. Like the 16th century maps that Pickles writes of, the Stockport Emotion Map is a *bricolage* that bears 'the traces of past mapping practices, local systems of representation and internally contradictory forms' (2004: 88).

This image has been removed for copyright reasons
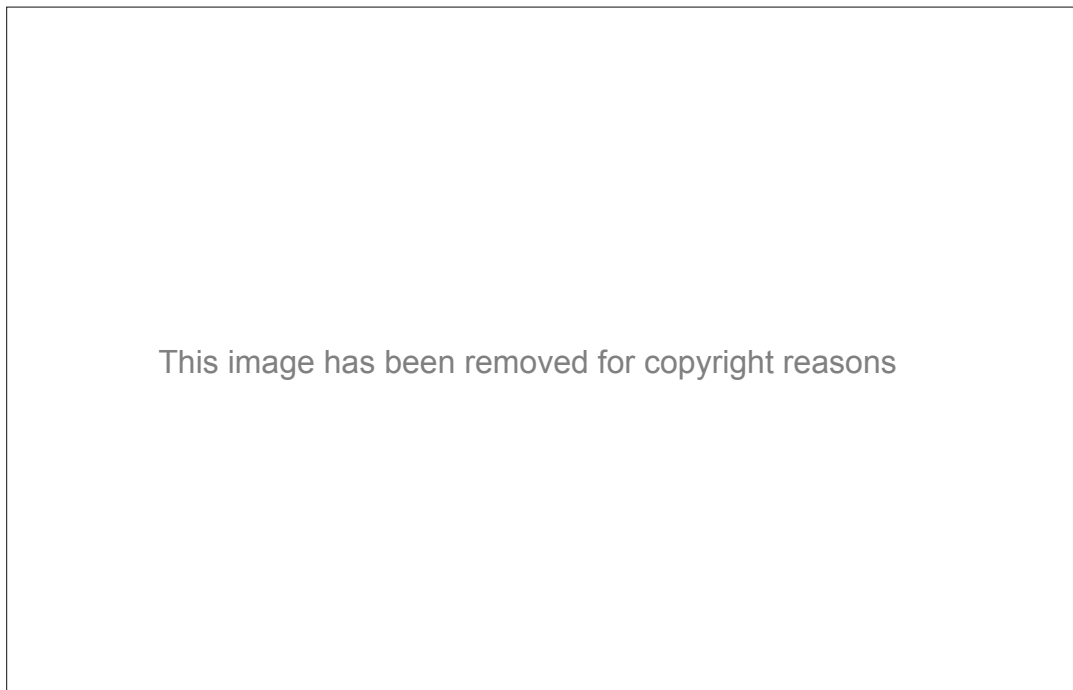
Figure 2.18: Christian Nold, with Daniela Boraschi, *Stockport Emotion Map* (2007). Detail. Courtesy of the artists.

The map also combines different and incongruous perspectives. By virtue of the use of GPS, the underlying organization of the map remains cartographical,

---

[100] In interview, Nold says that, as part of many weeks of research into Stockport, he and Daniela Boraschi 'looked at a lot of old maps of it' (2014: n.p.).

supplying a view of the town that is projected from a hypothetical position above it. However, the metallic columns are pictured from a bird's-eye three-point perspective, while the hand-drawn sketches mostly depict buildings as elevations that result from a vertical projection, as opposed to the map's horizontal projection. The overall effect unsettles the notion of a fixed viewing point. The eye, in accounting for incongruous perspectives, is forced to rove between a position at street level and what Soderstrom (1996) describes as a 'zenithal gaze' from above, with the GSR data represented by the columns sitting midway along this axis - suggesting, perhaps, that it provides a meeting point between the subjective and objective, between perspectivalism and projectionism, between art and science. It is a map that appears to be part objective, part subjective; part sketch map, part scientific map; part about place as it is perceived, but also place as it is fixed by coordinates.

This ambiguity is maintained by exploiting the affordances offered by techniques of data visualization and can be shaped by appealing to different visual codes and cues to present essentially the same data in quite different ways. The Stockport and Greenwich maps, for example, variously appeal to the authenticity of grassroots self-representation or, alternatively, to the methods, standards and visual repertoires of science. This equivocality reflects what is, for Manovich, a more general feature of the way in which artists make use of data visualization, and consists of two strands. On the one hand, there is what Manovich describes as an anti-sublime impulse to produce a visual or 'data-epistemology' that 'aligns data visualization art with modern science' (2002: n.p.). On the other hand, data visualization has the ability to 'show us other realities embedded in our own, to show us the ambiguity always present in our

perception and experience' (Ibid). Manovich urges that the latter be pursued as vigorously as the former:

> The more interesting and at the end maybe more important challenge is how to represent the personal subjective experience of a person living in a data society. [...] In short, rather than trying hard to pursue the anti-sublime ideal, data visualization artists should also not forget that *art has the unique license to portray human subjectivity* – including its fundamental new dimension of being "immersed in data" (Ibid, my italics).

This is a challenge to which Nold's Biomapping project, alongside its anti-sublime 'data-epistemology', clearly strives to respond, in its concerns both with subjectivity and the role of data in our lives; who owns it, who controls it, and how it is presented. Manovich's discussion suggests, then, that data visualization in works such as a *Biomapping* can be thought of in terms of a hybrid form that sits somewhere between the practices of science and those of art, and which are comprised of both informational and aesthetic elements.

For Nold, this combination of 'objective' data and 'subjective story' constitutes nothing less than 'a new type of knowledge' (2009: 5). Returning to the idea that, in the context of mapmaking, the poles between which *Biomapping* vacillates can be thought of in terms of 'bottom-up' and 'top-down' movements, doubt has already been cast on the possibility of effectively resolving these opposing forces. De Certeau, as has been previously noted, sees no possibility of mapping the tactical practices of everyday life (1984: 97) and, if 'bottom-up' and 'top-down' can be translated into Ingold's characterization of the vertically-acquired knowledge of 'navigation' and horizontally-acquired knowledge of 'wayfaring', there seems no room in that particular schema for their novel integration into some hybrid form of spatial knowledge. However, one way of thinking through Nold's proposition, and particularly with reference to

mapmaking, is provided by a number of feminist accounts of the relationship between science (and with it, cartography) and the body. Geographer Gillian Rose (1993) provides a succinct statement of the issues involved, which can be summarized as follows: '[t]he penetrating gaze, the strong claim to knowledge, and transparent space' of the sciences, including geography and cartography, are structured by 'the dominant Western masculine subjectivity in all its fear of embodied attachment' (1993: 71). This 'masculine knowledge of lucid transparent space' hides from view an 'other' space that it depends on for its meaning: an unknowable 'place' that is 'the location of direct experience, a sensuous swirl of emotions and perceptions and myths, which rational analysis can only ignore or destroy' (Ibid). This 'place' is the 'no-man's land' of the feminine, the maternal, and the unbounded body, which are 'mapped on different grids from that of empowered men' (Ibid: 76). The difficulty lies in how to know and represent what has been made unknowable and unrepresentable without recourse to the discourse that made them so - this being precisely the challenge faced by artists who work with locative media to map lived experience. Rose, however, identifies a strategy for dealing with this that bears comparison with Nold's *Biomapping*. Acknowledging her own position within the academy, as 'both part of its powerful discursive structures and apart from them, trying to challenge their exclusions from a position hopelessly within them', Rose advocates a 'strategic ambivalence' that recognizes her seduction by 'powerful discursive structures' but equally sees the seductive potential in bringing these structures into contact with their 'feminine other' (Ibid: 79). While there is no possibility of integration or hybridity between scientific knowledge and that which it makes unknowable, it is possible to make a strategic assertion about 'what might lie outside' such knowledge (Ibid). This 'strategic

182

ambivalence' is arguably at work in Nold's *Biomapping*, which plays with and between the twin seductions of scientific knowledge and the 'sensuous swirl of emotions and perceptions and myths' that lie outside it. However, the strategy in this approach lies in fully recognizing the limits that 'powerful discursive structures' (Ibid) like cartography impose on ways of thinking and seeing. It is one thing to ask a map to point towards 'what might lie outside' it, as Rose puts it (Ibid), but quite another to ask it to represent that which it has made unrepresentable; that which, in being a map, it excludes. Nold's *Biomapping* achieves a degree of ambiguity that points to and blurs the limits of cartography, but it does not escape cartography to produce a 'unity' between embodied experience and cartographic inscription in the way that Farman suggests (2012: 49).

Another way to attack this paradox –which is essential to cartography and afflicts all attempts by artists working with locative media to bring lived experience within its purview – is to rethink the status of the knowledge that is claimed by the map. Another feminist account of science suggests a way in which projects such as Nold's might occupy a position between, or outside, the views from above and below, and specifically through their manipulation of data visualization techniques. Donna Haraway proposes an alternative sense of 'objectivity', a 'feminist empiricism', that replaces science's 'conquering gaze from nowhere' (1991: 188) with 'a commitment to mobile positioning and to passionate detachment' (Ibid: 192). This 'embodied objectivity' eschews both the totalizing 'view from above' and the relativistic 'view from below', both of which are 'god-tricks' that promise 'vision from everywhere and nowhere equally and fully' (Ibid: 191). Instead, it produces 'situated knowledges', 'views from

somewhere', that are partial, contingent and interpretive (Ibid: 196). This viewpoint always acknowledges its own position and allows for other viewpoints, as well as for the agency of its object of study. Haraway's 'positioned rationality' rests on a re-appropriation of the visual realm both as a metaphor for 'seeing' and, strategically, in order to counter 'the visualizing tricks and powers of modern sciences and technologies' (Ibid:190). Haraway specifies that 'it is in the intricacies of [...] visualization technologies in which we are embedded that we will find metaphors and means for understanding and intervening in the patterns of objectification in the world' (Ibid: 195). In this view, Nold's work might be seen as operating within a 'positioned rationality' to produce 'situated knowledge' that appropriates and repurposes the 'visualising tricks and powers of modern sciences and technologies' (Ibid:190). Certainly, Nold is careful to make clear that what his maps show are only, in Haraway's words, 'partial views and halting voices' (Ibid: 196). However, as this analysis of *Biomapping* has shown, the appropriation of cartography does not result in a clean break from it. Rather, cartography continues to shape ways of thinking and seeing. Nold's *Biomapping* is artful in the way it balances opposing movements and perspectives, and by creating ambiguous readings it contributes to a critique of cartography; however, just as it pulls away from cartography, it is also impelled back towards it. In its desire to produce shared knowledge of the world, its commitment to transparency and the possibility of representation, and in its adoption of projectionism as the means to achieve these, *Biomapping* remains substantially indebted to cartography.

2.4 Conclusion

The case studies in this chapter all[101], in their own way, seek to return to the map the qualities of lived experience that cartography routinely excludes. Daniel Belasco Rogers's *The Drawing of My Life* makes the map personal through an inversion that highlights the lines of his own movement while removing all trace of the base map. Estha Polak's *Amsterdam Realtime* introduces time to the map to show the movements of participants as they unfold and, additionally, brings into question the map's surface of projection by projecting it as light that is independent of any particular surface. Christian Nold's *Biomapping* introduces a measure of subjectivity and stresses the processes of map-making over the map as a final product, as well as making use of data visualization techniques to create ambiguous readings of the map. In attempting to produce maps that represent the world in ways that are less abstract, that more fully accord with human experience, they contribute to a critique of cartography and respond to a crisis of cartographical representation that stems from a perception that cartography fails to adequately represent the world or, indeed, that the world is un-representable.

However, their 'appropriation' of cartography produces a paradox. The attempt to repurpose cartography in order to counter it also entails, often unwittingly and not least through their largely uncritical use of GPS, the adoption of cartographic ways of seeing, thinking and knowing that then work against this project. As a result, the desire to capture and make visible the qualities of lived

---

[101] Excluding Faithful's *0 °00 Navigation*.

experience results in the reproduction and perpetuation of cartography's abstract mode of representation. At best, these works hold the lived and abstract in dynamic tension in ways that defy an unambiguous reading but the lived/abstract dichotomy ultimately remains unresolved.

This is no accident or failure in execution. Rather, it results from the work of these artists and many writers on locative media remaining trapped within a very modern (cartographic) way of thinking that, for anthropologist Eduardo Viveiros de Castro, is characterized by the 'massive conversion of ontological into epistemological questions – that is, questions of representation' (2004: 480). Thinking about locative media in terms of a lived/abstract dichotomy, even in order to have one prevail over the other, also assumes a Cartesian dualism between representation and reality that is itself thoroughly modern and cartographic. This dualism is also evident in Alfred Korzybski's dictum, commonly asserted in relation to works of counter-mapping, including those of locative media[102], that 'the map is not the territory' (1941: 58). However, in positing a reality that falls outside the field of cartographic representation, and in wanting to bring this reality within its purview, ontological questions are converted into epistemological ones: how well does this map represent this reality? The only available solution is to produce 'better' representations but this rests on and perpetuates the dualism on which cartographic reason and representation relies, and which makes unknowable 'that which shuns from the map, that which does not appear on it' (Farinelli, 1998: 142). In the way that it defines both the known and the unknowable, the map is indeed the territory (*pace* Korzybski)[103].

---

[102] See, for example, Speed (2011).
[103] For another version of this argument, see David Turnbull's 'Maps are Territories' (1989).

In other words, the paradox with which the artists in this chapter grapple is fundamental to cartography and its presence in their work signals that, although they push hard against the limits of cartography, their critique of cartography ultimately remains one that is trapped within it. In their desire to produce shared knowledge of the world, their commitment to transparency and the possibility of representation, and their adoption of projectionism as the means to achieve these, the works in this chapter remain heavily indebted to modern, cartographic ways of seeing and thinking. This is evident in their maps, in which the conventions of cartography remain substantially intact, but it is also evident in the thoroughly modern assumptions they make about the stability of spatial categories such as *street*, *place* and *city* and the ease with which *communities*, *public space* and the possibilities for collective social action may be located in these 'places'. In seeking to reassert the authenticity of *place* against the abstraction of *space*, these works also overlook the ways in which new information technologies, including those employed by locative media, may be changing the nature of lived experience and producing new spatial relations and forms of territory in which 'places' become harder to locate.

The next chapter turns to a consideration of these issues and to works that more fully address them by attempting to map, for example, the nebulous territories that are produced by Wi-Fi and the operations of mobile social networks. While the works in Chapter 3 also fall back on cartographic modes of representation, they more fully explore its crisis by asking maps to represent phenomena that cannot readily be located within a cartographic frame. In doing so, they also more fully acknowledge that the technologies and methods they

employ, rather than remaining neutral tools of observation, may intervene in and shape space. In this way, the works of the next chapter move further away from a Cartographic model of space and begin to explore the conditions of Code Space.

Chapter 3

The Limits of Cartography

3.1 Introduction

In this chapter, I explore an on-going crisis in cartographical representation that is hastened by the novel spaces and senses of proximity that arise from the coded operations of information technologies. These invisible, intangible and fluid spaces do not readily conform to a Euclidean space and are therefore less readily represented within a cartographic frame. The case studies of this chapter demonstrate a number of different ways in which artists working with locative media have attempted to account for and map these novel spaces. In doing so, they operate at the very limits of cartography. However, they also remain substantially attached to cartographic ways of seeing and thinking, and their exploration of a crisis in cartographic representation often precipitates a crisis within their own representations. Accordingly, these works are seen as occupying an ambivalent position in relation to the models of Cartographic Space and Code Space.

I shall introduce the case studies of this chapter by differentiating them from those of the last chapter. These were characterized as operating within a very modern debate that pits the *lived* against the *abstract*. It was argued that, in seeking to incorporate the lived within cartographic representations of space, they were, paradoxically, not only attempting to employ a representational framework that works against this, but also confirming the essential dualism on

which it rests. Although they aimed to introduce new qualities to the map, they left the cartographic framework largely intact and unquestioned. Their dispute with cartography was to do with *what* it represented rather than *how* and *where* it located these. For these works, the *lived* (whatever new qualities it introduced) could still be located unequivocally within an *abstract* representation of space.

While the works in this chapter[104], it is argued, also remain heavily indebted to cartography, they bring into question its framing of space by asking it to locate phenomena that are less visible, tangible and defined and thus less susceptible to representation within a cartographic frame. The work of Pete Gomes maps the invisible Hertzian spaces of Wi-Fi and GPS, seeking common ground, but exposing the disjuncture between informational and architectonic spaces. Jen Southern and Chris Speed's *Comob* (2009) creates and maps mobile social networks that operate both in and across space, and which 'diminish the representational power of the base-map' (Speed, 2010: 174). Paula Levine's *Shadows from Another Place: San Francisco <-> Baghdad* (2004), in interrogating political, geographical and informational spaces, creates new

---

[104] While many other works of locative media art address the complex layering of geographical and informational, 'real' and 'virtual', spaces that characterize post-modernity, these have been selected because they address not just how these spaces might be experienced, but specifically how they might be mapped. For example, *Can You See Me Now* (2001) and *Uncle Roy All Around You* (2003), by the British artists' group Blast Theory, are also concerned with exploring these new informational territories and are broadly contemporaneous with, for example, the work of Peter Gomes discussed in this chapter, but they are primarily concerned with how these 'hybrid' spaces are experienced and understood rather than with how to represent them. They employ a quite conventional base-map as a game-board for play, but anomalies between informational and geographical spaces fail to register in this representation, as was the case (discussed by Benford and Giannachi, 2011: 63-65) when street-players in *Can You See Me Now* exploited the vagaries of GPS satellite signals to hide in their shadows. This points to a failure of representation in that both the real-world presence of street players and the informational shadows of GPS were rendered invisible. By contrast, the works included in Chapter 3 actively seek to make visible and represent these kinds of anomalies between material and informational spaces.

relations of proximity by cutting up the map and superimposing the fragments. By addressing spaces that are more fluid, complex, layered, and less firmly rooted in terra firma, they call into question the assumption that distinctive 'places' can be identified either on the ground or the map as being just 'here'.

Ultimately, it is argued, these works remain no less enamoured of modern, cartographical ways of thinking, but they do respond to modernity in a distinctive way. Whereas the case studies of chapter 2 counter the rationalization and abstraction of life experienced in modernity by harking back to what are perceived as 'pre-modern', chorographic conceptions of space, the case studies in this chapter have an eye to the future and particularly to the impact of emerging information technologies and practices, including their own. Thus the works in this chapter are more attuned to the way in which their own practices actively produce spaces, rather than (as cartography would also pretend) simply observing these from a distance. In this limited sense, at least, these works can be seen as moving towards what Pickles calls a 'post-representational cartography' (2004: 160).

However, they also find themselves caught in a paradoxical relationship with cartography, albeit different to that highlighted in the last chapter. Whereas those works sought to incorporate into their maps that which cartography cannot help but exclude, these attempt to map phenomena that are not just 'off the map', but 'un-map-able' (Jameson, 1991), and which therefore instigate a crisis in cartographic representation (Pickles, 2004: 27). This crisis has everything to do with cartography's projection of the world onto a flat surface, its portrayal of space as a singular Euclidean plane in which everything has its

191

place. The works in this chapter, in attempting to represent multiple, overlapping, and indistinct spaces, bring that surface of projection into jeopardy, and in the final case study, Paula Levine's *San Francisco <-> Baghdad,* this leads to a breaking apart of the map and a layering and superimposition of the fragments. Returning to an argument made in chapter 1, it is no accident that this interrogation of the surface of projection, mirroring the fracturing of perspectival space accomplished by analytical cubism, also responds to technological developments that call for a thickening of planes and dimensions beyond those that can either be seen from a single viewing point or projected onto a single surface.

The case studies of this and the preceding chapter can further be distinguished by the degree of *stability* that they accord to the surfaces of both the map and *terra firma*, or *representation* and *reality*, and the degree of congruity that they find between these. For cartography, it is this common *ground* that makes representation and shared knowledge of the world possible, as well as shaping ideas about places like cities, their public spaces, and the possibilities for collective action contained within them. The loss of a stable and shared sense of *ground,* which is the central issue addressed by the works in this chapter, brings about changes in all of these. It also signals a shift towards theoretical approaches that conceive of forms of connection that are not assignable to any one surface.

3.1.1 Ground

The idea of *ground* that is introduced here consists of a number of interlinked senses. First, there is ground as *terra firma*, the firm land beneath our feet. Second, ground can be thought of as the surface of projection, the ordered parametric space of the cartographical map. The first is encountered through lived experience and the second is produced through processes of abstraction. However, in the maps of Chapter 2, these two senses of ground are not incompatible, but two sides of the same coin. In the terms of Farinelli's description of cartographical reason, while *Being* is shunned from the map as the moulded clay of the *pinax* solidifies, it is still 'imprinted in the geometrical order implied in the very materiality of what functions as basis and concrete support of its representation' (1998: 142). In other words, cartographical reason provides a meeting point (in fact, *is* the meeting point) between these two senses of ground, and it is this that allows representation to take place. Put simply, it allows us to affirm that 'the place that I am pointing to here on the map is the place where we are standing'. By treating one thing 'as if' it were another, as Olsson puts it (1998: 148), it provides a means to share and understand the world. Thus we can also speak of *ground* in a third sense, as being the epistemological grounds for shared knowledge of the world.

The case studies of chapter 2, though they place emphasis on the experience of *life as it is lived on the ground*, continue to align this with *the ground of the map* by employing the *epistemological grounds* of cartographic reason and representation. In these works, then, there is no fundamental disparity between the *ground* beneath our feet, the *ground* of the map and the epistemological

grounds by which the world is represented and understood. For this congruity to be maintained, however, the ground below must remain stable and knowledge of it be shared. The cities of Berlin, Amsterdam and Stockport, addressed by works in chapter 2, consist of a tangible and tactile material landscape through which inhabitants can walk, dwell and, through their 'lived experience' of this space, claim to know it. As Ingold puts it, '*we know as we go*' (2000: 229, original emphasis). This knowledge is situated, and is therefore multi-perspectival, but these perspectives may produce shared spaces and shared knowledge, because they occupy a shared sense of territory that is congruent with that of cartography. We walk the same ground. While this broadly phenomenological approach to knowledge production is at odds with the 'scopic regime' of cartography (Jay, 1988), as the view from the ground and the view from above can never be fully reconciled, the idea of a shared and stable ground does allow for their co-existence. Although they may aim to express new qualities and points of view, the maps of Berlin, Amsterdam, Greenwich and Stockport that were examined in the previous chapter emphasize ideas of 'place', 'community' and 'locality' that are physically grounded, geographically bounded, and therefore map-able. Whether or not Nold's *Biomapping*, for example, adequately represents affective responses to the environment, there is little to dispute in his placing of phenomena within the map's representation since it is a simple matter, by design, of correlating GSR to GPS data. This melding of perspectives can be sustained, however tentatively, as long as the phenomena being mapped can be unequivocally located in the shared physical space of *terra firma*. Multiple perspectives are thus brought together within geographical boundaries that demarcate material spaces in reference to an abstract grid; or, in other terms, 'little narratives' of localized practices and

194

culture are brought within the frame of the map's 'grand narrative' (Lyotard, 1979).

By contrast, this chapter asks: what happens when the idea of *ground* is pulled from under us, when the lived experience of space no longer conforms to cartographic space because it is no longer clear where things are and no longer possible to reach a consensus about this? As discussed in Chapter 1, processes of globalization and the emergence of new information technologies have produced phenomena that are characterized by flows and networks that, while remaining spatial, refuse unequivocal location in either the ground beneath our feet or that of the map, and therefore challenge any shared sense of place. As they attempt to account for and represent these conditions, the works in this chapter seek to map what post-structuralist geographers have described as 'relational space'[105] in which material distance is no longer the only measure and it becomes possible to conceive of space as fluid, multi-dimensional and multi-layered. These works are markedly less interested in the use of GPS to track people's position on and movements across the ground. *Position* is not a function of geographical coordinates alone, but is to be accounted for in relation to other lines of connection and other kinds of spaces. While, paradoxically, the case studies in this chapter mostly continue to employ the Cartesian grid (through their reliance on GPS), they seek to represent much more than that which can be readily located within it. They turn their attention to the invisible Hertzian territories created by Wi-Fi, to mobile social networks in which connections are simultaneously forged within and across geographical

---

[105] See, for example, Jonathon Murdoch (2006).

space, and to the creation of scenarios in which the local and global are purposefully collapsed. The emphasis, therefore, is no longer on distinct *places* that form a discrete portion of a seamless space, as measured out and represented by the scientific map. They are concerned with global as much as local phenomenon and with networks and informational spaces that recognize no borders. Territories are not seen as geographically distinct, but as fluid, contingent and layered, and this is especially evident in the way that they view the city.

3.1.2 The City, Public Space and Collective Action

The works of the previous chapter make the city, presented as a given and geographically bounded entity, their basic unit of enquiry. In these works, knowledge of the city is a function of horizontal movement through its streets *and* vertical movement to a vantage point from which the city can be surveyed and mapped. In the way they alternate or hover between immersion and detachment, they can be seen as following in the tradition of the *flâneur*, described by Baudelaire as a 'passionate spectator' (1863/1964), and share the *flâneur*'s preoccupation with the modern city as a space for investigation. For Belasco Rogers, for example, the city of Berlin is discovered and mapped by means of his perambulations through the built structures of its streets. In contrast to this very modern notion of the city, the works in this chapter acknowledge the way in which flows of information, capital, and migration penetrate the city and enmesh it within networks that perforate its borders, challenging the city's integrity as a distinct and bordered space, a discrete container of social relations. In this chapter, Chris Speed and Jen Southern's

Comob (2009) highlights social networks that operate across multiple spatial scales and disregard the bordered space of the city, while Paula Levine's *San Francisco <-> Baghdad* explores the hidden relations between two cities not so much to confirm their independence and integrity, but rather to blur the boundaries between the two.

The works in this chapter also partake in a reappraisal of architecture, with the realization that urban spaces consist not only of the built environment, but also of invisible layers, interconnected nodes, and new forms of interface. It is not just the ground beneath our feet that becomes fluid and shifting, but also the architectonic surfaces that surround us[106]. Whereas, for example, Belasco Rogers's articulation of the space of the city is one that assumes a solidity of structure and the possibility of knowing it through contact with its surfaces (those of street and building), the work of Peter Gomes discussed in this chapter acknowledges the presence of invisible layers of the city and explores the implications of taking the Hertzian space of Wi-Fi to be an extension of built structure.

The works of Chapters 2 and 3 can also be differentiated in terms of *where* they locate public space and the possibilities for collective social and political action. Public space in the modern city could be readily located within the built environment (the street, the public square, the coffee house, and so on) and these might form a locus for political action (see Habermas, 1991; Sennet,

---

[106] This interrogation of the nature of built structures is also evident in architectural discourse. See, for example, Stephen Perrella's discussion of 'hypersurfaces' (1998).

1974). However, in conditions shaped by globalization and information flow, public space becomes fragmented and displaced. As Stephen Graham and Alessandro Aurigi put it: '[l]arge cities, based, in the past, largely on face-to-face exchange in public spaces, are dissolving and fragmenting into webs of indirect, specialized relationships' (1997: 26). This not only raises concerns about the displacement or even demise of the public sphere, but also hopes for its reconstitution through new forms of connectivity[107] as well as for new forms of collective action made possible by mobile technologies[108]. The works of Chapter 2 largely conform to a model of public space that is grounded in the street. While they do not locate public space in any one place (not the town square, for example), the maps they produce can be seen as simulating a public space for the discussion and negotiation of urban experience and this remains rooted in what Nold calls 'a shared vision of place' (2009: 7). By extension, the potential for collective social and political action is also firmly grounded in an exploration and negotiation of urban *places.* By contrast, the works in this chapter identify the potential, and in some cases aim to build, public spaces in, variously: the intersection of built environment, the invisible territory of Wi-Fi, and the online spaces they provide access to; in roving networks of mobile telecommunication users; and in the 'spaces that exists [sic] in between' material and virtual territories (Levine, 2005[c]: 17). The loci of collective action, along with the territories they may lay claim to, are thus extended from local to global and include the 'invisible' spaces of spectrum, network and (to some degree) the imagination[109].

---

[107] See, for example, Andreas Broeckmann (2000: 167) and Scott McQuire (2008: 26).
[108] See, for example, William Mitchell's account of 'swarms' (2003) and Howard Rheingold's discussion of 'Smart Mobs' (2002)
[109] An example would be the bid to create a digital 'commons' through the establishment of community Wi-Fi networks. Arguably, their territory is not only defined by access to Wi-Fi, but extends to a utopian no-place beyond.

A shift is also discernible between the two bodies of works from a 'tactical' to 'strategic' approach to political action. Through their emphasis on the tracking and tracing of movement, *Drawing*, *Amsterdam Realtime* and *Biomapping* become observations on the tactical negotiation of urban space, and the potential for political action is confined to the use of these observations to generate discussion within a community, or the rather vague notion that this might in some way better inform the practice of urban planning and thereby produce positive social change[110]. In this chapter, the works become more overtly political and advocate ways of acting strategically. The creation of a closed mobile network by *Comob* is seen as a potential tool for the 'co-ordination of strategic spatial action' (Southern and Speed, 2010: 167), Gomes's exploration of Hertzian space claims its territory as a 'commons' to be defended from encroachment by the powerful, while Paula Levine's *San Francisco <-> Baghdad* offers an overtly political commentary on, and counter-strategy to, the globalization of warfare.

3.1.3 Networked Flatlands and the Crisis of Representation

The degree of attachment to or detachment from ground that differentiates the works of chapters 2 and 3 is also reflected in their adoption of different modes of conceiving, theorizing and representing space, and the traditions in which they locate themselves. The bid to reincorporate lived experience into the maps examined in the last chapter was characterized as a reaction against modernity and the abstracting gaze of scientific cartography; albeit a paradoxical one,

---

[110] See, for example, Chris Perkins (2007: 128) and Will Straw (2010: 19).

given their reliance on the Cartesian model of space that is implicit in the use of GPS. This critique of a rationalising and abstracting modernity, accompanied by a harking back to conceptualizations of space that are perceived to have preceded it (through a reconnection with place and grounded experience) has a strong affinity with phenomenological perspectives, including that of Ingold, which was employed extensively in the last chapter. It is also reflected in the references made by the artists themselves to other theoretical positions and cultural antecedents; notably those of de Certeau and the Situationists. These share a commitment to overcome an abstraction and rationalization of space through a reconnection with the lived experience of place. In doing so, however, they almost entirely ignore the way in which new conditions have destabilized a shared sense of ground and therefore made highly problematic any such connection. Acknowledging these new conditions and the difficulties they create, the works in Chapter 3 do not situate themselves within the same tradition, but are instead forced to go in search of new metaphors[111] and models. It is sufficient, for the moment, to introduce just one such model, as an example, but also because it is referenced by the artists behind one of the case studies in this chapter.

Although Actor Network Theory (ANT) is not articulated as a theory of post-modernity, not least because *We Have Never Been Modern* (Latour, 1993), Bruno Latour's 'sociology of associations' provides a serviceable model of conditions widely regarded as constituting post-modernity. It is premised on a collapsing of scale and the vanishing of 'the solid ground of the local' (Latour,

---

[111] For example, see Barney Warf's discussion of the modern metaphor of 'surface' and post-modern metaphor of 'network' (Warf, 2009: 59-76).

2005: 202). For Latour, knowledge of the social can neither be gleaned from the situated practices of *local* interaction nor the 'overarching framework' (2005: 184) of *global* structure (dichotomous positions that might be equated with those between which the works of chapter 2 vacillate). Latour instead calls for a *flattening* of the landscape through a *relocation of the global* and a *redistribution of the local* (Ibid: 172), to be achieved through a shift in focus from 'places' (whether of micro/local or macro/global dimension) to complex networks of connection between social actors for whom 'scale is the actors own achievement' (Ibid: 185). Thus, for Latour:

> Sites no longer differ in shape or size, but in the direction of the movements to and fro as well as in the nature [...] of what is being transported: information, traces, goods, plans, formats, templates, linkages, and so on. It is now the mythical sites of local and global that are hard to locate on a map. (Ibid: 204-5)

Strength of connection or association through 'cables and conduits', including '[s]atellites, fibre optic networks, calculations, data streams' (Ibid:181), becomes the new measure of distance between entities, both human and non-human, that are produced by, rather than pre-exist, these connections. It creates what Latour describes as a new kind of 'flat "networky" topography' (Ibid: 242).

However, despite Latour's extensive use of geographic and cartographic metaphors, Actor Network Theory does not supply a means of *representing* this new terrain as there is no viewpoint from which to survey it. On the one hand, it suggests that the 'overarching framework' of scientific cartography offers a poor model for understanding the world as it provides only one measure of distance and proximity, a measure that is increasingly irrelevant. At the same time, Latour explicitly attacks phenomenological perspectives as they mistakenly find

'concreteness' in 'the meaningful lived world of individual humans' (Ibid: 60), whilst ignoring other non-human and unintentional forms of agency (Ibid: 61). In other words, neither is man (alone) the measure of all things. Rather, social life in a flattened landscape exists in 'tiny conduits' (Ibid: 5) of connection, a view of which is obtainable neither from above nor below and the terrain between which is a vast, unknowable 'plasma' (Ibid: 244). He writes that '[c]ontrary to substance, surface, domain, and spheres that fill every centimeter of what they bind and delineate, nets, networks, and 'worknets' leave everything they don't connect simply unconnected' (Ibid: 242). Latour's topology is, then, made of connections rather than surfaces, and these connections neither occupy nor can be mapped within a metric space. Latour has no difficulty in supplying an *account* of maps (Camacho-Hubner, Latour and November, 2010). They are seen as 'mobile and immutable artefacts' (Kitchin, Perkins and Dodge, 2009: 18) that are 'deployed in an actor-network of practices' (Ibid: 20) to transport spatial knowledge into new contexts. However, because actor-networks have neither a surface, nor a position outside of them from which they may be viewed, they are not susceptible to mapping.

The supposed un-map-ability of post-modern spaces[112], and the crisis in cartographical representation that this brings about, makes the locative media artists studied in this chapter either brave or foolhardy, but certainly interesting, since they persist in trying to navigate and represent these spaces. The works in the previous chapter, even while they operate through technologies that can be seen as instrumental in creating post-modern conditions, largely ignore

---

[112] As discussed in Chapter 1 (1.2.5).

those conditions, seeking instead to reassert the authenticity of site through a renewed engagement with it. The works in this chapter, by contrast, acknowledge from the outset their entanglement in these new (dislocated) conditions and seek to address them. Crucially, for all of these works, geographical distance is no longer perceived as the only measure, and the idea of 'place', while it continues to retain a grip on the artists' imaginations, is less firmly rooted in *terra firma*. Though Euclidean notions of a continuous, seamless space are not discarded, a reassessment of this framing of spatial knowledge is begun, and in the final case study leads to the frame and surface of the map itself being treated as a mutable rather than fixed form.

However, while the case studies in this chapter produce and explore spaces that test the limits of cartography, the paradox is that they tend to explore cartography's crisis from within a cartographic frame[113] and so, often unwittingly, bring about a crisis in their own representations. Although they point towards the kind of 'post-representational cartography' that Pickles postulates (2004: 160), their maps also display an unwillingness to relinquish cartographic ways of seeing and thinking. In particular, they remain attached to its *surfaces*, the *grounds* that it provides for shared knowledge of the world, perhaps mindful of the abyss that opens up when that ground begins to disintegrate, and so their maps are fraught with ambiguity as they struggle to reassert a firm-footed sense of place.

---

[113] With the exception of Gomes's work which, while addressing the issue of mapping, does not (for the most part) produce maps.

3.2: Mapping Hertzian Space: Pete Gomes

This section examines a series of works by London-based media artist and filmmaker Pete Gomes that seized on the newly available technology of Wi-Fi (and later GPS) in the early 2000s. Although Gomes's works only occasionally result in the production of what are clearly recognizable as maps, they fit within the present discussion because they draw attention to the challenge presented to cartography by the presence of invisible phenomenon from the farther reaches of the electro-magnetic spectrum: posing, if not always answering, the question, 'how can these be mapped?' In interview, Gomes confirms that, even in those works that did not produce a map, 'the word map was just in my head all the time, it was always about mapping' (2014).

Viewed from the vantage point of today, in which Wi-Fi has become ubiquitous through its use as a hub for domestic Internet connections and the proliferation of public 'hotspots', it is difficult to appreciate the level of excitement (and sometimes consternation) that met its introduction. It is also a technology that has been somewhat eclipsed by GPS in the (fledgling) history of locative media. Accordingly, it is useful to place it within a timeline, giving some sense of the novelty it presented, and thus reinstate it within the early history of artistic experimentation with locative technologies[114].

---

[114] See also the discussion in Chapter 1 (1.1.1), and see Mackenzie (2010: 1-18) for an overview of the development of Wi-Fi.

It was in 2000 that the first Wi-Fi enabled devices hit the market after a lengthy period of gestation. Although the Federal Communications Commission in the US had opened several bands of the wireless spectrum for unlicensed wireless use back in 1985, it had taken the intervening years for manufacturers to independently develop the technology and then agree upon a standard that would establish compatibility between these devices (*The Economist*, 2004). Wi-Fi - a trademark of the Wireless Alliance - first appeared as an option on high-end laptops produced by Apple but quickly spread, the first commercial Wi-Fi hotspots appearing in London, for example, in 2002 (McKenzie, 2010: 138). Writing in *The Guardian* in the same year, while seated at a café close enough to his home's wireless access point to pick up a signal (along with an email commissioning the article), journalist Ben Hammersley was able to describe it as 'a revolutionary step':

> [...] your first delivery of email over a community wireless network seems to come with angelic music and a parting of the clouds [...] Seeing a flickering light on my network hub, I knew someone was using it. It was Doc Searls, co-author of the Cluetrain Manifesto and top US blogger, who is in Britain for a few days. 'The Revolution is on, People!' he was to write later that day, 'I haven't felt this jazzed and with-it since the Sixties'. ([b], 2002)

While domestic use of the GPS system also dates from 2000, when the US government derestricted its civilian use, it was initially seen as a specialist tool for surveying, mapping and navigation, and therefore its adoption for other purposes lagged behind the use of Wi-Fi by a year or two. It was therefore with Wi-Fi rather than GPS that artists began to explore the relationship between digital information and space, thus rehearsing locative media's main themes. Certainly, the Locative Media Workshop at Karosta, Latvia in 2003, seen as a

pivotal or even founding moment in the development of locative media, devoted equal energy to pursuing both Wi-Fi and GPS technologies (RIXC, 2003). What is particularly intriguing about these Wi-Fi-based works (and maybe by virtue of the novelty of Wi-Fi's association of data with location) is that, whereas GPS-based works tend to take for granted the platform on which they are founded[115], instead exploring *what* can be achieved with it, the works discussed in this section are primarily concerned with explicating what Wi-Fi *is* and what it *means*. They may lack the sophistication of other works of locative media, but seem to possess a degree a critical clarity and self-criticality that is later somewhat obscured. In both a figurative and a literal sense, these works are explorations of new worlds and unchartered territory. They take their first steps, plant their flags, and pave the way for the settlers who will follow.

There are other artistic and 'hactivist' responses to the arrival of Wi-Fi that could have been included in this discussion, notably the work of Jonah Brucker-Cohen[116] and Julian Bleecker[117] in the United States. However, the work of Gomes is particularly interesting, firstly because of the almost prescient speed with which he responded to the development of Wi-Fi and, secondly, because his work is framed by a concern with architecture and therefore highlights the spatial ramifications of Wi-Fi and particularly what Adrian Mackenzie refers to as 'its discomforting of locations, boundaries and partitions' (2010: 25). As a

---

[115] An exception to this is *You Are Here* (1994) by Laura Kurgan. This installation at the Storefront for Art and Architecture gallery in New York involved the artist standing stationary and taking GPS-readings over an extended period in order to map GPS drift. Since this was before the US stopped its scrambling of GPS for civilian purposes, the artist recorded drift over a 500 metre square area. The work challenged the supposed stability of GPS, revealing it as another (drifting) layer of information, and one that can itself be mapped by turning it upon itself. See Laura Kurgan (1994), for an account of this work.
[116] For example, *Wi-Fi Hog* (2003).
[117] For example, *WiFi.Bedouin* (2003-2006).

lecturer at the Architectural Association (AA) in London at the time, many of Gomes's works were developed as class projects with architectural students, and Gomes describes them as 'conceptual architecture rather than solely conceptual art' (Gomes, 2004). 'At that time', says Gomes, 'everything I was thinking about was in and around architecture, everything I was thinking about was spatial' (2014). What Gomes was quick to grasp was that Wi-Fi (unlike the internet *per se*) was fundamentally a spatial technology. Although the spectrum in which it operates is invisible to the human eye, it is not immaterial but produces territories that are distinguishable by the presence or absence of Wi-Fi signals. As McKenzie puts it, 'Wi-Fi concerns the folding of data into specific places' (2010: 140). However, the 'places' and territories produced by Wi-Fi are less distinct and less firmly rooted in terra firma. Their borders shift with the ebb and flow of signal strength, and extend beyond fixed zones to create far-ranging connections, communities and (hybrid) forms of public space. Their borders are also disputed in the sense that they are permeable to some and not to others, leading to a spatial politics concerned with ownership, control, and rights of access. The territories created by Wi-Fi are fluid and ethereal rather than grounded – the metaphors of *earth* giving way to those of *water* and *air*. Yet it is precisely with the attempt to bring Wi-Fi back down to earth, literally onto the ground, that Gomes begins the work of mapping its spaces.

Gomes's experiments with Wi-Fi began in 2001, at which time its use was more or less limited to Local Area Networks, or LANs, set-up within office and other commercial environments, and had yet to be conceived in terms of public access points. Gomes had an antennae placed on the roof of the Architectural Association in Bedford Square to create a publicly accessible Wi-Fi node. In

order to make visible the range of the transmitter, Gomes and his students walked the square with Wi-Fi-enabled laptops, using chalk and stencils to mark out the node's boundaries directly onto the ground: producing what Gomes describes as 'signage for invisibility' (2004). Seen retrospectively, these chalk marks seem rather prosaic but reflect a genuine fascination with a novel form of territory and the desire to map its 'architecture'. Gomes writes: '[t]hese temporary drawn manifestations of invisible electronic signals create navigation, boundaries, and in turn new territories, building layers of points and planes which are unmistakably architectural and stem from their urban setting' (2004). While, in terms of radio and television broadcasting, maps of signal reach were nothing new, it was the local scale of these new Hertzian territories, and the way they most often emanated from transmitters attached to built structures, extending their space into the street, that allowed them to be thought of as a part of, rather than atmospheric accompaniment to, the urban fabric. Gomes describes the physicality of Wi-Fi in the following way:

> It elevated the idea of location because it was 'here's this antennae, its spitting out a signal, where does it go? It goes over there, over there and over there'. [...] You might be physically looking for those [antennae] and you'd have something on your laptop that would 'ping' when you were in that vicinity. The very nature of the technology, despite the fact that it connected you to the world, had this parallel, very physical, localized feeling. (Gomes, 2014)

It also created new modes of navigating urban spaces. The Wi-Fi enabled laptop (since smaller devices did not yet exist) became, potentially at least, a compass of sorts that might, by sensing the Hertzian space of Wi-Fi transmissions, steer the user not so much from place to place, but from node to node.

The desire to locate and map these Wi-Fi nodes was played out in a number of other ways around this time. 2002 saw the rise to prominence of a grassroots 'Warchalking' movement that took its cue directly from Gomes's chalk signage (Jones, 2002). The symbols with which 'Warchalkers' or 'WIBOs' marked the location of Wi-Fi hotspots were designed by London-based information architect, Matt Jones, and based on signs used by hobos during the 1920s and 30s in the United States.
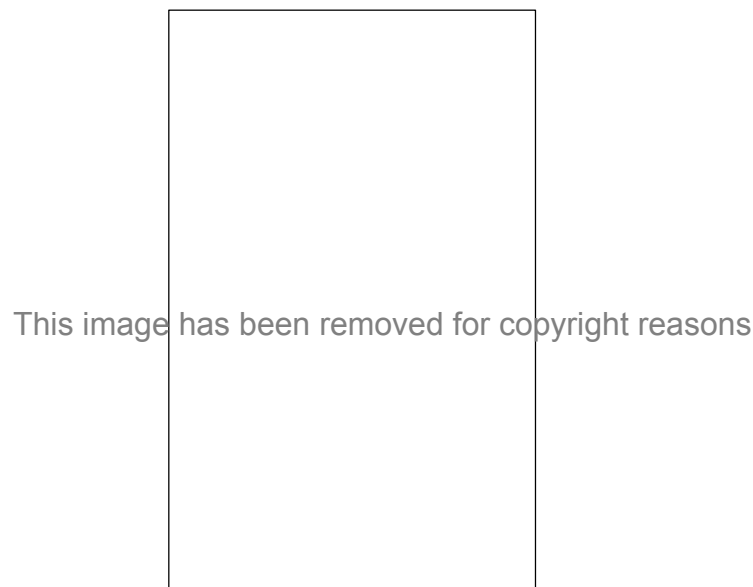
Figure 3.1: Matt Jones, *Warchalking card* (2002).
Courtesy of Matt Jones.

Within days of being posted on his blog (Jones, 2002), warchalking had caused a media stir on both sides of the Atlantic (Hammersley [a], 2002: n.p.), the *New York Times* designating it one of their 'ideas of the year' (Langley, 2003). Opinions were split as to whether this was a harmless and possibly useful form of urban annotation, or an act of vandalism and subversion. Interestingly, since it mirrors Gomes's reference to the navigational qualities of Wi-Fi, one of the first discussions to be generated by Matt Jones's original blog posting was

concerning the possibility of introducing 'directionality' through the use of some kind of arrow symbol to enable navigation between Wi-Fi areas, with one contributor suggesting that it might be possible to triangulate position from information about the whereabouts of three or more Wi-Fi areas contained in these annotations (Jones, 2002). However, as more publically accessible 'hotspots' began to appear, the Warchalking movement disappeared almost as quickly as it had appeared. Its website, established by and for enthusiasts to facilitate an exchange of information about the location of open Wi-Fi nodes, lasted little over a year. Further grassroots experimentation with Wi-Fi triangulation did not materialize either, and was in any case superseded by the growing availability of GPS-enabled mobile devices.

In the same year that the Warchalking phenomenon took off, the space of Wi-Fi was also more playfully explored in 'a game that transforms a city into a playing field' (Eyebeam, no date). *Noderunner* (2002), designed by Yuri Gitman and Carlos J. Gomez de Llarena, was winner of the 2003 Golden Nica Award for Net Vision from *Ars Electronica*. The game, first played in New York, but later in other cities worldwide, pitted two teams against each other in a bid to locate and record as many open Wi-Fi hotspots as possible. The teams were required to take photographs of these locations and upload them to a weblog which then awarded points, in real time, and progressively built a record of Wi-Fi accessibility across the city. Again, the work bears testimony to the level of excitement that could be generated by the prospect of revealing the invisible Hertzian territories of Wi-Fi, one that has clearly dimmed over the years, to the point that it is now difficult to understand what all the fuss was about.

One of the inspirations for Matt Jones's Warchalking proposal was another work by Pete Gomes that he happened upon whilst strolling outside the Architectural Association in London's Berkeley Square. For *Work/Place* (2002), Gomes drew in chalk a 1:1 scale plan of an office space onto the pavement outside the AA. Gomes, his students and other volunteers populated this 'temporary "room"' for a day; working on laptops connected to the AA's recently installed Wi-Fi hotspot (Gomes, 2002).

This image has been removed for copyright reasons
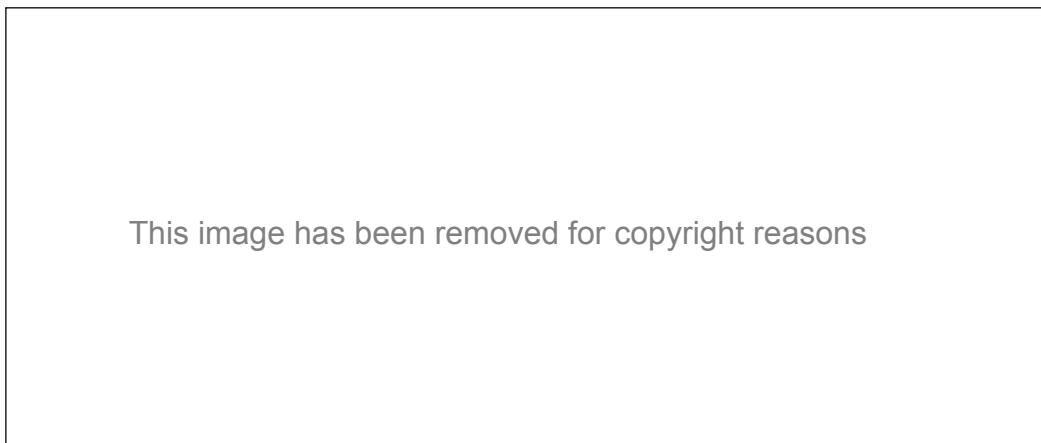
Figure 3.2: Pete Gomes, *Work/Place* (2002), still frame from video. Courtesy of the artist.

Inspiration for the work came from observing how mobile communications could shape the situations in which they occurred. Gomes writes:

> I saw somebody on a train who was a manager of some kind who had his shoes off and was reading a book, and was obviously not at work, and then the phone rang and he changed his posture, put his shoes back on, sat up and took the call in a different way [...] Suddenly he was in a work environment [...], it became his office. (2014)

Today, the idea that our workplace might be wherever we can make a wireless connection is utterly banal, but, at the time, it was considered distinctly odd: 'I remember doing *Work/Place* and people walking up and saying, 'what are you

doing?' I'd say, 'Well, we're connecting to the internet' and they'd look at you! [...] "What are you talking about?" "What's going on?"' (Ibid).

Although 'on one level surreal and ironic' (Gomes, 2002), *Work/Place* produced a vivid public display of the architectonic nature of an invisible Hertzian space, not only by mapping it onto the ground and thus giving it physical presence, but also, as Gomes says, by occupying that space and assigning the function of 'office' to it:

> One of the most important elements of *Work/Place* was to make the invisible visible, to create a location that visibly indicated that you were inside an area of a wireless Internet signal and conceptually give a function to specific territory or particular physical space. (Gomes, 2002)

The implication was that these informational spaces could be designed, constructed, and occupied (by architects no less), as if they were an extension of the built environment. A further inference was that, as they could be surveyed, drawn and marked-out, these invisible spaces were susceptible to mapping.

Mapping became a central concern in the works that followed *Work/Place*, as Gomes also seized on GPS-technologies, not just as a mapping tool, but as another manifestation of Hertzian space in its own right. In other words, the GPS system becomes the subject of the work, not just a constituent of its palette. *Location, Location, Location* (2004) involved the chalk-marking of a one kilometre route across London to the gallery where films of Gomes's earlier works were also shown, alongside other artefacts, including a scale map of the route (Gomes, n.d.). Along this path, pavements and walls were annotated with

212

GPS co-ordinates and time codes, and lines delineating street furniture such as doorways, benches, manhole covers and bags of rubbish [see Fig. 3.3].

This image has been removed for copyright reasons
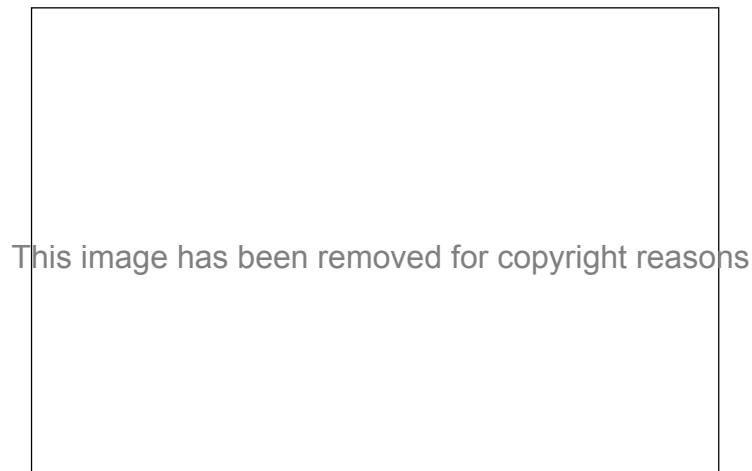
Figure 3.3: Pete Gomes, *Location, Location, Location* (2004). Photograph showing chalk marks and bin bags. Courtesy of the artist. In interview, Gomes (2014) says: 'I remember walking back in the afternoon and [the bags] had gone'.

Although the route nominally aided navigation of visitors to the gallery, more than that, it questioned the efficacy of GPS: the 'arbitrary relationship between the physical world and the co-ordinate system' (Bleecker and Knowlton, 2006, n.p.) and the difficulty of mapping transient and ephemeral phenomena. Not only are the chalk-marks temporary - sometimes washed away within hours of being drawn - but also the objects they delineate:

> I would sometimes return later to find the rubbish collected and gone and only my dotted boundary outlines remaining, with my hand written Time Code and Place Code identifying the spot. These small changes and movements in the urban landscape are one single example of transient, fluid and ephemeral moments which could have been cars, data or people. (Gomes, 2004)

Stedelijk Drawing (2005), a chalk drawing outside the Stedelijk Museum in Amsterdam, also addresses transient and (literally) fluid phenomena, marking the outlines of shadows that shift and puddles of water that evaporate to leave only the drawing itself.

This image has been removed for copyright reasons

Figure 3.4: Pete Gomes, *Stedelijk Drawing* (2005). Photograph showing chalk marks around puddle. Courtesy of the artist.

These works map these shifting phenomena not in order to show their map-ability, but in order to highlight the difficulties involved in their representation. In grappling with new forms of territory produced by the arrival of Wi-Fi and GPS at the turn of the century, they engage with what Mitchell terms the 'Hertzian landscape' (Mitchell, 2003: 55); however, as Adrian McKenzie writes, 'this landscape [...] is not easy to map or manage. It lacks the visibility and stability of other forms of space and property. It is more like sea than land' (2006: 141), or, as Jennifer Gabrys puts it, like clouds: 'the drift of these clouds – wireless, electric, informational – requires that we reconsider the city through the air. Instead of fixing on the pavement, we can begin to consider the more atmospheric transmissions and dynamic relations of cities' (2010: 57). However, it is precisely through the attempt to fix these clouds 'on the pavement' with his chalk-markings, rendering them as architectonic spaces that may be designed, built and inhabited, that Gomes highlights the difficulty in incorporating them within cartographic representations of space. Thus Gomes conceives of the

chalk markings of *Location. Location, Location* as architectural plans that, in 'slightly ludicrous' and 'surreal' ways, draw lines of connection between the divergent (abstract, concrete, invisible, and imaginative) *geometries* that are variously produced by coordinate systems, built structures, ephemeral objects, and everyday habits (2014: n.p.). Watching the film of these drawings, Gomes points to the screen at one point, and says, 'See, I've drawn lines between them but just what *is* the connection between that lamp post, the empty site of a street market stall, and a GPS co-ordinate?' (Ibid). The point of mapping these heterogeneous geometries to the same surface, of *grounding* them in this way, is not to scale and fit them within a singular representational frame but rather, through an 'engineered collision', to draw attention to things that 'don't really fit together' (Ibid).

In, as Gomes puts it, 'wrenching the signal away from the ether and presenting it to people and saying, "this is it, this is here"' (Gomes, 2014), the artist also opens up these new territories to occupation, popular colonization and contestation over rights of access and ownership. Mitchell notes of these Hertzian territories that, '[j]ust as the kingdoms and empires of old struggled for control of terrestrial territories, those who seek power today increasingly contend for control of the airwaves' (2003: 55). For Mitchell, the Hertzian landscape could either be treated as a communal resource, 'like the old village commons, or the land available to a squatter community' (Ibid: 56), or be auctioned off to the highest bidder and privatized like plots of 'frontier land' (Ibid: 55). Released from state ownership, the unlicensed spectrum of Wi-Fi produced both fortified private domains and open public spaces and Gomes was quick to grasp both its utopian and dystopian potential. Writing in 2002, he foresaw the

entrapment of 'consumers in the midst of a corporate and brand-filled datacloud of information and products', a prospect he describes as a 'Wi-Fi Meta-Mall', but, alongside it, 'the creation of areas based on locality and shaped by the people who live and work in the area [...], necessarily rooted in local community, local decision and empowerment' (Gomes, 2002). Interestingly, a stratospheric metaphor is applied to the dystopian vision ('datacloud'), while the utopian alternative is described in topographical terms ('local', 'area', 'rooted'), reflecting a degree of unease about the technology's propensity to detach spatial experience from *terra firma* that is also very obviously expressed in the chalk-markings, as they attempt to ground these.

However, the utopian vision for Wi-Fi extended beyond the local. Signatories to The Wireless Commons Manifesto, launched in 2001, sought to link community-controlled Wi-Fi areas around the globe to create a global communications network that was freed from central control and capable, through the unfettered social connections it created, of solving (as the manifesto's author put it) 'the social, political and technical challenges we face' (Shand, 2001). Gomes was an active participant in *Consume*, a London-based collective of artist-activists founded in 2000 which, while not a signatory to the manifesto, sought to establish a similar network of overlapping Wi-Fi zones that would be free, open source, and run by and for local communities. As zones were progressively linked together, they were displayed as maps on the collective's website (Consume, n.d.).
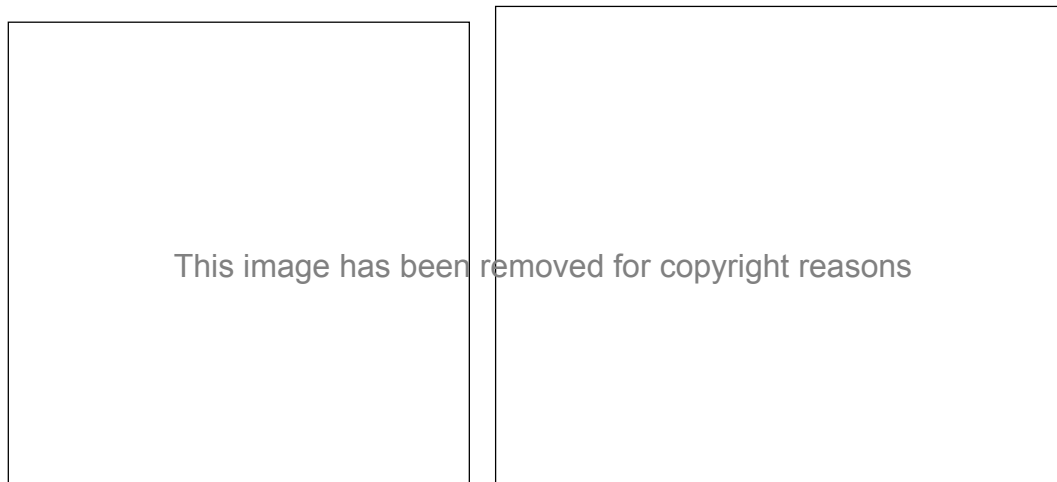
Figure 3.5: Maps showing the 'network' of open Wi-Fi zones within 2km (left) and 20km (right) of *Consume*'s Clink Street headquarters in London. [image online] Available at: <consume.net> [Accessed 20th January 2015].

The topography of these maps seems to confirm Andrew Wilson's observation that '[w]irelessness is not a grid laid across the world. Wirelessness is clusters and gaps' (2004, quoted in Hemment, 2006: 354), yet they remain gridded spaces that are little different to those produced by broadcast engineers to mark the reach of signals emanating from transmitters. However, the ideas with which they are invested suggest a more complex appreciation of space. While they obviously map the physical space occupied by Wi-Fi signals, the areas of connectivity they delineate also express a different order of territory. This territory is occupied by a Wi-Fi *community* that shares a physical locale (those areas where connectivity is openly available), but which also operates as a *network* in which social connection is not dependent on location. In other words, it is a territory that is simultaneously defined by social, informational, and locational parameters, and this presents a challenge for cartographic representation wherever they fail to neatly coincide. Consume's community wireless maps, though conventionally rendered, prompt navigation not just of city streets but also of layers of information and social connectivity. They invite

exploration of the open commons of the Hertzian landscape - a (utopian) space outside either the street plan, the ethereal Internet, or the fiefdoms of commercial Wi-Fi.

The role of Wi-Fi in the creation of new forms of public space is explored in another work by Gomes. *Park Bench TV* (2003) experiments with the potential of Wi-Fi to create what Gomes describes as a technologically-augmented 'Speakers Corner' (n.d.), with the ambition of 'harness[ing] a community around the node' (2014). What he grapples with in the process, much as in the earlier chalk-drawings, is how to reconcile spaces that are simultaneously visible and invisible, located and dislocated. Whereas maps were once a convenient device for locating the public space of the town square, and the internet created a public space that was simply off-the-map (in 'cyberspace'), this new territory seems to call for new modes of representation. *Park Bench TV*, centred on a bench in Berkeley Square and again making use of the AA's Wi-Fi hotspot, aimed to somehow marry the public space of the square and the public space created by a Wi-Fi zone. It consisted of:

> a Park Bench within range of a Wi-Fi signal; a discussion forum, available from the web site to both local people and other users; a media channel streaming content specifically about the area; a printed newsletter aimed at local people, and the Wi-Fi node allowing access to the Internet (Gomes, 2002).

The 'media channel' streamed short documentary films about the immediate vicinity, hence 'Park Bench TV', and developed the idea of creating media platforms that were free from central control that had begun with community Wi-Fi projects.

This image has been removed for copyright reasons
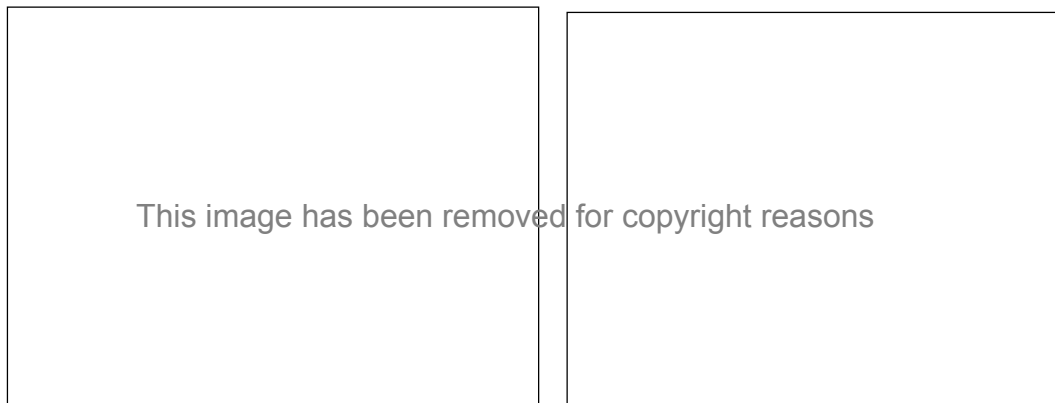
Figure 3.6: Pete Gomes, *Park Bench TV* (2003). Photographs showing production of the plank that was added to the park bench in Berkeley Square, London. Courtesy of the artist. The bench, with its replacement plank, has long since disappeared.

The virtual and physical elements of the project intersected at a new oak plank in the seat of the bench that was inscribed with 'GPS co-ordinates, information about Wi-Fi along with the URL of the project' (Gomes, 2002). Thus, 'the bench becomes a form of portal into the project', or what Gomes coins a 'terraportal' (2002). Again, it is the issues *Park Bench TV* raises rather than those that it successfully resolves that make it interesting. The layering of physical and informational space brought about by the introduction of Wi-Fi and, marginally later, GPS confounded any easy assimilation of the two, and these early attempts to grapple with this through experimentation highlight the difficulties involved in representing these novel hybrid spaces. Although unsophisticated by the standards of later works of locative media (what could be simpler than white chalk marks on a pavement?), they confront this in a way that is sometimes later overlooked. Chris Speed and Jen Southern's *Comob*, for example, which is discussed in the next section, is less concerned with scrutinizing the invisible infrastructure of information flow than with charting the socio-spatial operations that are enabled by it.

3.3 Mapping Mobile Networks: *Comob* (2009-)

Comob (2009-), produced by artists and researchers Jen Southern and Chris Speed, explores the potential of mobile social networks to strengthen the experience of place. In doing so, they are forced to redefine 'place' so as to take account of the way these socio-informational networks complicate any simple relationship with *ground*. However, the result threatens to set adrift the experience of place from a Euclidean framework and thus undermine their use of the base-map. It makes for an interesting case study because it highlights a tension between situated and networked practices and the difficulty of resolving this within the surface of the map. It thus, again, demonstrates the nature of a crisis in cartographical representation that is exacerbated by information technologies that rely on the operations of software code, and which introduce novel forms of space and senses of spatiality.

The starting point for *Comob* is its decision to foreground social networks and specifically those made possible by GPS-enabled mobile devices. Whereas the works of Peter Gomes sought to map the Hertzian spaces created by invisible portions of the electromagnetic spectrum, *Comob* maps and thus makes visible the social networks made possible by communication *through* that spectrum. Like the works discussed in Chapter 2, *Comob* is also concerned with the way in which people traverse and actively shape social spaces, but more directly addresses the *networked* nature of the negotiation of space that is made possible by mobile communication technologies. In other words, it seeks to marry the mapping of information networks *and* geographical mobility in order to

better account for conditions made possible by GPS-enabled mobile devices in which space is negotiated, on the move and in real time, by social networks that operate both *within* and *across* those spaces. It is the mismatch between the two versions of proximity that these operations create that *Comob* struggles to reconcile.

The *Comob* project consists of two iterations: *Comob* itself, a series of more or less controlled experiments conducted at a number of academic and arts conferences during 2009-2010, and *Comob Net*, a mobile application that was developed for the project and which is freely available as a download for use on iPhone and Android mobile devices. The two diverge in the degree of control exerted over their use, but share the same basic platform, an application for mobile devices that allows small, closed networks of users to see, on screen, not just their respective positions, represented by 'circular nodes' (Southern and Speed, 2010: 164), but also the connections between them, plotted to a base-map. This map is produced in real-time from GPS data that is collected by a central server from mobile devices operating within the 'network'. It is then processed using specially designed software to produce graphical annotations of a Google base-map that is then relayed back to mobile devices within the network. Where this map differs significantly from many of those produced by locative media projects is that, rather than tracking movement over time to produce a trail or trace, this map instead highlights the connections between members of the group, represented on the map by bold blue lines.

This image has been removed for copyright reasons
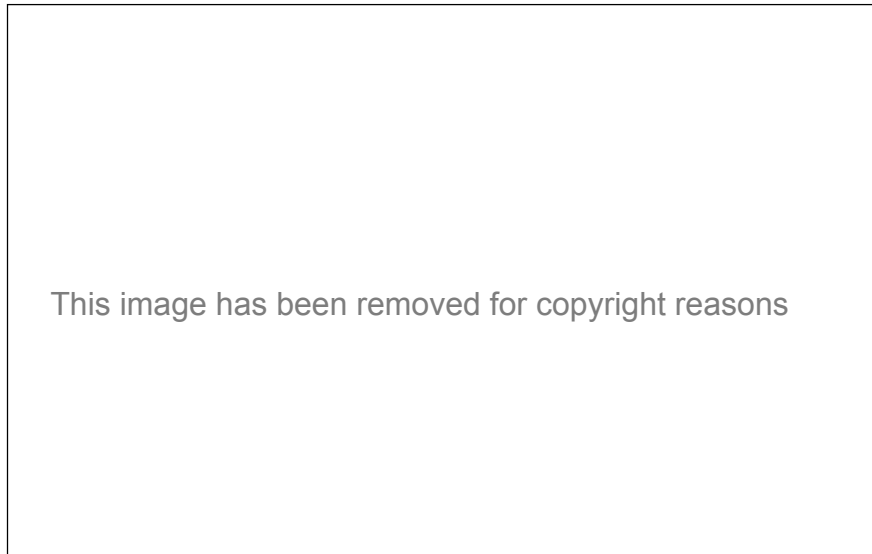
Figure 3.7: Jen Southern and Chris Speed, *Comob* (2009-). Photograph of the screen of the *Comob Net* app, showing circular nodes and blue lines connecting members of a *Comob* network. Courtesy of the artists.

Rather than showing all possible connections between each member of the network, producing a mesh of connections, a single line connects each in turn to form a loop[118]. This loop can be used as a mapping tool to delineate spaces, but also marks out the territory of the network itself. *Comob* thus operates in two distinct, but interrelated modes. Firstly, it produces maps of social connections in and across space; *in* space by plotting GPS coordinates to a conventional map, and *across* space by annotating the map with information (the blue lines) about social connectivity. Secondly, it produces maps through a collective (social) process. *Comob* explores and sometimes integrates both of these uses, and has been variously envisaged as a tool for research into group behaviour, a participatory method of urban planning, and as a means of co-ordinating social action (Comob, n.d.).

---

[118] The *Comob* app. now has the facility to also show all lines of connection between members of the network, producing a meshwork.

Going some way to explain the multifaceted nature of the project is the rich and varied agenda brought to it by the artists themselves. During its initial development and testing, Southern and Speed 'went looking for a purpose for it' (Speed, 2014) and explored a range of ideas[119]. A key concern is clearly to explore the possibilities for, and created by, the mapping of social networks: 'merely plotting others individual locations offers a limited perspective upon groups of people, but through connecting their locations with lines, opportunities arise to observe group dynamics and in addition offers novel ways in which to map space' (Southern and Speed, 2010: 165). For Speed, the plotting of lines of movement is an inheritance from the use of GPS technology as a navigational tool and overlooks, and fails to exploit, the way in which GPS capability has been married to social connectivity in the modern smart phone. *Comob* thus seeks to reveal the social nature of the production of space, the way in which it is collectively negotiated on the hoof, through new forms of mobile connectivity made possible by smart devices. There is also (in common with some of the works examined in Chapter 2) a concern with subjectivity and affect, and the role that this might play in new forms of collaborative mapping practices, and, as previously indicated, there is an attempt to produce an expanded definition of place.

---

[119] Since those early trials and wider uptake of the downloadable app, the artists have abandoned any specific research agenda and become more interested in how it is being used in people's daily lives: 'its been more fun looking at the, not transgressions, but the tactics and how its fitted into people's lives' (Speed, 2014). The artists are in the process of conducting interviews with some of *Comob*'s users, including extended families that use it as a way to stay in touch and to arrange family get-togethers. Other users include what appear to be truckers in the USA who arrange to meet-up at truck stops, and a network calling themselves the 'motherfuckers' who coordinate their movements across a city – leading to conjecture that they may be a street gang.

These concerns make themselves apparent, to one degree or another, in the *Comob* workshops that ran throughout 2009 and into 2010. In the Edinburgh workshop (2009)*, Comob* was used to map noise pollution and 'became a catalyst for discussion of how pollution is experienced and perceived on the ground' (Southern and Speed, 2010: 165). Five participants were briefed to work as a team to map the extent of noise emanating from a building site, using the blue line connecting them to demarcate a 'Comob "shape" around the area' (Ibid: 165). The group, having discussed how to go about the task, agreed to congregate on one corner of the site, then walk in opposite directions, spreading outwards, until they could no longer hear noise from the building site. During this process, the participants could observe each other's movements, the steady expansion of the shape formed by the blue lines, until all the participants came to a halt, at which point a note was made of the time in order to later correlate their respective GPS tracks and produce a real-time map of their movements to be replayed and discussed back at the workshop.

This image has been removed for copyright reasons

Figure 3.8: Jen Southern and Chris Speed, *Comob* (2009-). Google satellite views of Edinburgh showing (right) the 'shape' of noise pollution emanating from a building site that is created by a line linking *Comob* participants, represented by 'circular nodes'. Courtesy of the artists.

The workshop task is similar in many respects to other collaborative mapping projects such as Christian Nold's *Biomapping,* which also sought to map embodied and affective responses to the urban environment. Here, it is directed specifically at the issue of noise pollution, but again it asks participants to make maps with their bodies and through their movements. Subjective responses, the use of the senses, becomes a means to *feel their way* through a landscape (Ingold, 2000: 155). In also mapping these invisible fields, the participants bring them to light and represent them. However, *Comob* differs from *Biomapping* in two important respects. Firstly, the maps of *Comob* are produced *in situ* and real-time by the participants themselves. Secondly, they are arrived at via collective negotiation within a social network. These two points are developed at length in the following two sections because they have significant consequences for the way in which *Comob* defines 'place' and the agency it ascribes to social networks in the production of space - these together producing something of a crisis in *Comob's* representation of space.

3.3.1 Time and Place

Unlike *Biomapping*, the map in *Comob* is produced by the participants through a *live* performance, *in situ* and in real-time, rather than being mediated through and constituted by the artists *after* the event. It was noted earlier that the *Comob* software, using data gathered from individual users' iPhones, was able to reconstruct and replay participants' movements, after the completion of a mapping exercise. 'Time' has to be retrospectively reconstituted for participants to review their movements on their return from the streets to the workshop

225

situation, but is absent as a parameter in the map-view of the mobile application. For Speed, this removal of the element of time is quite deliberate: 'I decided to swap the discrete "time" parameter with a social one, leaving only people and geography' (2010: 173). The logic behind this decision lies in Speed's understanding of the relationship between time and space. Drawing on Lefebvre, Harvey, and others, Speed sees modernity as being characterized by a separation of time and space in which each is quantified, abstracted, and commodified, isolating the individual 'from others and a landscape' (2010: 174) and resulting in the loss of 'a sense of place' (Ibid: 172). Speed's critique of existing mobile applications is that in adopting a thoroughly modern, navigational model, which *correlates* but in doing so *splits* time and space, they produce 'individual time-based paths' (Ibid: 173) that are 'deeply linear and [have] little to do with a sense of place' (Ibid: 172). He writes, 'any aspirations for a non-abstracted sense of place are hampered by the language of the map, in which time becomes an arrow across a flat territory' (Ibid: 172). However, 'the capacity of locative media to connect people offers a path for a creative reconciliation between space and time' (Ibid: 169). It is by avoiding the use of time as a discrete unit that locative media is able to 'capitalise on its primary strength: supporting social networks' (Ibid: 174).

Through the removal of time and its traces in *Comob*, it is hoped that space and its representation are simultaneously realized, in the moment, as socially produced phenomena through which a shared sense of place can be experienced. What facilitates this is *Comob*'s ability to (automatically and in real time) place users within the maps they hold in their hands, thereby forcing a confluence of 'embedded' experience *and* detached 'overview'. While the views

from above and below may remain incongruous, the user's double position (placed both in the map and the landscape that is mapped) nevertheless promotes a negotiation between the two that, for Southern and Speed, amounts to the 'closing of the gap between experiences within the landscape and from reading the map' (2010: 171). *Comob* strengthens that claim; firstly, by providing tools for users to update, amend and rewrite the map, *in situ* and in real-time, and, secondly, by creating the opportunity for that writing to be negotiated between actors within a social network: 'By working together to negotiate the boundaries that surround an agreed upon problem, the collaborative GPS platform supports a situated discourse through which people learn about each other's relationship with a place' (Speed, 2010: 173).

However, the removal of one parameter, time, and its replacement with that of social connectivity has consequences that need to be followed through. The attempt to map social networks that operate both within and across space is fraught with difficulty since they operate along a series of axes - including latitude, longitude, time, communication across space and mobility in space - that cannot easily be reconciled and plotted to a map organized along Cartesian lines. Hertzian space, on its own, remains tied (if sometimes loosely) to material space, as does human mobility. Even the kinds of informational spaces produced by plugged-in, non-mobile communication (such as telephone networks and the Internet), although they may have the effect of foreshortening space, can nevertheless still be plotted to a map (as with Internet traffic maps, for example). However, the conjunction of communication space, physical space, *and* mobility - through communication *and* mapping on the move - produces shifting, transitory, unstable and heterogeneous spaces that cannot

be readily located and made homogenous within the metric surface of the base-map. In *Comob*, Speed and Southern adopt the base map's representation of *space* but highlight *place* as a product of social connectivity through the expulsion of *time* on the grounds that participants must always be *in place* to experience it and would need to be *out of place* to otherwise experience the representation of movement over *time*. It appears that in order to retain the integrity of the surface of projection in an increasingly complex and messy world characterized by multiple scales and an expanding menu of spatial, temporal, social, and informational variables, it becomes necessary to choose between parameters. This raises the possibility that the parameter of physical or geographical, and the map that conventionally represents it, may no longer be deemed relevant or necessary. This is a point to be returned to, but I will first examine *Comob*'s foregrounding of the collective negotiation of space through networks of actors, which also has a destabilizing effect on cartographic representation.

3.3.2 Networks and assembling the collective

The second key feature of *Comob* that distinguishes it from works like Nold's *Biomapping* is that the map is *collectively* negotiated and authored through a social and informational *network.* More than that, the 'shape' of this network on the map becomes synonymous with the act of mapping itself. This has far-reaching consequences in that it suggests that socio-spatial knowledge may be collectively produced and represented *within* these networks but need not be shared by other networks or a wider 'society'. The network, in effect, becomes the measure of all things. However, before elaborating on these consequences,

it is useful to further explore the agency that Southern and Speed accord to the collective actions of networks.

Taking the example of the Edinburgh workshop, Speed and Southern note that a definition of 'noise pollution' was negotiated not just in group discussions prior to execution of the mapping task, but also during the process, as individual perceptions were modified by an awareness of decisions being made by other participants, as observed and interpreted through the movements of 'nodes' and blue lines on the handheld map (Southern and Speed, 2010: 167). What counts as knowledge of 'noise pollution' is produced and mapped within the network rather than measured against some scale outside it. Whereas Nold's *Biomapping* seeks to quantify affective responses through the measure of galvanic skin response, the subjective responses of the Edinburgh participants were considered sufficient in themselves. No attempt was made to scientifically measure sound levels, not even for comparison, and no account taken of differences in the aural acuity of participants[120]. The sensory realm, collectively negotiated within a network, is seen as producing and capable of mapping a field of knowledge in its own right, independent of any external 'scientific' measure. The network, in other words, produces its own scale.

Speed and Southern also identify in this collective production of knowledge a 'potential for [...] the co-ordination of strategic spatial action' (2010: 167). Whilst occupying an 'embedded' position within the map, participants were also offered an 'overview' not just of their position in relation to features of the base-

---

[120] In interview, Speed now describes this as a 'flaw' in the design of the workshop task (Speed, 2014).

map but in relation to other members of the *Comob* network, creating

opportunities for group movements to be 'co-ordinated in new ways' (Southern

and Speed, 2010: 167). Their comments bear comparison with Rheingold's

description of 'smart mobs' (2002) and also carry the suggestion that such

coordination of group movements might inform grass-roots political action. The

idea that real-time mapping of social networks might have 'strategic' potential is

interesting. Compare, for a moment, the blue lines of *Comob*'s maps with the

arrows marking forces deployed and lines of supply that characterize the maps

of a war room. In *Comob*, it is now the troops that are marking up the maps,

and doing so through collaboration and negotiation. It suggests, once again,

that the map, which has historically functioned as a tool of territorial expansion,

occupation and control, can be appropriated by subjects on the ground to begin

marking out their own territory. Rather than facilitating the conquest of territory,

the maps of *Comob* make visible the way in which the social and affective fibre

of urban space is collectively negotiated, and remains open to renegotiation, by

roving networks of actors. *Comob* utilizes and remains tied to the base-map

(the same one utilized by generals and Google), but it also begins to make

conceivable the grass-root, real-time negotiation of space through extended

and overlapping social networks to produce maps that are continuously

adapting and evolving at the behest of wide social networks.

Through such rewriting, the map becomes the participants' own rather than one

produced by 'experts', into which they then insert themselves or are inserted

(through surveillance). The status of such expert knowledge is thus challenged,

or at least to some degree. The map of noise pollution in Edinburgh, for

example, relies less on a ready-made consensus supplied by professional

cartographers, and not at all on experts on noise pollution or devices for its scientific measurement. Rather, it is based on some form of consensus, however tentative, being reached within the network. This consensus is not, however, necessarily shared by other networks, resulting in multiple, layered, and conflicting representations of space and making problematic any broader shared sense of place. What for now holds together a wider consensus is the base-map that *Comob's* participants still inhabit by virtue of the lines they write upon it, and by which they are able to refer to a *place* called 'a building site in Edinburgh'. For now, the integrity - or what Speed describes as a 'commensurate experience' (2014) - of this 'place' as both a physical location that can be pinpointed on the base-map, and as the product of consensus arrived at within a social network, is maintained through a forced congruity that is achieved by asking the network to take shape on the ground. In this way, the surface of the map is able to represent social networks as being both *in place* and *producers of place.* However, in finding 'place' somewhere between geographical space and the social space of networks - in highlighting connections between 'nodes' rather than distances between geographical positions - the base map in *Comob* is already visibly receding. The question that *Comob* leaves unanswered is: what happens when these senses of place do not align and cannot be represented on the same surface? Where would that leave Speed's 'sense of place', and what would remain of the map?

This destabilization of the representation of space that results from the foregrounding of networks and the depiction of mapping as a perpetual renegotiation of space conducted through the conduits of these networks can be explored further in reference to Bruno Latour's Actor Network Theory (ANT),

which Speed specifically draws on, appealing to the way in which Latour also 'prioritizes social networks over both material and abstract interpretations of space' (2010: 172). Speed doesn't elaborate much further on the fit between *Comob* and ANT, but there are clear parallels. Both see knowledge as being produced and shared through a consensus negotiated within a network of actors – a process that Latour terms the *assembling* of *a collective* (2005: 247). Take, for example, the way in which 'scale is the actors' own achievement' (Ibid: 185) in the collective measurement of noise pollution in the Edinburgh workshop. The maps of *Comob*, then, with their introduction of 'nodes' and blue lines of connection, begin to resemble Latour's 'flat "networky" topography' (Ibid: 242) in which cartographic grids are replaced by 'star-shaped web[s] of mediators' (Ibid: 217). However, because of the way *Comob* appeals to places and scales that are produced *outside* the 'tiny conduits' (Ibid: 5) of networks, it fails to navigate a 'flattened landscape' (Ibid: 232) in the way that ANT prescribes. Visually, the blue lines stand out from the base-map but that map remains substantially intact and continues to order and scale spatial representation, locating smaller places inside larger ones. Latour is clear that there is no vantage point, either micro/local or macro/global, outside the operation of networks of actors from which to view the social, yet *Comob* holds onto the idea of local 'places' *and* the map's framing of these within a global metric space.

In conclusion*, Comob* brings the grounds of cartographic representation into jeopardy by introducing to it a non-representational model for the production of shared knowledge of the world, the truth of which is contained *within* the network rather than relying, as the cartographic map does, on treating one thing

'as if' it is another. It is not just, as Barney Warf suggests, that the *metaphor* of 'network' supersedes that of 'surface' (2009: 59-76). Rather, if networks become the source of shared knowledge, this leads to the disintegration of cartography's surface of projection and the representational logic that underpins it. In the end, *Comob* hesitates to relinquish that logic. It finds itself caught between the desire to better account for mobile social networks operating in, on, and across space, and the need to cling to some wider, shared notion of a measurable space. Although Speed finds merit in the interplay between these positions, he doesn't quite acknowledge the incongruity between them, preferring instead to invoke 'a soft, relational model, in which we anticipate multiple readings' (2010: 172). He talks of the *diminishing* of 'the representational power of the base map' (Ibid: 174) and urges locative media to be 'sensitive in the way that it adopts Cartesian and abstract ways of describing a sense of place' (Ibid: 173) - Cartesian space being just one 'end of the continuum of spatial systems' (Ibid: 172). In the end, *Comob* fudges the issue in trying to rescue a firm-footed sense of place from the 'soft, relational' quicksands of the logic of ANT. The value of the project, however, is in the scenario it presents, even if it falls short of acting upon it, in which the venerable vessel of Euclidean space is no longer deemed sufficient to contain our knowledge and sustain our representations.

3.4: Mapping the Map: *San Francisco <-> Baghdad* (2004)

San Francisco <-> Baghdad (2004) by Paula Levine marks a radical departure from the works so far discussed in that, instead of locating and representing movement (whether human, social or informational) within a metric cartographic space, it fragments that space to provide alternative accounts of such movements. The previous discussion of *Comob* (2009-) suggested that, in seeking to represent the operation of social networks both in and across space, the significance of the base-map was already 'receding' and that this suggested a scenario in which cartography might no longer be considered an adequate, or the only, framework for the expression of spatial relations. Whereas *Comob* hesitated at the edge of Olsson's 'abyss' (2007), hoping to soften the fall by retaining some grasp on the base map, *San Francisco <-> Baghdad* apparently takes the plunge by cutting, folding, and pasting the map to create new relations of proximity in which here and there, near and far, become malleable and open to playful and creative manipulation.

San Francisco <–>Baghdad was produced during a two-month residency at Banff Centre for the Arts in 2004. It 'overlays' (Levine, n.d. [a]) a map of Baghdad onto one of San Francisco. The Baghdad map, adapted from a map produced by *The Guardian Online*, is annotated with the locations of bomb explosions between the launch of the first American invasion of Iraq in March 2003, and April 2004. These bombsites, through the correspondence created by the overlay of the two maps, are then transposed onto a map of San Francisco and assigned new GPS co-ordinates.

This image has been removed for copyright reasons
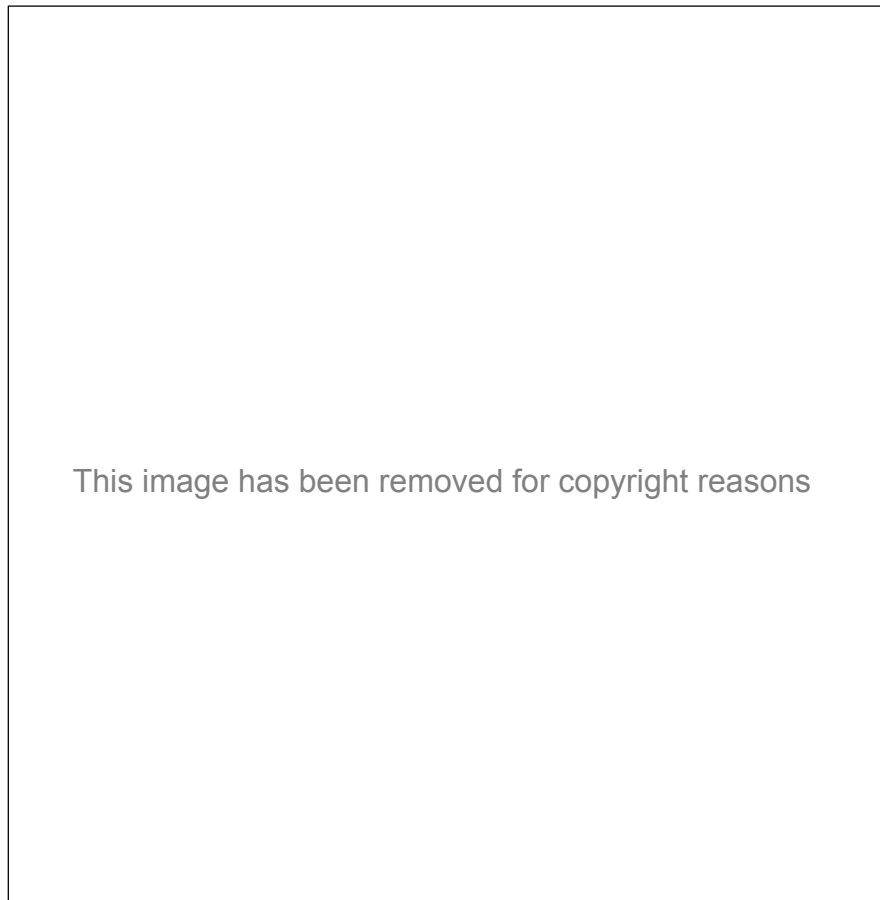
Figure 3.9: Paula Levine, *San Francisco <–>Baghdad* (2004). Screenshot showing superimposed maps of San Francisco and Baghdad from the project's website: <http://shadowsfromanotherplace.net/> [Accessed 20th January 2015].

On the ground in San Francisco, these locations are then 'chronicled and documented with photographs showing what currently exists at these locations', the photographs being uploaded to the project's website (Levine, n.d. [b]). At each of these sites, a 'geocache'[121] is placed: a metal canister containing printed information about the project and a list of US service personnel who had

---

[121] The inclusion of geocaching elements provided a means to secure a GPS equipped audience for the project at a time when GPS devices were not widely used. The geocaching movement adopted and experimented with early domestic GPS devices to take advantage of the recent (2001) de-restriction of GPS use for civilians by the American government and was popular around this time.

died in the war since May 1st, 2003, when President Bush declared that major

combat operations had ended (Levine, n.d. [a]).

Figure 3.10: Paula Levine, *San Francisco <–>Baghdad* (2004). Photograph of
one of the geocache canisters located in San Francisco. Courtesy of the artist.

The project, through its website, encouraged exploration of the bombing sites

now re-situated in San Francisco, using the GPS coordinates provided. A blog

of people's experiences of the project also existed on its website (Levine, n.d.

[b]) but is no longer available and so it is difficult to judge the extent of

participation and the impact of the project. However, whatever might have been

achieved through its execution, the idea behind the project is in itself of interest

because of the way in which it manipulates the surface of projection to collapse

two distinct spaces into each other.

In its creation of new connections and relations of proximity through disruption

of the map surface, there is an obvious comparison to be made with the

Situationists' production of psychogeographical maps. Guy Debord and Asger

Jorn's *The Naked City* (1957) cuts out neighbourhoods from the Paris map and

pastes them into new alignments and relationships that defy cartographic

measures of position and proximity and instead highlight alternative

(psychogeographical) ways in which they relate to each other. Like *Shadows*,

the maps are a political statement of sorts, designed to draw attention to

relations of power that produce centres and peripheries[122]. Unlike *Shadows*,

The Naked City places excerpts from the map side by side, rather than

superimposing them, but Debord specifically considers this possibility:

> The production of psychogeographic maps, or even the introduction of
> alterations such as more or less arbitrarily transposing maps of two
> different regions, can contribute to clarifying certain wanderings that
> express not subordination to randomness but complete *insubordination*
> to habitual influences […] A friend recently told me that he had just
> wandered through the Harz region of Germany while blindly following the
> directions of a map of London. (1981: 5)

This image has been removed for copyright reasons
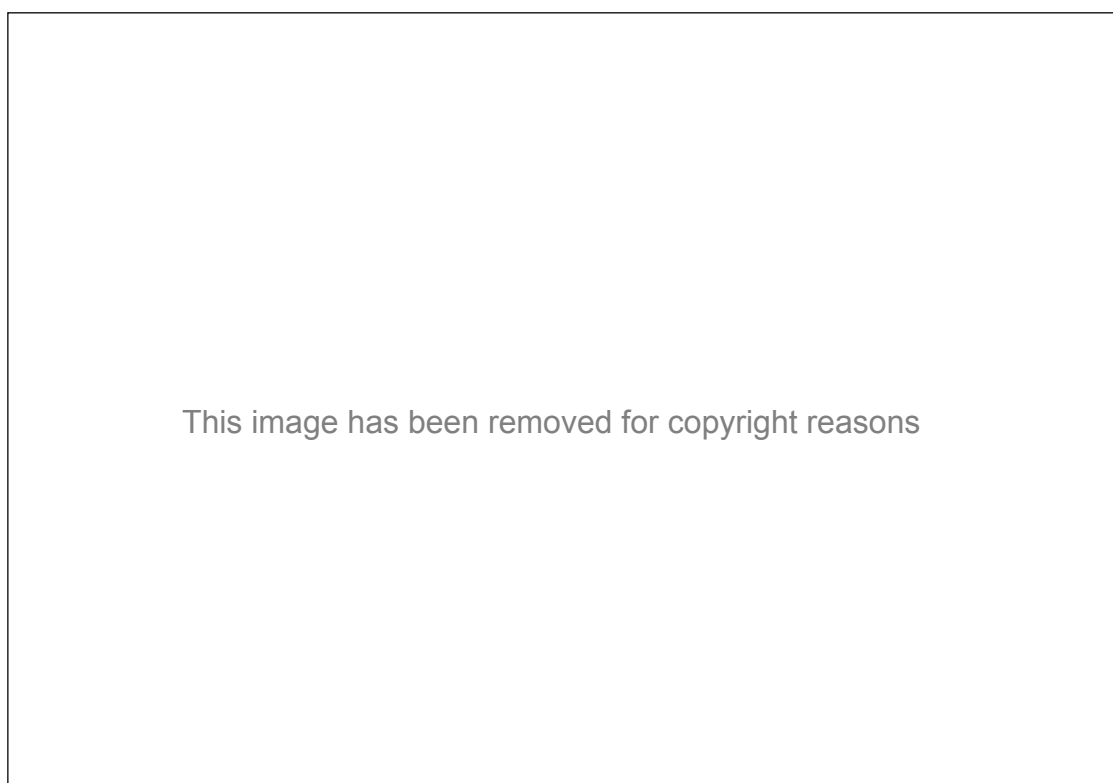
Figure 3.11: Guy Debord, with Asger Jorn, *The Naked City: Illustration de* l'hypothèse *des plaques tournantes en psychogeographique* (1957), screenprint, 33 x 47.5 cm.

---

[122] For a discussion of the idea of spatial 'centrality' (the production of powerful centres and marginalized peripheries) in the work of Henri Lefebvre, see Stuart Elden (2004: 151-157, 240).

Whether the map is subjected to montage (*The Naked City*) or superimposition (*San Francisco <-> Baghdad*), both of these operations can be seen as a folding of the map. In both cases, the aim is to play with notions of proximity in order to shift focus and make more central places that are somehow hidden from view. *The Naked City* highlights marginalized areas of the city of Paris, 'identifying the secret flows of money and power below the surface of the city' (Rieser, 2009: 379), while *San Francisco <-> Baghdad* aims to bring closer to home events in a city some 7000 miles distant. The different scales they operate at and the different flows they address correspond to a shift in radical political discourse in response to processes of globalization in late capitalism. For the Situationists, writing and practising the *dérive* in the 1950s and 60s, the city is the basic unit of account and their concern is with the 'flows of money and power' that operate across it and how these produce relations of centrality and marginality. The *Shadows* project, by contrast, is concerned with power relations operating at a global level, and addresses flows of information as much as it does those of 'money and power'. To better understand this, it is necessary to return to Levine's starting point for the project.

On the one hand, the project clearly responds to and is a commentary upon the use of military might by western powers in a foreign land. *San Francisco <-> Baghdad* tears up and reassembles the surface of the map to force acknowledgement of the global nature of power by making it local. As Levine puts it: 'Collapsing distinctions between "foreign" or "domestic," these hybrid spaces erase the safety of geographic distance and portray the impact of

political, social and cultural change in local terms/on local ground' (Levine, n.d. [b]). By using GPS coordinates to achieve this, it also draws attention to the use of geo-locative technologies in implementing these military actions. However, *San Francisco <-> Baghdad* represents more than just the collapsing of physical distance. It also addresses the nature of information flows that mediate across this distance and the incongruity of events that are simultaneously experienced as immediate and remote. Levine writes that the project was inspired by her own experience of news reports of the invasion:

> I expected to feel the impact, hear bombs, feel shock waves, see bright lights in the sky outside my studio window similar to those described on the radio. I anticipated that each satellite image would bare [sic] evidence of the missiles and bombs being levied more than 7000 miles away from where I sat. But, of course, none were visible. None were felt. None were heard. The invasion was a distant simultaneous event and, in spite of connections through media that reinforced my own expectation of proximity and simultaneity, the physical space between San Francisco and Baghdad remained fixed and sufficient to buffer the impact of the invasion taking place there. (2005: 1)

By seeking to bring closer still the distant consequences of homespun actions, the project points to the inadequacy and questions the veracity of mediations of war. It becomes, as well as a commentary on power, a commentary on the nature of information; its apparent ability to bring things closer whilst, at the same time, never quite being able to overcome the distance. In other words, it explores the nature of the relationship between physical and informational spaces. The incongruity experienced as a result of information *across* space is transposed through the overlaying of maps into incongruity *within* a space: the virtual proximity of a Baghdad placed into the streets of San Francisco. It is informational space rather than physical space that is collapsed and folded flat in order to achieve, or rather simulate, physical proximity. In *San Francisco <-> Baghdad*, the invasion of Iraq is no longer referenced in terms of 'here' and

'there' ('our reporter in Baghdad', 'our commentator here in the studio').
Baghdad is 'here' in San Francisco and information flow across space, the
interminable chatter of always-on global connectivity ('live via satellite'), is
momentarily silenced.

For a project that set out to bring closer to home the roar of bombs across the
city of Baghdad, this stillness is paradoxical. Levine had 'expected to feel the
impact, hear bombs, feel shock waves, see bright lights in the sky [...] But [...]
none were visible. None were felt. None were heard' (2005: 1). Unlike the
many locative media projects that explore notions of lived experience and social
connectedness, *people* are almost completely absent from *San Francisco <->
Baghdad*, featuring only as the end users of the experience. Even then, and
especially since there are no available reports of their experiences, it is difficult
to know what level of emotion (what sense of connection with the victims of the
bombing, for example) might have been aroused by the work. The impact of the
bombs is measured by way of a correlation between geographical coordinates,
and the only 'people' within *Shadows* are the dead, the lists of which are
entombed in metal geo-cache canisters. By way of contrast, Kit Galloway and
Sherry Rabinowitz's *Hole in Space* (1980) similarly collapsed the space
between two cities, but did so in order to bring people face to face, enabling
new forms of social interaction and (unmediated) flows of information. *San
Francisco <-> Baghdad's* attempt to create an experience of immediacy
paradoxically results in a curious abstraction in which people, events and
places become enumerated: the numbers of listed dead, the dates of the
military attack, the GPS-coordinates of bomb sites. This process of abstraction
and quantification is at work in, and may in part result from, Levine's use of

sources. These chiefly consist of: an online map of bomb sites in Baghdad, published by *The Guardian* newspaper; a New York newspaper's online 'roll call of the U.S. dead'; satellite photographs supplied by a commercial geo-spatial image agency; along with other online materials including census data and maps (Levine, n.d. [a]). This use of distant sources rather than sources closer to the ground of either Iraq or the U.S., may in part result from the project having been developed, at a distance, in Canada. However, it remains ironic that these primarily quantitative sources should be relied upon as the basis for a more immediate and qualitative experience of the consequences of war and terror, one supposedly *less* mediated by the flow of information. What it produces is a 'mash-up' of data in which numbers are crunched and correlated in such a way that they suggest relations and equivalencies where none may exist. What, for example, *is* the nature of the relationship between the site of a bomb in Baghdad and the names of U.S. military casualties from across Iraq contained in a metal canister somewhere in San Francisco, and why this relationship and not another?

The abstract nature of the relationships suggested by this work is nowhere more striking than in its central conceit - the superimposition of maps. At a very general level, it does raise the question, 'What if the bombs were falling here?', and maybe it reveals something about the density of bombing. Nevertheless, rather than pointing to other possible relations between the two cities - along social, economic, religious, or topographical vectors - the only relationship it creates is between geographical coordinates at a scale of 1:1. The bombsite in Baghdad is connected to *this* place in San Francisco by virtue of a hypothetical index created between two abstractions. The relationship between the two cities

is thus expressed as an equivalency between geographical coordinates that mark their respective centre-points:

N37 46 W122 26 **=** N33 26 E44 26

Paradoxically, the only thing holding the two parts of this equation together is *the map* and its version of a uniform and continuous space, framed by a global system of coordinates. Whilst appearing to disintegrate the map to create new relations of proximity, *San Francisco <-> Baghdad* unwittingly relies on the integrity of this abstraction to draw an equivalency between the two sites. As a result, the relationship between San Francisco and Baghdad is necessarily expressed through a re-stitching, a gluing together, of the fragments of the map.

Parallels were earlier suggested between Levine's *San Francisco <-> Baghdad* and Debord's *The Naked City* but there is a crucial difference in the way that they fold the map. *San Francisco <-> Baghdad*, in *superimposing* one part of the map on another, suggests a relationship of *equivalency* between two places - one that, as has just been suggested, is based solely on them being parts of the same map (and all that that map implies). *The Naked City*, in creating a *juxtaposition* of fragments of the map, produces *difference*, rather than equivalency. It is this that allows it to create and experiment with novel relationships *between* spaces. It is this that produces lines of movement, of flow, that are capable of expressing the quality of these relationships: for example, revealing power relations as they are played out across the city. The charting of these relations does not rely on the integrity of the map. Conversely, the energy and dynamism of *The Naked City* is the product of a map in tatters. Whereas *The Naked City* fragments the map to create dynamic spaces

between those fragments, *San Francisco <-> Baghdad* pastes and presses the fragments together to produce a flattening of the map that leaves little room for the exploration of new relationships and senses of proximity. The one creates incongruity while the other lapses back into the sterile congruity that marks the cartographic project as a whole.

In conclusion, *San Francisco <-> Baghdad* shares with the other case studies in this chapter the desire to explore and represent fluid and indistinct informational spaces that do not readily conform to the metric space of cartography and its representational logic. Paula Levine appears to make an important break from cartography by interrogating the surface of projection –literally breaking it apart and then superimposing the fragments. In doing so, she poses a challenge to its representational regime. Rather than treating the maps of San Francisco and Baghdad 'as if' they were San Francisco and Baghdad, she deforms the map in order to imagine one city 'as if' it were another. However, because she aligns the fragments by drawing an abstract equivalence between them, the conjunction that this 'as if' performs is entirely dependent on the representational conjunction of cartography. The two fragments of the map, rather than floating free, are firmly pasted together in a way that restores the integrity of the surface of projection.

3.5 Conclusion

While the works of chapter 2, although pitting the experience of place against the abstract representation of space, found little to question in the way cartography locates places within the space of a projected surface, the works in this chapter, in trying to map informational spaces that do not readily conform to Euclidean space, all to some degree interrogate the surface of projection. Gomes's work is intimately concerned with bringing disparate (geographic, architectonic, informational and imaginary) surfaces into contact with each other, speculatively marking them out on the ground in order to draw attention to the incongruities between them. Southern and Speed's *Comob* jeopardizes the integrity of the base-map by highlighting social and informational networks that cut across its metric space and produce a 'shared sense of place' that need not conform to that of cartography. Finally, Paula Levine's *San Francisco <-> Baghdad* very obviously tears up the surface of the map to create alternative senses of proximity.

However, they all back away from making the kind of 'break' with cartographic projectionism that has been likened to analytical cubism's 'break' with perpectivalism, although, as has been pointed out, both might be seen as responding to the discovery or advent of phenomena that elude the 'scopic regimes of modernity' (Jay, 1998). Gomes simply sidesteps the issue by not making maps or, if his chalk markings are to be read as maps, by making one as large as the territory that, as in Jorge Luis Borges's tale of the 'Art of Cartography', is 'useless' as a map (1946). *Comob* aims to 'diminish the

representational power of the base-map' (Speed, 2010: 174), yet the social networks and connections that it fosters are forced to take shape on the ground in such a way that the surface of projection remains intact. While *San Francisco <-> Baghdad* appears to break apart that surface, it transpires that its integrity is reaffirmed by the manner in which the fragments are then brought together. So, while the works in this chapter explore - and, to some degree, create for themselves - a crisis in cartographic representation, cartographic reason and representation remains the default position to which they ultimately revert.

Unlike the case studies of Chapter 2, however, they do substantially engage with and explore the emerging conditions of what I call Code Space. The difficulties they encounter in trying to represent these novel conditions, their pushing of cartography to its limits, serves to interrogate and destabilize its surface of projection, and this in turn points to a way beyond cartography. Thus, the works of this chapter provide a bridge between the case studies of chapters 2 and 4.

In the next chapter, the interrogation of surface, ground, and territory that was begun here is more fully developed, inaugurating a wholesale unravelling of cartographic representation. The works in Chapter 4 turn away from the secure ground of cartographic reason and take a speculative leap into Olsson's 'abyss' (Olsson, 2007). In the event, however, the abyss turns out not to be an empty void but made of lines of code.

Chapter 4

Adventures in Code Space

4.1 Introduction

The operations of code not only change the world that is to be mapped, but force a reassessment of what it means to map. Their production of spaces and senses of spatiality that resist representation upon a cartographic surface bring that surface into question and call for its breaking apart. However, code also becomes the means by which practices of mapping survive beyond cartography. In this chapter, I explore how artists making maps with locative media have employed code to interrogate the cartographic surface and break free from the representational epistemology that is integral to it, but I also demonstrate how they pioneer novel mapping practices that fundamentally refashion the way in which space is conceived, encountered, and navigated. These practices begin to give a fuller account of the world as it is currently taking shape, and I use the case studies to elaborate on the nature of Code Space.

I begin by situating the case studies in relation to those of the previous chapters, and in relation to what is seen as a paradigmatic shift from the Cartographic Space of modernity towards the emerging conditions of what I characterize as Code Space, in which spatial relations are increasingly mediated by computer code. In respect of Cartographic Space: Chapter 2 demonstrated the continuing hold that a cartographic mode of seeing and thinking exerted over the mapping practices of artists working with locative

media, even as they sought to 'counter' it. Chapter 3, by contrast, examined works that stretch the cartographic frame to its limits, exploring the implications of a widely acknowledged crisis in cartographic reason and representation, and often unwittingly precipitating such a crisis in their own representations. However, whereas those works hesitated at the edge of Olsson's 'abyss' (2007), the works in this chapter take the plunge, making a break with cartography that begins to suggest answers to the 'impossible question' of 'what to do instead' (Olsson, 1998:149). In respect of Code Space: the works of Chapter 2 are largely oblivious to the impact of code on the way in which space is lived and conceived, as well as their own reliance upon code. In Chapter 3, by contrast, the works directly address phenomena that arise out of coded processes, including those that are integral to the works themselves. However, in their attempt to bring these to light and represent them, and perhaps not knowing what else to do, they cling onto the secure and stable ground supplied by cartography. The works in this chapter, rather than viewing the space of code from a safe distance, begin to answer the question of 'what to do instead' by *inhabiting* that space. The qualities of code - its capacity to create new kinds of connection and its resultant propensity to disrupt fixed notions of proximity and territory - become the tools with which to further explore and map those qualities. In short, then, the works discussed in this chapter can be characterized by both the way in which they make a significant break with cartography and the way in which they more fully immerse themselves in the space of Code.

It was suggested in Chapter 1 that a 'break' with the 'scopic regime' (Jay, 1988) of cartographic projectionism - one that might productively be compared with

that achieved by analytical cubism in respect of its twin, perspectivalism - would involve an interrogation of the surface of projection and a thickening of that surface to endow it with depth. The works in this chapter begin to do just that. In their maps, the singular and secure 'ground' supplied by cartography gives way to multiple, layered, fluid and mutable surfaces that are also informed by alternative (non-Euclidean) geometries. They achieve this not so much by entirely discarding cartography's representational frame, but by multiplying frames, metrics and coordinate systems and playing with the slippages between them.

Nevertheless, what these maps do goes much deeper than what is visibly presented. Sticking with the metaphor of 'ground', and the 'abyss' that Olsson juxtaposes it with, the exploration of these coded spaces might be pictured as a subterranean adventure, burrowing below the surface of visibility and into the cryptic depths of a landscape that is characterized by amorphous spaces, deformed strata, and labyrinthine networks of connection. The metaphor doesn't perhaps capture the lack of solidity that characterizes these code spaces, but serves well enough in highlighting the sense of depth and obscurity that is involved and can also be used to make a point about the nature of representation in these works. Rather than falling into the 'abyss', never to be seen again, these works persist (through their production of 'maps') in bringing this hidden topology to light, insisting that it is not unfathomable, that the space of code can be de-crypt-ed. Yet they do not simply bring it to the surface, as it were, laying it out on the ground for all to see. It is a mapping that is not confined to or reliant upon cartography's 'visible surfaces' (Farinelli, 1998: 141). Whatever they do make visible, this serves not as a representation, but as the

visible tip of mapping processes that continue to operate below the surface - burrowing around, mining data, digging speculative boreholes in an invisible substrate. In other words, the maps that they produce do not *represent* an external reality, but rather remain intensive to a reality that they both inhabit and shape.

Assuming, for the moment, that the works in this chapter are still producing 'maps' of some sort - rather than 'diagrams', 'simulations' or something other - then the 'break' with cartography consists in allowing that maps may be non-representational, may operate below the threshold of visibility, and may address topological spaces as much as topographical surfaces. One point of departure in this radical reassessment of what maps are and what they may do is to more fully consider the spatiality of sound, rather than that of vision, and how artists who work with locative media and maps have explored this. Doing so creates a 'break' or 'line of flight' (Deleuze and Guattari, 1987: 9-10) from what Lefebvre describes as the 'illusions of transparency and realism' (1991: 28-29) that characterize the purely '*scopic* regime' (Jay, 1988, my italics) of cartography in which location remains fixed, gridded and, above all, visible. An examination of the relationship between space and sound in these works suggests new forms of mapping that might engage with invisible, intangible and fluid phenomena: not just those of 'acoustic space' (Carpenter and McLuhan, 1960), but of 'Hertzian space' (Dunne, 2005), 'augmented space' (Manovich, 2006), or what I describe as the space of code.

4.2 Acoustic Space and the Soundscapes of Locative Media

Before looking at the way in which artists working with locative media have explored the relationship between space and sound, and how this moves mapping beyond cartography, I want to elaborate on the nature of what Edmund Carpenter and Marshall McLuhan dubbed 'acoustic space' (1960). The first thing to note is that Cartographic Space is fundamentally a visual space, a 'scopic regime' that pictures space as 'geometrically isotropic, rectilinear, abstract, and uniform' (Jay, 1998: 6). Nevertheless, as Lefebvre observes, '[s]pace is listened for, in fact, as much as it is seen, and heard before it comes into view' (1991: 199-200). For Lefebvre, the privileging of sight is specific to the production of 'abstract space', and so one of the ways to counter the abstraction of space –to produce a 'differential space' – is to reencounter space as an acoustic phenomenon. In this, Lefebvre takes inspiration from Marshall McLuhan's depiction of 'acoustic space'[123] as a 'sphere without fixed boundaries' that is 'boundless, directionless, horizonless' (1960, p. 207). Although sound is necessarily spatial in that it occupies and is experienced in space, it refuses to occupy space in predictable ways. Acoustic spaces, being complex, dispersed and overlapping, neither possess nor can be reduced to distinct surfaces and, having 'no center and no margin' (McLuhan, 1969), refute the framing of position in terms of figure and ground. The lesson that can be learnt from thinking of space acoustically is that, in contrast to the visible surfaces of cartography, 'sound teaches depth' (McLuhan, 2007: 68). As Walter Ong writes, 'whereas vision situates man in front of things', and thus creates

---

[123] Lefebvre acknowledges that his concept of 'abstract space' was directly informed by McLuhan's concept of 'visual space' (Lefebvre, 1991: 261) while his concept of 'differential space' can be seen as roughly analogous to McLuhan's 'acoustic space' (see Cavell, 2002: 29).

surfaces, '[s]ound situates man in the middle of actuality and in simultaneity' (2000: 128). It calls into question the purely visual regime of cartography by revealing landscapes that, being composed of hidden depths more than visible surfaces, elude its standards of fixity, objectivity, measurability and visibility. As Julia Obert puts it, '[s]ound [...] consistently elides strategies of containment and transgresses bounds of visual space […], it exceeds the confines of cartography' (2006: 4).

The exploration of the relationship between sound and space by artists working with locative media might, then, also suggest ways of moving beyond cartography. Referring to more than just the manner in which sound occupies space, 'acoustic space' becomes a way of thinking about other phenomena and alternative senses of spatiality. In particular, the borderless space of sound features prominently as a metaphor and model for the deterritoralized experience of migration[124]. This tallies, too, with McLuhan's account of acoustic space in which 'man is no less a nomad than his paleolithic ancestors' (1994: 283). It is by no means coincidental, then, that many of the works in this chapter are also concerned with accounting for the complex and layered spaces of migration - including Petra Gemeinboeck's *Urban Fictions 2.0* and Nishat Awan and Phil Langley's mapping of diasporic territories (2013)[125]. For McLuhan, however, 'acoustic space' was primarily a way of thinking about the novel spaces produced by 'emerging mediums such as the satellite, the computer, the

---

[124] For example, in Homi Bhabha's discussions of musical hybridity (Bhabha, 1994), and in Nikos Papastergiadis's *The Turbulence of Migration* (2000).
[125] Another locative media project in this vein is Misha Myers' *Way From Home* which plots immigrant's memories of 'home' onto 'host' places in Plymouth.

data base' (2007: 72)[126]. Likewise, the discussion that follows of the 'soundscapes' that feature in works of locative media is intended to supply a means of thinking more broadly about the mapping of Code Space.

From the beginning, and following in the tradition of site-specific works such as Janet Cardiff's audio walks, artists working with locative media have extensively employed sound, most often in works that Tuters and Varnelis classify as being 'annotative' (2006: 359). In these, recorded sounds are associated with geographical coordinates that locate them as either a specific point or 'geofenced' area and are then experienced *in situ*, using a GPS-enabled mobile device[127]. Although tied to a cartographic grid, these 'soundscapes' do display some of the characteristics of 'acoustic space'. Firstly, the 'areas' of sound remain fluid because they are subject to the vagaries of 'GPS drift'[128]. Secondly, they remain ill-defined and indistinctly bordered because sounds are often programmed to fade in and out as the user moves closer to or further from a source. Thirdly, the maps themselves are often not made visible to end users but remain a hidden part of the production process and so are experienced only on an auditory and not on a visual register. The effect is to create a sonic 'layer' that, although tied to the map, seems to float loosely over the physical landscape. In doing so, it is capable of creating complex associations between landscape and soundscape, thereby producing new connections, contrasts, incongruities and harmonies. In other words, it is capable of creating novel

---

[126] The idea that ICT and particularly mobile media occasion a return to or reproduction of a nomadic way of life has been attractive to many writers. See, for example, William's Mitchell's account of 'wireless nomads' (2003: 60).
[127] For example, Blast Theory's *Rider Spoke* (2007), Proboscis's *Urban Tapestries* (2004-8)*,* SatSymph's *Hermes* (2010).
[128] 'GPS drift' describes conditions in which co-ordinates change even when the user is stationary. These fluctuations are most often caused by atmospheric conditions and obstructions in the line of sight to satellites, including trees and buildings.

experiences of space, might even be said to constitute an alternate or parallel space that, through the tensions and incongruities it creates, produces what Hemment, amongst others, describes as 'a space between' (2006: 353).

This image has been removed for copyright reasons
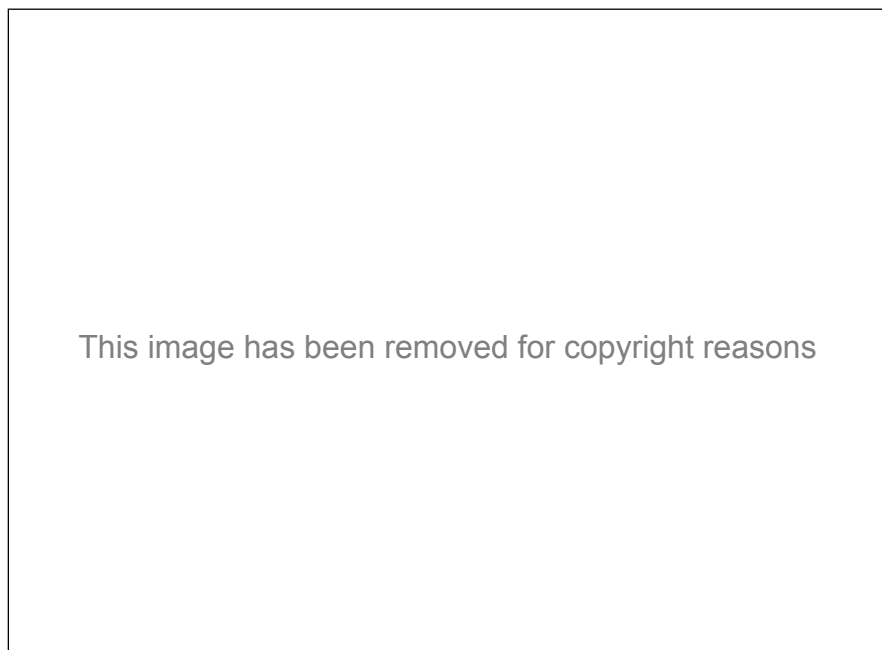
Figure 4.1: Screenshot of map interface of Mscape software [detail] showing 'geofences' as coloured blocks that link to recorded sounds to produce a 'soundscape' experienced on location through a GPS-enabled smart device. Courtesy of SATSYMPH, from prototype for *The Frome Maidens* (2010).

The soundscape, then, is not reducible to the surface of the cartographic map, to which it remains anchored, but always drifts free. Neither, however, is it reducible to the experience of being in the soundscape, although it continues to structure and shape those experiences. Rather, it sits somewhere between geographical location and the experience of place, neither fully a lived reality nor abstract representation, and invisible to both. In the discussion of the following two case studies, it is suggested that their soundscapes point towards novel modes of mapping that move beyond cartography. Rather than flatten space to a surface of projection, they invest it with depth by creating complex, shifting, multiple and layered realities.

4.3 Teri Reub's *Drift* (2004)

Teri Reub's appropriately named *Drift* (2004) produces a soundscape that functions as an alternate map that is deliberately set out of kilter with the physical terrain in order to create a disjuncture between geographical location and the experience of place. The soundscape consists of music and words[129] overlaid onto a two-square-kilometre stretch of coastline along the Wadden Sea in Germany. Despite its reliance on GPS, the purpose of the work is to unfix the experience of place from the precision of known degrees of latitude and longitude. Reub writes that, '[t]he installation embraces the flow of wandering, the pleasure of disorientation, and the playful unpredictability of drifting as it relates to movement and translation' (n.d.: n.p.). Fluidity is achieved by attaching the soundscape to a moving body of water. Instead of being fixed to the geographical grid, the soundscape moves with the tides, or, rather, a model of tidal movements. At low tide, the sounds 'wash over' an expanse of mud flats on the coastline while at high tide they drift over the seaside town of Cuxhaven, 'flooding' its streets. Yet the ebb and flow of water is more than just a *metaphor* for fluidity as it is also the motor that drives the soundscape's fluctuations. These movements invest in the soundscape the quality not just of temporality, but specifically of a cyclical temporality that is tied to the rhythms of the moon, seasons, days and nights; in other words, time as it is lived, rather than the abstraction of clock time. In this way, *Drift* seeks to produce a lived experience of place rather than one that is fixed to the grid: 'simply knowing one's

---

[129] The soundscape consisted of a selection of poetry concerning seas and tides (including works by Rousseau, Joyce, Mann, Dante, and Woolf), accompanied by an ambient soundtrack.

geographical location as expressed in longitude and latitude coordinates has little bearing on one's personal sense of place or direction' (Ibid).

The soundscape thus becomes an alternate 'map' or spatial framing that unhooks the experience of place from the geographical grid. This 'moving "frame"', to take Thrift's term (2011: 6), contrives to create a sense of disorientation and, by doing so, to produce fresh experiences of *place,* but also, more broadly, of *space*. It achieves this by placing users within an environment that consists of multiple planes and frames of reference: the GPS grid that underpins the work; the moving frame of the soundscape; the shifting tides to which it corresponds; and the movement of users on the ground through which they experience space as 'multiple, overlapping, and even sometimes contradictory' (Reub, 2011: 397). Unlike Paula Levine's *San Francisco <-> Baghdad,* which flattened different layers to the same representational *surface* by creating a fixed equivalence between them, *Drift* is premised on the creation of incongruent layers and irreducible differences through which space is experienced as *depth*. In creating these conditions, the soundscape acts as what Thrift calls a 'cultural probe' (2011: 19). These are to be 'understood as spaces, frames constructed to produce uncertain outcomes [...], frames which both interrupt and restart the process of association and, in the process, conjure up invitations to act differently' (Ibid).

However, *Drift* as a generator of moving frames and processes of innovation must eventually stall as, although the soundscape moves as a whole, it remains a fixed entity. Users experience the installation, in part, through their own movements, and these might to some small degree control their experience of

256

it, but they are not actively engaged in the production of the soundscape and there is no feedback mechanism that would allow for its evolution. By contrast, the soundscape of the next case study makes itself open-ended by turning users into active participants and writers of their own acoustical score.

4.4 Proboscis's *Sensory Threads* (2006)

While in many works of locative media, soundscapes are created by artists for a more or less passive audience[130], a number of works reverse this to turn participants into composers of the soundscape. Examples include Proboscis's *Sensory Threads* (2009), as well as Gemeinboeck and Tanika's *Net_Dérive* (2006), discussed later in this chapter. While Gemeinboeck and Tanika's work is explicitly an exercise in mapping, there is no evidence to suggest that the soundscape in the Proboscis project was ever thought of as a map. In fact, a conventional (visual) map remains a key device for locating the site of the soundscape's production. Nevertheless, treating the soundscape as though it were a map reveals much about the shift involved in moving from the visual to the acoustic. This case study also highlights the role of code in producing acoustic spaces.

Sensory Threads equipped groups of four participants with a specific sensor each: one a heart-rate monitor, one a sound/noise level meter, one a light detector, and one consisting of four ultrasound rangefinders arranged front, back, right and left of the wearer and which measured proximity to physical

---

[130] Examples include Mobile Bristol's *1831 Riot*, SATSYMPH's *On a Theme of Hermes* (2012), and numerous heritage audio tours in which a GPS-based app functions as a 'virtual' tour guide.

obstacles. The latter, through the arrangement of its sensors, could, for example, detect a difference between the experience of enclosure in a narrow alley and that felt in a dense queue of people. The participants were then encouraged to explore an urban setting as a group (since the wireless connections between them would only function as long as participants stayed within 5 to 10 metres of each other), but also to individually explore the effects that could be achieved using their individual sensors. The inputs from these sensors were then translated into sounds using software installed on a small netbook carried by the group. The resulting composition was played to the four participants through headphones, but also relayed back to a studio/exhibition space, where it accompanied a digital map that tracked the participants' location using GPS, thus tying the soundscape to the geographical location in which it was recorded. While the soundscape accompanies rather than replaces a conventional map, the soundscape can also be considered as a map of sorts in that it also structures and is structured by spatial experience and thus in some way 'represents' spatial relationships. The nature of this representation, if that is what it should properly be called, reiterates some of the ramifications of, and possibilities created by, the shift from visual to acoustic mapping.

Firstly, the sonic 'map' is necessarily temporal as sound is essentially durational. Unlike a visual map, meaning cannot be fixed. To illustrate the point, while the soundscape and GPS co-ordinates produced in *Sensory Threads* were recorded alongside each other for playback, pausing this playback would only freeze the visual map but would completely silence the soundscape. Even when the participants are static and all is still within the visual map, the soundscape continues to evolve over time in response to fluctuations in levels

of light and sound, spatial density and heart rate. The soundscape thus allows for the representation of qualities that are not susceptible to visual mapping, although they remain fully spatial phenomena: for example, by virtue of the way in which light and sound detected by the sensors is reflected by and refracted through the physical space of the street and the movements of cars and people within it. In other words, the temporality of the map opens it up to transitory phenomena. This temporality also bestows agency on the participants who may actively compose the soundscape through reiterative processes. The soundtrack fed to their headphones provides a feedback loop that allows for adjustment, modification and experimentation. By design, particular sounds are mapped to specific sensor data, supplying the soundscape 'map' with a scale and legend of sorts, knowledge of which allows participants to affect and modulate the soundtrack through their actions.

However, the soundscape's mapping of space cannot be considered representational in any simple sense. Meaning is not fixed, but is subject both to individual agency and collective negotiation, as well as change over time. If, as I have suggested, there is a scale and legend to this map, these create associations rather than establish (a = b) equivalencies. To begin with, they perform translations between unlike registers; speculative leaps that suggest that 'this' particular sound might stand in for a heartbeat, for example. These 'what-if?' propositions, in contrast to the 'as-if' conventions of a representational system (for example, the shading of contours to represent altitude), are constructed as provocations by the authors of the project and result from design processes that include 'aesthetic' decisions (Bryan-Kinns *et al*, n.d,: n.p.). Moreover, rather than being mapped one-to-one (with one sound representing a

single parameter of data), data streams are mapped to a series of parameters that include the 'pitch, pulse, filter, and density of sound' (Ibid). The heartbeat that is picked up by one of the four sensors, for example, is translated into a repetitive pulse (as might be expected), but 'pulses are not directly aligned with the heart beats of the sensor wearer' (Fencott and Bryan-Kinns, 2009: 171). Rather, these translations are designed to evolve over time, in part to avoid monotony, but clearly expressing the possibility that the scale and legend of this map need not be fixed in order to remain legible to the participants: '*Sensory Threads* begins by making the soundscape highly responsive, and adds in more complex themes and less direct responsiveness as time goes on' (Marshall *et al*, 2010: 197). The heart-rate sound, for example, evolves so that, '[o]ver time, the pitch of the individual pulses begins to modulate, gradually transforming the simplistic tones into a melody.' (Fencott and Bryan-Kinns, 2009: 170). Crucially, these complex translations between data and sound are implemented by software that, rather than obediently executing design decisions, becomes an active agent in the shaping of the work. *Sensory Threads* uses SuperCollider, a real-time audio synthesis and algorithmic composition software that utilizes an object-oriented language and, as will be explored later in this chapter, this language has an inbuilt propensity to correlate data and space in ways that are complex, fuzzy and associative rather than representational.

Using the case studies of *Drift* and *Sensory Threads*, it has been argued that treating soundscapes as maps allows alternative forms of mapping to come into view and, further, that a key characteristic of these is that they are non-representational. The soundscape of *Sensory Threads* does not represent

space, arraying it on surface for all to see. Rather, it acts something like a probe, exploring the depths of spaces that are complex, multiple, layered, and evolving. The one-to-one ('a = b') logic, and accompanying truth claims, of cartographic representation are set aside in favour of translations that make speculative associations ('a = b, or c, or d...'). The case for all these propositions needs to be strengthened and further argued. In addition, it will be necessary to consider *what* it is, precisely, that replaces *representation* in these maps. Are they to be thought of as 'models', 'simulations', 'diagrams' or something other? And how might they be characterized and understood? Before returning to these questions, it is useful to incorporate a further case study from the field of locative media that also constructs a soundscape. A consideration of Petra Gemeinboeck and Atau Tanaka's *Net_Dérive* (2006) deepens the insights that are to be gleaned by stepping back from visual space to consider acoustical forms. Because it is also a project that is overtly concerned with cartography, it strengthens the argument that these soundscapes - as spatializations of sound - can be treated as maps. Furthermore, because of the way it combines visual and acoustical elements, it suggests ways in which the mutable, dispersed, fluid cartographies of acoustic mapping might translate into new forms of visual mapping. The work also brings to the fore the role of computer code, of software, in producing these 'post-representational' maps.

4.5 Petra Gemeinboeck's *Net_Dérive* (2006)

Net_Dérive (2006), part of Petra Gemeinboeck's *Impossible Geographies* series, was produced in collaboration with Atau Tanaka and exhibited in Paris in 2006. The work features both visualizations and a soundscape - or 'sonification', as the artists refer to it (2006) - that are accessible both in a gallery space and to participants equipped with mobile devices as they roam the streets of Paris, shaping these outputs as they do so. In writing about the work, the artists draw on familiar points of reference, particularly de Certeau and the Situationists. The drifting of participants becomes a 'writing' of the city, through sound and image, and this writing is depicted as a 'collective narrative' that is political in nature (Gemeinboeck, Tanaka & Dong, 2006: n.p.). However, the nature of this 'writing' and quite how it becomes political remains unclear. The work, dressed up in the standard-issue rhetoric of locative media, becomes much more interesting once stripped bare. Here, the aim is to achieve that by attending more closely to the mechanics of the piece, particularly the way in which information is processed by software, and by thinking of both the visualizations and sonifications as maps.

Net_Dérive consisted of a gallery installation, connected *live* to three participants who walked the streets of Paris. The participants wear a 'scarf' containing two 'advanced' (for 2006) mobile phones and a GPS device. The 'acquisition phone' acts as a probe that collects photographs every thirty seconds and continuously records audio, as well as feeding-back coordinates from the GPS device. The other phone displays a 'radar' screen showing the position of participants in relation to each other or, alternatively, a series of

visualizations of their movements. At the same time, it plays audio that has

been collected, mixed and treated in various ways, along with verbal

instructions (including directional instructions, location specific information, and

options that encourage a rendezvous with other participants) which participants

may choose to either follow or ignore - this, according to the artists, mimicking

dérives performed by the Situationists. Data gathered by the 'acquisition phone'

is transmitted, using a 3G network, to a central server that processes this

information to produce visualizations and 'sonifications' that are played live in

the gallery space, as well as being relayed to the participants' 'display

phone[s]'.

This image has been removed for copyright reasons
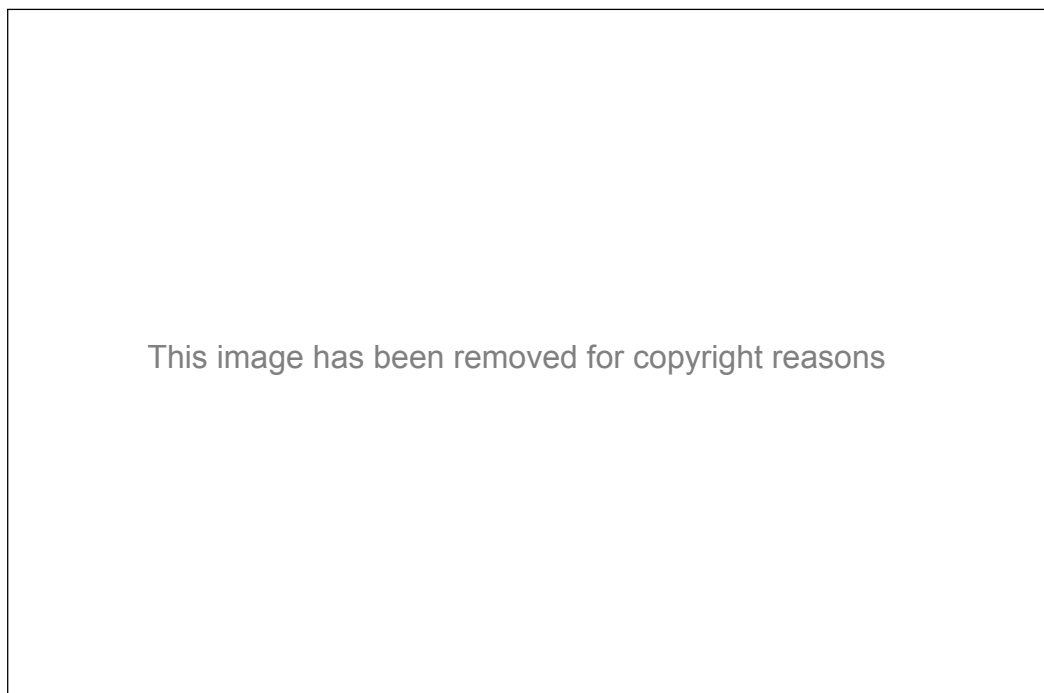
Figure 4.2: Gemeinboeck and Tanaka, *Net_Dérive* (2006). Diagram showing
the functions of 'acquisition' and 'display' phones. Courtesy of the artists.

This image has been removed for copyright reasons
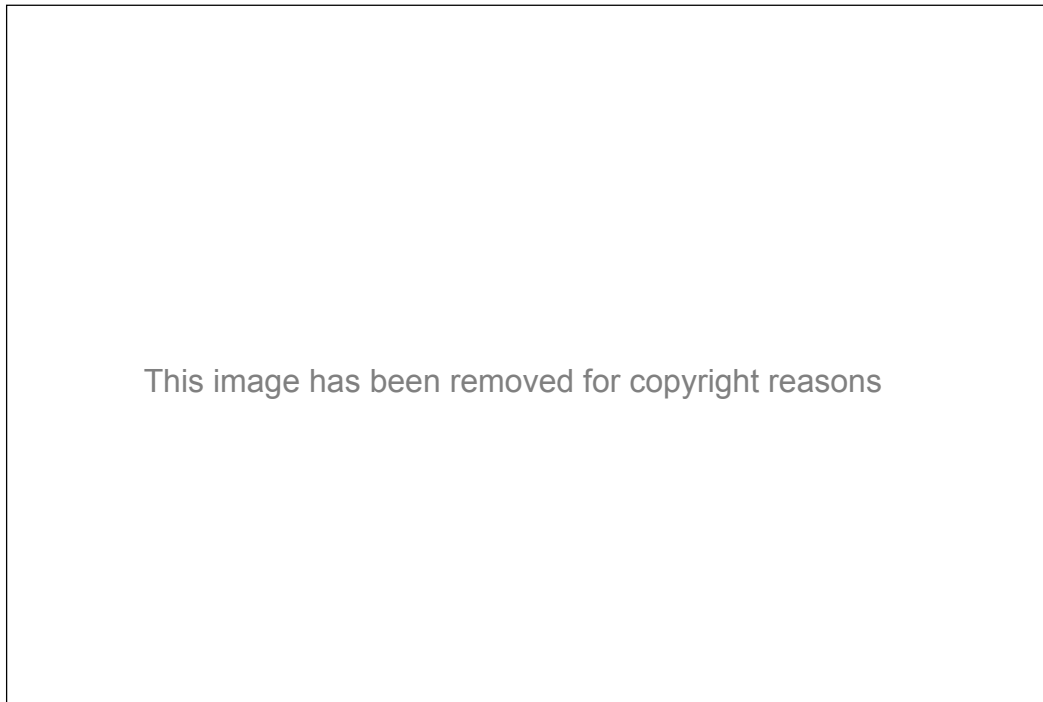
Figure 4.3: Gemeinboeck and Tanaka, *Net_Dérive* (2006). Diagram of the connections between mobile devices and the gallery display. Courtesy of the artists.

I will first examine the visualizations that result from these processes. These consist of three images that are projected against a blank wall of the darkened gallery space, in a split screen arrangement comprised of the positions of top-left, bottom-left and right. The top-left image is a 'radar' device, centred on the location of the gallery itself, that with each sweep reveals the geographical position of the participants, represented as dots, beside each of which appear coordinates expressed in degrees of latitude and longitude. It also shows trails of geo-located thumbnail photographs from the participants' acquisition devices, and these are arranged not just according to absolute geographical position but are also influenced by the movements of other participants. The bottom-left image combines photographic images with a device like an oscilloscope that stretches the images along their x-axis to form waves that respond to the speed at which participants move. To the right side of the screen is a satellite image of

Parisian streets, shown from a bird's eye perspective that is achieved by turning the flat image into a virtual 3D object. This shows the paths of participants, firstly by overlaying photographs from the acquisition device onto the satellite image and, secondly, by 'grooving' the composite photograph/satellite image. The grooves consist of a 3D warp that produces a valley-like topographical deformation in the wake of participants. This 'groove' remains and can be further deepened by participants who subsequently take the same route, contributing their own photographs, but also 'excavating' photographs previously attached to the location, which remain stored in the main server's memory. In this way, the collective paths of participants become layered in what the artists describe as 'an archaeology of the instant, into which we will be able to carve grooves to uncover layers of shared memories' (Gemeinboeck, in Tanaka, n.d.).

This image has been removed for copyright reasons

Figure 4.4: Gemeinboeck and Tanaka, *Net_Dérive* (2006). Photograph of the split-screen projection in the gallery space. Courtesy of the artists.

In part, these images can be viewed as an interesting but essentially routine exercise in data visualization, concerned only with the novel display of otherwise conventional information. The 'radar', for example, is a purely graphical device (since there is no real radar) that, at heart, remains

underpinned by GPS data. The 'grooving' of the map is interesting because it introduces the idea that the surface of the map might be mutable, elastic, and subject to deformation. The grooves can only be achieved by means of models of space that are non-Euclidean in their geometry. Their formation relies on irregular distortions that are not achievable in a regularly gridded space. A rigid metric grid could not survive these distortions but would tear and break apart, and it is this ripping of the map that becomes a central component of Gemeinboeck's later project in the *Impossible Geographies* series, *Urban Fiction* (2007)*,* discussed later in this chapter. However, the groove-like paths made by participants remain firmly tied to GPS data rather than being knocked off-course by these deformations and, in this sense, the deformations remain superficial.

This image has been removed for copyright reasons
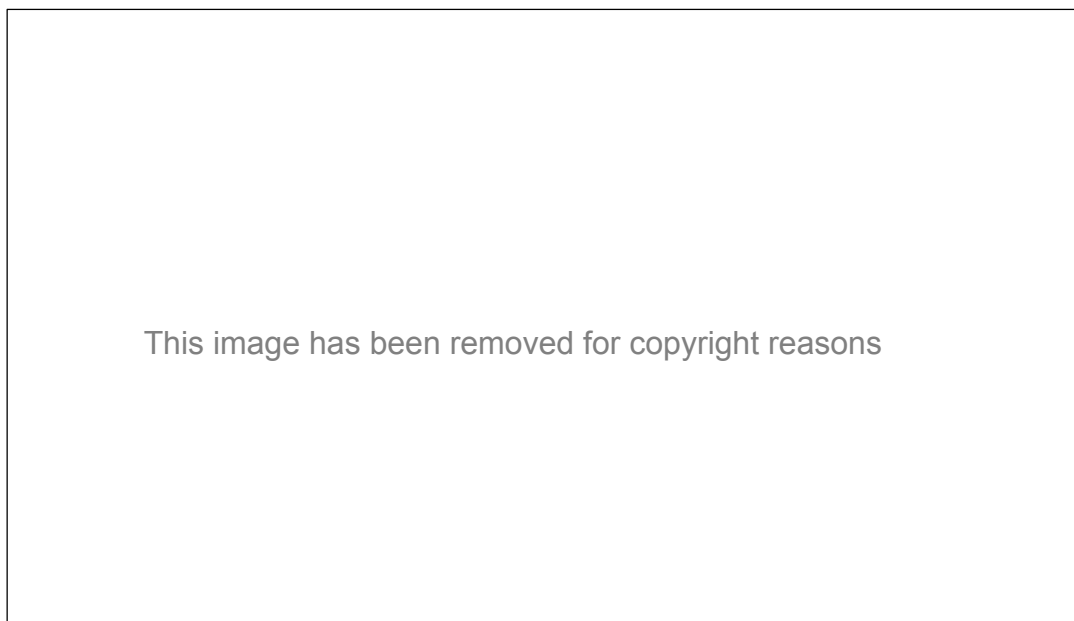
Figure 4.5: Gemeinboeck and Tanaka, *Net_Dérive* (2006). Computer vizualization produced during development of the project, showing the grooved satellite image and 'warped' photographs. Courtesy of the artists.

What the grooves do add to the map is a temporal (narrative) element where the depth of a groove signifies a path well-trodden. Nevertheless, apart from the layering of photographs along the path, neither is this especially novel.

Computer graphics aside, and the fact that these grooves are produced in real time, it is strongly reminiscent of Torsten Hagerstrand's Time-Geography in which time is added to the map as a third dimension, expressed as depth.

However, more than *just* an exercise in visualization, the work experiments in alternative forms of mapping that take place below the surface of visibility. These invisible 'maps' result from the plotting of one set of data into another. From a menu of data-sets, of which GPS is just one, 'maps' are produced by selecting and then correlating disparate inputs. 'Speed', for example, is mapped into 'photographs' and *then* visualized as a waveform. In addition, the visualization demonstrates (all at once in the gallery and in rotation for the mobile participants) that the same spatiotemporal data can be depicted in different ways, producing multiple and nuanced accounts of space. Thus, for the authors, these 'processes of hybridization and mutation' (Kihm, in Tanaka, n.d.) lead to 'alternative modes of reading and forms of representation that produce spaces in-between, hybrid spaces, from which other relations, yet unknown, can emerge' (Tanaka, n.d.).

However, it remains that geographical location, as fixed by coordinates within a gridded cartographic space, provides the basis for most of these visualizations. The work appears to come up against the 'glass ceiling' that Gemeinboeck later writes about as preventing locative media art from producing 'new knowledges' (Gemeinboeck and Saunders, 2011: 164). However, the way in which it operates at an acoustical level more strongly suggests ways of reaching beyond this glass ceiling, and it is to this aspect of the work that I now turn.

The 'sonification' in *Net_Dérive* works in much the same way as the visualization, by mapping between different sets of data. Sounds collected by participants with their 'acquisition phone' are spectrally-analyzed[131] in real-time and then 'applied to other audio instruments in order to harmonically tune them to the environmental sounds' (Momeni, in Tanaka, n.d.). The collective distance of the participants from the gallery affects the resonance of these instruments, while the relative proximity of the participants to each other (measured as the area between them) governs the speed of a repetitive sine pulse. In addition, each participant is allotted a dedicated 'instrument' of their own and this is 'played' according to measures of their individual speed, levels of activity, and proximity to other participants. All these different inputs and the effects assigned to them are then mixed to produce a single audio output that modifies over time in response to the incoming data.

This mapping of space with sounds works with a different sense of location to that of the cartographical map. GPS remains an important building block in the sonification, since it is used to calculate factors like the distances between participants, and between participants and the gallery. However, the sonification is informed by a *relational* sense of position that results from the movement of participants in *relation* to each other and the gallery space, rather than the *absolute* sense of position supplied by geographical coordinates. GPS becomes just one type of source data and is freely mixed with others, with no one source taking automatic precedence over another. The soundscape is as much a product of recorded sounds from the streets as it is of GPS data. More significantly still, in the way it maps spatial information into sounds, the work

---

[131] Spectral analysis of sound waves produces a graphical display of the constituent frequencies and can be used to identify a particular sound by its 'acoustic signature'.

translates between *unlike* registers for which there is no ready-made method of transposition or, in other words, no representational framework. Since there is no given sound that represents a particular configuration of data, it always has to be invented. Initially, that invention is the task of the programmer, but the process of invention then takes on a life of its own. In large part, this results from the work's use of non-linear computational methods that are themselves inventive rather than rule-bound, and which, instead of simply crunching datasets together, create new relations and categories and thus possibilities for translation between them. I will go on to discuss these computational processes in detail, but, outside of these, the work also evolves as a result of the feedback loop that allows participants to hear the soundscape they are producing and thus modify it through their actions. The process of composition in this work is, then, unlike a piano solo, where there is a score to follow and the relation between the striking of a piano key and the sound it produces is well-established, and much more like a free improvization, performed by an ensemble of players, the complexity of relations between which means that the music could go off in any number of directions. That is not to say that its composition results from a free-for-all, however. The soundscape remains grounded in and shaped by spatial experience and movement. However, if the soundscape can be considered as a map of some kind, in that it continues to structure and be structured by spatial relations, then it is clearly a very different sort of map; one that that is fluid, relational, and evolves over time rather being fixed, gridded and representational.

To better understand the nature of this mapping, it is necessary to look more closely at the computational undercurrents that produce it. Although largely

withdrawn from view, the mapping that is performed by *Net_Dérive*'s software is not just the mechanism by which the programmer-artists conjure novel sonifications and visualizations of space, but fundamentally shapes the work. It does so not just through the number-crunching work of mapping between sets of data, but by inventing novel spatial relations and senses of spatiality.

4.6 Code Space and the Code Maps of Locative Media

This research has insisted, from the start, that computer code should be thought of as a spatial phenomenon. In some respects, that argument is easy to make. In the example of the airport check-in desk that I quoted in Chapter 1 (Kitchin & Dodge, 2011: 17), it is obvious that if the software that allows check-ins to be accomplished suddenly crashes, then that space no longer functions as a check-in area, but becomes something else. However, the argument I want to make about the relationship between code and space is stronger than that made by Kitchin and Dodge (2011: viii), in which the entities of *code* and *space* exist in a dyadic relationship, and interact with and affect one another. Code, I argue, does not just produce spatial effects that are external to it; for example, by reassigning the function of a pre-existing space within an airport. Rather, space is increasingly *integral* to the functioning of code in that it is *already* creating spaces and mapping spatial relations, even before and even if these were never to spill out into what we take to be the 'real' or material space of the world: hence my conjunction of Code Space, in contrast to Kitchin and Dodge's disjunctive Code/Space. Furthermore, I argue that because code creates spaces and maps spatial relations in novel ways, and because its effects do

spill out into the world, code is re-mapping that world and introducing to it novel forms of spatiality.

To begin making this argument, I want to take as an example, though a highly significant one, the software operations that at work in *Net_Dérive.* This work uses the Max/MSP/Jitter software bundle, which is often and henceforth referred to simply as 'Max'. Max is an object-oriented programming environment in which 'objects' are created and manipulated through a graphical interface, the objects appearing as either two or three dimensional shapes, and the relations between them visually plotted. Using the MSP component, it has been widely used to compose interactive electronic music in real-time, while the Jitter component allows for the processing of pixel-video and OpenGL (Open Graphics Library) information and is used specifically to produce visualizations. While the visual interface has certainly been part of its appeal for artists - providing an accessible means of 'mixing' data, often in real-time, that is not afforded by linear programming – it is more than just an interface that makes visible and tangible otherwise arcane computer processes. The interface is intimately tied to and profoundly shapes the processes at work. Objects do not just *appear* as shapes that occupy the space of the screen, but are spatializing in their effects.

To understand the nature of this spatialization, it is necessary to further explore object-oriented computing (OOC), of which Max is an example. The development of OOC from the 1960's onwards has been seen as more than just a progression in computing efficiency, a paradigm shift in computational methods that is also more broadly epoch-defining. Sherry Turkle, for example,

271

sees the move from procedural (linear) to object-oriented computing as a defining moment in the transition from modern to post-modern conditions (Turkle, 1996, quoted in Galloway, 2004: 108). Casey Alt, an American digital artist and researcher, offers a Deleuzian reading that casts OOC as the ultimate 'abstract machine' for our age; one that disciplines and 'recodes all aspects of the noncomputational world in very real ways' and represents 'the social imposition of a very specific set of power relations and practices into code' (2011: 298). These arguments about the power of code, and parallels that might be drawn with the power of maps, will be opened up in Chapter 5. For now, the focus is on understanding how OOC creates spaces, and maps relations.

This image has been removed for copyright reasons
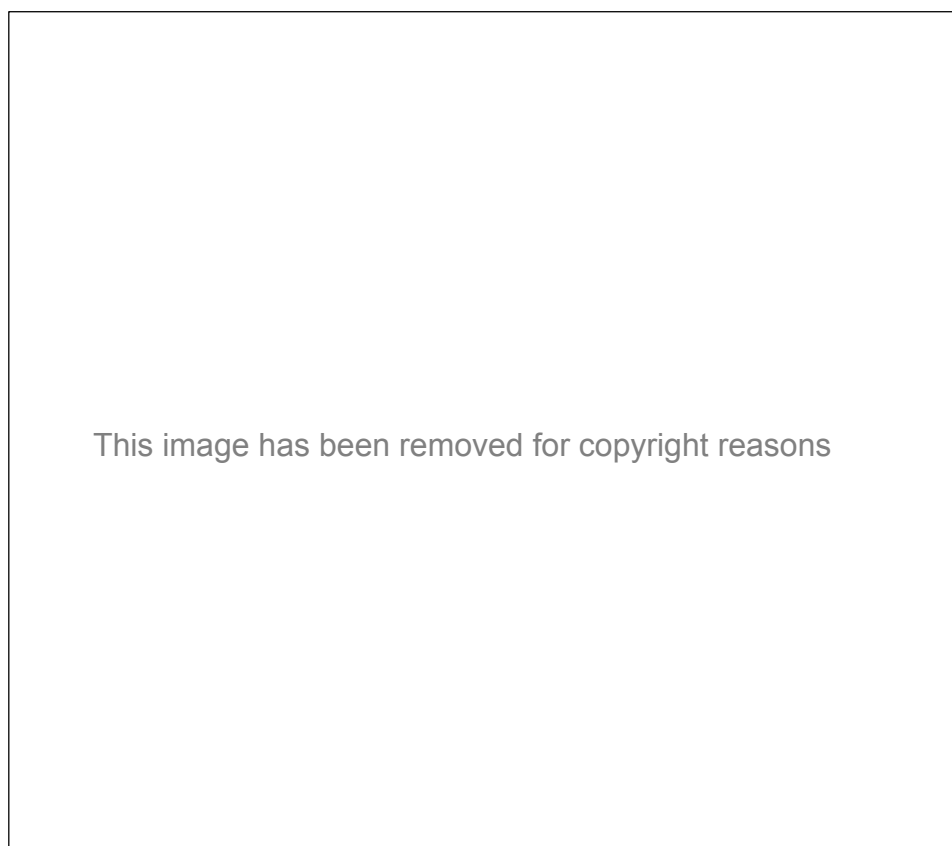
Figure 4.6: Screenshot of Max MSP interface, showing a design space in which there are five 'objects' - the boxes indicating their properties and shaded coloured areas indicating the effect of a Gaussian kernel that disperses rather than locates objects and their properties in space. (Momeni and Wessel, 2003).

Object-oriented programming, which was pioneered by Alan Kay in the late 1960s and early 70s, fragments linear computing into discrete 'objects' that encapsulate both data and 'all the processes that operate on their states' (Alt, 2011: 292). Rather than computation consisting of a hierarchy of functions within a whole, it is broken down into a number of independent elements, each of which is assigned specific behavioural relations with others. Thus, for Kay, 'objects are a kind of mapping whose values are its behaviours' (quoted in Alt, 2011: 292). In this rhizomatic structure, dynamic *relationships* between objects take precedence over any overarching *process*. The advantage of such an approach was its 'ability to simulate complex situations by creating individual programming objects that mapped onto real-world objects' such that *approximate* solutions dynamically emerge (Ibid: 284). A practical example of this is its use in the engine management systems of modern cars to model and thus coordinate the various parts of a combustion engine to produce gains in efficiency and reliability.

In its mathematical modeling of complex systems (such as the heating system in Fig. 4.6), Alt finds a close affinity with systems theory and cybernetics (Ibid: 298), as well as with 'systems artists' who saw in these emerging disciplines an opportunity to model the world in novel ways (Ibid: 281)[132]. The art maps studied in this chapter may also be seen as dipping into this systems-oriented approach (which, like OOC, grew out of the 1960s) through its shared interest in accounting for complexity through the production of novel (cartographical) models. At work in the OOC employed by these artists is a systems approach to

[132] Alt refers to artists including Merce Cunningham, John Cage, Hans Haacke, and Allan Kaprow.

the mapping or modeling of reality that places greater weight on the utility and persuasiveness of such models, rather than on precision and veracity.
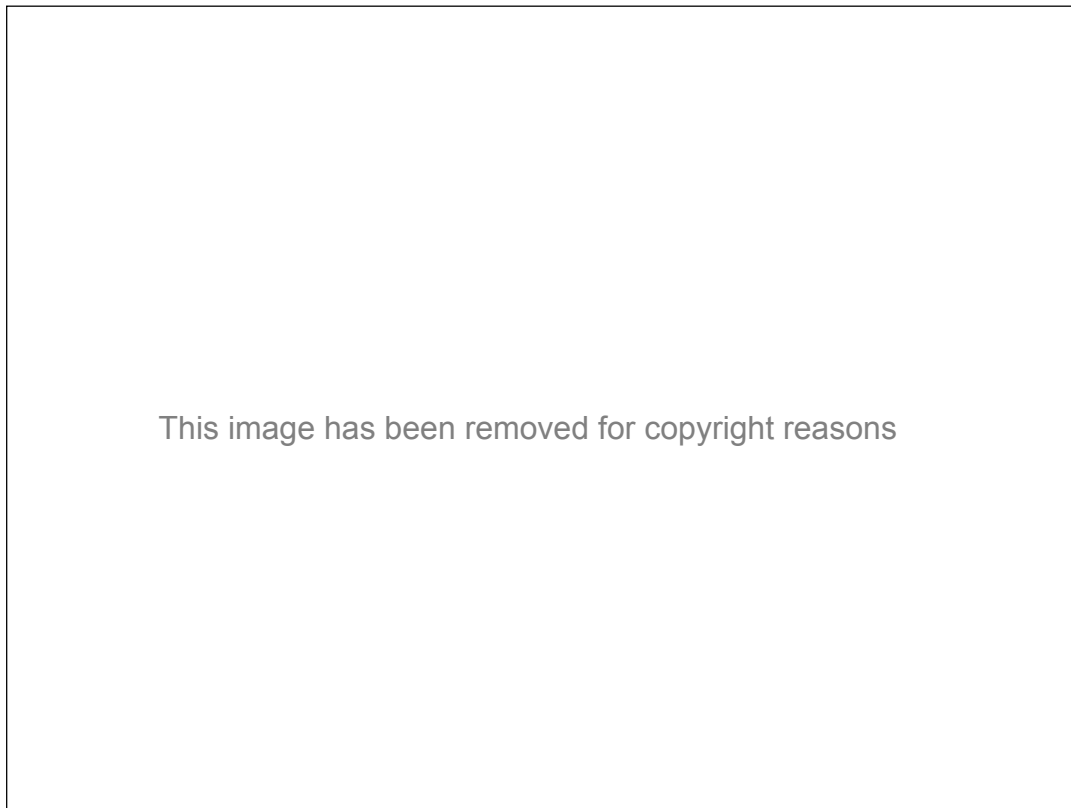
Figure 4.7: Object-oriented modeling of a heating system in which objects (encapsulating data and behaviours) are mapped in relation to each other. Note the rhizomatic ('networky') rather than arboreal (linear and hierarchical) topography (Biggs, n.d.).

In drawing parallels between mapping practices and OOC, it is important to understand that these computational processes are more than just semantic, just lines of code, but are also spatial, both in the way they create spaces that are internal to the software, and in the way this leaks out into and (re-)orders material spaces. The shift from linear (or process) computing to OOC marks the 'opening of multidimensional space within the conceptual act of progamming' (Alt, 2011: 292). Firstly, a two-dimensional space is produced in the move from the single thread of linear programming to the parallel threads of object-oriented programming. Secondly, the encapsulation of objects as both *state* and *process* 'opens up concepts of both exteriority and interiority, which necessarily imply a

conceptual opening of three-dimensional volume within the code' (Ibid: 292).

Thus Rheingold sees OOC as 'opening up a multidimensional environment' that is 'occupied by spatialized objects' (quoted in Alt, 2011: 287). So, the encapsulation of data and their behaviours as objects invests them with shape and volume, and places them in relation to each other within a (conceptual) space. That space may be conceived of in any number of ways. In Max, for example, objects are initially given shape through the plotting of points in a uniform, metric Euclidean space. However, this space is also malleable, fluid, and amenable to alternative geometries and mathematical operations; for example, through the application of Gaussian Kernels that may turn fixed points in a two-dimensional Euclidean space into dispersed fields of intensities within an undulating three-dimensional space.

Rather than simply occupying the conceptual space of OOC, its objects (and particularly relations between these objects) also shape it, just as planets do in an Einsteinian model of the universe. This foregrounding of *objects as spatializing* rather than as *objects in space* mirrors or, for some, has precipitated (Galloway, 2012; 2013), a wider shift in the conceptualization of both objects and space by what has become known as Object-Oriented Ontology (OOO). Levi Bryant (a key proponent of OOO[133]) writes that, 'space-time is not something in which entities are contained. Rather, space-time *arises* from the mass of objects or machines. Space-time doesn't pre-exist things, but rather arises from things' (2012: 3). An alternative rendering of this, but one that is specific to the objects of OOC, is offered by Alt, who considers the 'space' of

---

[133] Bryant has in fact differentiated himself from other proponents of OOO, such as Graham Harman (2002), by arguing for a *Machine* Oriented Ontology (MOO). Informed by Gilles Deleuze, this emphasizes dynamic processes over the properties of 'objects'. It is, in other words, more concerned with 'what things do' than 'what things are' (Bryant, 2012).

code specifically as a *medium* that is produced by messaging between objects. As Alt writes, the 'external "space" between different objects becomes a substrate for communication' (2011: 293), a medium through which objects summon each other, creating shifting and multiple relations of proximity, and thus creating an elastic, non-metric, topological space. In this space of communication, multiple messages trigger parallel events that effect 'a continuous qualitative transformation across the entire set of objects' (Ibid: 293).

The space of OOC is thus an 'emerging and perpetually unfolding topological whole' (Ibid: 293) in which outcomes are unpredictable. While the programmer establishes parameters for coordinating between objects, the behaviour of objects is largely self-organising. Because they contain properties that are hidden from other objects, they attain a degree of autonomy that, for Alt, bestows 'subjectivity' upon them. In his Deleuzian reading of OOC, these subject/objects produce *affect* in a manner that is similar to that produced in living beings in the gap or interval between sensory and motor systems, or between sensation/perception and action. In a process called 'late binding', objects wait until the last possible moment to respond to messages from other objects, creating a 'centre of indetermination' between receipt of the message (sensation/perception) and the provision of a method of execution (action). The process of messaging thus opens up a 'durational' sense of time, in the Bergsonian sense, that consists of both a subjective duration that is specific to each object and and a universal duration that is shared by the whole set of objects.

Messaging also relies on a shared interface and protocols that allow for interaction between objects without making visible the hidden, encapsulated, interiors of these objects, amounting to what Alt describes as a 'rule-based community structure [that] injects a kind of sociality into the space of code' (Ibid: 297). Crucially, the user (whether programmer or end-user) is also drawn into this community of objects and made to inhabit its space, or medium, and is thus also treated as an object (Ibid: 297)[134]. What this produces is a flat ontology in which subject and object are thought of as one (Ibid: 284). In this way, the workings of OOC are not to be thought of as discrete and purely virtual (in its computer science sense), but as leaking out into (or even constitutive of) both the material world and human subjectivity. For Alt, 'object orientation opens the rigid, linear logic of serial computation onto the brute messiness of the world, inviting the entire breadth of lived experiences to be incorporated into a self-fulfilling, self-reinforcing feedback loop' (Ibid: 298). Thus, the qualities of lived experience that were seen as sitting outside the cartographic map are now incorporated within the operations of code. In the process, however, lived experience is transformed as code 'reorder[s] culture according to its own specific logic and enforce[s] this logic upon anyone wishing to access it' (Ibid: 298). Alt sees this recoding of 'all aspects of the noncomputational world' as a disciplining of users that recasts 'our entire view of the universe as exclusively object oriented' (Ibid: 298).

---

[134] In support of his argument that the medium of OOC is internalized by users, Alt quotes Kay's reference to McLuhan in this regard: 'anyone wishing to receive a message embedded in a medium must first have internalized the medium so it can be "subtracted" out to leave the message behind. When he said "the medium is the message", he meant that you had to *become* the medium if you use it' (Kay, quoted in Alt, 2011: 298).

The computer protocols that underpin this view, that create the space between and around objects through which they communicate, also control this space through what Galloway terms 'the power of protocol' (2004: 167). Alt writes that 'object orientation is not so much a revolutionary computational breakthrough as it is the social imposition of a very specific set of power relations and practices into code' (2011: 298). What this suggests is that code may act as cartography did in framing views of the world that reflect powerful interests but, at the same time, make those interests invisible (Harley, 1989). It also suggests a very different understanding of 'lived experience' to that employed in, for example, the works discussed in Chapter 2, where it was seen as an antidote to the abstraction of space that could be rediscovered through a more authentic, embodied, grounded connection with place. By Alt's reading, that which cartography shuns from the map, and which those works sought to reinstate, has already been colonized by code, which wields power through an entirely different order of abstraction. This discussion of the changing nature of both power and lived experience is returned to in the next chapter. However, to summarize the discussion of OOC, it has been argued that OOC produces spaces and senses of spatiality that are, first of all, internal to its operations – and so might be described as 'virtual' - but which also leak out into and reorder the 'real' world. In this, it is proposed, there is a parallel between the mapping practices of cartography and OOC. They each produce and shape space by defining the nature of space and relations between things in space and, in either case, this mapping cannot be considered innocent or neutral, but may enact forms of discipline or control. In a work such as *Net_Dérive*, for example, OOC does not simply provide a *mechanism* by which artists construct novel

maps but actively shapes them, and the senses of time and space they invoke and evoke.

Having considered what kind of *spaces* are produced by the non-linear operations of code, the focus now turns to what kind of *mapping* they perform. Again, as with the introduction of acoustical elements, the role of OOC in works such as *Net_Dérive* and *Sensory Threads* moves them away from representational forms of mapping. OOC collapses the subject/object distinction to produce a 'community of objects' – a flat ontology that encompasses users, subjects, data, actions and relations. In this kind of object-oriented ontology, there is only reality in process, as it unfolds, not as structured by representational frameworks. The mappings that emerge from OOC, rather than representing reality from a position above and outside it, partake *in* it. OOC urges that space be considered not as a singular and uniform container of objects, but quite the reverse, as emerging dynamically and heterogeneously from the relations between objects. Thus OOC shapes space through the way in which it maps and thus creates relations between objects. 'Mapping' consists not in the plotting of things to a surface that represents an external reality, but rather the creation of relations between things through which reality is constituted. 'Things' can no longer be unequivocally located in proximity to other 'things' and according to a fixed scale. Location, proximity and scale become fluid, multiple and relational. This is not to say, however, that there is no order, but rather that there is no *one* order. Models and frameworks, rules and protocols, geometries and dimensions do not disappear but multiply and proliferate. Abstraction and calculation intensify to a degree that, as Alexander Galloway puts it, 'math itself, as algorithm, has become a historical actor' (2012,

n.p.). In place of the representational framework and visual iconography of cartography, a new set of rules operate not to fix meaning, but to allow for meanings to proliferate: protocols that, in OOC for example, allow objects to communicate, to interact, without making visible their internal workings. Objects become visible, are known, only at the level of interface (Alt, 2011: 296), whether that be the graphical interface of an OOC programme or the visualizations that are produced through OOC, and which are seen by users in works such as *Net_Dérive*. Through these interfaces, users become part of a 'community of objects', become embedded in what might be thought of as either the medium or space of code. In these works, then, it is unavoidable that the mapper becomes mapped, is embraced by the space of code. While cartographic maps have always allowed users to locate themselves within their representation of space, in these code maps the user is always already located within the map - 'the inhabitable map', as Thrift calls it (2011: 9) -, not just as represented by a GPS trace, but as positioned by the map within a complex web of relations that, rather than representing those relations, constitute them.

The mapping of relations between objects within OOC (while dependent on the input of the programmer) is not proscriptive since objects consist not just of mute data and preprogrammed actions, but also of subjectivities that produce affect and thus indeterminacy. Instead, this mapping suggests associations that may dynamically and unpredictably lead to multiple possible outcomes - to the production of difference. In other words, it speculates by asking 'what if?' *Net_Dérive*, for example, asks, 'what if geo-locational data were sounds?' Not 'what is this data?' but 'what *could* it be?' So while mapping in this code space still performs translations, these are not of the 'a = b' representational type,

280

producing equivalencies, but in the manner of 'a = b +/or c +/or d, +/or e', and so on, or Deleuze's stammering 'AND, AND, AND' (Deleuze & Parnet, 1996, 34), and thus they are producers of multiplicity and difference. It is important to understand that this speculative stance is not simply afforded to programmers by the computer's ability to crunch data-sets but is intrinsic to computational operations in which generative algorithms produce models by (speculatively) filling gaps in the data to produce new intervals within and *between* sets of data, or otherwise by (speculatively) searching for, identifying and creating new patterns of relations. In OOC especially, the processes of messaging and late binding cede power away from the programmer to invest the software with multiple subjectivities and imbue it with affective powers. The relations it creates are therefore fuzzy and indeterminate and, in the case of *Net_Dérive*, for example, subject to feedback loops that involve complex assemblages of software, users, viewers and sensing and transmitting technologies through which the 'shape' of objects and the spaces they create evolve and shift.

These mappings, then, are not concerned with absolute position, with any fixed sense of place, or with fixed meanings, but with dynamic relations between things. Furthermore, these relations are necessarily temporal. As Alt writes, 'movement and the transformation of the whole must take place within some sense of time' (2011: 294), a durational sense of time, which in OOC is opened up by the processes of messaging and late binding, and 'experienced as a continuous global change within the relations and states of an entire field of objects' (Ibid: 294). These are 'maps' in which both object and field, figure and ground, are inseparably bound together and in constant motion.

The discussion so far has suggested that the relations produced between objects in OOC can be seen as a form of mapping and that this mapping produces and works with a conception of space that is quite unlike that of modern cartography. It is *firstly* a conceptual space, but a conceptual space from which effects may spill out and be realized in the material world - for example, in the way in which *Net_Dérive* produces soundscapes that are mapped back onto the surface of the earth, using GPS, to locate sounds in space. The space that is mapped by code is also largely an invisible space, part of what Thrift terms a 'technological unconscious' that noiselessly works in the background and becomes a 'second nature' (2004a: 585). Because of this invisibility, it may seem something of a stretch to say that code produces new kinds of 'maps'. What could an invisible map possibly mean? *Net_Dérive* produces visualizations, of course, but these are outputs *from* OOC's mapping processes, rather than the processes themselves, and while the interface of OOC programmes are more closely, in fact intimately, aligned with these processes, they bear little relationship to what we would sensibly call 'a map'. The maps of cartography that we are accustomed to operate according to a logic of visibility while the logic of code is, quite counter to this, one of invisibility. In next case study, however, Petra Gemeinboeck takes the (OOC) mapping logic employed in *Net_Dérive* and seeks to *visualize* it specifically as a map. In doing so, she deliberately brings this logic into contact with that of cartographic reason to produce both a critique of cartographic representation and one possible model for mapping beyond it.

4.7 Petra Gemeinboeck's *Urban Fiction* (2007; 2011)

Petra Gemeinboeck's *Impossible Geographies 2* series, comprised of *Urban Fiction* (2007) and *Urban Fiction 2.0 (2011)*, and produced in collaboration with computer scientist Rob Saunders, rehearses many of the conventional concerns of locative media, and particularly the expression of lived experience, but moves beyond other works in the way its disintegrates the sure and stable ground of the cartographic surface to produce maps in which figure and ground, point and surface, fluidly interact. *Urban Fiction* also makes use of OOC and it is this that makes possible and shapes its map-making. However, the focus here is on what kinds of maps - visibly recognizable as 'maps' - might be produced within the software environment that was more fully attended to in the study of *Net_Dérive*.

The first iteration of *Urban Fiction*, which is the one to most decisively make a break with cartography, was produced between 2006-7, just as others were depicting locative media as something of a spent force[135]. It produces a map of Sydney that envisages the city as a fabric that may be stretched, compressed, torn and re-stitched. As with Polak's *Amsterdam Realtime*, the map is produced in real-time, in response to the movements of participants, as measured by GPS. However, while these movements are precisely tracked using GPS coordinates, they are not simply plotted within a cartographic grid, but actively warp and shape the grid itself. The fabric consists of three layers that 'allude to the multi-layered quality of the urban fabric' (Gemeinboeck and Saunders, 2011: 165), and interact with each other in complex ways:

---

[135] See, for example, Hemment (2006); Tuters and Varnelis (2006).

In the first layer, participants' encounters trigger forces that warp a grid-like fabric; in the second layer, the participants' paths deflect the weaving of new threads; and in the third, the forces of the first layer created tensions that caused the fabric to rip, while the threads of the second layer became stitches to darn the fabric. (Ibid)

This image has been removed for copyright reasons
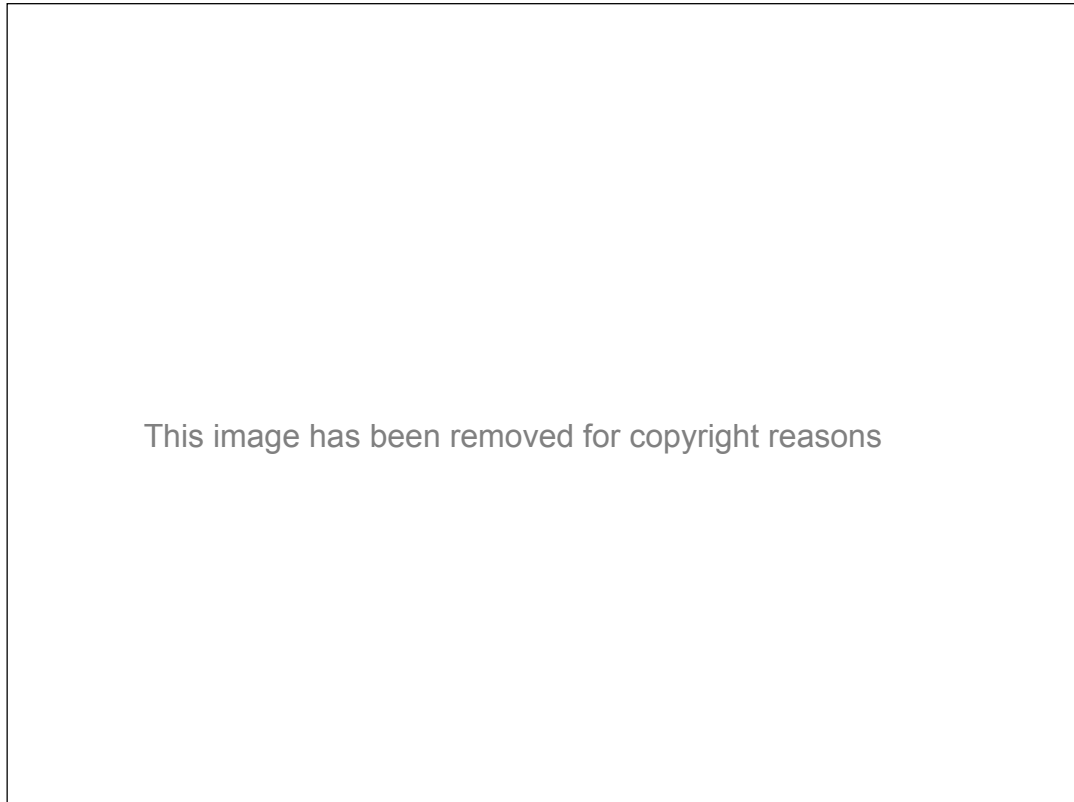
Figure 4.8: Petra Gemeinboeck (with Rob Saunders), *Urban Fiction* (2007). Still frame from video showing participants' movements and encounters (top left), and (top right, bottom left and bottom right), the first, second and third layers of the digital fabric, respectively showing the forces of 'warping', 'deflecting' and 'ripping/stitching'. Courtesy of the artists.

However, the fluidity of these three layers and their constitutive actions of

stretching, ripping and stitching are constrained by 'an underlying map derived

from demographic data' (Ibid). This data, sourced from the 2006 Australian

Census, consisted of information concerning ethnic origin and wealth:

> The demarcation lines between different degrees of cultural diversity and levels of income determined the location and intensity of static force fields that defined the local properties of the virtual fabric, e.g. stiffness or brittleness. They affected the intensity and orientation of the dynamic forces, constituted by participants' movements. (Ibid: 166)

The map is thus produced through the complex interplay between dynamic and

inertial forces, between the 'living city' and the 'fixed city' (Ibid), producing tensions and compressions that lead to rupture and repair.

This image has been removed for copyright reasons
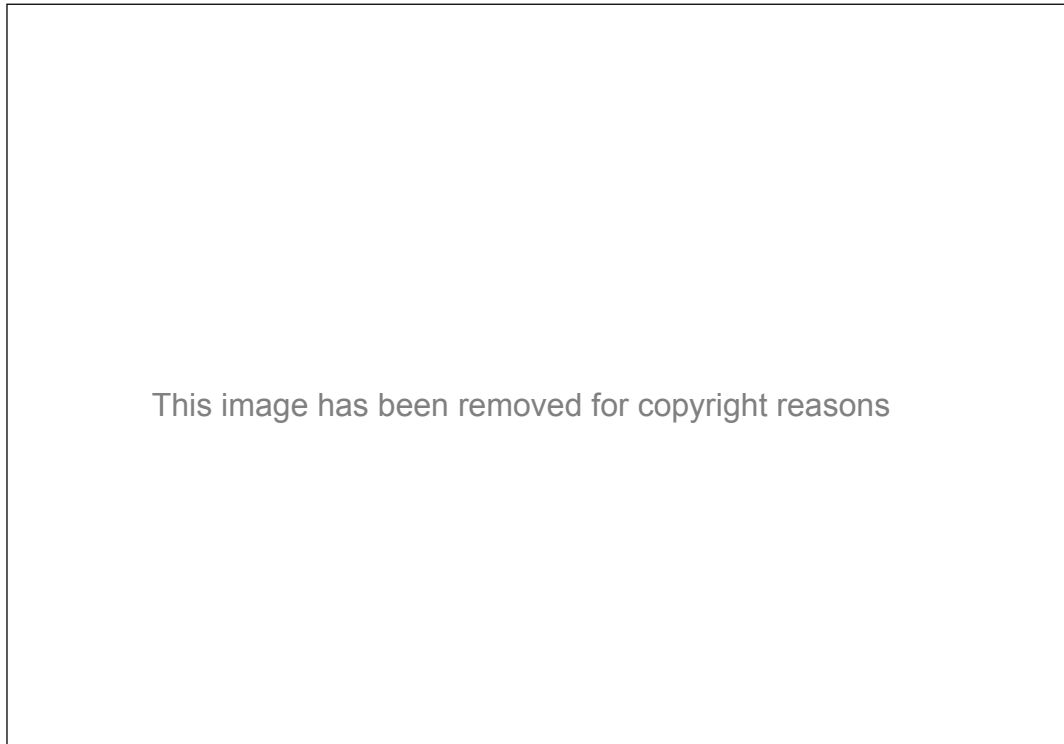
Figure 4.9: Petra Gemeinboeck (with Rob Saunders), *Urban Fiction* (2007). Photograph of the gallery installation consisting of projections onto three silicon screens (two shown). Courtesy of the artists.

Images of the digital fabric that resulted from participants' movements were relayed back to a gallery in the city where they were projected onto three silicon screens, suspended from scaffolding in the gallery space. A limitation of the work acknowledged by its producers is that while these images could clearly be seen in the gallery, only a very simplified version could be viewed by participants out on the street. The aim of the project had been (much in the manner of *Comob*, for example) to reduce the distance between the map and the mapped. However, the limits of mobile technology at the time did not allow participants to 'inhabit the alternate urban fabric *in situ*' (Ibid).

This image has been removed for copyright reasons
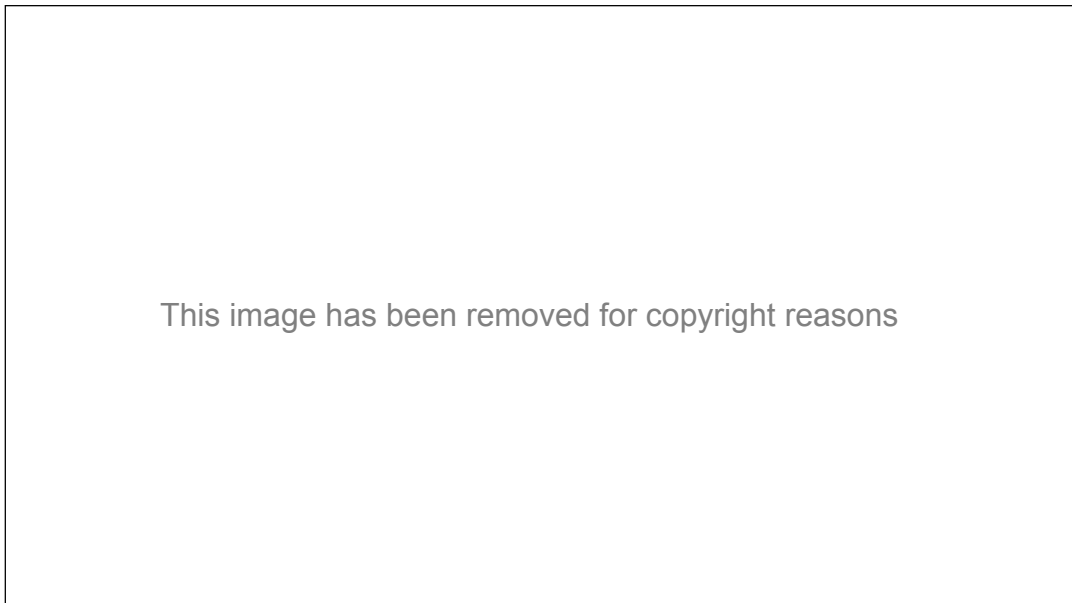
Figure 4.10: Gemeinboeck and Saunders *Urban Fiction 2.0* (2011). Screen shot
of the mobile interface showing interlaced threads that stretch, twist, loop
and weave in response to participants' movements. Courtesy of the artists.

It was in response to these technological limitations that Gemeinboeck and

Saunders produced a second iteration in 2010-2011. *Urban Fiction 2.0* (2011)

makes the production of the map visible to the users who produce it. Gone is

the gallery installation and specially adapted mobile devices. Instead, via a

freely downloadable application, the map in all its detail appears on the screens

of users' iPhone and Android devices, turning what had in the previous iteration

been the passively mapped into active mappers. The map on the screen at first

resembles a conventional grid plan, with streets and blocks marked by white

lines on black. However, these lines begin to stretch, twist, loop and interweave

to form a fine filigree of interlaced threads in response to the movements of

participants (measured both by their GPS coordinates and by motion

sensors[136]), as well as their communications via location-aware social

---

[136] The app made use of accelerometers (sensing linear acceleration in three dimensions) and
gyroscopes (sensing yaw, pitch and roll) that were becoming a standard feature of some mobile
devices. A gyroscope, for example, was first made available on Apple's iPhone in 2010.

networking services such as Twitter, Foursquare and Facebook. Users share the same fabric, can see each other's position, and are thus able to collectively refashion the fabric through their movements and encounters. Gemeinboeck and Saunders report that this 'encouraged participants to move differently, e.g. more playfully or forcibly, particularly within groups', leading to the spectacle of participants 'spinning, jumping and dancing in the streets' to produce 'twirling and rippling effect[s]' in the map's lattice of threads (Gemeinboeck and Saunders, 2011: 169).

I will go on to argue that *Urban Fictions*, particularly in its first iteration, offers something genuinely new in the canon of locative media but, before unpicking the threads of that argument, it is interesting to first note the way in which it rehearses familiar concerns. In writing about the *Impossible Geographies* series, particularly with Rob Saunders (2011), Gemeinboeck effectively reiterates many of the points thus far made in this thesis. In particular, she recognizes and clearly articulates a paradox that lies at the heart of locative media and which, for some, has been its undoing:

> On the one hand, they may allow us to challenge the epistemological myth, created by traditional cartography, by providing the medium for a corporeal, participatory and subjective investigation. Yet on the other, one could argue that locative art is marked by the tensions between a political agenda to break out of cartography's epistemological imprisonment and the impossibility of doing so by deploying a technology that [...] endorses the Cartesian way of seeing the world (Gemeinboeck and Saunders, 2011: 163).

Her work incorporates tried and tested approaches to resolving that paradox. As with Polak's *Amsterdam Realtime*, she introduce temporality in an attempt to enliven the map, and, like Southern and Speed's *Comob*, she experiments with the entanglement of 'geographic locations and social dynamics' (Ibid:160), again in a bid to make visible the evolving and socially constructed nature of

space and spatial experience. In *Urban Fictions 2.0*, electronic communications through social networks are given the same weight as face-to-face encounters, particularly in acknowledgement of the kinds of social networks and senses of proximity that comprise the space of migrants as they 'weave a net of fragile threads, invisible to native eyes, tracing their belonging to other places' (Ibid: 168-169). As with *Comob*, Gemeinboeck has also been keen to dissolve or at least lessen the distance between the mapper and the mapped. *Urban Fictions 2.0* specifically aims to make these roles one and the same, placing users in control of the maps they inhabit and thus directly addressing de Certeau's claim that the positions of the elevated voyeur and pedestrian below are incompatible. Gemeinboeck and Saunders write, in reference to de Certeau, that 'we like to believe that the performative lens of *Urban Fiction 2.0* allows participants to read the 'thicks and thins' of the migrational city they write (Ibid: 170). Even the use of fabric as a metaphor for space, or visual device for its representation, is not without precedent: for example, in Jen Hamilton and Jen Southern's *Running Stitch* (2006) and Proboscis's *Urban Tapestries* (2002-4).

This image has been removed for copyright reasons
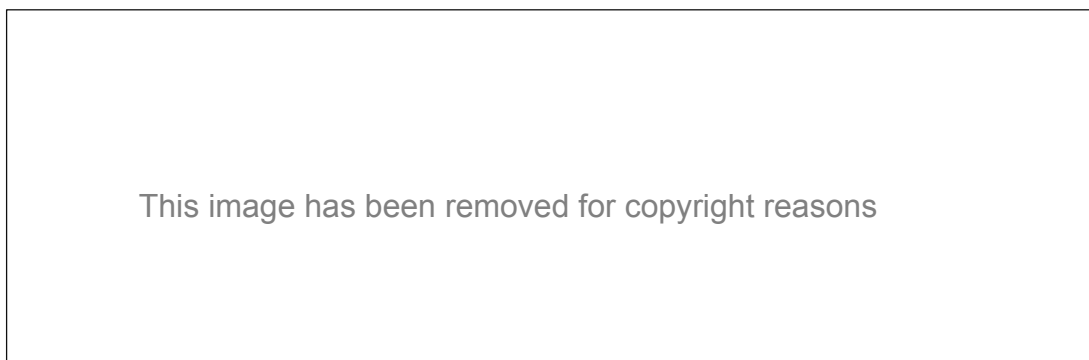
Figure 4.11: Petra Gemeinboeck (with Rob Saunders), *Urban Fiction* (2007).
Computer visualization showing prototype of the digital fabric being torn
and re-stitched. Courtesy of the artists.

As with most artists in this field, Gemeinboeck also draws inspiration from the walking and mapmaking practices of the Situationists[137]. Like Debord's *Naked City* (1957), *Urban Fiction* 'aim[s] to destabilize the geographical order and bring about a questioning of the familiar' (Ibid), while Debord's description of 'different unities of atmosphere and of dwellings' (1958: 54) is the inspiration for her use of ethnicity and income data to demarcate areas of relative solidity that are surrounded by 'potential break lines, where the digital fabric was more brittle and as such more likely to break' (Gemeinboeck and Saunders, 2011: 165).

Thus far, this is all very familiar territory for works of locative media, but Gemeinboeck begins the work (which is also central to this thesis) of placing locative media within 'a critique of maps and mapmaking practices as social constructions of the world' (Gemeinboeck and Saunders, 2011: 160). She is critical of locative media's claims to embrace a critical cartography since it remains, by virtue of its reliance on GPS, 'inextricably linked to the technologies and politics of spatialization and the history of cartographic practices' (Ibid) and 'shares its Cartesian anchorage and technological lenses' (Ibid: 161). For Gemeinboeck, this is the 'glass ceiling' (Ibid: 163) that must be broken if artists are to produce 'new knowledges' (Ibid: 164). Gemeinboeck also engages more earnestly than many artists discussed in this thesis with the tradition of critical cartography; using Harley, for example, to make the point that scientific cartography is inextricably linked to the manufacture of power (1992: 144). Although not directly referencing geographers who have made similar suggestions[138], Gemeinboeck and Saunders propose a 'performative geography based on a generative mapping approach that understands maps as

---

[137] As discussed in Chapter 1 (1.2.5).
[138] For example, Rob Kitchin, Chris Perkins and Martin Dodge (2009).

a dynamic process, rather than a fixed representation' (2011: 160). They also draw on feminist theorists who have addressed issues of cartography and location, including Donna Haraway (1991), to argue for an alternative cartography that makes visible situated, partial and multiple knowledges of space (Ibid: 164). For Gemeinboeck, however, and this is where she makes an important break with locative media thus far, the only way to achieve this is to untie the project of mapping from the Cartesian grid upon which GPS relies: 'To become a tool of intervention, the map needs to depart from a notion of location bound to a fixed reference point […] The map has to become an unstable, slippery ground itself' (in Gemeinboeck and Saunders, 2011: 164).

In *Urban Fiction*, there is a deliberate break with a Euclidean notion of space and a Cartesian mode of representation, allowing for senses of location, distance, and proximity that are unfixed and malleable. The three layers of the map that produce stretching, ripping and stitching actions in response to the movements of users, actively warp and deform the grid upon which it is based. Once these processes are set in motion, there is little likelihood that this grid will ever return to its former shape. The only resistance to these fluid forces, the only sense of a solid ground of any sort, is the 'base' layer compiled from demographic data that provides some kind of bedrock for the permutations of the three dynamic layers. However, while it is static rather than dynamic, it is not a uniform surface but consists of varying magnitudes of solidity, of gravitational pull, of what Gemeinboeck and Saunders purposefully refer to, using a Deleuzian concept, as 'intensities' - intensities that are located *in* space but at the same time are able to overcome and foreshadow any fixed sense of location.

Having broken or at least pressed hard against the 'glass ceiling' that Gemeinboeck identifies, the second iteration of *Urban Fictions* steps some way back from this. In *Urban Fiction 2.0*, even though the texture of the fabric woven by participants is fluid and open to invention, their locations remain firmly fixed within a conventional grid. Perhaps because of the work's emphasis on placing participants within the map they collectively produce, as a corrective to faults perceived in the first iteration, the leap made by *Urban Fiction* was set aside. In fact, Gemeinboeck writes of her desire to reintroduce to *Urban Fiction 2.0* actions that rip and re-stitch the map (in Gemeinboeck and Saunders, 2011: 170). *Urban Fiction 2.0* does introduce something new to the way in which proximity is treated in that electronic contact between participants (through location-aware social networking sites) is treated on a par with physical proximity, both carrying the same power to shape the filigree of threads depicted on the map. However, like *Comob*, though co-presence achieved at a distance is mapped, it does not alter the shape of the map itself.

The first iteration of the *Urban Fictions* series, however, does significantly move beyond cartography by breaking apart the surface of projection and, through its creation of dynamic layers, by investing it with depth. This reworking of the surface of projection signifies a break with cartographic reason and representation. As discussed in Chapter 1, for Olsson, cartographic reason relies on taken-for-granted processes of abstraction ('a', 'b'), translation ('a' = 'b'), and the geometric representation of these translations. That they are taken-for-granted rests on the thesis of the necessary unity of consciousness, the idea that our own consciousness entails a consciousness of other things outside us,

and it is this that allows a shared understanding of the world (I = We). In other words, and put very simplistically, 'the city I am pointing to on the map, a map which we can all read, is the city that we all know'. In *Urban Fiction*, however, 'a' no longer stands for 'b' since the geometric grid supplying the frame of reference for one thing to be treated 'as if' it were another is in a state of flux and fragmentation, shifting unevenly and over time. It would seem to signal a crisis in cartographic representation and the loss of 'the solid ground of understanding' (Olsson, 1998: 146) through which cartographic reason once allowed us to 'share and understand the world' (Ibid:150). For Olsson, when cartographic reason and the 'project of mapping is shaken at its foundation, like a Humpty Dumpty tumbling down from its elevated position' (Ibid: 152), it can never be put back together again and '[t]he *impossible* question is what to do instead' (Ibid: 149, *my italics*). The only alternative Olsson can foresee is the replacement of 'a = b' (informative but not necessarily true) with 'a=a' (true but never informative), the 'We' replaced by 'I' and the long fall into a relativistic 'abyss'. Olsson, writing of the demise of cartographic reason, produces a description that seems very apt to the map in *Urban Fiction*:

> the fix points are in fact so invisible and unstable that they are not at all; the scaling lines so twisted and the angles so skewed that the threads which once were woven into a net of longitudes and latitudes now form a hopelessly tangled skein; the screening *mappa* not a flat surface but a set of warped and rhizomatic napkins[139], culture-stained and with a scent distinctly of their own. (Olsson, 2007: 410)

Yet *Urban Fiction's* mapping is not as 'hopeless' or 'abysmal' as this suggests. Despite the break with cartographic reason and representation, its maps

---

[139] Michel Serres similarly describes topological space in terms of a handkerchief: 'If you take a handkerchief and spread it out in order to iron it, you can see in it certain fixed distances and proximities. [...] Then take the same handkerchief and crumple it, by putting it in your pocket. Two distant points suddenly are close, even superimposed. If, further, you tear it in certain places, two points that were close can become very distant' (Serres and Latour, 1995: 60).

continue to be part of a sense-making process that is collectively produced and shared (at least by the project's participants). 'a = a' is not the only truth that is offered in place of 'a = b'. Rather, meanings are relational, fluid and shift over time so that 'a' may equal 'b', or 'c', or 'd', or 'e', and so on, depending on the way in which participants collectively move, how these movements are constrained, and the way in which data concerning both movement and constraint is collected, processed and visualized. It suggests that although this is not a map framed by a Cartesian grid, neither is it a map with no frame at all. In its why and wherefore, it is a map without (cartographic) reason, but not entirely without rhyme (Shakespeare, 1590/2002: 112).

The map in *Urban Fiction*, in beginning to supply answers to Olsson's 'impossible question' and refuting his *abysmal* projections concerning the end of cartography, provides some clues that allow at least a preliminary sketch to be made of what lies beyond cartography and how to map it. In working with these clues, it is useful to turn to Thrift's prescient observations on a more general shift from a 'Euclidean model of numbered and angled space [that] produced a grid over the world' to an emerging world in which 'a new ontology is being constructed' (2011: 7). In charting this territory as it 'hove[s] into view' (2004: 591), Thrift urges that paying greater attention to the 'frames' that shape 'new apprehensions of space and time' (Ibid: 582) will allow these 'new things to be seen and handled' (Ibid: 583). Accordingly, I now want to address the question of what kind of 'frame' remains or takes over when the map is loosed from the fixed frame of reference provided by the Cartesian grid. An examination of the map in *Urban Fiction* suggests that, in place of the isotropic surface, rectilinear frame, and rational grounds of cartography, this 'new ontology' is characterized,

just as Thrift has suggested of his 'movement-space', by frames, surfaces, and grounds that are multiple and shifting.

Firstly, the framing of space in *Urban Fiction* is fluid, shifts over time, and lacks fixed co-ordinates. What at first appears to be a gridded surface made of lines of latitude and longitude turns out to be a woven fabric made of the weft and warp of threads that may be pulled, stretched, ripped and repaired. These actions continuously warp the surface of the map and thus invest it with three-dimensional depth. It is precisely this kind of space that Nigel Thrift seeks to capture with his concept of 'movement-space': a new mode of spatiality that he sees as slowly and unevenly edging out cartographic space in a second Euclidean pass that is founded on the massive calculation and 'qualculation' that accompanies a 'new information age' (2011: 6). This 'movement-space' is:

> a space in which movement is able to take on a different form, no longer understood as a simple displacement in space, [...] but arising instead from the institution of what Manning (2009: 187) calls a 'resonant grid' that can itself shift shape (Ibid: 7).

In *Urban Fiction*'s map, a displacement *in* space is also a displacement *of* that space. Both figure *and* ground are set in motion, fluidly interacting to co-produce what Gemeinboeck and Saunders call a 'living map' (2011: 160) that is never at rest, but always coming into being through its performance. Significantly, it is to the metaphor of fabric that Thrift also reaches in describing the fluid conditions of 'movement-space' as:

> a redefinition of the world of persons and objects as constituent elements of a mutually constitutive moving `frame', which is not really a frame at all but more of a fabric that is constantly being spun over and over again as position becomes mobile, sometimes producing new patterns.
> (2011: 6-7).

Secondly, the 'frame' or 'fabric' of movement-space not only shifts shape, but consists of multiple rather than singular framings that are produced by the 'array of new co-ordinate systems, different kinds of metric and new cardinal points' that emerge from a 'space-time background' of 'enhanced calculativity' (Thrift, 2004: 596). The map in *Urban Fiction* consists of multiple overlapping layers that interact with one another to create multiple experiences of space. To occupy *a* 'position' within this map is to simultaneously experience multiple framings and thus, in relation to these, to simultaneously occupy multiple positions. These are not arrayed on one (extensive) surface, as with cartography, but are experienced as the (intensive) *depth* of stratum, and this produces what Thrift describes as 'a thickening of space' (2012, 151). A sense of 'place', to whatever extent it survives in this map, is not at all grounded and sure-footed but experienced as incongruous and multiple.

Thirdly, and returning to the implications of OOC and other computational processes, the framing of space in *Urban Fiction* is fundamentally shaped by code. For Thrift, code not only produces space, but does so in distinctive ways. The 'enhanced calculativity' afforded by coded processes introduces new *qualities* - a property of 'movement-space' that he terms 'qualculation' (2004: 596). As Gemeinboeck writes, 'The formulation and implementation of the computational processes constitute *an inseparable part of the creative process* of shaping the framework in which these digital cartographies are woven' (Gemeinboeck, Tanaka and Dong, 2006: 2, *my italics*). Firstly, data is collected from disparate sources: the GPS position of participants, their motion as detected by the accelerometer, the demographic data that forms the substrate of the map. This data is then algorithmically software-sorted and modeled by

object-oriented procedures that establish relations between data-sets and visualize outputs. These processes do not determine these relations once and for all by setting fixed parameters, but employ a 'fuzzy logic', introducing an element of indeterminacy to produce parameters that evolve, and further evolve through the feedback loops that are established between the framework and incoming data: '[t]he behaviours adapt over time based on the works' history and a growing set of relations that change the interpretation of current events' (Ibid). It is also worth mentioning that atop the OOC undercurrents that drive *Urban Fiction*'s mapping is another computational process that also contributes 'fuzziness' to its visualizations. These are achieved through a 'particle system', a computer graphics technique that is designed to visualize highly chaotic systems. 'Particles' or graphic objects pulse from an 'emitter' which is located in the graphic space and determines factors such as the direction and velocity of the particle. To this, other parameters can be programmed, such as the lifespan and rate of emission of the particle. Once set in motion, however, an element of chance (of chaos) is introduced as the particles move and distribute themselves to create patterns and outcomes that are unpredictable and unintended.

In the framing of *Urban Fiction*'s map, then, *intentions* remain unclear. The relationship between and respective roles of artist-programmers and computational processes is highly ambiguous, involving as it does both the programmer's intentions and unintended, fuzzy, consequences. For Gemeinboeck, '[t]he generative algorithms, fuzzy logic inferencing, image recognition techniques, and the integration of these algorithms become the material with which the artists sculpt the digital (urban) fabric and its dynamic

behaviors' (in Gemeinboeck, Tanaka and Dong, 2006: 2). With its 'dynamic behaviours' and 'fuzzy logic', clearly this computational 'material' is capable of offering resistance to the sculptor's hands. It is a map that, unlike the pinax about which Farinelli (1998) writes, refuses to solidify. However, while it is a medium that may be continuously shaped and molded, it is also, as Casey Alt (2011) argues, one that disciplines its users and whose most important messages are contained in the medium itself.

Fourthly, the framing of *Urban Fiction*'s map is not about representing anything and makes a different kind of truth claim. The map is, as has been previously noted, 'non-representational' in that the frame that would treat 'a' as if it were 'b' has been discarded in favour of multiple possible framings, none of which make any claim to 'the truth'. Gemeinboeck is at pains to make clear, not least in its title, that the map is a 'fiction': 'our experiments don't create maps any less blind. They differ with regard to their performativity: rather than marking and creating boundaries they render them elastic and permeable' (in Gemeinboeck and Saunders, 2011: 165). The map is no longer a representation of reality but, rather, 'a tool of intervention' (Ibid: 164) that is immanent to the real or, to borrow an apposite phrase from Deleuze and Guattari, 'an experimentation in contact with the real' (1987: 21). In this sense, the map becomes performative in its own right:

> [w]hat distinguishes our generative practice from other mapmaking practices is that we locate this performative potential and its agency to intervene and produce imaginary spaces not only in the collective performance of the mapmakers but also in the map itself. The map becomes a heterogeneous process, continually reshaping that out of which it itself is emergent. (Gemeinboeck and Saunders, 2011: 171).

Thrift describes it as 'a very different way of thinking about representation' in which 'static representation becomes subordinated to flow' (2011: 590) and the

role of art is seen not as a mirror to reality but as a part of it, one specifically tasked with generating 'unfathomable experiences' (2012: 152). Not *unreal*, then, but 'fictional realities', 'impossible geographies', out of which new possibilities may emerge. For Gemeinboeck and Saunders, the map in *Urban Fictions* is 'a "map" for deterritorialising the map, where the act of mapping is productive and has agency, interrupts the norm, unanchors the fixed, and innovates' (2011: 171). The interweaving of data through complex and unpredictable processes into a moving frame, an elastic map, can create 'impossible relations' that would never have found expression in the maps of cartographic reason (Ibid: 170). In his discussion of the framing of movement-spaces by code, Thrift also identifies the possibilities that emerge from the indeterminacy of code: 'code is law of a kind. But it is not so much law considered as a set of rules as law considered as a set of possible stories framing encounters' (in Thrift and French, 2002: 326). Movement-spaces are therefore spaces of invention in which '[s]oftware's very indeterminacy and lack of closure provide a means of creating new kinds of order' (Thrift and French, 2002: 328). This reframing of the world through the operations of code and enhanced calculativity may provide the 'opportunity for people to re-define/re-cognize their environments, […] by producing new gaps, fractures, breaks, and slippages, and thereby inventing new, more mobile definitions of historical memory, mindfulness, and political engagement that provide at least the opportunity to connect differently' (Thrift, 2011: 23). This is certainly the stated aim of *Urban Fiction*; its intention being to open up the map to allow for 'impossible relations to be read between the (grid)lines' (Gemeinboeck and Saunders, 2011: 170).

The next and final case study of this chapter also produces, through fuzzy computational processes, maps that eschew working with gridded spaces in order to chart more transient, fluid, dispersed phenomena – in this case, the shifting territories of migrants. It provides another model of post-cartographic, post-representational mapping that again stresses the dynamic, layered and relational nature of code spaces and the speculative or propositional role that mapping may play in producing such spaces.

4.8 OPENKhana's Mapping of Diasporic Territories

Many of the case studies of this chapter address the experience of being set adrift and a number do so specifically in reference to the movements and experiences of migration. This interest in migration is not accidental. In part, it is because migration challenges cartographic notions of territory, as well as universal scales of distance and proximity. The experiences of migrants suggest multiple, co-existing senses of place that, rather than being fixed, are carried around with the migrant. However, the nomadic nature of migrant experience also acts as a metaphor for more widely experienced conditions occasioned by processes of globalization and the growth of new information technologies, particularly mobile media, in which communication across space multiplies and thus complicates the experience of presence and measures of proximity. Thus McLuhan foresaw a return to a nomadic mode of existence (1962: 8) and William Mitchell writes about mobile media's production of city-dwelling 'wireless nomads' (2003: 60). The experience of migration also fits well with a theoretical zeitgeist that places emphasis on movement and fluidity; for example, in the way that Deleuze and Guattari (1987) recommend the nomad

as a metaphor for a 'deterritorilized' mode of thinking, or Rosa Braidotti's (1994) introduction of the 'nomadic subject' to feminist debates.

Of course, there is nothing new about migration. What may be new is the way in which migration is being conceptualized. This might be very simplistically summed up as a move away from an idea of migration as *people moving around the world* to one of *worlds moving around people*, from *welt* to *umwelten,* or what Thrift describes in terms of a 'moving "frame"' (2011:6). Thus the mapping of migrant territories may pose a challenge to cartographic conventions and call for new forms of mapping. Certainly, this is the starting point for OPENKhana's[140] mapping of Turkish and Kurdish migrants living in North-East London.

The project, by Nishat Awan and Phil Langley, both architects though Langley is also a specialist in computational design, aims to produce 'an alternative planning tool' (Awan and Langley, 2013: 14) that, rather than presenting urban regeneration plans as a *fait accompli*, first interrogates the way in which an urban space is encountered and used. In this there are echoes, acknowledged by Awan and Langley (2014), of the Situationist project of 'unitary urbanism'. In particular, their focus is on Turkish and Kurdish migrants living around Stoke Newington High Street and Kingsland Road in the London Borough of Hackney and is based on the observation that, although they may occupy the same street, they do so in quite disparate ways; for example, by using different coffee shops, community centres and shops. Their personal 'micro-territories' are also

---

[140] OPENKhana is a Sheffield-based collective comprised of architects and artists with a shared interest in topological understandings of the city and a focus on the possibilities presented by new computational techniques (www.openkhana.net).

shaped by different senses of 'home' and belonging, of territories elsewhere, and thus become, collectively, 'affiliative or political territories' (Awan and Langley, 2013: 3). These diasporic territories are variously imagined as 'scapes' (following Arjun Appadurai [1996]), 'spheres' (following Peter Sloterdijk [1998, 1999, 2004]), and as *umwelt* (following Jakob von Uexküll [1926]), all of which characterize space as consisting of multiple, layered and overlapping personal and political subjectivities and trajectories. These territories are conceived not as bounded entities with distinct borders but (following Eyal Weizman [2005]) as '[t]he fragmented islands of territory of an archipelago' with 'fluid and temporal boundaries' (Awan and Langley, 2013: 13). In this, again, there are affinities with a number of Situationist maps that picture Paris as an archipelago of urban islands within a 'psychogeographical sea' (Saddler, 1999: 88).

The key question for Awan and Langley became how to *map* these multiple, shifting, and therefore also temporal, territories:

> A practice of collective mapping of migrant space that emphasizes the relations between different people's territories, and the way in which they affect each other, required a shift in thinking: from the Euclidean space of normative architectural practice to a different kind of space, one that is heterogeneous, multiple, and communicative. (2013: 5)

From the start, Awan and Langley deliberately eschewed the use of GPS tracking on the grounds that it 'brings back the detached perspective of the traditional cartographer' (2013: 9)[141]. They instead initiated a practice of 'walking with' their participants, a technique that also involved informal interviews about places encountered during the course of a walk. Questions

---

[141] The use of GPS was also 'completely useless' for working at the detailed scale required by the project since GPS 'drift' would make it impossible to accurately distinguish between, for example, stopping to look in a shop window and actually entering the shop (Awan and Langley, 2014).

about which shops or cafés they used and at what times of the day were supplemented by questions concerning their feelings towards and the stories associated with these places (reminiscent of the Situationists' invocation of 'ambiances'). These 'performative' walks thus generated information about the participants' spatial and temporal trajectories (the 'where' and 'when') along with subjective descriptions and responses (the 'what' and 'how') and so 'any representation of them needed to convey their spatial, durational, and experiential logic' (Ibid: 3).

In processing and presenting such disparate inputs, Awan and Langley turned to computational methods offered by artificial neural networks (ANNs) and executed through a form of object-oriented programming[142]. ANNs are mathematical models of information flow inspired by biological neural networks in which synapses and neurons are replaced by nodes and connections. The specific type of ANN used by Awan and Langley is derived from what is known as 'the self-organizing map' (SOM), a description that does not usually imply a strong connection with cartographic practices but turns out to be quite apt. This form of ANN was particularly well suited to the task set by Awan and Langley as it provided a means of producing low-dimensional (2D) visualizations from the high-dimensional data they wanted to work with. However, as a previous discussion of object-oriented programming has suggested, these computational processes consist of much more than the neutral processing or visualization of raw data. As Langley puts it, code 'never really puts you in the driving seat totally, you're not completely in control' (in Awan & Langley, 2014). In writing the code for the project, Langley did not prescribe what connections it could

---

[142] Awan and Langley used Programming, a simple visual programming language derived from Java.

make, but only 'defined the *way* in which it could make those connections' (2014, my italics), thus allowing code some agency in the making of connections and the shaping of spaces. The map spaces created by SOMs are made of rectangular or octagonal grids consisting of nodes and connections that retain something of the proximity or likeness between original input datasets. This is achieved through what is known as a 'neighbourhood function' that groups like-dimensioned and similarly-weighted data objects. They thus preserve the topological structure of the input space.

This image has been removed for copyright reasons
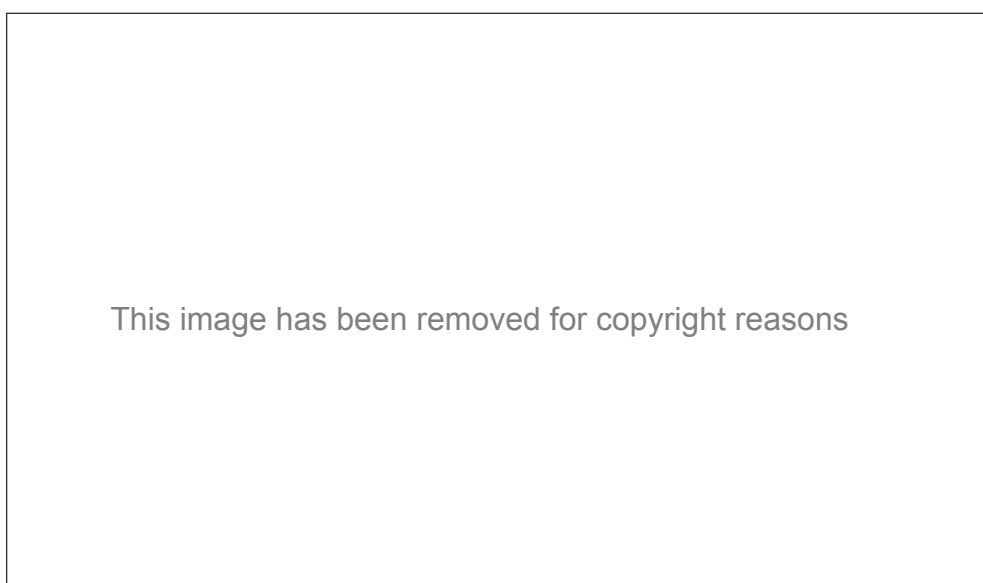
Figure 4.12: Diagram showing example of three 2D growing ANNs with different adaptive topological structures responding to the same input data (Awan & Langley, 2013: 9).

However, these processes cannot be considered as representational in any simple sense, but involve mutation and transformation. Firstly, in common with most ANNs, SOMs involve twin processes of 'training' and 'mapping'. While the map, once built, can automatically classify new data inputs ('mapping'), it must first be 'trained' to do so. This form of machine learning makes use of an 'unsupervised learning algorithm'; that is to say that it creates its own classifications by sifting through the data in search of patterns rather than

simply processing pre-labelled data. It is in this sense that the maps are *self-organizing*. Secondly, ANNs are typically used to produce models of complex patterns and relationships from datasets that are incomplete. ANNs fill-in gaps in the data - or, 'interpolate' - to produce maps that are complete but imprecise. This generative 'fuzziness' is embraced by Awan and Langley as a positive quality (2013: 7) and made fuzzier still through their use of 'growing ANNs'. These, in contrast to standard ANNs, can alter the size (number of nodes) and topology (structure of connections) in response to new inputs.

As with Gemeinboeck's treatment of the representational framework of the cartographic map, the rigid grid of these maps becomes fluid and mutable. Movement within the frame becomes movement of the frame, privileging topological over metric space, or as Awan and Langley put it: 'what is mapped are topological relationships rather than topographic descriptions' (2013: 7). Although they describe this as a 'deformation of space', it would perhaps be better to describe it as a *re-formation* of space: an experiment in what space becomes after cartography. Just how anti-cartographical this mapping is becomes clearer by considering the break with cartographic reason that results from using ANNs to highlight dynamic relations over absolute positions:

> [...] based in the observation that just as in real life the relations between people, objects, and spaces are altered as soon as something extra is added or someone else arrives, so the same is also true for a neural network, which is in essence a map of relations. It is solely a representation of the original inputs—there is no field on which inputs are distributed and therefore there can be no categories, *only* relations. The advantage for us in using ANNs lies not in their ability to provide classifications of data but to provide approximations of it. (Ibid)

This, then, is a map without a surface since '*there is no field* on which inputs are distributed'. Cartographic reason and representation, as Olsson insists, relies on being able to classify things or data as 'instances' and then translate

between categories within a Kantian schema. It is this that allows things to be placed alongside and in relation to each other within the common ground of the surface of projection; or, as Farinelli puts it, 'beings only bear their names and are represented through their visible surfaces' and 'placed one beside the other' (1998: 141). However, Awan and Langley's mapping no longer requires this tabular ordering. As Langley puts it:

> Those maps [...] are about classification, making containers for putting people or places into, [...] and neural networks [...] is a way to not worry about classification at all any more, to have a kind of dynamic relationality that doesn't really care [...] it's quite liberating to not have to worry about classification! (in Awan and Langley, 2014)

In Awan and Langley's map, in which there is a 'removal of Euclidean metrics', there is no common ground and so 'instances are no longer defined through orders of magnitude (1, 2, 3, . . .)', but by *relations* of 'convergence, continuity, connectedness' (2013: 5). These relations are not *represented* since ANN's operate only as 'a map of themselves' (Awan and Langley, 2014) rather than in relation to an external reality. Instead, these relations take shape as *propositions* that produce their own realities:

> The map no longer simply indicates which shop someone went to and when, instead it starts to show a field of influence, how certain events or the presence and absence of certain people and places changes the mapped territory. In this sense, the mappings move into a topological space of possibilities and the mapping tool becomes propositional. (Awan and Langley, 2013: 5)

The 'propositional' nature of this mapping is akin to what Gemeinboeck and Saunders describe in terms of 'performative mapping' and is likewise rooted in the generative capacity and fuzziness of the mapping software employed and which gives rise to models that, rather than represent reality, propose ways of engaging with and shaping it. Awan and Langley's project, in particular, although it might also be said of works like *Drift* and *Urban Fiction,* is suggestive of the 'cultural probe' that Thrift sees as the basis for a new form of social

305

science: one that does not claim to represent, does not seek an overview, but which experimentally intervenes *in* the world, its 'mission to provoke awareness in untoward ways in order to produce new means of association' (Thrift, 2011: 5). Through its experimentalist stance, the project promises to produce, in Thrift's words, 'uncertain outcomes' (Ibid: 18), rather than the *certain outcomes* of the urban regeneration plans that Awan and Langley were seeking to contest. Awan admits that this shift from representation to propositional intervention only fully dawned on her after days spent puzzling over cross-sections from the three-dimensional mapping produced by the ANN, and it came with the realization that this production of propositions was also thoroughly architectural in nature:

> I was having all these slices of this map and trying to somehow understand the space or seek some "truth" in it, and it was then that I thought, "of course, that's not what they are there for, they are there to talk about the possibilities of that space" [...] For architects, everything is about being propositional [...], about what the possibilities of that space are. (Awan and Langley, 2014)

The answer that Awan and Langley's mapping supplies to Olsson's 'impossible question' about 'what to do instead' of cartography (1998:149) can also be understood as a specifically architectural response. Although their maps are non-representational, do not assume a shared ground, and make lively play with classifications and translations, there is nothing in their maps that suggests a headlong fall into the void. On the contrary, their maps are intended to be readable, meaningful and informative: a tool for architects that allows them to explore the possibilities of spaces and propose alternatives. With this in mind, Awan and Langley worked to produce an interface that would be accessible to fellow architects: 'whatever that interface is, it has to be about a kind of architectural language because it is a tool for architects in the end [...] its actually for the people who interpret it as a way of thinking about space' (2014).

As has been claimed of previous case studies in this chapter, the map as it is visualized (what we see of it) is only one possible outcome of the computational mapping that remains largely invisible (even to the programmer). The process of visualization can be considered as a second-order process atop those of the mapping below and requires numerous practical and aesthetic decisions about how best to present the material.

This image has been removed for copyright reasons

Figure 4.13: Nishat Awan and Phil Langley, 'Mapping Diasporic Territories' (2009-). Computer visualization of the output from ANN mapping, corresponding to the view from one end of the street. Courtesy of Awan and Langley.

The mapping produced by the ANN in Awan and Langley's project produced a three-dimensional web of lines, roughly in the shape of a very elongated sphere (see Fig. 4.13). The length of this shape corresponded to the length of the street but, in every other respect, would be difficult for architects to read - a 'meshwork' that is 'archi-textural' rather than architectural, as Lefebvre might have described it (1991: 117-18). Awan and Langley therefore deliberately designed an interface that drew on conventional architectural forms of representation, including street plans and elevations.

The maps were designed to be presented as part of a web interface since the aim was to make their methods widely accessible to others[143]. In these maps, geographic position cedes primacy to other factors, but retains some hold. For example, in one map view, a 'plan drawing of a walk' (see Fig. 4.14), the street is represented both pictorially as a bird's eye view and a street elevation made from a montage of photographs, both of which are executed with more or less geographical precision. On top of this, in green, are the traces of 'personal territories' that represent 'intensities of relationships' (Awan and Langley, 2013: 12).

This image has been removed for copyright reasons

Figure 4.14: Nishat Awan and Phil Langley, 'Mapping Diasporic Territories' (2009-).
Plan drawing of a walk mapped using an ANN. Courtesy of Awan and Langley.

However, for the purposes of the main web interface (see Fig. 4.15), the maps are further abstracted. The photographic collages depicting elevations of street frontages remain (top and bottom) but 'act as a navigational device allowing the user to explore the territorial maps in 'sections'' (Ibid: 5). These sections are slices taken from the three-dimensional web of lines produced by the ANN and

---

[143] The software has not yet been released and there is currently no website for the project. The maps contained in their paper (2013) are currently the only ones publicly available.

appear in the centre of the screen, surrounded by a 'clock' with a twenty-four hour dial. The sections appear as shapes that are shaded green and represent the participants' 'personal territories' or 'spatial envelopes' (Ibid: 14). These shapes mutate as they map changing 'relations, overlaps and intensities' (Ibid: 14). Navigation is achieved *through space*, by 'clicking' on the street elevation, and *through time*, by 'clicking' on the dial of the clock. In addition, quotations taken from transcripts of the walking interviews appear on either side of the central clock device.

This image has been removed for copyright reasons

Figure 4.15: Nishat Awan and Phil Langley, 'Mapping Diasporic Territories' (2009-). Screenshot of web interface showing one participants walk, annotated with the conversations and observations of the initial walk. Courtesy of Awan and Langley.

There is also a facility that allows for the overlapping of individual territorial maps, highlighting the way in which the same space may be variously encountered by different individuals and groups. The authors report, for example, that using certain cafés had particular political connotations that could either attract or repel participants, and that familial connections were also played out on the street, while a mosque figured more predominantly in the movements of male participants, for example. In this way, the maps picture space as layered, overlapping, relational and evolving: '[t]hey go beyond simple descriptions of physical space to describe the complex processes that produce migrant spatiality, including layers of the political, religious, cultural, gendered, and the economic' (Ibid: 9).
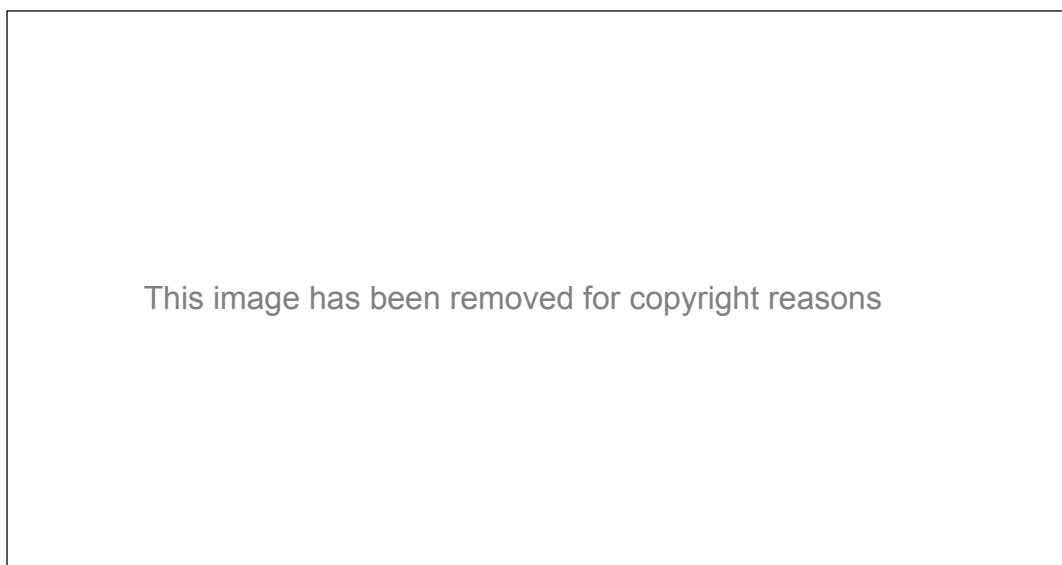
Figure 4.16: Nishat Awan and Phil Langley, 'Mapping Diasporic Territories' (2009-). Screenshots from the web interface which was designed to explore each walk in section, but with the ability to overlay different walks for comparison. Courtesy of Awan and Langley.

Though the complex mappings produced by the ANN are, in the user interface, reduced to a two-dimensional screen, this does not, as with cartography, produce a flattened space but rather a thickening of space that is characterized by multiple and dynamic frames, surfaces and ontologies - *umwelten* rather

than *welt.* Intrinsic to this are computational methods that do not simply process data but contribute to a proliferation of frames and propositions. For Awan and Langley, these computational processes allow them to move 'beyond the conventions of [...] Euclidean space' and 'away from the standards and conventions of representation' to produce maps of 'relations, overlaps, and intensities', rather than what they call 'instances' (Ibid: 14), but which might otherwise be conceived (cartographically) as 'positions'.

Awan and Langley's radical reworking of what is meant by 'position' has far reaching consequences for what it means to orient oneself and find one's way about, and these are explored in the next chapter. What it argues is that navigation is no longer about *pointing to* a map but about *inhabiting* the map. Rather than positions being arrayed upon a surface that stands in for reality, realities are brought into being and arrayed around a user who is always already situated within that map and at its centre. What it marks is a return to some form of 'wayfaring', in which the *dead certainties* of cartography give way to a speculative practice of *dead-reckoning*.

4.9 Conclusion

The case studies of previous chapters have been used to explore the grip that cartography holds on ways of seeing and thinking, and a developing crisis in these. By contrast, the case studies of this chapter point towards what might lie beyond Cartography, and how it might yet be mapped. This chapter concludes with a brief characterization of the maps it includes and sets out a number of key issues that they raise. These points are not further developed here as they

form the basis for an extended discussion in the next chapter.

In contrast to what I described, in Chapter 1, as the 'cartographic map', the maps of this chapter may be described as 'code maps', and their chief characteristics may be summarized in the following way:

Firstly, they engage with invisible as much as visible phenomena and themselves operate largely below the surface of visibility. Indeed, a number of the case studies demonstrate how the exploration of acoustic space has provided a means of escape from the purely 'scopic regime' of cartography (Jay, 1988), and allowed artists to consider less fixed and bounded conceptions of space.

Secondly, these works all to some degree interrogate the cartographic surface of projection in which everything has its place and positions can be knowledgably asserted. They endow this Euclidean plane with depth by employing a number of different strategies: either layering the map to produce multiple surfaces and thus multiple senses of position and proximity; and/or by pulling the cartographic surface out of shape and thereby disrupting its gridded metric space; and/or by proposing that surfaces only come into being and take shape around map users and their movements.

Thirdly, these works are less interested in *representing* an external reality - including the realities of *lived experience* that were a preoccupation of the works in Chapters 2, and the novel experiences of position and proximity with which the works of Chapter 3 engaged. Instead, their focus is more on how

maps might be used to *invent* novel realities. In works such as *Urban Fiction* and OPENKhana's mapping of diasporic territories, the representational 'as-if' of cartographic reason is replaced by a speculative 'what-if?' that allows for the exploration of 'impossible relations' (Gemeinboeck & Saunders, 2011: 170) and places their maps in an entirely different relationship with the real.

Fourthly, the case studies of this chapter demonstrate that the operations of code are more than just tools for realizing these works, but actively inform and shape them. Code's capacity to map novel alignments, to handle higher dimensions, and to adaptively generate propositions, contributes to the production of novel and multiple senses of position and proximity, and the production of spaces that are complex, layered, and fluid.

Fifthly, though these maps bring the cartographic project into jeopardy by challenging the stable representational surface upon which its claim to knowledge is built, they do not, as Olsson feared, plunge users into a relativistic abyss, but continue to provide some sense of orientation, and even the possibility of shared knowledge. In these code maps, the modern binaries of lived and abstract, subject and object, reality and representation, are brought into fresh alignment and demand to be rethought. However, they also propose alternative means by which the world and our position in it may be understood.

In a scenario in which maps are no longer concerned with representation, and no longer claim knowledge in the way that the cartographic map once did, there is a need to understand just how they operate, in what way they can still be considered as 'maps', and what happens to 'the power of maps'. The next

chapter more fully explores just what it is that takes the place of Cartography in these maps, and what this can tell us about the emerging conditions of Code Space.

Chapter 5

Mapping Beyond Cartography

5.1 Introduction

The purpose of this chapter is to further discuss how the analysis of case studies supports the argument that the maps of locative media bear witness to, and partake in, an on-going reconceptualization of space that is broadly epoch-defining. Cartography has been depicted as the foundation for distinctively modern ways of seeing and thinking, and for modern forms of territory and governance. Few would question that this modern world is passing, may even be receding into the distance, but it has been far harder to understand what comes in its wake. The thesis argues that locative media's sustained experiment with cartography, and its ambivalence towards it, make it a productive site in which to explore not just the demise of cartography, that cornerstone of modernity, but also what lies beyond it. The analysis of the case studies in the previous chapter suggested that the operations of computer code play a central role in the 'break' with cartography and the production of 'new apprehensions of space and time' (Thrift, 2004: 582). Accordingly, the space of Cartography is counterposed to the space of Code. This chapter more fully, if somewhat speculatively, explores the nature of this Code Space, and what is entailed in the shift away from Cartographic Space.

The chapter is organized into four parts. It begins by clarifying the way in which the case studies have been ordered in relation to the categories of Cartographic Space and Code Space and, given the rather sweeping claim that is made on the basis of this, inserts some caveats and notes of caution.

As well as sketching out the nature of 'code space', the chapter is also more specifically concerned with exploring what becomes of the map after the break with cartography. Along with the reconceptualization of space that these maps participate in, there needs to be a re-evaluation of what 'mapping' is and how maps might continue to provide a means of orientation in radically altered conditions. It is suggested that this is marked by a return to something akin to Ingold's 'wayfaring' (2007), but one in which 'the lived' emerges from, rather than in opposition to, processes of abstraction.

This reworking of the lived/abstract dichotomy is pursued by recasting many of the arguments of the thesis in terms of geometry, and by contrasting the analytic geometry of cartography with the 'living geometry' of code. This rephrasing of arguments in terms of geometry also provides novel ways of bringing theory and practice into closer alignment and allows further parallels to be drawn between the abstract paintings of avant-garde artists and some of the maps produced by artists working with locative media.

The chapter finally returns to the issue of *power* that is central to the discussion of both maps and the works of locative media. It is argued that 'the power of maps' has its counterpart in 'the power of code' which acts as a mechanism of control by mapping newly mobile territories in which the lived performance of space, and its promise of creative, political and personal freedom, is harnessed to the needs of a *security-entertainment complex.* The issue then becomes whether those artists who use code to map 'new means of association' (Thrift, 2011: 5) are not also, albeit unwittingly, furnishing prototypes for a society of

control. The section concludes with some thoughts on possible strategies and forms of counter-mapping that might escape this entanglement with power.

5.2 From Cartography to Code

In order to better chart the shift from cartography to code, this section begins by proffering a map of sorts. It is a table listing the contrasting attributes of Cartographic and Code Space and by which the maps of locative media might be oriented, along with the ideas and debates that have accompanied these. In the way that it produces categories and maps relations between them onto a two-dimensional plane, ordered by rows of 'longitude' and columns of 'latitude', it is, perversely, a highly cartographical construction. For Farinelli, at least, the 'table' and 'map' are one and the same thing in that they claim knowledge through a reduction of things to a flat and smooth surface (1998: 142). As such, the table must be treated with a degree of scepticism and much of this chapter is dedicated to qualifying its use. However, this resort to cartography should come as no surprise. To whatever degree the case studies break away from cartography, they always also remain somewhat indebted to it. The table perfectly illustrates the difficulty involved in mapping *beyond cartography* and the exploration of territories for which, as Thrift observes, vocabularies have yet to be invented (2011, 23). It also testifies to the persistence of a cartographical desire to find a vantage point from which to view the world, particularly when that world appears so dense, viscous and obscure.

317

Cartographic Space	Code Space
Representation	
Representational	Non-representational
Symbolic	The Real
Visual space	Acoustic/Hertzian/Informational spaces
Cartographic Map	Post-cartographic Mapping
Knowledge	
Epistemology (A Single Ontology)	Ontogenesis (Multiple Ontologies)
Cartesian subject/object	Object-oriented/flat ontology
Maps as Scientific Knowledge	Maps as Speculative, Propositional, and Performative - 'cultural probes' (Thrift)
Navigation	Wayfaring (Ingold)
Geometry	
Analytic Geometry	Synthetic Geometry
Euclidean Space -'first Euclidean pass' (Thrift)	Non-Euclidean & 'Living Geometries' (Rajchman) -'second Euclidean pass' (Thrift)
Metric Space -positions -surface	Topological Space -relations -depth
Singular and fixed frame, scale and point of view	Multiple and fluid framings, scales and points of view
Fixed Territory	Moving Territories
Power	
Discipline (Foucault)	Control (Deleuze) Environmentality (Foucault)
Extensive/ Hegemonic (Lash)	Intensive/ Post-hegemonic (Lash)
Epistemological	Ontological (Lash, Thrift)
Abstract	Lived

Figure 5.1: Table showing the contrasting attributes of Cartographic Space and Code Space

The table above (Fig. 5.1) is offered, then, with some sense of humility and not without irony. It should be treated as a sketch-map that speculates on the journey ahead, pointing out some of the landmarks but knowing that it is headed into largely uncharted territory and towards a destination that can yet only be hazily perceived.

The nature of Cartographic Space was extensively described in Chapter 1 and explored throughout the case studies, particularly those of Chapter 2. In summary, it is a distinctly modern conception of space that is founded on what Olsson terms 'cartographic reason' (2007). In this view, the maps of scientific cartography are not only products of modernity, but form its guiding principles: distinctive ways of seeing, thinking about and representing the world, the chief attributes of which are listed in the left column of the table, grouped around themes of 'representation', 'knowledge', 'geometry' and 'power'. The case studies, particularly of Chapter 3, also bear witness to an on-going crisis in this cartographic mode of reasoning and representation such that, as Olsson puts it, 'our navigational tools have become badly outdated' (2007: 410).

The attributes of Code Space are suggested by way of analogy with Cartographic Space, about which more is understood. As Thrift puts it, 'we inevitably have to think analogically, since we are trying to name something that is only just coming into existence' (2012: 154). Working primarily from the case studies of Chapter 4 and finding that it is increasingly code rather than cartography that informs their mapping, the table's right hand column suggests how the key attributes of cartographic space are altered when code becomes the primary producer of spaces and senses of space. Rather than a 'virtual'

layering of the (somehow more 'real') spaces of cartography, it is proposed that code fundamentally reshapes those spaces and the nature of relationships in space - joining up the world in novel ways that displace cartographic modes of seeing, thinking and knowing. The above 'map', then, also has a temporal dimension in that it proposes movement over time - left to right - from one set of conditions to another.

While the categories of Cartography and Code were largely pieced together in the process of sifting and sorting case studies, they are also informed by a number of theoretical insights, and can also be positioned in relation to these. In particular, the above schema draws inspiration from, and closely corresponds to, Thrift's reference to two Euclidean passes (2011: 6). These are likewise seen as epochal in nature and as intersecting specifically in 'the advent of global positioning systems' and 'the introduction of new forms of information technology that produced a generalised capacity to track movement' (Ibid). Scott Lash's (2010) distinction between 'extensive' and 'intensive culture' also provides another marker, as does, expressed in terms of power, the shift from 'discipline' to 'control' (Deleuze, 1992), the nature of which will become clearer as the chapter progresses. Cartographic Space specifically takes Olsson's 'cartographic reason' as a starting point: the idea that cartography, being more than just the production of maps, is formative of a distinctly modern way of seeing and thinking about the world - one that Olsson also depicts as being in a state of crisis but to which he can envisage no alternative. Code Space is a direct response to Olsson's 'impossible question' about 'what to do instead' (1998:149). It builds on a growing literature that suggests that code becomes a producer of spaces (Thrift and French, 2002; Mackenzie, 2009; Kitchin and

Dodge, 2011; Alt, 2011) and, at the same time, leads to a 'renaissance of mapping' rather than its demise (Thrift, 2014: 59), suggesting that the activity of mapping remains central to what Thrift calls 'practices of worlding' (2012: 161)[144]. Finding evidence in the works of locative media that it is increasingly code, more than cartography, that supplies their mapping with a method and logic, the category proposes that a world shaped by cartography, in the way that Olsson suggests, becomes a world shaped by code. However, as Thrift puts it, the effects of a second Euclidean pass are 'still in formation' (2011: 7), and so the category of Code Space is necessarily conjectural; a heuristic device that proceeds by way of an analogy with Cartography in order to gain some sense of purchase on conditions that might otherwise only be hazily perceived. As Thrift points out, writing about what he alternatively calls 'movement-space': '[n]ecessarily, at this point, I must move to the very limits of conjecture, and perhaps beyond them. But, in order to get some form of grip on these issues this seems to me to be a worthwhile risk to take' (2004: 596).

Before returning to a discussion of these risks, more needs to be said specifically about the relation of the case studies to the categories of Cartography and Code, since the above table has arisen primarily out of an examination of these works and is intended, in true cartographic fashion, to provide a schema by which they can be characterized, categorized and located - acts of naming that constitute just one of many (hopefully) 'worthwhile risk[s]'[145]. The table, it should also be noted, is as much a categorization of 'maps' as 'spaces', since it is argued that neither Cartographic nor Code Space

---

[144] Precisely what becomes of the map and its 'power' to shape the world is considered in detail in later sections of this chapter.
[145] Olsson writes, 'without names we are nothing, for without names the Kantian as-if has nothing but its own trickery to hook on to' (2007: 410).

can be thought of without reference to their respective maps. In the case of Code Space, these prominently include those maps of locative media that move *beyond representation*, and it is to the discussion of representation and the possibility of *non-representational* mapping that I now turn.

The case studies have been grouped into three chapters on the basis of the position they broadly occupy in relation to Cartographic Space and Code Space, repectively. The case studies of Chapter 2, it has been argued, operate primarily within Cartographic Space, even as they critique the representational regime of cartography. What is at stake in these works is the *veracity* of cartographic representations rather than the project of representation itself. They implicitly critique cartography for its failure to adequately represent lived experience and, in support of this critique, they draw on theoretical and artistic traditions that also have as their target the scientific abstraction of space that occurs in the modern era, these including de Certeau (1984) and Lefebvre (1991), Debord (1955; 1958) and the Situationists, as well as feminist critics of cartography's masculine gaze (Haraway, 1991; Rose, 1993). The works of Chapter 2 seize upon the affordances of locative media - particularly its ability to trace movement - to reinstate within the map the lived experience of place. Belasco Rogers charts his everyday movements through and personal knowledge of a city, while Nold maps the distribution of collective emotional responses. *Amsterdam Realtime* shares Belasco Rogers's concern with movement, but represents this movement through maps that evolve in real-time. All, to some extent, also diminish or subvert the representational palette of cartography in ways that seem to suggest that the project of representation is itself is being scrutinized. Belasco Rogers and Polak remove all trace of the

base map while Nold parodies the visual regime of cartography by, for example, delineating emotional rather than topographical contours, or introducing sketched caricatures in place of cartographic symbols. They all to some degree play with what is visible, bringing phenomena out of the shadows of cartography, while making the cartographic schema more or less invisible. This illusion is particularly elegant in *Amsterdam Realtime,* where the map ceases to exist without the movement of participants, and the cartographic image, projected as light, floats free from any one surface.

However, it remains that these artists subscribe to the idea that they are representing *something*, even if and specifically because these are things that conventionally remain invisible to scientific cartography, and that these can be located (using GPS) upon a gridded surface, even if that surface remains partially out of view. As a result, any one of these maps can be reconciled with the cartographic project simply through the overlaying of their maps to produce an exact fit. Despite all contrary effects, and there are many, they are talking about the same places by locating them within the same metric space. In short, their critique of cartography is confined to the belief that it might be somehow enlivened to *better represent* that which cartography routinely excludes through processes of abstraction, translation and geometric projection. The paradox inherent in this is that, by Farinelli's (1998) account, *lived experience* - or, what he terms *Being* - is created by cartography as *that which it excludes from its representations*, and so these works struggle to represent a reality that inevitably escapes cartographic representation, while at the same time unwittingly revalidating that mode of representation. More than that, they operate with a peculiarly outmoded version of 'lived experience' that overlooks

the ways in which it must now also consist of experiences that are shaped by new information and communication technologies, including those that are integral to these works and which, once again paradoxically, further complicate the quest for a more grounded and deeply felt sense of 'place'.

The case studies of Chapter 3 occupy a more ambiguous position in relation to Cartographic Space in that they acknowledge the way in which lived experience has become extended, particularly by information technologies and the operations of code, in ways that undermine the criteria and standards of visibility, scale and proximity with which cartography fixes positions within a single and stable ground. These maps attempt to incorporate phenomena that cannot so easily be located within a cartographic frame. They include, in Gomes's work, Hertzian spaces that are invisible, lack definite borders, and are liable to drift and, in Southern and Speed's *Comob*, social connections that operate both in and across space, thereby unsettling fixed notions of proximity and shared conceptions of place, and it leads, in Paula Levine's *San Francisco <-> Baghdad,* to a manipulation of the map in which one place is superimposed upon another, in order to highlight the competing senses of proximity that are occasioned by the mediatization of war. In all of these, there is a mixing of scales, a degree of ambivalance about what is properly to be thought of as local or global, and uncertainty about the location and nature of *places*.

In attempting to locate phenomena that are less visible, fixed and discrete, they begin to play with the cartographic surface through processes of, for example, 'softening', cutting and pasting, and superimposition. However, they also remain ambivalent in their relation to Code Space in that although they recognize many

of its facets, they ultimately revert to a cartographic frame in trying to represent these. *Comob,* despite its attempt to diminish the representational power of the base map (Speed, 2010: 174), ultimately reaffirms its integrity, while *San Francisco <-> Baghdad* can only perform its radical foreshortening of space in reference to the same cartographic surface that it ostensibly dismantles. Gomes's work is a little different in that, although it also questions the map-ability of spaces that are both grounded and ungrounded, visible and invisible, physical and informational, it nevertheless hesitates to answer that question through the production of maps that might give shape to these incongruities. This case study aside, intended as an introduction to the challenges posed to the cartographic project by invisible and fluid phenomena, the case studies of Chapter 3 continue, almost in spite of themselves and their implicit critique of cartography, to adopt the frames, fix-points, and scales of cartographic representation. By highlighting discrepancies and tensions between Cartographic Space and Code Space, they explore a crisis in cartographic representation and often precipitate such a crisis in their own representations. The surface of projection is subjected to forces that reveal its breaking points, yet these works hesitate to make such a break and finally reaffirm its integrity.

Demonstrating once again that theory and practice are inseparable in evaluating the significance of these artists' maps, the case studies of Chapter 3 locate themselves in relation to quite different theoretical landmarks than those of Chapter 2. References to writers such as de Certeau (1984) and Lefebvre (1991), in support of their attempts to reinstate the lived experiences and everyday practices that are rendered invisible by cartography, are replaced by

references to theorists[146] who recognize and embrace another kind of invisibility: that of communication networks and information flows that are forever dipping in and out of view[147]. Within these frameworks, reality and representation are collapsed into a 'flat ontology' (De Landa, 2002) that may only be understood from within, through inhabitation, but which cannot be viewed from the elevated perspective of cartography. It is this conundrum that the maps of Chapter 3 to varying degrees both face up to and shy away from, struggling to picture this novel landscape within an outmoded representational frame.

In Chapter 4, the case studies move beyond Cartography to more fully embrace the conditions of Code Space, leading to what can be identified as a decisive break with cartography. The possibility of this break is first suggested by works that undermine cartography's 'scopic regime' (Jay, 1988) by producing 'soundscapes' that, although they continue to map spatial relations, work with acoustic spaces that lack the visibility, stability and exactitude that are essential to cartography. Though Reub's *Drift* continues to rely on GPS to place sounds, these are set out of kilter with the secure ground of cartography by indexing them, instead, to the ebb and flow of tides. By treating moving water as solid ground, a new surface is brought into being that operates independently of the cartographic surface and sets both in motion. This 'moving "frame"' (Thrift, 2011: 6) unfixes the experience of 'place' from terra firma and creates senses of position that are multiple and relational and defy representation within a cartographic frame.

[146] In particular, Latour's Actor Network Theory (2005), as discussed in Chapter 1.
[147] An exemplary exploration of such conditions is Bruno Latour and Emile Hermant's *Paris: Invisible City* (1998).

Rather than create an acoustic map that is then experienced *in situ*, *Sensory Threads* begins with the experience of location (as measured by an array of sensors) and then maps this to a 'musical' score that is played in real time. Although this 'soundscape' lacks a surface, it continues to map spatial relations: probing the shapes, patterns, and textures of an urban landscape comprised of disparate intensities of sound and light, structure and feeling. It is a map that is in constant flux, being subject to individual agency, collective negotiation and change over time, as well as complex feedback loops that promote a ceaseless rewriting of the map by those who populate it. Rather than produce representational relationships in which equivalencies are posited ('a = b'), it proposes *associations* that are speculative, involve translations between unlike registers, and which evolve over time. Thus a physiological function like heart-rate is translated into a musical score that bears only a loose resemblance to, let alone *represents*, the original input, and yet it remains readable to the producers of this acoustic map.

Gemeinboeck and Tanaka's *Net_Dérive* subjects GPS data to much the same kind of treatment; 'mixing' it with recorded street sounds as well as using it as the basis for a series of locational parameters (such as the relative proximity of participants and their individual speeds) that are used to further modify the soundscape (affecting changes in tempo, pitch and resonance). Again, this mapping is no less spatial than that of cartography, no less a product (ultimately) of spatial experience. Conversely, neither is it less 'abstract' or 'mathematical'. What distinguishes this mapping is its disavowal of cartography's reduction of space to just two axes and one surface. In place of a single frame that defines all possible relations and reduces them to a single

327

plane, these maps work with multiple frames that move and interact with one another to create complex and layered senses of space and of relations in space. What makes it difficult to acknowledge these soundscapes as 'maps' is that they are independent of *any* visible surface: Invisible maps.

With Gemeinboeck's *Impossible Geographies: Urban Fictions* series, it becomes easier to see a *break with*, rather than *escape from*, Cartography because of the way it produces a visible surface - or, rather, surface*s*. *Urban Fiction* engages directly with cartography by contorting, layering, ripping and re-stitching its surface of projection to invest it with such depth that it fills a gallery space rather than resting on one of its walls. 'Location' must be reconceived in relation to moving frames and as subject to the on-going performances of both mappers and the map itself. Together they generate 'uncertain outcomes' (Thrift, 2011: 18) that defy representation and secure knowledge. This is a map in which it is possible to be in two or more 'places' at the same time and these 'places' are contingent on multiple performances, the outcome of which is unpredictable and therefore provides no sure way of knowing where one is. Nevertheless, it is still recognizably a map, and not just superficially so, since it continues to produce a shared sense of the space, and in ways that facilitate and actively encourage engagement with that space.

Awan and Langley's mapping of diasporic territories offers another model of post-cartographic mapping that again suggests that these maps continue to provide a sense of orientation that may be shared and acted upon, and their maps are in fact designed with this purpose in mind, as a tool for urban planning. Again, these maps break with Cartography by producing depth in

place of a flat surface. Spatial relations are modelled in multiple (spatial, temporal and affective) dimensions before being 'sliced' to produce sections that can be read in sequence. What this case study introduces, and this will be developed later, is the idea that, rather than maps consisting of several interconnected layers, there may be as many maps as there are people and that each carries their own map with them – a moving frame within which they sit at the centre.

To summarize, the key to the break with Cartography that is witnessed in the case studies of Chapter 4 lies in a disavowal of the surface of projection as a coherent, isotropic and depthless plane, within the rigidly-gridded space of which everything has its place. By contrast, these Code Maps acknowledge and work with spaces, territories and surfaces, as well as senses of scale, position and proximity, that are multiple, overlapping, and dynamic. In other words, they delve below cartography's 'visible surfaces' (Farinelli, 1998: 141) to invest the map with depth. Crucially, the fuzzy, indeterminate and generative operations of code become integral to the process of mapping and these work to supplant the representational 'as-if' with a speculative 'what-if?' that repudiates the shared grounds and dead certainties of cartographic reason. However, the maps they produce are far from formless or unreadable. They continue to provide a means of orientation. They continue to be part of a sense-making process that is collective and shared. They may even, in some novel form, perpetuate 'the power of maps'.

A discussion of 'the power of code' will follow in due course, and much more needs to be said about the nature of post-cartographical mapping but, having

sketched the way in which the case studies are positioned in relation to Cartographic Space and Code Space, it is necessary to insert some 'small print' about how these categories have been arrived at and how they are used in relation to the case studies.

5.2.1 The Small Print

Firstly, it is clear from the cartographical device of the table in figure 5.1 that the categories of Cartographic Space and Code Space are themselves products of what Alpers (1983) describes as a 'mapping impulse': abstractions that result from a desire to rise above and take an overview that affords some description of the terrain. However, they have in practice arisen more in the manner of landmarks or beacons that aid wayfinding than as fix-points that allow routes to be definitively plotted. Wading through the maps of locative media and disoriented by their diverse and competing senses of space, the categories provided a means to tease these apart and make some sense of them. It is a sketch-map, then, that does not claim to unequivocally locate the case studies, and so the only criterion by which these categories may be judged is whether or not they are useful.

Another important caveat in the use of these categories is that they are not to be considered as exclusive or incompatible. Mapping is and always has been, as Pickles observes, a practice of bricolage that draws on disparate skills and sets of knowledge and is permeated by both older and newer forms: for example, the persistence of pictorial representations of sea dragons and sailing ships in early modern scientific maps (2004: 88). Similarly, Code and Cartography may be mixed in ways that are entirely congruous, and this is

330

particularly evident, for example, in the use of Geographic Information Systems that extend and supplement cartographic methods with massively coded processes. Most emphatically, Code Space does not *replace* Cartographic Space. We continue to use maps that look like maps and operate within a cartographic frame as an aid to navigation. In particular, the widespread use of GPS keeps alive a Cartesian coordinate system that is integral to the cartographic project. It also remains one of the key inputs in works of locative media. However, GPS is just one dataset, one input among many, and, as data, is amenable to manipulation and modulation by computational procedures that may bring it into novel alignment with other datasets. Rather than progressively supplanting Cartography, Code introduces 'an array of new co-ordinate systems, different kinds of metric and new cardinal points' (Thrift, 2004: 596) that ensure the proliferation of multiple spatial frames and surfaces that produce 'a thickening of space' (Thrift, 2012, 151).

Just as there is no simple transition from Cartographic to Code Space, neither do the works neatly fit within such a chronology. While it is true that some of the more recent works most fully address the fluid spaces of code (those of Gemeinboeck, for example), some of the very earliest works studied here also address these issues (for example, Gomes's prescient observations on the fluidity of informational spaces such as Wi-Fi). Even within the corpus of a single artist, there is often no clear progression. Gemeinboeck appears to make an important conceptual leap in pulling apart the base-map in *Urban Fiction*, only to reinstate it several years later in *Urban Fiction 2.0.*

The case studies always occupy an ambiguous position between Cartographic and Code Space. Although the works in Chapter 3, in particular, are identified as sitting between Cartography and Code, this is only because these works more obviously (and perhaps more consciously) grapple with the mismatch between them. All the works discussed in this thesis are to some degree hybrid in their relationship to Cartographic Space and Code Space. Even those works most dependent on code for their operations still give more than a passing nod to the conventions of cartography. Gemeinboeck's *Urban Fiction*, however un-conventional it may appear, can only perform its critique of cartography by utilizing some of its conventions: for example, in the use of gridlines that are then deformed. In other words, they are still engaged in a conversation with cartography, even as they endeavour to move beyond it.

As a result, the placement of case studies within a schema consisting of three chapters has been by no means straightforward. Nold's use and scrutiny of data and visualization techniques, for example, at times suggested that *Biomapping* would be better placed in Chapter 3. To take another case in point, Belasco Rogers's *The Drawing of My Life* was also placed in Chapter 2, where it was first read as a triumph of wayfaring over navigation, then ultimately judged to have succumbed to the navigational grip of cartography. Belasco Rogers's intimate relation with a city, his nomadic wandering through its streets, the intertwining of his path with that of his partner, turns out to be expressed in rows of numbers that locate him in the same abstract grid that fixes national borders and locates goods in transit. On this reading, the artist's bid to reconnect with the world in more personal ways paradoxically results in the creation of a personal 'barcode' that identifies him as an object of logistical science.

However, there is also a third possible reading of his work that sees the artist beginning to grapple with the conditions of Code Space. In interview, Belasco Rogers (2014) says that, although his mapping practice has changed little over the years, his thinking about it has been significantly transformed. While the work began as a mapped chronicle of his lived experience and expanding knowledge of a new city, Berlin is now so familiar that the practice of GPS recording no longer serves that purpose. Instead, his attention has turned to how the vast pool of data that he so assiduously collects can be freshly explored and reconfigured. In *My Life as a Birch Forest* (2012), the same data that was used to make maps is visualized as a 'forest' in order to focus on the activity of data collection itself.

This image has been removed for copyright reasons

Figure 5.2: Daniel Belasco Rogers, *My Life as a Birch Forest* (2012). Computer visualization of eight years of GPS data collection where white represents breaks in the recording of data. Courtesy of the artist.

The tree-like columns each represent a year, arranged in succession from left-to-right, with the months, January to December, running from top to bottom. Each bark-like horizontal strip represents a day, black where GPS was recorded and white where it was not, revealing travels to different time zones, nights spent out on the town and, with the birth of a child, nights spent in. More than that, however, it is a picture of data and the shapes it can take. Bare white strips represent not days spent at home but a failure to record or log data resulting from 'forgetting to download, missing cable while away, lack of batteries etc.' (Belasco Rogers, 2012). The gaps and breaks in the recording of data become interesting not because they represent something - since they are just gaps - but because, in their abstraction, they become a meditation on the nature, qualities and patterns of data and the way in which these infiltrate our lives.

Thus, although Belasco Rogers's maps find themselves in Chapter 2 by virtue of the way they ultimately fall back on a cartographic framing of space, his work can also be seen as a remarkably prescient exploration of what Thrift calls 'new apprehensions of space and time' (2004: 582). At the heart of Belasco Rogers's work is the collection of a vast pool of data and its management, classification and presentation; the significance of which he (perhaps only intuitively) grasped as far back as 2003. Rather than either a *navigator* or a *wayfarer*, we might see Belasco Rogers's recent work as an exploration of what it means to be '[s]wimming in a sea of data' (Thrift, 2011: 5), one that responds to Manovich's call for a sublime data-art that is capable of representing 'the ambiguity, the otherness, the multi-dimensionality of our experience' in a data-society (2002: n.p.).

Notwithstanding this lengthy list of caveats, the categories of Cartographic

Space and Code Space provide two points of reference by which to navigate

the tangled and complex conceptions of space that are at work in the maps of

locative media. The remainder of this chapter is devoted to using such

categories to further tease these out and to develop an overview of what lies

beyond Cartography, beginning with a discussion of the fate of the maps.

5.3 What Becomes of the Map?

Here, I finally address an issue that has so far been deferred: namely, whether

the strangely layered and nebulous maps that were examined in Chapter 4 are

in fact 'maps'; what threads of continuity can be traced from the maps of

cartography, or those that came before; and (if they are still maps) what they tell

us about the changing nature of mapping. What *is* clear is that, at the end of

Cartography, mapping does not disappear, but is in fact reinvigorated,

particularly by the activities of non-professional cartographers[148] in DIY and

community mapping projects, and the creation of map mash-ups[149] and art

maps, including those of locative media. This prodigious outpouring of maps is

no coincidence for Thrift, but results from, rather than in spite of, the incarnation

of 'movement-space', or what I characterize as a shift from Cartographic to

Code Space. As Thrift notes, '[t]he renaissance of mapping is clearly correlated

with the rise of big data, the internet and global communication more generally'

(2014: 59). Just as in previous ages of dramatic social and technological

---

[148] For accounts of these, see Perkins (2007) and Wood (2010), for example.
[149] A map mashup combines and visualizes content from a variety of other sources, such as photographs, video, and all manner of data.

change, maps become the means by which to make sense of unfamiliar and uncharted territory. A post-cartographical world, in which we are asked to 'rethink the map, the landmark we presumed we could locate, the direction we thought we knew how to follow' (Manning, 2009: 183) demands that 'reality' be created on the hoof and this 'requires constant mapping and remapping' (Thrift, 2012: 153). Thus, for Thrift, maps 'have become a basic unit of account - a means of building infrastructure, locating and wielding influence, [and] shaping identity' (2014: 58-9). However, it is not just map *use* that is changing. Here it is argued that the map itself, and what we take to be 'a map', also mutates. The case studies of Chapter 4 - maps stripped of scales, fix-points and surface - alter what is meant by location, what it means to *know* where one is, and to use a map to find one's way about. In order to begin assessing whether they still count as 'maps', however, I shall begin by suggesting that the way in which we recognize and identify maps is shaped by highly cartographical, and specifically modern, assumptions about the nature and purpose of maps.

5.3.1 What is a Map?

A complex of 3000-year-old engravings on rocks at Valcamonica in northern Italy is frequently cited as being amongst the oldest maps in the world[150]. The Bedolina Map, as it has become known, appears to show topographical features such as fields and paths and dwellings, along with animals and stick-like human figures, shown from a bird's-eye perspective. The example would seem to offer a neat way of affirming that humankind has always had an impulse to map and will therefore continue to do so long after the 'death' of cartography (Wood, 2003). However, it is by no means certain that the carved

---

[150] See, for example, Harley and Woodward (1987).

rocks at Valcamonica really are a 'map'. So far, the consensus is that they probably are, but this entails an evolution in views about what a map consists of. Early interpretations of the Bedolina Map took it to be a straightforward representation of the surrounding landscape, later revised as an idealized map that expressed the aspirations of its makers to control more land[151], while the latest suggestion, from Alberto Marretta, is that it may be more a conceptual diagram than a map, depicting 'an elaborate net of relationship between different units' and which 'could have carried concepts that had nothing to do with the landscape' (2013: 350). All these views are further complicated by the fact that the 'map' does not lie flat but follows the contours of rock formations – the significance of which varies in all these accounts[152]. These various interpretations illustrate two interconnected perils in talking about the continuity of maps in the way that this thesis would like to. The first is that maps might be seen where there are none, what critical cartography scholar John Krygier calls 'cartocacoethes - a mania, uncontrollable urge, compulsion or itch to see maps everywhere' (2008: n.p.). Certainly, the conclusion that the rectangular figures seen in the Bedolina map are farms or houses viewed from above might be seen as a prime example of this[153]. Conversely, the second danger is that such a narrow, modern, understanding of the map may occlude consideration of cultural artifacts that might usefully be considered as maps. For Marretta, for example, the non-representational and 'conceptual' nature of the diagrams at Valcamonica should give cause to hesitate before naming them as 'maps'. The difficulty is in finding a definition that is neither too wide, nor too narrow and overly tainted by culturally and historically-specific preconceptions.

---

[151] See Marretta (2013: 345).
[152] See Marretta (2013: 348).
[153] See discussion by Marretta (2013: 347).

This image has been removed for copyright reasons

Figure 5.3: Tracing of the 'Bedolina Map' (c. 700-800 BC),
a rock engraving at Valcamonica, Italy (Turconi, 1997).

In trying to break free of a view of maps that has been too narrowly prescribed

by cartography, taking a wider definition would seem the lesser risk. However,

such a definition would need to be wide enough to include maps that are

invisible, that do not claim to represent anything, that do not offer directions

from point 'A' to point 'B', and may even make dis-orientation their goal.

The aim here is not to offer a definition that would accommodate such maps.

According to one account, there are at least 321 possible definitions, all of

which reflect 'changing intellectual fashions' (Andrews, 1996), and producing

yet another will not settle the issue. Rather, the aim is to expand the ways in

which maps might be imagined. Sticking with definitions for the moment,

however, Harley and Woodward's widely accepted definition of maps as

'graphic representations that facilitate a spatial understanding of things,

concepts, conditions, processes, or events in the human world' (1987: xvi)[154] would seem broad enough to encompass many of the Code Maps discussed in Chapter 4. In fact, it appears particularly appropriate since they place 'concepts, conditions, processes, or events' alongside 'things'. It allows that maps might encompass more than purely cartographic notions of *position* as the placing of things *in* space *and proximity* as the distance between things in space, while their inclusion of 'processes' and 'events' allows that time might also be brought within the map's purview. It is, however, limited to 'graphic representations' and while others[155] have no difficulty in including maps that rely on haptic and auditory senses, the idea that maps might be *non-representational* is altogether more troubling. Even advocates of a 'non-representational' geography have depicted it as a 'journey without maps' (Smith, 2003), one best accomplished by dispensing with them altogether. Alternatively, there is a raft of critical cartographers who identify themselves with a 'post-representational cartography'[156], but what this essentially recommends is that cartography (as an academic field of study) should not *only* treat maps as representational artifacts, but also take account of the way they are practised through performances of map-reading and map-making such that maps are 'always in a state of becoming' (Kitchin, Perkins and Dodge, 2009: 17) and 'maps and spaces are co-constitutive' (Del Casino and Hanna, 2011: 105). It is an approach that is highly applicable to the maps of locative media where human performances are central to the map-making process, but what it does not envisage is that maps themselves might be non-representational (and that they might be active

---

[154] Harley and Woodward's definition has been widely, but not universally accepted. See for example, John Andrews (2007), who criticizes it for being 'seriously over-extended' in order to 'raise the extra-European profile within their editorial domain by fabricating a cartographic role for various kinds of non-cartographic drawing and painting' (Andrews, 2007: 205).
[155] See Krygier (1994), for example.
[156] For a review of 'post-representational cartography' see Kitchin (2010), or for a more detailed account, see Fernandez and Buchroithner (2014).

participants in such performances). In Kitchin, Perkins and Dodge's formulation, for example, there is a 'dyadic relationship' between representation and practice through which they are mutually constitutive of 'map/space'. However, although the map is *subject to* human performances, it remain no less an epistemological project - a means of knowing the world through its *representation* (Kitchin, Perkins and Dodge, 2009: 17). Focusing on *practices of* representation does not make the map non-representational. Rather, it is another formulation of the thoroughly cartographic juxtaposition of lived practice and abstract representation. Whereas, for example, the case studies in Chapter 2 attempted to incorporate lived practices *within* the cartographic surface, here the lived practices (of map-making and map-reading) come into contact with that surface through continual use and handling - making it somehow more pliable by rendering it open to interpretation and amendment, but leaving its surface essentially intact. In order to begin talking about maps as 'non-representational', a more thoroughgoing overhaul of cartography's representational epistemology is required.

5.3.2 Representation and Knowledge

The claim here concerning representation is much stronger. Rather than a 'post-representational *cartography*', this research finds evidence in some of its case studies for an emerging practice of *post-cartographical mapping* that, in moving beyond cartography, dispenses with its representational epistemology. Rather than seeking to *explain* the world by means of its representation, plotting real-world things onto a surface that stands in for these, these maps operate at a purely ontological level, understanding the world by engaging *in* it. In their maps, coded operations that are fuzzy and generative, dynamic and

approximate, supply new means of linking the world up that do not represent a

reality that lies outside it, but instead participate *in* the real. To put this in Lash's

terms, they are no longer 'extensive' to a reality that they then *talk about,*

operating discursively, but are 'intensive' to that reality (2010). This distinction

becomes clearer in the context of the way in which power also once operated

epistemologically (not least through cartographic practices) but increasingly

operates ontologically in a 'post-hegemonic' society (Lash, 2010). This is

developed in a later section concerning the changing nature of 'the power of

maps'.

The Code Maps of Chapter 4, then, are interested in *making* rather than

revealing reality, and they do so experimentally, by proposing novel relations

between things through which multiple, dynamic and indeterminate realities

unfold. Rather than holding a mirror to the world, 'the mapping tool becomes

propositional' (Awan and Langley, 2013: 5) and is 'a tool of intervention' in the

world (Gemeinboeck and Saunders, 2011: 164). In these maps, the 'as if' of

representational logic is replaced by a speculative 'what if?' that explores

possibilities rather than manufacturing certainties. The cartographic frame that

produced solid ground on which to build shared knowledge of the world

becomes unfixed, is set in motion, and is accompanied by a plethora of

alternative frames that propose other possible mappings and thus create new

kinds of relations. In Reub's *Drift*, for example, the map speculates about what

happens to fixed notions of territory once the frame is set in motion and so

produces novel experiences of place, while Gemeinboeck's *Urban Fiction*

layers multiple frames to speculate on the possible outcome of opposing forces

of integration and disintegration at work in the city. These frames are neither

rigid nor static but mutate, change shape, and do so in interaction with each other - visibly so in the stretched, ripped, and re-stitched maps of *Urban Fiction.* However, they may also operate below the surface of visibility, mapping between different datasets to create 'impossible relations' (Gemeinboeck and Saunders, 2011: 170) between incongruous elements: in the case of *Net_Dérive*, for example, in the way that spatial data is mapped into sounds.

5.3.3 The Lived, the Abstract, and New 'Unorientations'

The nature of the surfaces that are created in these Code Maps not only dispense with the binary of representation/reality, replacing representation *of* the real with speculative interventions *in* the real, but also challenge the 'dyadic relationship' between *representation* and *practice* that 'post-representational cartography' maintains as distinct entities, thus perpetuating the lived/abstract binary that is at the root of cartography (Kitchin, Perkins and Dodge, 2009: 17). Rather than being maps that are *subject to* human performances, they are inseparable from that performance and co-constitutive of the spaces that result from processes of mapping. Returning to Farinelli's discussion of cartography, these maps are quite unlike Anaximander's clay *pinax* that, as it dried and solidified, gave rise to both cartographical reason and *Being* as 'that which shuns from the map' (Farinelli, 1998: 142). Instead, they remain fluid and malleable, 'philosophical sculpture[s]' (Farinelli, 1998, 139) that are always in the making and in which human and non-human performances become threaded together. In these complex assemblages, it is no longer possible to separate 'performance' from 'map', subject from object, the living from the abstract. As Alt makes clear about the Object Oriented Computing that is the engine for many of these maps, code takes on qualities of subjectivity while

'users [...] are treated as objects themselves' (2011: 297) so that computation both spills out into 'the brute messiness of the world' and incorporates 'the entire breadth of lived experiences' (Ibid: 298). The practices and performances of life as it is lived no longer sit outside the map but are assimilated into a living map. It fundamentally collapses the distinction between 'map' and 'map users' and what it means to 'use' a map to find ones way about. In these maps, there is no fixed scale, no metric grid, no common ground within which to locate 'places' and affirm that 'You Are Here'. They offer no elevated position, no outside, from which to survey the terrain. Instead, the performance of 'position' takes place within the map and so the only way to proceed is to inhabit it.

The idea of being in and part of a map that is unable to locate its user in a prior existing field, but must create fields and senses of location as it goes along, is not only counter intuitive but utterly *disorientating*. Nevertheless, a sense of position need not and did not always rely on there being a prior field within which to frame position. This might be illustrated by way of a comparison between Awan and Langley's maps and a navigational device that was used aboard ships from at least the early 1500s onward: in other words, long before the world was fully mapped and gridded, before methods for measuring longitude were established, before position became synonymous with geographical coordinates. The comparison also serves to demonstrate how code maps produce a novel form of 'wayfaring' in which the abstract and lived are threaded together.

The 'traverse board' consisted of a circular piece of wood showing compass points at its outer edges. Radiating from the centre were eight concentric rings

of holes, each representing a half-hour of a ship's 'watch'[157]. Every half-hour, the helmsman would, working from the centre of the circle, place a peg to show the compass direction taken by the ship. A rectangular section of peg holes beneath the circle would similarly be used to indicate the ship's speed. Together they provided a dead reckoning device for calculating the ship's movements.

This image has been removed for copyright reasons
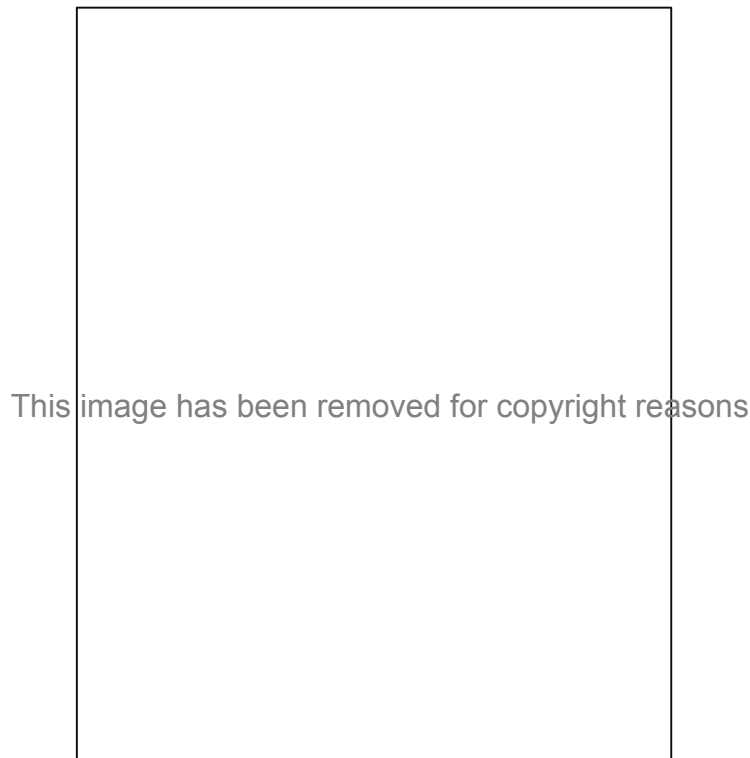
Figure 5.4: A mariner's traverse board (early 20th century).

Firstly, there are some visual similarities between this and Awan and Langley's maps in which the circular 'clock' device likewise combines time and space within the same view. However, more significant is the way in which movements and the territories that form around them are (speculatively) mapped within a world that is centred on that which is moving (the ship, the migrant) rather than

---

[157] From which the modern sense of 'watch' as a timekeeping device derives.

in reference to an external frame[158]. In other words, the frame itself is moving

and there are as many frames as there are migrants and ships. Encounters

between ships and between migrants (and, quite plausibly, between ships *and*

migrants) entail an encounter between their moving frames.

Just as the traverse board could be used to chart a sense of position and

movement that is independent of an external frame, so too do Awan and

Langley's maps of diasporic territories. An encounter with these maps does not

leave one feeling 'all at sea'. Although there is no solid ground in sight, these

are maps that give their users some purchase on the world (or rather 'worlds')

around them. What it suggests is that, *beyond Cartography*, navigation is again

accomplished by a form of dead reckoning[159], or, as Edward Casey puts it,

orientation gives way not to utter disorientation but a more provisional sense of

'unorientation':

> [t]o be disoriented is to be genuinely lost in the landscape [...]. To be
> unoriented is to not know where I am - not yet. This does not mean that I
> am lost: it just means that I cannot specify my whereabouts. (2007: 91,
> quoted in Thrift, 2011: 19)

This sense of unorientation - of being '*at* sea' rather than 'routing *across* it' - is

much closer to Ingold's 'wayfaring' (or, 'seafaring') than 'navigation' (or,

'shipping') (2007: 77). Wayfaring is about being immersed in the world, always

already *in* position, rather than navigating *towards* 'destinations fixed within a

---

[158] There are numerous anthropological accounts of such 'person-centred' rather than 'fixed-point' systems of navigation. See, for example, Luke Strongman's (2008) account of traditional Polynesian navigation. It is significant that Thrift also predicts a strengthening of 'egocentric co-ordinate systems' in conditions of 'movement-space' (2006: 600).

[159] Though Awan and Langley's mapping of diasporic territories does not use GPS and therefore conforms with definitions of 'dead reckoning' as being accomplished 'without the aid of celestial navigation' (Encyclopedia Britannica, 2013), 'dead-reckoning' still appears an apt description of works like Urban Fiction where navigation is, in part, performed through satellite technologies and therefore with the aid of celestial bodies.

global system of co-ordinates' (Ibid). However, the kind of dead reckoning performed by some the maps in Chapter 4 does not stand in opposition to the 'instrumental calculus of point-to-point navigation' (Ibid), and not just because they most often continue to make some use of navigational technologies like GPS. It consists in this: that rather than seeking *an escape from abstraction* - achieved through phenomenological encounters that are somehow more grounded and authentic - these maps, and the qualitative experiences that they instigate and work with, result from coded processes that, ironically, rely on *an intensification of abstraction*. Thus it is that Thrift, referring to Ingold as 'an exceptionally interesting but, in the end, traditional phenomenologist' sees in the workings of code 'the first stirrings of a phenomenology machine' that radically reworks the concept of 'wayfaring' (2011: 15):

> [Ingold] argues that we are beset by a world in which Euclidean lines which work from point to point have superseded an older and better way of proceeding which might be understood as the wayfaring line, the kind of line which can wander about (and which, by inference, is closer to the fabric of the world). I want to argue that the kind of world in which this wandering, wayfaring line held sway is now being rebuilt but out of fields of number, out of the stuff of calculable coordinates. (Ibid: 7)

For Thrift, this 'phenomenology machine' (Ibid: 15), 'in which feeling and the abstraction of calculation are threaded together' (Ibid: 14), is 'able to reproduce phenomenal awareness through *an orrery of surfaces understood as flows*' (Ibid: 15, my italics). It is a thoroughly apt description of the kind of layered, dynamic maps that figure in the works of Chapter 4, and one that again harks back to methods for apprehending space that precede modernity and modern cartography.

This image has been removed for copyright reasons

Figure 5.5: Model of the Antikythera mechanism by Michael Wright and Mogi Vicentini (2007).

The orrery was a mechanical model showing the movements of stars and

planets and, like the computational processes that produce a 'phenomenology

machine', it also conceived of position as relative and dynamic. Significantly,

the first known example of an orrery, the 'Antikythera mechanism' (c.125 BC), is

also widely acknowledged to be the first analogue computer[160]. Though it was

discovered by sponge-divers in 1900, the mechanism has only been more fully

understood in recent years. Made of 27 brass cogwheels, it modelled the

---

[160] See, for example, Harry Henderson (2009: 13).

movements of the Earth, Moon, and four known planets to predict lunar eclipses. Since it was concerned with approximating the *future* movements as much as current positions of astronomical bodies, it was, much like Thrift's 'moving "frame"', 'able to detect and work with the coming-into-existence as well as that-which-already-exists' (Ibid: 7).

Like the traverse board, it bears comparison with Awan and Langley's mapping of diasporic territories. It likewise constructs its view from a centre (the migrant, the Earth) rather than from a position above and outside, and rather than being projected onto a single surface, this view acknowledges heterogeneous planes and surfaces, all of which are in motion. Built in order to speculate on future astronomical events, it is also, like Awan and Langley's maps, more concerned with possibilities than certainties. The parallels, at the risk of overstating these, also extend to the mechanisms by which they produce their computational models of time and space. As Sunny Bains observes, 'neural networks are essentially analog computers' (1998). In the analogue methods of both ANNs and the Antikythera mechanism, discrete 'nodes' (cogwheels) are in communication (transmission) with one another via 'connections' (the meshing of cogs) in order to dynamically model *approximate* outcomes[161]: 'approximate' because they are both mechanisms that are prone to 'error' and 'noise'. In short, both the coded operations of ANNs and the Antikythera mechanism

---

[161] Awan and Langley note that although the operations of an Artificial Neural Network are very precise, it's outputs are imprecise and fuzzy, this imprecision being seen as crucial to their mapping (2013: 7).

operate as heuristic devices that rely on analogical rather than deductive methods[162].

This image has been removed for copyright reasons
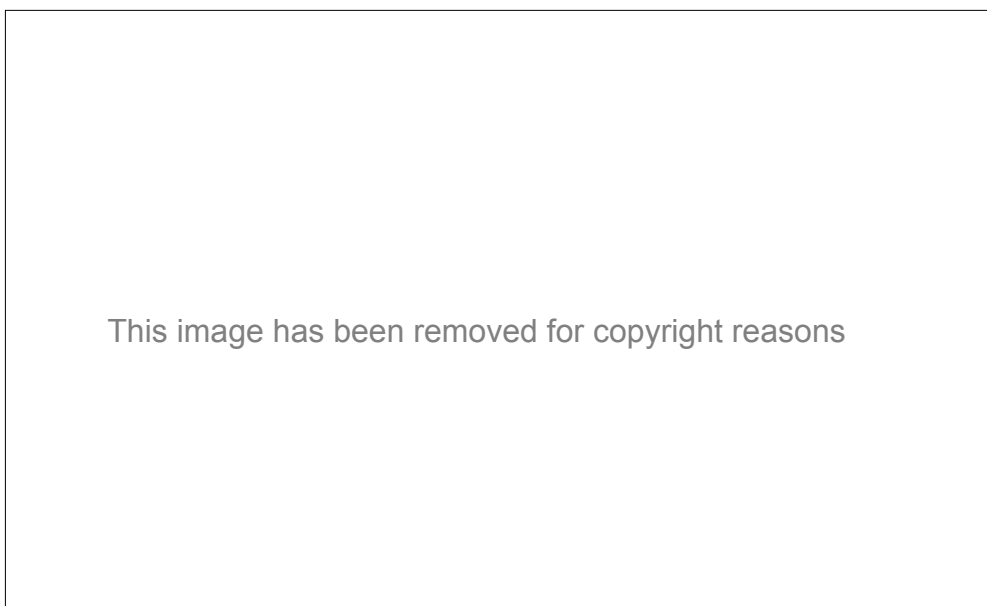
Figure 5.6: 'Cogwheels' in an artificial neural network (Awan and Langley, 2013: 9).

Clearly, there are many differences between Awan and Langley's use of ANNs and the 2000 year old orrery, not least that the Antikythera mechanism is a closed system that is incapable of either 'learning' or 'growing'. Coded operations like ANNs are not a *return to* anything[163]. However, the broader point of the comparison is that both *before* and *after* cartography, there are ways of thinking about and mapping space that do not require a pre-existing field, a table within which to categorize and place things. Rather, they model dynamic and unfolding relations to explore possible outcomes and produce approximate solutions that carry a lesser burden of truth. Since all other criteria for veracity

---

[162] It is interesting to note that breakthroughs made by the Antikythera Mechanism Research Project in understanding how the mechanism once worked have predominantly been made through both mechanical and computerized reconstructions of the mechanism – in other words, by heuristically making models of the model.

[163] However, it is interesting to note that many see a return to analogue computing (using computational models that are more fully embedded in the hardware (though of silicon rather than brass) as the next possible breakthrough in computing power. See, for example, the work on 'Super-Turing' analogue computing using ANNs by Hava Siegelmann (1998).

(scale, fix-points and surface) have been set aside, the only measure of these maps can be what they *do* and where they take us - which, in fact, has always been the case with maps. As Thrift puts it, 'maps have always been engines rather than cameras' (2011: 9). The problem is that cartography made us forget that, and only now are the *dead certainties* of cartographic reason being pushed aside by novel forms of mapping that re-engage with the pragmatic art of *dead reckoning*. This is not to say, however, that cartography will vanish without trace. The landscape today is built on, shaped by and littered with the remnants of previous forms of navigation. A journey on foot through the countryside reveals trig-points, milestones, Cairns and beacons that bear testimony to these. Cartography, no less, will remain a part of our landscape, but what counts as territory will have dramatically changed.

5.3.4 Post-Cartographic Mapping

Being largely stuck, even now, in cartographic ways of thinking and seeing, the difficulty has been in imagining how space could be conceived and pictured beyond cartographical reason and representation, and what kind of maps could chart these spaces and provide some form of orientation. As Olsson puts it, 'how can anyone find the way in a world in which the fix-points are unfixed, the scales twisted, the mappae crumpled' (2010:10)? The maps of locative media grapple with this question, struggling all the while to break free of cartography, but finally emerge with an answer: beyond cartography, finding a way is accomplished, not in spite of, but precisely by means of just such an unfixing of fix-points, twisting of scales and crumpling of the map. They may not be immediately recognizable as 'maps' but they do continue to provide a means of

orientation, responding to the question 'where am I?' and supplying ways of seeing, thinking and acting in the world. They may even continue to contribute to a shared understanding of the world (Olsson, 1998: 150), so long as it is allowed that 'places' may be multiple and their meanings in flux. In any case, what else to call them? Not 'simulation' since they are fully real rather than mimetic. 'Diagram' is more plausible, particularly Deleuze's 'diagram' that consists of 'several superimposed maps' (1988: 44) and which 'does not function to represent [...] but rather constructs a real that is yet to come, a new type of reality' (1987: 142). Definitely *not*, however, Bender and Merriman's 'diagram', which is too closely allied to science and the Enlightenment project (2010). However, 'diagram' would tend to diminish the fully spatial nature of these maps - the way in which they continue to shape spaces and orientate spatial experience. The problem, as with the 2000-year-old Bedolina Map, is that cartography's appropriation of the map has left a poor footing from which to understand the maps that come both before and after, but clearly the way a map responds to the question of 'how to find the way' changes from age to age. Just as European medieval maps located their travellers within a spiritual journey towards God, and the maps of cartography enabled the establishment of property rights, the building of nations, and imperial expansion, so too the Code Maps studied here are entirely of their age, mapping 'ungraspable forces which do not sit still but hop capriciously about' (Olsson, 2010: 3). Rather than question whether these really are still 'maps', it might be more productive to ask *what other kind of map* would find its way through an environment that is characterized by: a collapsing of scales; a layering of realities; the presence of invisible forces, connections and threats; and (as will be discussed in a later section) forms of power that operate 'intensively' rather than from above. In

351

many respects, these maps resemble those of the early modern period in that they operate at the very edge of the known, speculatively mapping un-chartered territory with a view to naming and claiming it. Just as those maps forged the modern era, so novel forms of mapping partake in the exploration and shaping of what follows. The maps of locative media venture beyond the limits of cartography to explore the new territories of Code Space, and thereby participate in a transformation of space.

The mapping of new territories, of whatever kind, is inseparably connected with power: the power to define, claim, enclose, control and exploit those territories. The issue of power is returned to in the final part of this chapter, but the next section first reconsiders and rephrases the arguments and analysis of the thesis in terms of *geometry*. Together, these discussions develop on the significance of a collapsing of the lived/abstract dichotomy that was introduced above.

5.4 The Geometry of Maps

Here I use *geometry* as another lens through which to view the shift from Cartography to Code and the maps that both participate in and bear witness to this shift. The thesis has at various points suggested that the introduction of non-Euclidean geometries has some bearing on these changes and, more specifically, have been instrumental in the 'breaks' with the 'twin scopic regimes' (Jay, 1988) of perpectivalism and projectionism. Here, the aim is to examine this claim more systematically and with more precision. Thinking through the issues raised by this research in terms of geometry's fundamental questions of size, shape, position and relations brings together, under one roof, the

disparate elements of mapping, art, mathematics, and philosophy that have entered into this discussion. Not only does it pull theory and practice, science and art, into closer alignment, it offers another way of thinking through the integration of the lived and abstract - the restoration of Lefebvre's 'lost unity' (1991: 175) and the role of art in this. Articulating these issues through the language of *geo-metry*, or 'earth-measurement', also reinforces the argument that what is witnessed in the shift from Cartography to Code is not an escape from matters of space but a reworking of space and of spatiality.

5.4.1 The Geometry of Cartography

The first task is to describe cartographic space in terms of its geometry, a task that is not as straightforward as is suggested by the ascriptions of 'Euclidean' and 'Cartesian' that are commonly used interchangeably in relation to cartography. While it is true that cartography assumes *space* to be Euclidean (that is, space as homogenous, unbounded, isotropic and flat[164]), for Euclid, these attributes did not stem from a pre-existing surface into which points and lines are then placed and by means of which measurements determined. Rather they were rooted in and logically proceeded from his *axioms*, which are essentially *ideal forms* based on *intuitions* about the nature of space (and in which distances can only be measured relationally). It is, then, a 'synthetic geometry' in that it does not depend on *a priori* co-ordinates, but proceeds, instead, from axiom (*if* 'a'...) to deduce proposition (...*then* 'b'). In Kant's account, however, and this is formative of a modern understanding of Euclidean space, these axioms are an innate inner faculty of the mind, independent of either perception or logic - the definitive *synthetic a priori* (1781/1998). For Kant,

---

[164] 'Flat' only in two-dimensional but not three dimensional Euclidean geometry.

the 'if' is a given, closed off to alternative intuitions, and so geometry becomes, as Olsson puts it, 'the formalization of the intuition of the tactile, the taken-for-granted constructed, the constructed taken-for-granted' (1998: 148).

However, it is in cartography's adoption of a Cartesian 'analytic geometry', in which points are figured within an *a priori* field, that the 'formalization' of intuition becomes not just 'taken-for-granted' but utterly unimpeachable. It produces a numbered space of 'x' and 'y' coordinates in which position and proximity are *fixed* rather than *relational,* as they are now a product of *reason* rather than *intuition.* This is the birth of the cartographic surface, the secure ground of cartographic reason, and one that is analogous to the moment, described by Farinelli, when the clay of Anaximander's *pinax* congealed and set - a petrified form that has not only forgotten its basis in intuition but has removed all trace of it. It marks the point at which intuition is codified and becomes self referential so that, from now on, 'a' must always equal 'b'. There is no 'if' about it. Thus, cartographic reason and representation, and the power of its maps, is founded in its geometry and, specifically, its production of a surface - a singular, uniform, metric plane within which all positions and relations can be calculated and unequivocally represented.

The shift from synthetic to analytic geometry that occurs in cartography is made historically tangible in the way that early practices of triangulation led to the production of a grid over the world. The use of triangulation to survey the landscape was, from the 16th century until as recently as the advent of global navigation satellites, an indispensible tool of mapmaking, yet its geometry is

essentially *synthetic*[165]. The measurement of position and distance does not take place within a grid of coordinates but makes do with just one baseline and two angles. To triangulate, it is first necessary to be *in* position, and then measure out a straight line to a second position. From each of these, a third position (a landmark) is sighted and the angle of the sightline to the baseline measured. From these measurements, the position and distance of the third ('trig') point can then be calculated. Note the human (*lived*) scale of these practices of sighting and pacing-out[166]: For the Ordnance Survey's Principle Triangulation of Britain, begun in 1784, it took more than two months, dozens of uniformed soldiers, and yards of hollow glass rods, just to measure out a five-mile baseline across Hounslow Heath (Hewitt, 2010: 76-77).

Slowly, these practices of mapping from the ground up (rooted in 'intuitions' as much as calculation) became integrated into a system of meridians and gridlines to produce a view from above: cartographic maps of *analytic* certainty from which the traces and (triangular) forms of these earthly and pragmatic arts were steadily expunged. Now, the trig-points that once produced the first accurate maps of nations, beginning with the Cassini maps of France (see Fig. 5.7), and which still litter their landscapes, stand as stone or concrete monuments to a lost *art* of mapping, their primary use now as landmarks for *wayfaring* ramblers.

---

[165] Triangulation is not essential to but is compatible with Euclid's axioms.
[166] Although Ingold acknowledges that deciding whether 'a line is real or a ghost [...], a phenomenon of experience or apparition [...] is decidedly problematic' (2007: 50), he concludes that '[s]urvey lines, such as those linking triangulation points, are of [...] [a] ghostly nature' (Ingold, 2007: 49). This seems to overlook, however, that the method of triangulation involves human practices, experiences and intuitions as much as abstract geometry and calculation.
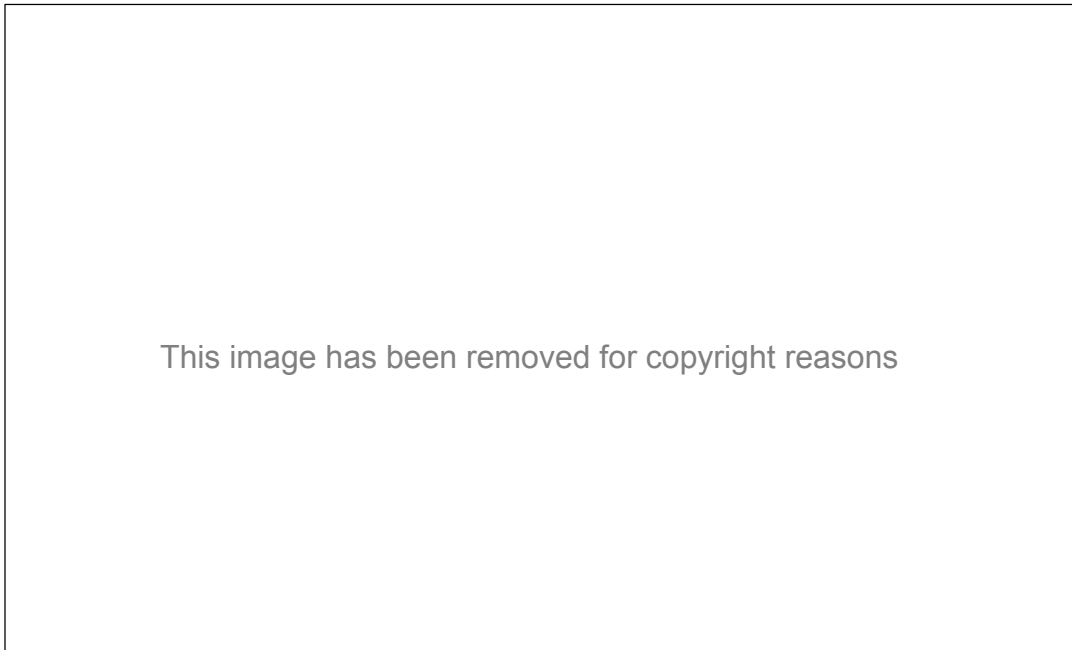
Figure 5.7: Cassini de Thury, *Carte qui comprend touts les lieux de la France qui ont été déterminés par les opérations géométriques* [167] (1746). Detail. Bibliothèque National de France.

The paradoxical nature of many of the maps discussed in this thesis can now be restated in terms of their geometry and the distinction that has been made between synthetic and analytic geometry. In Chapter 2, the works aim to reinstate the 'intuitions' of lived experience within the a priori *analytic* surface of cartography, which is paradoxical since this surface is hermetically sealed from its *synthetic* roots - the matter of form having been settled once and for all. However, it does not produce a crisis in the cartographic surface because the phenomena being mapped remain axiomatic and conform to Euclidean space. The works in chapter 3, by contrast, *do* instigate such a crisis because they attempt to map phenomena that are not self-evident and do not readily conform to Euclidean space, and therefore reopen the issue of *form* that cartography would have us forget. Paradoxically, however, they do not relinquish the surface that accomplishes this forgetting.

---

[167] Trans.: 'A map including all of the places in France which have been established by geometrical operations'.

The remainder of this discussion of geometry is devoted to the task of also describing the Code Maps of Chapter 4 in the language of geometry; the key feature of these maps, and which sets them apart from those in Chapters 2 and 3, being their disruption of cartography's *analytic* surface. The issue of surface was first raised in Chapter 1, in relation to a discussion of the 'twin scopic regimes' (Pickles, 2004: 84-86) of *perspectivalism* and *projectionism*, both of which rely upon a gridded Euclidean space. I have suggested that the introduction of non-Euclidean geometries has some bearing on the breaking apart of these regimes, and I now turn to a development of that argument.

5.4.2 Non-Euclidean Geometry, Art and Maps

To recap arguments introduced in Chapter 1: it was suggested that a 'seismic break' (Denil, 2011: 21) with cartographic projectionism might bear comparison with the break with perspectivalism accomplished by analytical cubism, but with the essential difference that, while the break with perspectivalism was achieved through a flattening of perspectival space to create multiple perspectives, cartography would need to achieve it by interrogating the surface of projection and investing it with depth. In Chapter 1, it was noted that both of these 'breaks' are achieved, to some degree, by way of an appeal to, or at least in awareness of, non-Euclidean geometries. In relation to abstract art, Dalrymple Henderson (2013) draws attention to the way in which a heightened interest in non-Euclidean geometry and the fourth dimension at the turn-of-the-century created a context in which perspectival illusionism gave way to alternative expressions of form. A hundred years later, a renewed interest in alternative geometries, along with the capacity of computer software to incorporate and visualize them,

357

provides similar conditions in which such experiments in form may thrive (Ibid: 9, 76-91). Common to both periods is an acceleration in scientific and technological innovation that draws attention to invisible, intangible and ethereal phenomena and prompts the invention of novel models and dimensions with which to account for them (Ibid: 25). In other words, they are both periods in which what is taken to be self-evident, and particularly the axiomatic understanding of space as homogenous, unbounded, isotropic and flat, is subjected to fresh scrutiny. As Thrift notes of the current situation, a new (technologically-enhanced) space-time background 'calls to the body in different ways' (2006: 597) and so is leading to 'new forms of intuition' (Ibid: 584). This involves a reworking of proprioception, new modes of haptic enquiry and novel forms of spatial co-ordination that add-up to a 'new sensorium' (Ibid: 596) in which 'space itself seems to perform' (Ibid: 597); in other words, precisely the sense of space that is pioneered by the Code Maps of locative media.

Something more can now be asserted about the relevance of non-Euclidean geometry to the 'breaks' with modernity's 'twin scopic regimes' (Pickles, 2004: 84-86). Firstly, non-Euclidean geometries also question the axiomatic nature of space, either by rejecting or amending one or more of the axioms from which Euclid proceeded to describe space as homogenous, unbounded, and isotropic. Secondly, non-Euclidean geometry, just like Euclidean geometry, is *synthetic* in that space is figured without recourse to a pre-existing co-ordinate system. In other words, non-Euclidean geometry's return to synthetic methods marks a break with analytical geometry and, with it, the kind of co-ordinate systems that produce both perspectival spaces and cartographic surfaces.

To begin with the second of these two points, and returning to the Code Maps of Chapter 4, these are also characterized by a synthetic geometry that dispenses with an *a priori* surface and, by means of this, with cartographic modes of reason and representation. In other words, there is a very precise fit and, whereas the connections between abstract art and alternative geometries in the early twentieth century can only be charted as an exchange of ideas between artists and geometers, in the Code Maps of locative media, non-Euclidean geometry is not just an 'influence', but can be identified as a constituent of the work and in many cases as the 'engine' by which relations are mapped[168]. As Thrift notes, while the 'idea of spaces that fold and flow is hardly a new one, [...] *enhanced calculation* [has allowed] all kinds of entities which could be imagined but not actualized finally to make their way into the world' (2004: 594, my italics). The non-linear processes of Object Oriented Computing, Artificial Neural Networks (ANNs), Self-Organizing Maps (SOMs) and 'particle systems' of visualization, all work with synthetic geometries as their mapping of relations does not take place within the 'numbered and angled space' of a pre-existing field of co-ordinates (Thrift, 2011: 148). As Awan and Langley put it, writing about their use of ANNs and SOMs, 'there is no field on which inputs are distributed' (2013: 7). While surfaces of one form or another are produced, these emerge from the on-going process of mapping and are not the flat plane of two-dimensional Euclidean geometry, but the curved and multiple surfaces of a Riemannian geometry that incorporates higher dimensions. This facilitates the mapping of complex phenomena that could not be conceived of within a gridded

---

[168] It should be stressed, however, that in the Code Maps of locative media, Euclidean geometry does not entirely disappear but, rather, is supplemented by these other geometries. For example, although Awan and Langley's mapping of relations with ANNs takes place in a non-Euclidean space, their use of architectural plans and elevations in visualizing these outputs takes place within a Euclidean space.

Euclidean space. Awan and Langley, for example, turn to Artificial Neural Networks specifically because of their capacity to handle higher dimensions of data and this allows them to map relations, not just between time and location, but also intensities of feeling. The synthetic geometries of code allow the mapping of a wider array of possible (and seemingly impossible) relations, and since there is no prior-existing grid within which to figure these relations, 'position' and 'proximity' become relational and multiple.

However, mapping beyond cartography involves more than just the rejection of an *a priori* surface. If, just as in non-Euclidean geometry, there is no field of co-ordinates within which to affirm positions, calculate distances and plot directions, then this raises a question about just where to start from and how to proceed. It refocuses attention on the 'if' propositions that Euclid took to be axiomatic, Kant saw as innate, and which the analytic surface made redundant. What it calls for is a re-examination of the *intuitions* that supply a basis for understanding the world *and*, along with this, an exploration of the possible *forms* it can take. In the case of non-Euclidean geometries, for example, Euclid's fifth 'parallel postulate'[169] is no longer accepted as axiomatic and is replaced by various (non-axiomatic) postulates that allow parallel lines to bisect in various ways, leading to the possibility that space may be curved rather than flat and consist of higher dimensions. The production of a non-Euclidean space, in other words, requires the invention of both new *intuitions* and *forms*: if' the intuition is that parallel lines may cross, 'then' *this* is the form that space takes. Likewise, to take the case of Awan and Langley's mapping of migrant territories,

---

[169] In essence, the fifth postulate asserts that parallel lines remain at a constant distance to each other, even if extended to infinity. Non-Euclidean geometries replace parallel lines with lines that either curve away ('hyperbolic geometry') or towards ('elliptic geometry') each other.

'if' space consists of multiple planes and higher dimensions that include, for example, 'intensities of relationships' (2013: 12), 'then' *this* is the shape that a migrant's micro-territory may take.

However, it is in the nature and handling of the relationship between intuition and form that the Code Maps of Chapter 4 and the mathematical project of non-Euclidean geometry diverge. Whereas the intuitions of non-Euclidean geometry consist of a singular abstract proposition that results in a singular and stable *ideal form*, these maps operate with a much looser, evolving, and mutable sense of both intuition and form. The once-and-for-all 'if' that might supply an alternative ground for knowledge, and, in doing so, definitively answer Olsson's question about 'what to do instead' (1998:149), is replaced by an experimental 'what if?' that ceaselessly invents and reinvents both novel forms and 'new forms of intuition' (Thrift, 2004: 584). Moving beyond analytical calculation to synthetic 'qualculation' (Thrift, 2004), the non-linear operations of code provide the motor for this invention: driving an on-going process of synthesis in which intuition and form are folded into one another. These processes, rather than supply an alternative ground for secure knowledge, produce a 'movement-space' in which the ground is set in continuous motion and through which, like the wayfarer, it is only possible to 'know as we go' (Ingold, 2000: 230). A fixed epistemology is thus replaced by multiple and shifting ontologies in which forms take shape through movement*;* not, however, movement within a field, but forms that *are* their own field or, as Langley puts it, 'a map of themselves' (in Awan and Langley, 2014). Thus, just as Thrift asserts, we have entered 'an era in which <u>forms are being rethought as journeys</u>' (2014: 55, original emphasis).

However, I want to hold onto the idea that a geometry, of sorts, still underpins such journeys, and I now consider how the perpetual invention of intuitions and forms that is found in Code Maps might be conceived of as a 'living geometry'. What this provides is another way of thinking through the lived/abstract dichotomy that is fundamental to cartographic reason and representation and which, as I have already argued, is dissolved in the post-cartographical mapping of Code Space.

5.4.3 Living Geometries

In order to address the geometry that is at work in the dissolution of the lived/abstract dichotomy, I now turn to the work of philosopher John Rajchman (1998) who describes the interweaving of (lived) intuition and (abstract) form in terms of 'living geometries', or 'geometries of becoming' that he contrasts with the gridded geometry of Euclidean space. His arguments are particularly apt as they are geared towards architecture which, no less than the map, remains inhabited and can therefore no more afford a retreat into abstract ideal forms. By analogy with Code Maps, it might be stated that Rajchman searches for an architecture that, rather than fitting people into prefabricated boxes, fluidly takes form and shapes itself around people's lived practices. I will begin by aligning Rajchman's argument with those that have already been made concerning geometry.

Rajchman likewise sees geometry as intimately tied to the philosophical project, arguing that it was in Euclid's geometry that philosophers found 'a whole model

of knowledge' (Ibid: 96)[170]. Rajchman thus conceives of 'other geometries' not just as alternative mathematical models but as '*ways of knowing* that do not fit the Euclidean model' (Ibid: 101, my italics). He distinguishes between 'effective' and 'affective' spatial dispositions, which each have their own kind of geometry. The first, essentially Euclidean geometry[171], 'tries to insert movements, figures, stories, activities into some larger organization that predates and survives them', while the second 'seeks to release figures and movements from any such organization, allowing them to go off on unexpected paths or relate to one another in undetermined ways' (Ibid: 91). Although couched in different terms, this distinction exactly corresponds to the 'analytic' and 'synthetic' geometries I ascribe to Cartography and Code, as the following passage demonstrates:

> [t]he first tries to draw all lines of our various geometries from the *fixed points of a prior system*, while the second works through a more informal diagram that throws together odd features in *a loose intuition that creates its own points as it goes along* (Ibid: 92, my italics)

The maps of Code Space, through their use of 'fuzzy' and approximate computational processes, display precisely this quality of 'loose intuition', and do so, in part, through the way in which these processes draw on alternative geometries: for example, in Awan and Langley's use of ANNs and SOMs to create points without resort to a pre-existing field. Thus, rather than being located *in* space, their subjects - members of the Turkish and Kurdish diaspora communities - produce their own territory *around* them. However, this conceptual shift is not simply a product of the novel geometries that are introduced by code. Rather, it is also in Rajchman's second, wider sense of

---

[170] This is clearly a reference to Kant's use of Euclidean geometry as a prime example of the synthetic a priori and consistent also with Olsson's view that an essentially Kantian cartographic reason is founded in geometry.

[171] Note that Rajchman conflates 'Euclidean geometry' with 'Euclidean Space' and thus associates it with cartography's gridding of space, wrongly identifying it with analytic geometries that rely on a pre-existing field of co-ordinates. However, if his use of 'Euclidean geometry' is taken to stand for the 'whole model of knowledge' that was built on it, and which includes the analytic surface of cartography, his interpretation of the significance of Euclidean geometry is entirely consistent with that presented here.

geometry - as 'ways of knowing' and 'spatial dispositions' - that we might also think of 'other geometries' operating within Code Maps.

Rajchman's discussion of these two ways of knowing supplies another way of thinking about an opposition that was introduced in Chapter 1 and developed by way of the case studies in Chapters 2 and 3, as well as helping to place the code maps of Chapter 4 in relation to this binary; that between what Rajchman terms a 'lived spatiality' and the 'ideal geometric figures' of abstract space (1998: 100). To take Husserl's formulation of this distinction: the 'mathematization of nature' (1970: 23) in the ideal forms of Euclidean geometry fails to fully capture a non-geometrical and non-mathematical 'life-world' - defined by Husserl as 'the spatiotemporal world of things as we experience them in our pre- and extra-scientific life', and in which these ideal forms are necessarily 'grounded' (Ibid: 138). What Rajchman argues, however, is that there are 'other geometries' that operate *outside* the lived/abstract binary. Neither, following Plato's Theory of Forms, is a 'real' circle a poor copy of an ideal circle, nor is an 'ideal' circle derived from that which is experienced phenomenologically, or intuitively, as 'vague essence' (Husserl, 1970), or as Rajchman nicely puts it, 'a "roundness" prior to any ideal circularity' (1998: 98). In other words, it is neither phenomenological experience nor abstract ideal forms that provide the grounds for knowledge in these 'other geometries'. Instead, 'vague essence' itself, intuitively derived, 'becomes the object of a geometry focused on concrete problems' (Ibid: 99). For Rajchman, these living geometries share 'a concern for indeterminate essences prior to contoured rectilinear ones, for dynamic or "emergent" properties rather than fixed or static

ones and an appeal to intuition with its anexact rigor' (Ibid: 100). He describes them in terms that tally closely with my analysis of Code Maps:

> "[o]ther geometries" […] require other ways of knowing that don't fit the Euclidean model. They are given by intuition rather than deduction, by informal diagrams or *maps that incorporate an element of free indetermination rather than ones that work with fixed overall structures into which one inserts everything*. (Ibid: 101, my emphasis)

In the Code Maps of Chapter 4, the real, and knowledge of it, is grounded neither in the formless 'essences' of the *life-world* nor in the abstract formalism of Euclidean space, nor any dynamic tension between or resolution of the two; as, for example, in the maps of Chapters 2, which attempted to insert 'non-geometrical' lived experience into the abstract geometry of the map. Instead, these other geometries - understood as both mathematical models and as ways of knowing - introduce what Rajchman terms an 'operative formalism' in which 'the issue is not what forms mean or represent but what they do, what they *can do*' (Ibid: 104). It is precisely this operative formalism that is to be found at work in the Code Maps of Chapter 4, and specifically in their use of Object Oriented Computing, ANNs and SOMs. For Rajchman, this is 'another kind of abstraction based not on isolating form, celebrating its purity or autonomy, but, on the contrary, on releasing it from the sort of spatial system that defines and fixes shapes, organizes visibility, ensures there will be no surprises' (Ibid). Works such as *Urban Fiction* and OPENKhana' s mapping of diasporic territories are premised precisely on this ability to change shape, to play with visibility and invisibility, and to produce surprises.

Rajchman's proposal for a 'living geometry' or 'geometry of becoming' can be further clarified in reference to the distinction that I have made between synthetic and analytic geometries - a distinction that Rajchman collapses by

lumping together Euclidean *synthetic* geometry and Cartesian *analytic* geometry[172]. To paraphrase Rajchman's argument in these terms: living geometries are clearly synthetic in that they both lack and eschew an *a priori* field of coordinates. However, whether starting from axiomatic (Euclidean) or non-axiomatic (non-Euclidean) presuppositions, a synthetic geometry need not proceed from a *foundational intuition* towards a static and fixed *ideal form*. Rather, in Rajchman's words, impure and dynamic forms may emerge from 'indeterminate essences' that are 'intuitively derived' (Ibid: 100). In these *living geometries*, then, intuition and form become inseperably enfolded in an *ongoing process of invention* that dissolves the opposition between *lived* intuition and *abstract* form.

Living geometries can additionally be distinguished from analtytic and synthetic geometries according to the way in which they treat the zero point. In analytic geometry, the zero point or *Origin* is pre-ordained; while in synthetic geometry, it is freely selected as *a* starting point from which to proceed. However, a living geometry perpetually invents *and* continuously inhabits its own zero point; a mobile, nomadic zero that is both *Origin* and *destination* at once. To bring this back to practices of mapping and navigation: Code Maps neither navigate a route in reference to a fixed point of origin (0°, 0°), nor triangulate directions and distances from a synthetic starting point ('0') but, rather, find their way *as they go along* - just like Ingold's wayfaring line but by means of what Thrift describes as a 'phenomenology machine', in which 'feeling and the abstraction of calculation are threaded together' (2011: 14).

---

[172] See previous footnote.

In summary, this discussion of the role of geometry in maps (and art) has allowed me to provide a more precise description of the transformation from Cartography to Code, and particularly to account for the way in which the lived and abstract become folded together in Code Space. This collapsing of the lived/abstract dichotomy, now couched in terms of a 'living geometry' that finds its way along by means of a generative synthesis of intuitions and forms, also has profound implications for discussions of the changing nature of power, and it is to these that I now turn. What this also allows me to make clear is that Code Space, far from being a distant land that has been explored by only a handful of artists, is now as close-to-hand as the 'smart' devices with whose maps we now routinely find our way around. If the Code Maps of locative media do mark it out as an *avant-garde* movement, then Google Inc. and others were not far behind.

5.5 The Power of Code

The break with cartography that is witnessed in the Code Maps of locative media is also a break with a top-down mode of power. As discussed in Chapter 1, the cartographic map affected an abstraction and rationalization of space to produce an apparently neutral view from which the overseers of that striated space, chiefly the state[173], could discipline subjects, assert ownership rights, trade commodities, delineate borders and expand territories. By contrast, these living maps, with their living geometries, do away with a singular panoptical view, with fixed positions, with clearly demarcated territories, and a metric ordering of space into equivalent units. Instead, they conduct 'an

---

[173] Though it should be noted that cartography was also an important tool for supra-national commercial bodies like the East India Trading Company. See, for example, Jerry Brotton's account of Joan Blaeu, official cartographer to the VOC (2012: 260-293).

experimentation in contact with the real' (Deleuze and Guattari, 1987: 21) that thrives on difference, invention and an open-ended exploration of the possible, suggesting that, now freed from the strictures of cartography, they are rich with radical potential. Those who were once mapped may now map their own spaces and perhaps the course of their lives. However, as Deleuze and Guattari warn, in writing about the kind of fluid, nomadic, non-metric spaces that these maps work with:

> smooth spaces are not in themselves liberatory. But the struggle is changed or displaced in them, and life reconstitutes its stakes, confronts new obstacles, [...] switches adversaries. Never believe that smooth space will suffice to save us' (1987: 500).

Returning to the issue of 'power' which is central to discussions of both maps and works of locative media, I consider an altogether more dystopian vision in which liberation from the constraints of cartography leads, not to creative, political and personal freedom, but to the institution of new forms of control that operate by the very means that seem to promise this freedom. Just as the map persists beyond cartography, so too does the 'the power of maps' as it continues to create and mark out territories, and elicit performances of territory, that serve powerful interests. However, Code Space changes what it means to map and, along with it, 'the power of maps' is changed. To distinguish these new forms of power, and to highlight the role of code in mapping them, I instead refer to 'the power of code'.

5.5.1 Control

The context for this argument about the changing nature of power is familiar enough and was also briefly sketched in Chapter 1. In Foucault's terms, it is a shift from the governmentality of 'discipline', involving the regulation of populations by way of a 'standardizing, identificatory, hierarchical

individualization' (2008: 261), to one of 'environmentality', in which the public is managed by modulating its environment. Government becomes the art of 'knowing what relations of proximity, what type of storage, circulation, mapping [...] and classification of human elements should be adopted in a given situation to achieve a given end' (Foucault cited in Elden, 2001: 116). For Deleuze, building on Foucault, these are 'societies of *control*' in which *modulation* takes the form, not of a 'mold' but 'a self-deforming cast that will continuously change from one moment to the other' (1992: 4), or what Deleuze tellingly describes, in relation to the previous section of this chapter, as 'a system of variable geometry' (Ibid). Alternatively, this shift is described by Lash as movement away from an *extensive*, hegemonic, 'power over' to an *intensive* 'power from within' (2010: 132). Power is thus no longer epistemological, but ontological in nature as 'it enters into us and constitutes us from the inside' (Ibid: 139). It takes its legitimacy not from hegemonic *representations* but through the 'profane banality' of everyday *communications* (Ibid: 144) that amount to 'the mediatization of life itself' (Ibid: 149). In writing about the societies of control, Deleuze had already noted that 'what counts is not the barrier but the computer that tracks each persons position [...] and effects a universal modulation' (1992: 7). For Lash, intensive power may now be described as 'cybernetic power' (2010: 146) since, in an age of ubiquitous computing, 'power is increasingly in the algorithm' (Ibid: 150), or, as Galloway puts it, 'calculation, math, algorithms, and programming are precisely coterminous with quotidian human experience' (2013: 360). In other words, power now operates, not from above, but through coded operations that are part of our everyday lives.

If these accounts of the changing nature of power are accepted, and they

certainly resonate with the shift from Cartography to Code that is witnessed in the maps of locative media, then many works of locative media that claim to be doing something liberatory have missed their mark since, to paraphrase Deleuze and Guattari (1987: 500), the stakes, obstacles and adversaries of struggle have all changed. An abstract *power from above*, wielded by states and administered through military technologies of war and surveillance, has been replaced by *control from within* through the modulation of lived experience, by multinational corporations as much as states, and administered through intelligence-gathering, continual monitoring, and computational protocols. In short, it is a scenario in which power operates not through fixed and stable structures (such as those inscribed by cartography), but through perpetual instability and movement (such as that witnessed in the Code Maps of locative media).

However, the role of maps and mapping in most of these accounts of power is at best a metaphorical one[174]. The problem has been that, while it is not difficult to make the connections between cartography and, say, the kind of disciplinary *biopower* that Foucault talked about - this being quite tangible in maps that govern populations by charting disease and poverty, for example -, it has been harder to identify maps that epitomize 'control' and, in any case, easy to assume that maps have no life beyond cartography. What this research adds to these accounts, then, through its discussion of post-cartographical mapping practices, is the possibility that maps not only reflect these changes but may also be instrumental in bringing them about - that maps literally, and not just metaphorically, *lay the ground* for new forms of control.

---

[174] See, for example, Deleuze's description of the 'diagram' as a 'map' of these new power relations and his depiction of Foucault as their 'new cartographer' (1988: 21-38).

5.5.2 Territory

One way to consider 'the power of code' is in terms of the kind of territory that is produced by Code Maps. The cartographic map presented a fixed representation of a fixed territory - a space ordered by categories and equivalencies and arrayed upon a surface. This representation served well to establish territories in which populations could be both disciplined and mobilized to defend their borders, and from which colonies could be claimed, resources identified, and trade conducted around the world. It has been argued that the break with cartography that occurs in the Code Maps of locative media chiefly consists in the way that they disrupt this cartographic surface and, with it, the idea of territory as fixed, stable and bordered. These are essentially maps without a surface, or at least in which surfaces are only brought into being through the on-going process of mapping and which present themselves not as fixed entities, but as mutable, multiple and richly layered. These maps take shape around their inhabitants as both map and map user find their way along, providing only a provisional sense of orientation that arrives just in time to make the next step forward, but cannot point to a final destination. Territory, then, unfolds as the outcome of a mutual performance by code, map and inhabitants and is therefore always 'a rolling composition' (Thrift, 2012: 151). Moreover, because of the way in which the lived and abstract are seamlessly threaded together, the map becomes, more than ever, co-extensive with the territory. In post-cartographic mapping, there are no fix-points or scales, and no representational surface, with which to measure accuracy against an external reality. The map, always on the move, can only be *inhabited*.

In other words, these maps produce new forms of territory, and do so (as has already been extensively demonstrated) in ways that conform with Thrift's description of 'movement-space' and the 'inhabitable maps' that chart this space. While Thrift has been careful to leave open the possibility that artists working with maps may provide 'means of questioning the world rather than just asserting it' (2014: 59), his analysis largely attests to the continuing power of the map as a means of 'explicitating [sic] new lands that are then there for the taking' (Ibid: 58-59). Although the nature of space and its mapping is radically altered, the map may continue to serve powerful interests:

> we might see the inhabitable map as a new version of the imperial map but one in which the maps are not just means of colonisation but the colonisation itself. The inhabitable map produces both a knowing, empowered imperial audience and its subjects. [...] [I]n the contemporary era, maps take on a different quantity, measuring out territory that is continually on the move, thus rendering the imperial impulse a more flexible entity in which territory can be temporarily held - on a permanent basis. (Ibid, 2011: 9-10)

For Thrift, these 'proto-territories' are akin to 'land' and can be treated as naturalistic environments in which both new 'crops' and new forms of tenancy can be cultivated. It amounts to a 'new round of enclosures' but 'without fences or hedges or walls' and which 'aims not so much to close off as to continuously colonize a moving field, asserting ownership over the process itself' (Thrift, 2012: 155). In particular, the tilling of this 'continuously migratory land' (Ibid: 143) produces high yields of 'ideas and affects' that provide cognitive capitalism with a 'new means of extracting surplus and thereby turning a profit' (Ibid: 155). This harvesting of invention and desire relies on producing a space that 'can work one small step in front of the moment in order to be able to charge the moment up with favourable ideas and affects' (Ibid: 157). It also relies on the production of 'mobile and flattened identities' and collective identities that can be sold on as commodities and thus be 'folded into the landscape' (Ibid: 159). It

372

is, in short, '*becoming put to work*' (Ibid: 151, original emphasis).

5.5.3 Maps

The 'inhabitable maps' of locative media, in which flexible and relational senses of position and territory emerge, from moment to moment, out of the mutual performances of the map and its inhabitants, might cynically be seen as pioneers of this 'continuously migratory land' and therefore instrumental in its colonization. Liberation from the strictures and categories of cartography results not in a freeform exploration of possibility, but, rather, in an unwitting prototyping of new spaces of economic governance and the moulding of subjects fit to inhabit them. In this dystopian view, their production of 'moving, relative location' (Thrift, 2012: 144) appeared to offer liberation from the power of maps, but turns out to be mapping the grounds for new forms of exploitation, fulfilling Andreas Broeckman's depiction of locative media as 'an *avant garde* of the "Society of Control"' (2000: 167).

The links between industry, government and artists working with locative media were briefly outlined in Chapter 1. These have consisted of privately and publically funded collaborations, often involving university research groups, in which a 'sandbox'[175] experimentalism is harnessed to the good of the 'creative economy'. Certainly, a political economy of locative media that explored these links might be a fruitful avenue for future research, but regardless of these, it is clear that locative media has been seen as a source of inspiration for the

---

[175] Originally a term for testing or experimenting with computer programmes, the term 'sandbox' has been adopted by a number of new media research groups to denote an environment in which serious play is central to the creative process. It is used, for example, by the Bristol-based REACT Knowledge Exchange Hub for the Creative Economy as a title for publicly-funded collaborations involving artists, entrepreneurs and technologists, as well as featuring in the title of MIT's Sandbox Summit, which aims to foster the creative use of technologies by children.

commercial development of locative technologies and platforms. Tuters and Varnelis suggest that industry looked to locative media artists as 'prime movers' (2006: 359), and several artists interviewed for this research attest to the interest that, whether welcome or not, commercial concerns took in their work. Pete Gomes, for example, says that 'when the locative media thing was at its peak [...] all those companies were super aware of what everyone was doing, they were sniffing around, [...] they were funding stuff, that was the point when politically it all got really messy' (2014). It may be the case that, as Thrift suggests in reference to developments since Pop Art, 'art does not simulate commerce so much as commerce simulates art' (2012: 144). It is not surprising to find, then, that the experimental Code Maps of Chapter 4, so alert to their radical potential, already have well-established counterparts in commercial location platforms such as Google, Facebook and Foursquare.

An analysis of the maps and databases that underpin these location platforms reveal them to be reordering social relations and spaces to produce precisely the kinds of territories that Thrift describes, and which he sees as central to a new form of control. To take Google Places as one example, Carlos Barreneche has meticulously examined the parent company's registered patents to unpick the way in which Places manufactures new senses of position and proximity that are premised on movement and which are topological rather than topographical. In essence, Places collects and sorts geo-tagged information from disparate sources to produce a 'points of interest' database that algorithmically ranks 'places' according to a range of factors. This database underpins both Google's maps and search engine, and suggests points of interest that are 'relevant' to users' locations and search requests. However, the

ranking of 'places' by Google's patented PageRank system is 'not strictly geographical' and therefore does not necessarily point users towards what is nearest to them (Barreneche, 2012: 335). Amongst these 'non-cartographical attributes' (Ibid: 335), what counts most is the 'attention value' accorded to a place, as measured in real-time by mining the flow of information that is associated with it to extract and quantify 'mentions'. Other algorithms introduce an 'affective dimension' (Ibid: 336) by analysing online reviews to assess the qualities and strengths of feelings associated with a place and thereby produce a measure of 'sentiment'. Rankings are additionally personalized to match the user's preferences, based on their search history and the reviews, ratings and recommendations made by both them and their social network. In other words, the landscape that presents itself to mobile users of maps and local searches is not a fixed entity, tied to geographical location, but a landscape that shifts in real-time in response to collective and personal intensities of feeling. It is a landscape that is in constant movement and in which 'Place' (now a proprietary brand) must be continually performed through processes of checking-in, liking, reviewing and rating. 'Space' becomes 'movement-space' and introduces a new software-sorted geodemographics in which both 'place' and 'identity' are no longer about *where you come from,* but about *where you go*, or even, as Barreneche suggests, about *where you might be going*. The development of what Google call 'contextual discovery', in which there is *persistent monitoring* of a user's movements, habits and environment (Ibid: 344), would allow context and user-specific information and advertising to show up without ever being requested. In the words of Google's Vanessa Mayer, the company's goal 'is to anticipate what people might want [...] before they actually know it' (Siegler, 2010, quoted in Barreneche, 2012: 340). This is exactly the 'engineering of

propensity' that Thrift sees as producing a 'form of continuity which gains its phenomenal grip from ensuring that what should be an experience of dislocation is experienced as an intuitive plane of motion - always going somewhere' (2011: 8).

In other words, Google Places' treatment of space is uncomfortably close to that of the Code Maps produced by artists working with locative media. Location is unfixed from geographical co-ordinates and becomes relational as alternative senses of proximity are introduced. The map and its inhabitants are engaged in a co-performance that seamlessly weaves together the lived and the abstract. 'Places' become fluid, evolving and time-specific and yet collectives of 'like-minded' people (Google Inc., 2011, quoted in Barreneche, 2012: 338) may also share a sense of place. Personalization and 'contextual discovery' also results in the formation of territory around the user, producing a form of user-centric dead reckoning, rather than navigation across an *a priori* surface. This is 'wayfaring' the Google way, whereby corporations get a say in how 'new vistas open up and others are closed off' (Ingold, 2007: 87).

Locative media's art maps and commercial location platforms are also founded on similar computational processes. At the core of locative platforms, Barrenche isolates the 'k-nearest neighbour algorithm', a machine learning algorithm that is also used in Self-Organizing Maps like those employed by Awan and Langley in their mapping of diasporic territories. Again, it works with higher dimensions of data - allowing it to associate data inputs according to various measures of proximity, including both geographical and social - and then maps this into a space that it produces as it goes along, and according to multiple metrics and

coordinate systems. What it specifically achieves for location platforms is an *approximate* model of 'nearby' points of interest that combines multiple scales of proximity – both social and geographic. While all that might mean to the user is a short-cut to a recommended restaurant, Barreneche argues that it also institutes a 'geodemographic ontology' that reorders people and spaces. It may, for example, affect property prices and create areas of privilege and deprivation - places that prominently feature and places that fall off the map (2012: 346). It may also, despite a rhetoric of exploration and serendipitous encounter (Ibid: 344), lead to homophilly and a narrowing of worldviews (Barreneche, 2014: 10). As Matthew Fuller and Andrew Goffey put it, 'actions predicated on the basis of topologically abstracted patterns of data' may end up 'enacted into existence' (2012b: 327). There is, then, as Barreneche says, a need to 'interrogate the moment when computational logics may translate into cultural logics, or vice versa' (Barreneche, 2014: 14).

Quite so, except that, from the point of view of this research, that translation is precisely the point at which *mapping* takes place. Barrenche sees code's spatial ordering via algorithm as productive of 'cluster diagrams' that then inform things that can properly be considered as maps, but to mobile users of Google maps, that cluster diagram *is* the map. It is what orders their experience of being in space - an increasingly *personalized* space in which 'points of interest' are arrayed, not across a metric plane, but around the user, anticipating and prompting their next move by manufacturing serendipity. Despite the map's cartographic veneer, what it increasingly facilitates is not point-to-point navigation across a homogenous and isotropic plane but a means of wayfinding through affective territories that shift and flow like atmospheres - like weather.

However, these maps not only forecast the weather, but create it (Thrift, 2012: 161). In the hands of Google and other location platforms, the artistic exploration of difference and possibility through the creation of new senses of orientation and forms of territory becomes geared to social control and the extraction of profit. Ontogenesis *is* the new ontology and, without 'new weapons' (Deleuze, 1992: 4) to fight it, 'Lifeworld Inc.' threatens to become the only reality.

5.5.4 'New Weapons'

It had been hoped, not least by artists using locative media to create new forms of maps, that breaking free of cartography and the old order of political power it instituted would be liberation enough, yet it is in the shift away from the sure ground of cartography that the nature of power has also changed. In a scenario in which invention and creativity are the means by which control is achieved, it becomes difficult to judge whether artistic interventions designed to open up possibilities are not also, at the same time, expanding a form of control that depends on such innovations.

That is not to doubt the radical intentions of some of these works. Gemeinboeck's *Urban Fiction* aims not at a geodemographics of consumption and control, but rather explores how geodemographic differences create tensions and compressions within the fabric of a city that may pull it apart. Similarly, Awan and Langley's mapping of diasporic territories is seen as an exploration of difference and a weapon against the homogenizing effects of urban redevelopment. However, to the extent that these works also sow the seeds for a 'continuously migratory land' (Thrift, 2012: 143) that others may

378

then harvest, they may indeed be operating as 'an *avant garde* of the "Society of Control"' (Broeckmann, 2000: 167). In other words, beyond cartography, locative media continues to struggle to define a radical project that would unambiguously set it apart from the modes of governance that it ostensibly opposes. As maps change, so does the power of maps, and with it, necessarily, 'the struggle is changed' (Deleuze & Guattari, 1987: 500).

Lash (2002; 2010) pins down the nature of this change particularly well, noting how the struggle against hegemonic (or epistemological) power was always conceived of in ontological terms by aligning itself with the unrepresentable - the real, the lived, the everyday and tactical. However, in the shift to non-hegemonic power, '[i]nstead of the ontological being only a site of resistance to such abstract power, it now becomes an apparatus of domination itself' (Lash, 2010: 135), and therefore leaves 'no outside space [...] from which critical reflection can be launched' (Lash, 2002: vii). The 'lived', in other words, once stood outside the cartographic map and so offered a place from which to critique it - to point to its failures - but now the map has come down from its perch and is living amongst us. The Code Map not only lays claim to 'the lived' but thoroughly colonizes it. Locative media begins by asserting that 'the map is not the territory'[176] but, because of the way it renegotiates what counts as 'territory', it ensures that, perhaps more than ever, map and territory are coextensive. As Lash puts it, '[t]here is no escaping from the information order, thus the critique of information will have to come from inside the information itself' (2002: vii).

---

[176] An assertion that is still regularly made in the field of locative media and participatory mapping. See for example, an article by Chris Speed that carries this mantra as its title (Speed, 2011) and its use in the title of a 2014-15 seminar series run by East London based Living Maps (livingmaps.org.uk).

The question then becomes: what wiggle room might be left to mount radical challenges from *within* this *enclosed* space? Locative media's strategy of 'counter-mapping' in which alternative and oppositional spaces are *invented* becomes problematic since it is the process of invention itself that is owned and controlled (Thrift, 2012: 155), and, specifically, as Galloway (2006) argues, by means of computational 'protocols' that serve as an underlying grammar for that control. Indeed, these protocols might be seen as functioning in much the same way as the protocols concerning meridians, professional standards and international compatibility that paved the way for a scientific cartography. On the other hand, Thrift argues that this new form of capitalism is founded on instability and an open-endedness that cannot be 'exactly controlled', suggesting that 'there is a political moment here, if only it can be seized' (2012: 161). If, as Thrift suggests, 'control' is analogous to weather forecasting (Ibid), it might yet be possible to kick up a storm. In the words of Deleuze, '[t]here is no need to fear or hope, but only to look for new weapons' (1992: 4). What those weapons might be is a complex issue and one that has been much written about[177], including discussions of 'cartographical' tactics[178]. Here, just a few brief thoughts that arise directly out of the research are added to this debate.

---

[177] See, for example, Galloway (2006), Thacker and Galloway (2007), Deiter (2011), Wark (2004).
[178] See, for example Cobarrubias and Pickles (2009).

The first thing to note is that the idea of counter-mapping[179] remains a useful one, albeit that this counter-mapping would not be counter to Cartography but to a new set of conditions - those of Code Space. Algorithms can be put to work in different ways and the speculative 'what if?' proposition remains a powerful one. The space of Google, for example, might be contested by starting out from a different set of presuppositions, intuitions or values to generate alternative 'points of interest'. This kind of counter-mapping is explicit in the work of Awan and Langley, for example, who see their mapping of diasporic territories as a direct response to the work of the UCL Space Syntax Laboratory, and its commercial arm, Space Syntax Ltd. Essentially, Space Syntax is a computational modelling of spaces on the basis of 'shedviews'[180] in order to maximize efficient *wayfinding* (the term they employ). It offers a 'science-based: human-focused' (Space Syntax, n.d.) method for anticipating the ways in which people will move through a space and thus a means of engineering propensity into those spaces, with an eye to maximizing their commercial value:

> Space Syntax works to de-risk property investment decisions, showing how the spatial layout of places can be optimised to enhance the social, economic and environmental value of developments. (Space Syntax Limited, n.d.)

Awan and Langley's discomfiture with such an approach to urban planning is that it treats all people alike and therefore tends towards a rationalization and homogenization of space (2014). In response, they take (more or less) the same computational framework and repurpose it to highlight difference and the multiple nature of territory. As was suggested in the analysis of their mapping offered in Chapter 4, such an intervention might be seen as an example of the

---

[179] 'Counter-mapping' was coined by Nancy Peluso (1995) as a strategy for affirming indigenous land rights but has since been used to describe any use of maps to counter dominant power structures.
[180] The field of view made of clear sight-lines from any particular point within a space and which suggests possible paths.

'cultural probe' that Thrift sees as having a 'mission to provoke awareness in untoward ways in order to produce new means of association' (2011: 5). Certainly, Thrift sees 'the work of that legion of artists who are using the map to inspire new forms of mapping, diagramming and wayfinding' (2014: 58) as being exemplary of interventions that:

> [...] change the terms of trade by representing space in different ways which play with boundary and technology in order to create not just [...] new bearings [...] but new canopies under which alternative urban cultures [...] can be nurtured and allowed to thrive precisely because of their speculative diversity. (Ibid: 56)

However, while Awan and Langley's aim is, in the manner of a 'cultural probe', to produce 'uncertain outcomes' (Thrift, 2011: 18) that challenge the homogenizing certainty promised by Space Syntax, there is a need also to be mindful of a capitalism that thrives on uncertainty, innovation and difference and is primed to feed off it. There is nothing to say that Awan and Langley's mapping might not be recycled as a novel tool of targeted marketing, for example. Under these conditions, one needs to be circumspect about just what one is pioneering and astute in judging whether one is really going against the flow or just being swept-along by it, and so, for some, the only possible resistance is either to 'drift' or 'drop out'. Thacker and Galloway, for example, recommend that 'future avant-garde practices will be those of non-existence' (2007: 136), perhaps as a purposeful dropping *off the map* in the manner of Hakim Bey's Temporary Autonomous Zones, or Susan Härtig's *Disconnected*, consisting of 'a territory-tent' that insulates its inhabitants from all electronic communications - a nomadic architecture that, ironically, creates a static enclave within a world of flows (Lemos, 2010: 406). Alternatively, Lash identifies a 'strategy through movement' that sees a return to something like Debord's

practice of the *dérive*: 'The response to domination through interactivity is the "interpassivity" of drifting' (Lash, 2010: 146).

Much academic writing on this enclosed post-hegemonic environment also appears content to (more or less) passively drift *within* its ecosystem. To pick on just one example, Fuller and Goffey's *Evil Media*, finding no other way to proceed, immerses itself in a murky world of 'gray zones' (2012: 11-13), tentatively following the 'dimly sensed links' (Ibid: 4) and 'atmospheric qualities' (Ibid: 12) that flow through them in the hope of stumbling upon 'opportunities and affordances' (Ibid: 8), but recommending no course of action other than a 'discrete unobtrusiveness' (Ibid: 23). Their reluctance to rise above the grey mist for a clearer view is understandable, but even in a world without the surefooted sense of grip that cartography once provided, I want to suggest that there are other ways by which to find some sense of orientation. In unfamiliar territory and without a map, the wayfarer draws on the tales of travellers who have gone before, surveys the shape of the landscape with an eye for landmarks, builds cairns where there are none, and eventually learns how to triangulate between them and make some kind of map –whether cognitive, sketched or plotted. In a situation in which the maps we increasingly inhabit subject us to a form of colonization, there seems no alternative but to 'map or be mapped'[181]. This research is one attempt to do that, and does so, like the wayfarer, with the aid of histories, landmarks, the building of cairns, and the use of triangulation. The history of cartography provides one reference point, the tangible remnants of which permeate all maps of locative media, while other

---

[181] The call to 'map or be mapped' is associated with indigenous counter-mapping practices as a post-colonial tactic in, for example, asserting land rights. See, for example, Bryan and Wainwright (2009).

clues to orientation are to be found in some of the hazily remembered practices that preceded it, and in the path taken by modern art as it turned away from representation. The landscape is not featureless but littered with recognizable forms and geometries, while the speculative 'cairn' of Code Space, built stone by stone, provides a second landmark from which to begin triangulating positions and mapping the territory of locative media. The certainties of cartography are gone, but all is not lost. What it requires, though, is a different means of travelling.

Conclusion

In seeking to reframe the discussion of locative media and re-evaluate its significance, this research has roamed far and wide, venturing into the territories of philosophy, cartography, geography, geometry, art history and software studies. The primary aim of this conclusion is to return to the more narrow study of locative media, spelling out how the research reconfigures its key debates and reevaluates its significance. However, ahead of that discussion, I want to assess what the research contributes to other fields, and how it might be further developed.

Throughout the thesis, its arguments have been brought into alignment with those from fields as diverse as software studies, human geography, philosophy and sociology that also attempt to account for the dissolution of a modern world and to understand what it is that replaces it. By situating the works of locative media in relation to this transformation, the thesis contributes tangible examples of the way in which space, power, knowledge, and representation are being reworked, not just in theory, but in practice. In particular, the research responds to Olsson's 'impossible question' about 'what to do instead' of cartography by pointing to the work of artists who, rather than falling into his 'abyss', demonstrate the possibility and the means by which activities of mapping may continue to provide a means of orientation (1998:149).

In insisting that what follows cartography remains no less spatial, the research also provides a corrective to accounts that have tended to downplay or turn

away from issues of space by highlighting phenomena such as communications networks that appear to be oblivious to it. The thesis argues that what is witnessed is not the demise of 'space', but of a peculiarly cartographic conception of space that nevertheless persists to the degree that it makes it difficult to imagine any other kind, and so precludes the possibility that what changes is the *way* in which space is conceived and encountered. Analysis of the Code Maps of locative media demonstrates the nature of this transformation and, by highlighting the role of code in it, contributes to a growing literature on the relationship between code and space that also affirms the essential spatiality of phenomena that have often been regarded as 'virtual' and thus aspatial. In short, that which fails to register on a cartographic map does not exist outside of space, but may require a different kind of map to establish its whereabouts.

By drawing attention to post-cartographical mapping practices and their production of non-representational maps, the research also throws out a fresh challenge to the academic study of cartography. Even in its most radical 'post-representational' form, the emphasis has been on what people do with maps. However, what is taken to be a map remains largely unchanged. Perhaps because maps were always presumed to be representational and therefore suspect, the 'performative turn' towards practices of map-making and map-reading[182] has also been a turn away from scrutiny of the 'the map' itself. This research suggests, quite counter-intuitively, that maps need not be representational and that, at least with respect to the Code Maps of locative media, where the map and map user are inextricably engaged in a co-

---

[182] See, for example, Kitchin, Perkins & Dodge, 2009.

performance, the separation of 'representation' and 'practice' is unhelpful and needs to be rethought.

The thesis draws heavily on the work of Nigel Thrift and the vocabulary with which he begins to describe a transition towards 'a new kind of world' (2011: 6). However, it also contributes to this work. In particular, the distillation of arguments about the changing nature of spatial representation into the language of geometry provides an alternative and perhaps more precise vocabulary with which to describe these changes. The research also significantly extends Thrift's discussion of maps. While he correctly identifies the activity of mapping, particularly by artists, as a key site in the production and contestation of novel apprehensions of space, his focus has been - in line with other non-representational geographers and post-representational cartographers - on what people *do* with maps, rather than on the changing nature of maps themselves. Even his highly suggestive 'inhabitable map', so apt to the Code Maps of locative media, often appears to be used as a metaphor, rather than to describe maps *per se*. However, the post-cartographical mapping practices that are addressed by this research supply tangible evidence of the instrumental role that maps play in pioneering new forms of space and territory.

The thesis also suggests something like a 'methodology', or at least a way of proceeding, when investigating post-cartographical conditions in which there is no prior field, no fixed point of reference, no scale of measurement by which to orientate the research, and therefore no secure ground from which to claim knowledge. It finds a model for this method in the post-cartographical mapping

practices witnessed in a number of its case studies, and particularly their return to a form of 'wayfaring' (Ingold, 2007). As was suggested in the Introduction, and again at the close of Chapter 5, post-cartographic conditions call for post-cartographic modes of investigation. The landscape has not been mapped out and so the work of orientation must begin again, from the ground up, but with an eye for landmarks, and a willingness to *synthetically* construct landmarks where none exist. Code space is just such a construction and, however imperfect, it does allow positions to be triangulated and, however sketchily, the works of locative media to be re-mapped.

I will shortly return to a discussion of this re-mapping and how it reconfigures the debates surrounding locative media and its perceived significance. Before doing so, and acknowledging that the research is only a provisional foray into what Olsson (1998: 145) describes as 'the lands not yet discovered', I would briefly like to suggest a number of directions in which the research might be further developed, and the case for its thesis strengthened.

In particular, it would be beneficial to study the political economy of the relationship between the art maps of locative media and the development of commercial location platforms, the possible connections between which have so far been mostly anecdotal. This might establish the extent to which locative media, even as it moves beyond cartography, remains entangled in issues of power, and therefore provide a better understanding of the constraints it may face in countering newly intensive forms of control. The need to reformulate oppositional tactics in response to 'the power of code' is a pressing one and has not yet been addressed within the field of locative media, which continues to

work with an outmoded model of where power resides, how it operates, and how to counter it. The task of rethinking what it means to 'counter-map', particularly through the production of experimental works, is a challenge that artists and researchers in the field might productively address in the future.

The thesis has suggested parallels between the code maps of locative media and an earlier *avant-garde*, as they in different ways dismantle the 'scopic regimes of modernity' (Jay, 1988) and experiment with novel intuitions and forms. This parallel has only briefly been sketched and deserves further study, and perhaps a more nuanced account. In particular, there is the suspicion that their 'breaks' with modernity, separated by a century, may be less distinct and more connected than has been suggested. Dalrymple Henderson, in the 'Reintroduction' to her work on modern art and the fourth dimension, traces a thread that passes through artists including Marcel Duchamp, Buckminster Fuller, and Robert Smithson to the computer visualizations of artists like Marcus Novak - all of whom are seen as 'keepers of the flame' of the fourth dimension and have, at the same time, consistently engaged with maps and cartography (Henderson, 2013: 35-90). By the same token, Rajchman (1998) demonstrates how the 'living geometries' with which I describe the Code Maps of locative media are also at work in the field of abstract painting, how these have been employed by artists[183] to interrogate the surface of the painting in much the same way that art-cartographers have interrogated the surface of projection, and how this has also led to a decomposition of figure/ground relations in which the canvass (like the surface of the map) becomes figurative in its own right.

---

[183] Rajchman focuses on the works of Jackson Pollock and Francis Bacon (1998: 61-70; 102-107).

Finally, and as also suggested by both Dalrymple Henderson (2013) and Rajchman (1998), the role of geometry in both mediating and understanding changes in the way in which the world is connected up and takes form seems worthy of further consideration. The attempt, in the final chapter, to restate the key arguments of the thesis in terms of geometry suggests that it may supply an elementary spatial grammar with which to identify and describe the kind of breaks and transformations that this research has sought to address across multiple fields (including art and cartography); one which is adept at locating commonalities and continuity as well as radical points of departure, both across and within these fields. Given the way in which geometry has been implicated in cartography's abstraction of space and thus often denounced, there is also something perversely appealing in being able to reclaim and repurpose geometry's reductive power in this way.

Having drawn some conclusions about the contribution of this study to wider debates concerning space, art, and mapping, and having suggested ways in which the research might be more fully developed, I shall now spell out how it *remaps* the field of locative media and the implications of this for its future study.

In a world of accelerated change in which the 'next big thing' eclipses the last without much time to take stock, there is a tendency in accounts of these developments to swing wildly between euphoria and disenchantment. A reappraisal of the significance of locative media, once ecstatically welcomed[184],

---

[184] For example, see Russell, 2000, 2003.

but quickly condemned as a failed experiment[185], appears to be currently underway, with a recent plethora of edited volumes[186]. Maybe now, in the second decade of the 21st century, there is sufficient distance from the birth (and supposed death) of locative media in the first to begin placing locative media within a wider historical context? Despite this potential, the majority of accounts to date, including those offered by the artists themselves, have remained firmly tied to a historically-specific way of seeing and thinking, the passing of which, and the role of locative media in its unraveling, has, as a result, largely gone unnoticed. The course taken by locative media has conventionally been plotted within a rigidly cartographic framework (with fixed reference points, scales and senses of position that supply a secure ground for knowledge) and this disallows the possibility that the framing of space (what we mean by space and how we negotiate it) is itself in flux. Thus, what is pictured as locative media's failure to open up new spaces is, in fact, largely the failure of these accounts to see that new forms of spatiality are emerging off and outside the cartographic map. They remain stuck within a cartographic frame, and cartographic notions of representation, reality, and power, that offer no view of what lies beyond it, or the role of locative media in opening up these novel territories.

This thesis has attempted to reframe the study of locative media by moving it beyond cartography in a number of ways and through a series of steps. Firstly, it focuses on maps, not just because they are central to locative media, but because they provide more or less tangible documents of the way in which

---

[185] See, for example, the contributions of Tuters, Thielmann and Shepard to the 2011 ISEA conference (ISEA, 2011).
[186] See Wilken & Goggin, 2015; Farman, 2014; Goggin & Hjorth, 2014.

artists working with locative media have conceived of space, regardless of the rhetoric that surrounds their work and which often contradicts this.

Secondly, it attempts to demonstrate the extent to which works of locative media, and the discussion of them, have been constrained by cartographic reason and representation, more fully exploring the consequences of this framing and exposing its historical specificity. In other words, it aims to expose a trap into which thinking about these works has fallen, and which prevents a fuller account of the way in which space, maps and the power of maps is changing.

Thirdly, having identified the constraints that Cartography imposes on these accounts, the crucial step has been in finding a way of moving beyond a Cartographic framework, and this has been achieved by constructing Code Space as a second reference point or landmark by which to triangulate a course and (re)position the works of locative media. The spatiality of code provides such a marker as it is increasingly the coded processes of computer software that are producing, or are allowing the production of, novel forms of spatiality and modes of mapping.

Fourthly, locative media is then positioned between Cartography and Code as a site in which their respective conceptions of space meet, mingle, and eventually part ways. Specifically, the use of GPS is seen as both a remnant of cartography and a product of, and susceptible to remoulding by, coded processes, and so locative media becomes a privileged site within which to

witness the shift from Cartography to Code and the new forms and senses of space that it ushers in.

By placing locative media in a broader historical perspective to reveal, however imperfectly, an epochal shift in ways of thinking about space, this novel framework radically reconfigures many of the debates surrounding locative media.

Firstly, the lived/abstract dichotomy that underpins so many discussions of locative media, and which valorizes 'the lived' as a means of thwarting the abstraction of cartography, is revealed to be integral to the modern cartographic project, and a distinction that becomes outmoded in the conditions of Code Space. As the lived and abstract become inextricably entwined, the issue is no longer about *what maps represent*, and the authenticity or otherwise of these representations, but about *what maps do* in the world, and the realities they invent. There is a need, then, to move beyond the representational epistemology that the study of these works has largely been caught up in.

Secondly, and following on from the above, the research calls into question the juxtaposition of 'real' and 'virtual' space that also characterizes many discussions in the field of locative media. It is, in any case, a distinction that has been eroded by an increasing awareness of the material nature and effects of 'virtual' processes, yet it retains some utility in the field of locative media where it continues to supply a handy means of distinguishing between space understood as physical geography, and the ability to 'overlay' this space with media content. In this, however, there is the thoroughly cartographic

assumption that this space precedes and takes precedence over other forms of space by supplying a ready-made, *a priori*, container into which all other phenomena can then be placed, or presented as a *layer* atop this reality[187].

Such an approach leaves the cartographic surface intact and unquestioned, with the result that what might better be understood as an ongoing transformation between spatial paradigms, in the way I have suggested, is reduced to the interplay between a *foundational* cartographic 'reality' and 'virtual' spaces that are subordinate to this reality, and therefore less real. The post-cartographical mapping practices identified by this study demonstrate how spaces that are layered and multiple, fluid and shifting, and invisible as well as visible, can be considered no less 'real', even though they defy representation within a cartographic surface. This cartographic framing of 'reality' was only ever an invention that arose at a specific juncture in history and in response to a particular agenda. Mapping *beyond* cartography requires stepping outside this frame to recognize how other spatial realities may be brought into being, and how these change over time and within a broader historical context.

Thirdly, the research also calls for a reassessment of locative media's relationship to power. Both the claim that locative media is complicit in imposing a 'hyper-rationalist grid of Imperial infrastructure' (Holmes, 2003), *and* the claim that it may resist such power by mapping from the bottom up, are equally outdated since they both assume that power continues to operate from above -

---

[187] A stark distinction between 'real' and 'virtual' has been has been significantly softened in a number of accounts: for example, by way of appeal to 'hybrid spaces' (de Souza e Silva, 2006), or 'mixed realities' (Benford and Giannachi, 2011), or a 'continuum' that runs between the real and the virtual (Milgram and Kishino, 1994). However, implicit even in these more sophisticated accounts, is an assumption that physical or geographical space (as figured by the cartographic map) remains the foundational reality, a largely unquestioned benchmark against which other realities are then measured, and from which they more or less deviate.

hegemonically rather than ontologically, extensively rather than intensively (Lash, 2010). The power of code is quite different to the power of the cartographic map and calls for different strategies. Whereas the radical response to hegemonic power was seen to lie in the lived performance of place, ontological power now operates precisely through such performances. As a result, many of the works that espoused such a response may have unwittingly pioneered novel forms of control, and the challenge now is to formulate strategies that are better suited to changed conditions. Counter to current orthodoxy, such strategies may rest not on mapping from below, but in finding some high ground - or, rather, synthetically constructing such a position - from which to get a clearer view and identify a course of action.

This reworking of some of the main areas of debate within the field of locative media demands a reassessment of its significance; one that is both harsher than the early euphoria with which it was greeted and more forgiving than the cynicism with which its early demise was pronounced: 'harsher' because the research finds many works to be more fully trapped in cartographic modes of seeing and thinking than their creators would like to think; and 'more forgiving' because the research also identifies works of locative media that are more genuinely innovative and historically significant than the field's detractors would have us believe. The problem has been that both the perceived promise and failure of locative media are derived from and hidebound to a view of the world that is narrowly prescribed by modern cartography. Thus, what is perceived as its failure to inject lived experience into the abstraction of the map in order to more adequately represent the world and counter top-down forms of power is also a failure to think beyond representation, a failure to acknowledge the

changing nature of power and lived experience, and also a failure to recognize that 'the lived' is itself a product of cartographic abstraction.

By reframing the study of these works, it is possible to see them in an altogether different and perhaps more positive light. Artists making maps with locative media embark on what appears to be a fool's errand. They persist in engaging with a cultural form that is so obviously a product of and tainted by modernity, but never losing hope that they may one day make the map their own. Indeed, many of the case studies demonstrate the immense grip that cartographic reason and representation continues to hold. Nevertheless, this sustained experimentation eventually leads to a radical reworking of what a map is, and what it can do, that marks a decisive departure from ways of seeing and knowing that have stood for more than four hundreds years, the significance of which is comparable to the 'seismic break' achieved by non-representational abstract art (Denil, 2011: 21). Locative media did not just lose its way, but eventually invented other ways of getting about. Working with the novel intuitions, forms and geometries that arise from the operations of software code, they pioneer new senses of space and orientation and roll out novel forms of territory that sweep aside modern understandings of knowledge, representation and power. Although locative media has always been a small and specialized field, with little obvious public impact, there is a growing appreciation that its quirky little experiments paved the way for the development of commercial location platforms that increasingly mould and modulate social, political and economic life[188]. In the hands of multinationals like Google, the Space of Code, the maps that chart it, and the forms of power that accompany

---

[188] See, for example, Barreneche, 2012; Wilken, 2012; Tuters & Varnelis, 2006.

it, are fast becoming the new reality. The escape from entanglement in cartographic forms of top-down power does not automatically result in the kind of liberation that some might have hoped for. However, the Code Maps of locative media also begin to suggest new, and much needed, modes of counter-mapping.

Many other and more able writers have addressed similar processes of transformation to those I have tried to describe, and certainly locative media is not the only site in which these processes may be observed and understood. However, it is a hugely significant one that has thus far been overlooked because of the way in which it was hastily written-off as politically dubious and anachronistic. The true significance, poorly understood, is that locative media engages so directly and persistently with a cultural object that, if Farinelli (1998) and Olsson (2007) are to be believed, is the blueprint for and cornerstone of modernity. Not surprisingly, the struggle to remake the map anew is littered with blind alleys and failed attempts, but what finally emerges from this process of experimentation is truly momentous and extra-ordinary. The Code Maps of locative media take hold of that cornerstone and prise it from the edifice, bringing tumbling down along with it notions of representation and knowledge, and senses of space and place, that have stood for centuries. Yet something endures. As the dust settles, these tenacious artists are still holding onto a map: a map that fundamentally alters the territory and the task of finding ones way about, but nevertheless still *a map*.

Bibliography

Albert, Saul (2004). 'Locative literacy - four locative micro-rants'. [online] April 27th 2004. Available at: <http://www.crumbweb.org/discItemDetail.php?& useArch=1&arch ID=347&op=2&sublink=1&fromSearch=1&> [Accessed 10th April 2013].

Alpers, Svetlana (1983). *The Art of Describing: Dutch Art in the Seventeenth Century.* Chicago: University of Chicago Press.

Alt, Casey (2011). 'Objects of our Affection: How Object Orientation Made Computers a Medium'. In: Erkki Huhtamo & Jussi Parikka (eds.), *Media Archaeology: approaches, applications and implications.* Berkeley, CA: University of California Press. pp.278-301.

Andrews, John (2007). 'Reflections on the Harley-Woodward Definition of "Maps"', *Irish Geography*, 40(2), pp.200-205.

Appadurai, Arjun (1996). *Modernity at Large: Cultural Dimensions of Globalization.* Minneapolis: University of Minnesota.

Artsway (n.d.), 'This is my land'. [online] Available at: <http://www.artsway. org.uk/programme/this-is-my-land/ [Accessed 23rd February 2013].

Awan, Nishat & Phil Langley (2013). 'Mapping Migrant Territories as Topological Deformations of Space', *Space and Culture,* [online] Available at: <http://sac.sagepub.com/content/early/2013/04/02/1206331213475746> [Accessed 15 November 2013].

Bains, Sunny. 'Analog computer trumps Turing model'. *EE Times,* [online] Available at: < http://www.eetimes.com/document.asp?doc_id=1138111> [Accessed 04 November 2014].

Barreneche, Carlos (2012). 'Governing the geocoded world: Environmentality and the politics of location platforms', *Convergence: The International Journal of Research into New Media Technologies* 18(3), pp.331-351.

Barreneche, Carlos (2014). 'The Cluster Diagram: A Topological Analysis of Locative Networking'. In: Rowan Wilken & Gerard Goggin (eds.), *Locative Media.* London: Routledge. Available online at: <https://www.academia.edu/ 5085485/The_Cluster_Diagram_A_Topological_Analysis_of_Locative_ Networking> [Accessed 5th May 2014].

Baudelaire, Charles (1964). *The Painter of Modern Life.* New York: Da Capo Press.

Baudrillard, Jean (1981). *Simulacra and Simulation* (trans. Shiela Faria Glaser). Ann Arbor: University of Michigan Press.

Belasco Rogers, Daniel (2004). 'The Daily Practice of Map Making'. [pdf] Available at: <http://www.planbperformance.net/dan/texts/RadiusEdit.pdf> [Accessed 14th April 2013].

Belasco Rogers, Daniel (2008). 'Daniel Belasco Rogers', *SHIFT* [online]. Available at: <http://www.shift.jp.org/en/archives/2008/06/daniel_belasco_ rogers.html> [Accessed 14th April 2013].

Belasco Rogers, Daniel (2012). 'My Life as a Birch Forest', *Binary Stumble* [blog]. Available at: <http://planbperformance.net/dan/blog/?p=973> [Accessed 12th May 2014].

Belasco Rogers, Daniel (2014). Interviewed by Dan Frodsham, Berlin, 23rd May 2014.

Bender, John & Michael Merriman (2010). *The Culture of Diagram.* Stanford, CA: Stanford University Press.

Benford, Steve & Gabriella Giannachi (2011). *Performing Mixed Reality*. Cambridge, MA: MIT Press.

Bhabha, Homi (1994). *The Location of Culture.* New York: Routledge.

Saint-Pol, Bibi (2006). *Possible Rendering of Anaximander's world map*. [image online] Available at: <http://commons.wikimedia.org/wiki/File:Anaximander_ world_map-en.svg> [Accessed 20th January 2015].

Biggs, Peter (n.d.). 'A Survey of Object Oriented Methods'. Brigham Young University [online]. Available at: <http://students.cs.byu.edu/~pbiggs/survey. html> [Accessed 29th October 2013].

Bleecker, Julian & Jeff Knowlton (2006). 'Locative Media: A Brief Bibliography And Taxonomy Of GPS-Enabled Locative Media', *Leonardo Electronic Almanac* 14(3), July 2006 [online]. Available at: <http://www.leoalmanac.org/wp-content/ uploads/2012/07/Locative-Media-A-Brief-Bibliography-And-Taxonomy-Of-Gps-Enabled-Locative-Media-Vol-14-No-3-July-2006-Leonardo-Electronic-Almanac.pdf> [Accessed 10th December 2012].

Board, Christopher (1967). 'Maps as Models'. In: R.J. Chorley and P. Haggett (eds), *Models in Geography.* London: Methuen. pp.671-726.

Borges, Jorge Luis (1946). *On Exactitude in Science*. In: Andrew Hurley (trans.), *Jorge Luis Borges: Collected Fictions*. New York: Penguin, 1998. p.325.

Braidotti, Rosi (1994). Nomadic Subjects: Embodiment and Sexual Difference in Contemporary Feminist Theory. New York: Columbia University Press.

Braun, George & Frans Hogenberg (1572). Map of Famagusta, Cyprus. [image online] Available at: <http://historic-cities.huji.ac.il/cyprus/famagusta/maps/ braun_hogenberg_I_50_4_b.jpg> [Accessed 20th January 2015].

Broeckmann, Andreas (2000). 'Public spheres and network interfaces'. In: R. Lozano-Hemmer (ed.), *Vectorial Elevation: Relational Architecture No. 4.* Mexico City: Conaculta Press. pp.165-82.

Brotton, Jerry (2012). *A History of the World in Twelve Maps.* New York: Viking Penguin.

Bryan-Kinns, Nick., Demetrios Airantzisb, Alice Angusc, Robin Fencott, Giles Lane, Frederik Lesage, Joe Marshall, Karen Martinc, George Roussos, Jenson Taylor, Lorraine Warren, Orlagh Woods (2009). 'Sensory Threads: Perceiving the Imperceptible'. In: Callaghan, V., Kameas, A., Reyes, A., Royo, D. and Weber, M. (eds.), *Intelligent Environments: Proceedings of the 5th International Conference on Intelligent Environments.* Ambient Intelligence and Smart Environments 2. Lansdale, PA: IOS Press. pp.404-410.

Bryant, Levi (2012). 'The Gravity of Things: An Introduction To Onto-Cartography', [pdf] Available at: <http://larvalsubjects.files.wordpress.com/2012/09/bryantontocartographies.pdf> [Accessed 1st November 2013].

Camacho-Hubner, Eduardo, Bruno Latour, Valerie November (2010). 'Entering a Risky Territory: Space in the Age of Digital Navigation', *Environment and Planning D: Society and Space*, 28, pp.581-599.

Careri, Francesco (2005a). *Walkscapes: Walking as an Aesthetic Practice.* Barcelona: Gili.

Careri, Francesco (2005b). 'Constant and New Babylon's Roots', D*omus*, 885, October 2005, pp. 100-103.

Carlstein, Tommy., Don Parkes and Nigel Thrift (1978). *Human Activity and Time Geography*. New York: Wiley.

Carpenter, Edmund & Marshall McLuhan (1960). 'Acoustic Space'. In: Edmund Carpenter & Marshall McLuhan (eds.), *Explorations in Communication.* Boston: Beacon Press. pp.65-70.

Casey, Edward (1993). *Getting Back into Place: Toward a Renewed Understanding of the Place-World.* Bloomington: Indiana University Press.

Castells, Manuel (2000). *The Rise of the Network Society*. Oxford: Blackwell.

Cavell, Richard (2002). *McLuhan in Space: A Cultural Geography.* Toronto: University of Toronto Press.

Certeau, Michel de (1984). *The Practice of Everyday Life* (trans. S. F. Rendall). Berkeley: University of California Press.

Cobarrubias, Sebastian & John Pickles (2009). 'Spacing movements: the turn to cartographies and mapping practices in contemporary social movements'. In: Barney Warf & Santa Arias (eds.), *The Spatial Turn: Interdisciplinary Perspectives.* Abingdon: Routledge. pp. 36-58.

Coley, Rob & Dean Lockwood (2012). *Cloud Time: The Inception of the Future.* Winchester: Zero Books.

Comob (n.d.). *Comob Net and Comob: Collaborative GPS Mapping* [online]. Available at: <http://www.comob.org.uk/?page_id=179> [Accessed 10th December 2012].

Conley, Tom (2007). *Cartographic Cinema.* Minneapolis: University of Minnesota Press.

Consume (n.d.). [online] Available at: <www.consume.net> [Accessed 10th October, 2012].

Corby, Tom (2008). 'Landscapes of Feeling, Arenas of Action: Information Visualisation as Art Practice', *Leonardo* 41(5), pp.460-467.

Cosgrove, Denis (2005). 'Maps, Mapping, Modernity: Art and Cartography in the Twentieth Century', *Imago Mundi: The International Journal for the History of Cartography*, 57(1), pp.35-54.

Crampton, Jeremy (2003). *The Political Mapping of Cyberspace.* Edinburgh: Edinburgh University Press.

Crampton, Jeremy (2010). *Mapping: A Critical Introduction to Cartography and GIS.* Chichester: Wiley.

Crampton, Jeremy & Kohn Krygier (2006). 'An Introduction to Critical Cartography', *ACME: An International E-Journal for Critical Geographies,* [online] Available at: <www.acme-journal.org/vol4/ JWCJK.pdf> [Accessed 5th August 2014].

Crandall, Jordan (2005). 'Operational Media'. *ctheory.net,* [online]. Available at: <http://www.ctheory.net/articles.aspx?id=441> [Accessed 10th June 2013].

Debord, Guy (1955). 'Introduction to a Critique of Urban Geography'. In: Ken Knabb (ed. & trans.), *Situationist International Anthology.* Berkeley, CA: Bureau of Public Secrets (1981). pp. 5-8.

Debord, Guy (1958). 'Theory of the Dérive'. In: Ken Knabb (ed. & trans.), *Situationist International Anthology.* Berkeley,CA: Bureau of Public Secrets (1981). pp. 50-54.

Debord, Guy (with Asger Jorn) (1957). *The Naked City: Illustration de* l'hypothèse *des plaques tournantes en psychogeographique*, screenprint, 33 x 47.5 cm.

Del Casino, Vincent & Stephen Hanna (2011). 'Beyond the "Binaries": A Methodological Intervention for Interrogating Maps as Representational Practices'. In: Martin Dodge, Rob Kitchin, Chris Perkins (eds.), *The Map Reader: Theories of Mapping Practice and Cartographic Representation.* Oxford, Wiley. pp.102-107.

De Souza e Silva, Adriana (2006). 'From Cyber to Hybrid: Mobile Technologies as Interfaces of Hybrid Spaces', *Space and Culture,* 9(3), pp.261-278.

De Souza e Silva, Adriana & Daniel Sutko (2011). 'Theorizing Locative Technologies Through Philosophies of the Virtual', *Communication Theory,* 21, pp.23– 42.

Deleuze, Giles (1988). *Foucault* (trans. Seán Hand). Minneapolis: University of Minnesota Press.

Deleuze, Gilles (1992). 'Postscript on the Societies of Control', *October*, 59, Winter 1992, pp.3-7.

Deleuze, Gilles (2003). *Francis Bacon: The Logic of Sensation* (trans. Daniel W. Smith). London: Continuum.

Deleuze, Gilles (2004). *The Logic of Sense.* London: Continuum.

Deleuze, Gilles & Felix Guattari (1987). *A Thousand Plateaus: Capitalism and Schizophrenia* (ed. Brian Massumi). London: Continuum.

Deleuze, Gilles & Claire Parnet (1977). *Dialogues.* Paris: Flammarion.

Denil, Mark (2011). 'A Search for a Radical Cartography', *Cartographic Perspectives*, 68, Winter 2011, pp.7-28.

Cadastral map of Ayii Trimithias, Cyprus (1924). Detail. Department of Lands and Surveys, Republic of Cyprus. Available at: <http://www.cadastral template.org/cadastraltemplate/uploadedphotos/CYP/CYP_image_D2.jpg> [Accessed 20th January 2015].

Dieter, Michael (2011). 'The Becoming Environmental of Power: Tactical Media After Control'. *The Fibreculture Journal,* [online] Available at: <http://eighteen.fibreculturejournal.org/2011/10/09/fcj-126-the-becoming-environmental-of-power-tactical-media-after-control/> [Accessed 20th December 2014].

Dietz, Steve (2006). 'Mapping the Homunculus'. In: Janet Abrams & Peter Hall (eds.), *Else/where: Mapping - New Cartographies of Networks and Territories.* Minneapolis: University of Minnesota Design Institute. pp.200-205.

Dodge, Martin & Rob Kitchin (2005). 'Code and the Transduction of Space', *Annals of the Association of American Geographers*, 95(1), pp.162–180.

Dodge, Martin, Rob Kitchin & Chris Perkins (2011). *The Map Reader: Theories of Mapping Practice and Cartographic Representation.* Chichester: Wiley.

Dourish, Paul (2006). 'Re-Space-ing Place: Place and Space Ten Years On'. *Proceedings of ACM Conference on Computer-Supported Cooperative Work, CSCW 2006, Banff, Alberta*. pp.299-308.

Dunne, Anthony (2005). *Hertzian Tales: electronic products, aesthetic experience, and critical design.* Cambridge, MA: MIT Press.

Edney, Matthew (1993). 'Cartography without "progress": Reinterpreting the nature and historical development of map-making', *Cartographica*, 30(2/3), pp.54-68.

Elden, Stuart (2001). *Mapping the present: Heidegger, Foucault and the project of a spatial history.* London: Continuum.

Elden, Stuart (2004). *Understanding Henri Lefebvre: theory and the possible.* London: Continuum.

Encyclopedia Britannica (2013), 'dead reckoning', [online] Available at: <http://www.britannica.com/EBchecked/topic/154249/dead-reckoning> [Accessed 3rd November 2014].

Eyebeam (n.d.). 'Noderunner', [online] Available at: <www.*eyebeam.org/projects/noderunner*> *[Accessed* 20th October 2012].

Faithfull, Simon (2003). *Palm Pilot Drawing # 204 ConesNcrane.* [electronic print] Available at: <http://www.simonfaithfull.org/limbo-drawing/204-conesncrane/> [Accessed 20th January 2015].

Faithfull, Simon (2009). 'Simon Faithfull, interviewed by Annet Dekker for Visual Correspondents', [online] Available at: <www.visualcorrespondents.com/ faithfull/html> [Accessed 20th November 2013].

Farman, Jason (2012). *Mobile Interface Theory: Embodied Space and Locative Media.* New York: Routledge.

Farman, Jason (ed.), (2014). *The Mobile Story: Narrative Practices with Locative Technologies.* New York: Routledge.

Farinelli, Franco (1998). 'Did anaximander ever say (or write) any words? The nature of cartographical reason', *Philosophy & Geography*, 1(2), pp.135-144.

Fencott, Robin & Nick Bryan-Kinns (2009). 'Sensory Threads: Sonifying Imperceptible Phenomena in the Wild', *Proceedings of the SMC 2009 - 6th Sound and Music Computing Conference.* Porto, Portugal, 23-25 July 2009, pp.167-172.

Fernandez, Pablo Iván Azócar & Manfred Buchroithner (2014). *Paradigms in Cartography: An Epistemological Review of the 20th and 21st Centuries.* Heidelberg: Springer.

Flanagan, Mary (2008). 'Locating Play and Politics: Real World Games & Activism'. *Leonardo Electronic Almanac* [online] Available at: <http://www.leonardo.info/LEA/perthDAC/MFlanagan_LEA160203.pdf> [Accessed 20th July 2013].

Foucault, Michel (1977). *Discipline and Punish: The Birth of the Prison* (trans. A. Sheridan). New York: Pantheon.

Foucault, Michel & Donald Bouchard (ed.), (1977). *Language, Counter-Memory, Practice: Selected Essays and Interviews.* Ithaca, NY: Cornell University Press.

Foucault, Michel (1988). *The History of Sexuality, Vol.1: The Will to Knowledge.* London, Penguin.

Fuller, Matthew (2005). *Media Ecologies: Materialist Energies in Art and Technoculture.* Cambridge, MA: MIT Press.

Fuller, Matthew & Andrew Goffey (2012a). *Evil Media.* Cambridge, MA: MIT Press.

Fuller, Matthew & Andrew Goffey (2012b). 'Digital Infrastructures and the Machinery of Topological Abstraction', *Theory, Culture & Society*, 29(4-5), pp.311-333.

Fusco, Coco (2004). 'Questioning the Frame: Thoughts about Maps and Spatial Logic in the Global Present'. *These Times,* [online] 16 December 2004. Available at: <http://www.inthesetimes.com/article/1750/> [Accessed 4th August 2014].

Gabrys, Jennifer (2010). 'Atmospheres of Communication'. In: Barbara Crow, Michael Longford, Kim Sawchuk (eds.), *The Wireless Spectrum: the politics, practices and poetics of mobile media.* Toronto: University of Toronto Press. pp.46-62.

Galloway, Alexander (2006). *Protocol: How Control Exists after Decentralization.* Cambridge, MA: MIT Press.

Galloway, Alexander (2009). 'Debord's Nostalgic Algorithm'. *Culture Machine,* [online] Available at: <http://culturemachine.net/index.php/cm/issue/view/21> [Accessed 10th August 2014].

Galloway, Alexander (2012). 'A response to Graham Harman's "Marginalia on Radical Thinking"'. [blog] 3rd June 2012. Available at: <http://itself.wordpress.com/2012/06/03/a-response-tograham-harmans-marginalia-on-radical-thinking/> [Accessed 31st October 2013].

Galloway, Alexander (2013). 'The Poverty of Philosophy: Realism and Post-Fordism', *Critical Inquiry,* 39, Winter 2013, pp.347-366.

Galloway, Alexander & Eugene Thacker (2007). *The Exploit: A Theory of Networks.* Minneapolis: University of Minnesota Press.

Garfield, Simon (2013). *On the Map: A Mind-Expanding Exploration of the Way the World Looks.* New York: Gotham Books.

Gemeinboeck, Petra., Andy Dong, Francesca Veronesi (2007). 'Who Writes The City?' In: Gerald Goggin & Larissa Hjorth (eds.), *Proceedings of Mobile Media 2007.* Sydney, Australia. pp.13–22.

Gemeinboeck, Petra & Rob Saunders (2011). 'Urban fictions: a critical reflection on locative art and performative geographies'. *Digital Creativity*, 22(3), pp.160-173.

Gemeinboeck, Petra & Atau Tanaka (2006). '*Net_Dérive: Participative Locative Media Work'* [pdf]. Available at: www.ataut.net/site/IMG/pdf/Tanaka-Net_ Derive-score.pdf> [Accessed 3rd November 2013].

Gemeinboeck, Petra., Atau Tanaka, Andy Dong (2006). 'Instant archaeologies: digital lenses to probe and to perforate the urban fabric'. *ACM Multimedia 2006 Proceedings*. New York: ACM Press. pp.279-286.

Gere, Charlie (2002). *Digital Culture*. London: Reaktion Books.

Gere, Charlie (2010). 'Slitting Open the Kantian Eye'. In: Chris Bailey & Hazel Gardiner (eds.), *Revisualizing Visual Culture.* Farnham: Ashgate. pp.151-164.

Giannachi, Gabriella (2004). *Virtual Theatres: An Introduction.* London: Routledge.

Goggin, Gerard & Larissa Hjorth (2014). *The Routledge Companion to Mobile Media.* New York: Routledge.

Gomes, Pete (n.d.), *Mutant Film,* [online] Available at: <http://mutantfilm.com/> [Accessed 20th October, 2012].

Gomes, Pete (2002). 'Terraportals, Dataclouds and Networked Architectures'. *AA Files*, 44, Architectural Association, Autumn 2002. [online] Available at: <http://mutantfilm.com/node/43> [Accessed 19th October 2012].

Gomes, Pete (2004). 'Signage for Invisibility'. [online] Available at: <http://mutantfilm.com/node/43> [Accessed 19th October 2012].

Gomes, Pete (2014). Interviewed by Dan Frodsham, London, 28th April 2014.

Gordon, Eric & Adrianna de Souza e Silva (2011). *Net-Locality: Why Location Matters in a Networked World.* Oxford: Wiley-Blackwell.

Graham, Stephen & Alessandro Aurigi (1997). 'Virtual cities, social polarization, and the crisis in urban public space', *Journal of Urban Technology,* 4, pp.19-52.

Hansen, Lone (2012). 'Paths of Movement: Negotiating Spatial Narratives through GPS Tracking'. In: Jason Farman (ed.), *Digital Storytelling and Mobile Media: Narrative Practices with Locative Technologies.* London: Routledge.

Habermas, Jürgen (1989). *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society* (trans. Thomas Burger & Frederick Lawrence). Cambridge, MA: MIT Press.

Hammersley, Ben (2002a). 'Working the web: Warchalking'. *The Guardian* [online], 4th July 2002. Available at: <http://www.theguardian.com/technology /2002/jul/04/internetnews.onlinesupplement1> [Accessed 16th October 2012].

Hammersley, Ben (2002b). 'Start a Wi-Fi revolution in your street', *The Guardian* [online], 20th June 2002. Available at: <http://www.guardian.co.uk/ technology/2002/jun/20/news.onlinesupplement1?INTCMP=ILCNETTXT3487> [Accessed 16th October 2012].

Haraway, Donna (1991). *Simians, Cyborgs and Women: The Reinvention of Nature.* London: Free Association Books.

Hardt, Michael & Antonio Negri (2000)*. Empire.* Cambridge MA: Harvard University Press.

Harley, Brian (1989). 'Deconstructing the Map'. *Cartographica*, 26(2), Spring 1989, pp.1-20.

Harley, John & David Woodward (1987), 'Preface'. In: John Harley & David Woodward (eds.), T*he History of Cartography*, *vol. 1*. Chicago: University of Chicago Press.

Harrison, Steve & Paul Dourish (1996). 'Re-Place-ing Space: The Roles of Space and Place in Collaborative Systems', *Proceedings of ACM Conference on Computer Supported Cooperative Work, CSCW '96*. New York: ACM. pp.67-76.

Harman, Graham (2002). *Tool-Being: Heidegger and the Metaphysics of Objects*. Peru, Illinois: Open Court

Harvey, David (1990). *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change.* Oxford: Blackwell.

Harvey, David (2000). *Spaces of Capital: Towards a Critical Geography.* London: Routledge.

Heidegger, Martin (1938). 'The Age of the World Picture'. In: Julian Young & Kenneth (eds. & trans.), *Off the Beaten Track.* Cambridge: Cambridge University Press. pp.57-73.

Hemment, Drew (2004). 'Locative Dystopia'. [online] January 2004. Available at: <http://eprints.lancs.ac. http://eprints.lancs.ac.uk/id/eprint/30831> [Accessed 1st July 2014].

Hemment, Drew (2006). 'Locative Arts', *Leonardo*, Vol. 39, No. 4, Pacific Rim New Media Summit Companion, pp. 348-355.

Henderson, Harry (2009). *Encyclopedia of Computer Science and Technology.* New York: Infobase Publishing.

Henderson, Linda Dalrymple (2013). *The Forth Dimension and Non-Euclidean Geometry in Modern Art.* Cambridge, MA: MIT Press.

Hewitt, Rachel (2010). *Map of a Nation: A Biography of the Ordnance Survey.* London: Granta Press.

Hight, Jeremy (2010). 'Locative Narrative, Literature and Form'. In: Jörgen Schäfer & Peter Gendolla (eds.), *Beyond the Screen: Transformations of Literary Structures, Interfaces and Genres.* Transaction: London. pp.317-330.

Holmes, Brian (2003). 'Drifting through the grid: Psychogeography and imperial infrastructure'. *Springerin,* [online] Available at: <http://www.springerin.at/dyn/heft_text.php?textid=1523&lang=en> [Accessed 23rd October 2012].

Holmes, Brian (2006). 'Counter Cartographies'. In: Janet Abrams & Peter Hall (eds.), *Else/where: Mapping - New Cartographies of Networks and Territories.* Minneapolis: University of Minnesota Design Institute. pp.20-25.

Hopman, Aske (2005). 'Amsterdam Realtime'. In: Joke Brouwer, Arjen Mulder, Anne Nigten (eds.), *Art & D: Research and Development in Art.* Rotterdam: V2. pp.48-58.

Husserl, Edmund (1970). *The Crisis of European Sciences and Transcendental Phenomenology.* Evanston, IL: Northwestern University Press.

Ingold, Tim (2000). *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill.* New York: Routledge.

Ingold, Tim (2007). *Lines: A Brief History.* New York: Routledge.

Jameson, Fredric (1991). *Postmodernism, Or, The Cultural Logic of Late Capitalism.* Durham, NC: Duke University Press.

Jay, Martin (1988). 'Scopic Regimes of Modernity'. In: Hal Foster (ed.), *Vision and Visuality.* Seattle: Bay Press. pp.3-23.

Jones, Matt (2002). 'Vaguely-definitive genesis myth'. *Warchalking: Collaboratively Creating a Hobo-language for free wireless networking*, [blog] 26th June 2002. Available at: <http://www.blackbeltjones.com/warchalking/archives/2002_06.html> [Accessed 16th October 2012].

Kant, Immanuel. (1781/1998). *The Critique of Pure Reason* (trans. P. Guyer & A.W. Wood). Cambridge: Cambridge University Press.

Kaye, Nick (2000). *Site-Specific Art: Performance, Place and Documentation.* New York: Routledge.

Kern, Stephen (1983). *The Culture of Time and Space: 1880-1918.* Cambridge, MA: Harvard University Press.

Kitchin, Rob (2010). 'Post-representational cartography', *Io Squaderno*, 15, pp. 7-12.

Kitchin, Rob. & Martin Dodge (2001). *Mapping Cyberspace.* London: Routledge.

Kitchin, Rob. & Martin Dodge (2011). *Code/Space: Software and Everyday Life.* Cambridge, MA: MIT Press.

Kitchin, Rob, Chris Perkins, Martin Dodge (2009). 'Thinking about maps'. In: Martin Dodge, Rob Kitchin, Chris Perkins (eds.), *Rethinking Maps: New Frontiers in Cartographic Theory.* Abingdon: Routledge. pp.1-25.

Klinghoffer, Arthur Jay (2006). *The Power of Projections: How Maps Reflect Global Politics and History.* Westport, CT: Praeger Publishing.

Krauss, Rosalind (1979). 'Sculpture in the Expanded Field', *October*, 8, Spring 1979, pp.30-44.

Krygier, John (1994). 'Sound and Geographic Visualization'. In: Alan MacEachren & David Taylor (eds.), *Visualization in Modern Cartography.* Oxford: Pergammon. pp.149-166.

Kurgan, Laura (1994). 'You Are Here: Information Drift', *Assemblage,* 25, December 1994, pp.14-43.

Kwan, Mei-Po (2007). 'Affecting Geospatial Technologies: Toward a Feminist Politics of Emotion', *The Professional Geographer*, 59(1), pp.22-34.

Korzybski, Alfred (1941). *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics.* Englewood, NJ: Institute of General Semantics.

Lammes, Sybille (2008). 'Playing the World: Computer Games, Cartography and Spatial Stories', *Aesther: The Journal of Media Geography,* Summer, 2008, pp. 84-96.

Langley, Nick (2003). 'The demise of the warchalkers', *Computer Weekly*, [online] Available at: <http://www.computerweekly.com/feature/The-demise-of-the-warchalkers> [Accessed 16th October 2012].

Lash, Scott (2002). *Critique of Information.* London: Sage.

Lash, Scott (2010). *Intensive Culture: Social Theory, Religion & Contemporary Capitalism.* London: Sage.

Latour, Bruno (1993). *We Have Never Been Modern.* Cambridge, MA: Harvard University Press.

Latour, Bruno (1998). 'How to be iconophilic in art, science and religion?' In: Caroline A. Jones & Peter Galison (eds), *Picturing Science, Producing Art*. London, Routledge. pp. 418-440.

Latour, Bruno (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory.* Oxford: Oxford University Press.

Latour, Bruno & Emilie Hermant (1998). *Paris ville invisible.* Paris: La Découverte-Les Empêcheurs de penser en rond.

Lefebvre, Henri (1965). *La Proclamation de la commune: 26 mars 1871.* Paris, Galimard.

Lefebvre, Henri (1991) *The Production of Space* (trans. D. Nicholson-Smith). Oxford: Blackwell.

Lefebvre, Henri (1997). 'Lefebvre on the Situationists: An Interview'. *October*, 79, Winter 1997, pp.69-83.

Lemos, Andre (2010). 'Post−Mass Media Functions, Locative Media, and Informational Territories: New Ways of Thinking About Territory, Place, and Mobility in Contemporary Society'. *Space and Culture* 13(4), pp.403–420.

Lenz, Ronald (n.d.). 'Locative Media'. [pdf] The Wagg Society. Available at: <http://spresearch.waag.org/images/LocativeMedia.pdf> [Accessed 10th June 2013].

Levine, Paula (n.d. [a]). 'Paula Levine'. [online] Available at: <http://shadowsfromanotherplace.net> [Accessed 18th October 2012].

Levine, Paula (n.d. [b]). 'Shadows From Another Place'. [online] Available at: <http://www.paulalevine.banff.org> [Accessed 20th October 2012].

Levine, Paula (2005). 'Shadows From Another Place: Transposed Space'. [pdf] Cambridge, MA: Massachusetts Institute of Technology.
Available at: <http://web.mit.edu/comm-forum/mit4/papers/levine.pdf> [Accessed 26th September 2012].

Levine, Paula (2013). 'On Common Ground: Here as There'. In: Jason Farman (ed.), *The Mobile Story: Narrative Practices with Locative Technologies.* New York: Routledge. pp.143-158.

Long, Richard (1960), *A Line Made By Walking*. [electronic print]. Available at: <http://www.richardlong.org/Sculptures/2011sculptures/linewalking.html> [accessed 20th January 2015].

Lukinbeal, Christopher (2010). 'Mobilizing the cartographic paradox: tracing the aspect of cartography and prospect of cinema'. *Educação Temática Digital, Campinas* [online], 11(2), January/June 2010, pp.1-32. Available at: <http://www.fae.unicamp.br/revista/index.php/etd/article/viewFile/2109/pdf_88> [Accessed 13th July 2014).

Lynch, Kevin (1960). *The Image of the City.* Cambridge, MA: MIT Press.

Lyotard, Jean- François (1979). *The Postmodern Condition: A Report on Knowledge* (trans. Geoffrey Benning & Brian Massumi). Manchester: Manchester University Press.

MacDonald, Gavin (2012). *Moving Bodies in the Inhabitable Map: The GPS Trace in New Media Art.* PhD. Manchester Metropolitan University.

Mackenzie, Adrian (2002). *Transductions: bodies and machines at speed.* London: Continuum.

Mackenzie, Adrian (2009). 'Intensive movement in wireless digital signal processing: from calculation to envelopment'. *Environment and Planning A*, 41(6), pp.1294-1308.

Mackenzie, Adrian. & Theo Vurdubakis (2011). 'Codes and Codings in Crisis: Signification, Performativity and Excess'. *Theory, Culture & Society,* 28(6), pp.3-23.

Manning, Erin (2009). *Relationscapes: Movement, Art, Philosophy.* Cambridge, MA: MIT Press.

Manovich, Lev (1998). 'Database as a Symbolic Form'. [online] Available at: <http://manovich.net/DOCS/DATABASE.RTF> [Accessed 10th December 2012].

Manovich, Lev (2002a). 'The Anti-Sublime Ideal in Data Art'. [online] Available at: <http://www.manovich.net/DOCS/data_art.doc> *[Accessed 20th May 2012].*

Manovich, Lev. (2002b). *The Language of New* Media. Cambridge, MA: MIT Press.

Manovich, Lev (2006). 'The Poetics of Augmented Space'. *Visual Communication*, June 2006, 5(2), pp.219-240.

Maps: Power, Plunder and Possession (2010). [TV programme]. BBC, BBC2, 18th April 2010.

Marretta, Alberto (2013). 'The abstract mind: Valcamonica complex geometric compositions in the light of new discoveries'. [online], XXV Valcamonica Symposium. Available at: <https://www.academia.edu/4624338/The_ abstract_mind_Valcamonica_complex_geometric_compositions_in_the_light_of _new_discoveries> [Accessed 13th December 2014].

Marshall, Joe., Demetrios Airantzis, Alice Angus, Nick Bryan-Kinns, Robin Fencott, Giles Lane, Frederik Lesage, Karen Martin, George Roussos, Jenson Taylor, Lorraine Warren, Orlagh Woods (2010). 'Sensory Threads'. *Leonardo*, April 2010, 43(2), pp.196-197.

Massey, Doreen (1993). 'Power Geometry and a progressive sense of place'. In: Jon Bird, Barry Curtis, Tim Putnam, George Robertson, Lisa Tucker (eds.), *Mapping the Futures: Local Cultures, Global Change.* London/ New York: Routledge. pp.59-69.

McLuhan, Marshall (1962). *The Gutenberg Galaxy: The Making of Typographic Man.* Toronto: University of Toronto Press.

McLuhan, Marshall (1969). 'The Playboy Interview: Marshall McLuhan'. [online] *Playboy Magazine,* March 1969. Available at: <http://www.nextnature.net/2009/12/the-playboy-interview-marshall-mcluhan/> [Accessed 25th November 2013].

McLuhan, Marshall (1994). *Understanding Media: the extensions of man.* Cambridge, MA: MIT Press.

McLuhan, Marshall (2007). 'Visual and Acoustic Space', in C. Cox & D. Warner (eds.), *Audio Culture: Readings in Modern Music.* New York & London: Continuum, pp.67-72.

McGarrigal, Coner (2010). 'The Construction of Locative Situations: Locative Media and the Situationist International, Recuperation or Redux?'. *Digital Creativity*, 21(1), pp.55-62.

McKenzie, Adrian (2006). 'From Cafe to Park Bench: Wi-Fi and technological overflows in the city', in Mimi Sheller & John Urry (eds.), *Mobile Technologies of the City.* London & New York: Routledge. pp.137-151.

Mackenzie, Adrian (2010). *Wirelessness: Radical Empiricism in Network Cultures.* Cambridge, MA: MIT Press.

McQuire, Scott (2008). *The Media City: Media Architecture and Urban Space.* London: Sage.

Milgram, Paul & Fumio Kishino (1994). A Taxonomy of Mixed Reality Visual Displays. *IEICE Transactions on Information Systems*, E77(D12), pp.449-455.

Minard, Charles Joseph (1869). *Carte figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.* Paris: Regnier et Dourdet. Available at: <http://en.wikipedia.org/wiki/File:Minard.png> [Accessed 20th January 2015].

Mitchell, William J. (2003). *Me++: The Cyborg Self and the Networked City.* Cambridge MA: MIT Press.

Mitew, Teodor (2008). 'Repopulating the Map: Why Subjects and Things are Never Alone'. *The Fibreculture Journal*, [online] Available at: <http://thirteen.fibreculturejournal.org/fcj-089-repopulating-the-map-why-subjects-and-things-are-never-alone/> [Accessed 3rd August 2014].

Momeni, Ali. & David Wessel (2003). 'Characterizing and Controlling Musical Material Intuitively with Geometric Models'. *Proceedings of the 2003 Conference on New Interfaces for Musical Expression (NIME-03)*, Montreal, Canada, pp.54-62.

Monmonier, Mark (1996). *How to Lie with Maps.* Chicago: University of Chicago Press.

Murdoch, Jonathon (2006). *Post-Structuralist Geography.* London, Sage.

New, Sophia & Daniel Belasco Rogers (2010). 'Me, You and Everywhere We Go: plan b'. *Performance Research: A Journal of the Performing Arts*, 15(4), pp.23-31.

New, Sophia & Daniel Belasco Rogers (2014). 'The Drawing of our Lives and other Practices: An introduction to the living archiving processes of Belasco New'. *MAP: Media, Archive, Performance*, [online] MAP #5, June 2014. Available at: <http://www.perfomap.de/map5/belasco-new-the-drawing-of-our-lives-and-other-practices/the-drawing-of-our-lives-and-other-practices.pdf> [Accessed 9th September 2014].

Nold, Christian (2001). *Mobile Vulgus.* London: Book Works.

Nold, Christian (2006). *Greenwich Emotion Map*. [pdf] Available at: <http://emotionmap.net/GreenwichEmotionMap.pdf> [Accessed 20th May 2012].

Nold, Christian (2007). *San Francisco Emotion Map*. [pdf] Available at: <http://sf.biomapping.net/sanfran.pdf> [Accessed 20th May 2012].

Nold, Christian & Daniela Boraschi (2007), *Stockport Emotion Map.* [pdf] Available at: <http://stockport.emotionmap.net/download.htm> [Accessed 20th May 2012].

Nold, Christian (ed.), (2009). *Emotional Cartography: Technologies of the Self. [e-book]* Available at: <http://emotionalcartography.net> [Accessed 20th June 2012].

Nold, Christian (2014). Interviewed by Dan Frodsham, London, 20th May 2014.

Nold, Christian (n.d.(a)). *Softhook*. [online] Available at: <http://www.softhook.com/> *[Accessed 14th January 2014].*

Nold, Christian (n.d.(b)). Bio Mapping/Emotion Mapping. [online] Available at: <http://www.biomapping.net> [Accessed 14th January 2014].

NY Art Beat (2011). 'Simon Faithfull "Going Nowhere"'. *NY Art Beat* [online]. Available at: <http://www.nyartbeat.com/event/2011/44D9> [Accessed 14th April 2013].

Obert, Julia Catherine (2006). 'The Cultural Capital of Sound: *Québécité's* Acoustic Hybridity'. *Postcolonial Text*, 2(4), pp.1-14.

Obrist, Hans Ulrich (2014). *Mapping It Out: An Alternative Atlas of Contemporary Cartographies.* London: Thames & Hudson.

Olsson, Gunnar (1998). 'Towards a critique of cartographical reason'. *Philosophy & Geography*, 1(2), pp.145-155.

Olsson, Gunnar (2007). *Abysmal: A Critique of Cartographic Reason.* Chicago: University of Chicago Press.

Olsson, Gunnar (2010). 'Mapping the forbidden'. *Fennia*, 188(1), pp.3–10.

Olwig, Kenneth (2002). 'Landscape, Place and the State of Progress', in R.D. Stack (ed.), *Progress: Geographical Essays.* Baltimore, MD: John Hopkins University Press. pp.22-60.

On the Map (2012). [Radio programme]. BBC, BBC Radio 4, *Book of the Week*, October 2012.

O'Rourke, Karen (2013). *Walking and Mapping: Artists as Cartographers.* Cambridge, MA: MIT Press.

O'Sullivan, Jill (2010). 'The Contemporary Visual Literacy of Mapped Place: Chorographic Directions, Links and Analogies'. In: Monika Raesch (ed.), *Mapping Minds.* [e-book] Oxford: Inter-disciplinary Press, pp. 3-12. Available at: <http://www.inter-disciplinary.net/publishing/id-press/ebooks/mapping-minds> [Accessed 10th June 2012].

Papastergiadis, Nikos (2000). *The Turbulence of Migration.* Cambridge: Polity Press.

Paraskevopoulou, Olga., Dimitris Charitos, Charalampos Rizopoulos (2008). 'Location-specific art practices that challenge the traditional conception of mapping'. *Artnodes,* [online] December 2008. Available at: <http://www.uoc.edu/artnodes/8/dt/eng/paraskevopoulou_charitos_rizopoulos.pdf> [Accessed 13th March 2013].

Parikka, Jussi (2010). *Insect Media: An Archaeology of Animals and Technology.* Minneapolis: University of Minnesota Press.

Parikka, Jussi (2011). 'Media Ecologies and Imaginary Media: Transversal Expansions, Contractions, and Foldings'. *The Fibreculture Journal,* 17 [online]. Available at: <http://fibreculturejournal.org/wp-content/pdfs/FCJ-116Jussi%20Parikka.pdf> [Accessed 26th January 2015].

Parikka, Jussi (2012). *What is Media Archeaology?* Cambridge: Polity Press.

Peltier, Georges (1920). *Plan de Paris à vol d'oiseau.* Bibliothèque National de France [online]. Available at: <http://gallica.bnf.fr/ark:/12148/btv1b53064796h> [Accessed 20th January 2015].

Perec, George (1999). *Species of Spaces and Other Pieces* (ed. & trans. John Sturrock). London: Penguin.

Pinder, David (2005). 'Arts of Urban Exploration'. *Cultural Geographies*, 12, pp.38-411.

Peluso, Nancy (1995). 'Whose Woods are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia'. *Antipode,* 4(27), pp.383–406.

Perkins, Chris (2007). 'Community Mapping'. *The Cartographic Journal*, 44(2), pp.127-137.

Perkins, Chris (2009). 'Performative and Embodied Mapping'. In: Rob Kitchin & Nigel Thrift (eds.), *International Encyclopaedia of Human Geography.* London: Elsevier. pp.126-132.

Pickles, John (2004). *A History of Spaces: Cartographic reason, mapping and the geo-coded world.* London: Routledge.

Pinder, David (2005). 'Arts of Urban Exploration'. *Cultural Geographies,* 12, pp.38-411.

Pinder, David (1996). 'Subverting cartography: the Situationists and maps of the city', *Environment and Planning A,* 28(3), pp.405-427.

Perrella, Stephen (1998). 'Hypersurface Theory: Architecture><Culture'. In: Stephen Perrella (ed.), *Hypersurface Architecture.* London: Wiley. pp.6-15.

Plan B (n.d.). *Plan B.* [online] Available at: http://www.planbperformance.net> [Accessed 2nd March 2012].

Polanyi, Michael (1958). *Personal Knowledge: towards a post-critical philosophy.* Chicago: University of Chicago Press.

Pope, Simon (2005). 'The Shape of Locative Media', *Muteno* [online], 29, February 2005. Available at: <http://www.metamute.org/editorial/articles/shape-locative-media> [Accessed 10th April 2013].

Rajchman, John (1998). *Constructions.* Cambridge, MA: MIT Press.

Reichert, Dagmar (1998). 'Obituary', *Philosophy & Geography*, 1(2), pp.157-164.

Reub, Teri (n.d.). *Drift*. [online] Available at: <http://www.terirueb.net/drift/> [Accessed 12th September 2013].

Reub, Teri (2011). 'Trace, The Choreography of Everyday Movement and Drift'. In: Martin Rieser (ed.), *The Mobile Audience: Media Art and Mobile Technologies.* Amsterdam: Rodopi. pp.389-400.

Rheingold, Howard (2002). *Smart Mobs: the Next Social Revolution.* Cambridge, MA: Perseus Publishing.

Ricoeur, Paul (1984). *Time and Narrative, Volumes 1-3* (trans. Kathleen MacLaughlin & David Pellauer). Chicago: Chicago University Press.

Rieser, Martin (2005). 'Locative Media and Spatial Narrative'. *REFRESH 2005, Proceedings of First International Conference on the Media Arts, Sciences and Technologies,* Banff Center, September 29 - Oct 4 2005. [online] Available at: <http://www.banffcentre.ca/bnmi/programs/archives/2005/refresh/docs/conferences/martin_rieser.pdf> [Accessed 10th April 2013].

Rieser, Martin (2009). 'The Art of Mobility: How Transdisciplinary Artists Projects Are Testing The Boundaries of Mobile Media Design'. In: Vic Callaghan, Achilles Kameas, Angelica Reyes, Dolors Royo, Michael Weber (eds.), *Intelligent Environments 2009: Proceedings of the 5th International Conference on Intelligent Environments.* Amsterdam: IOS Press. pp.371-384.

RIXC (2003). 'Locative Media (and ad-hoc social networks)'. [online] Available at: <http://locative.x-i.net/intro.html> [Accessed 3rd August 2014].

Robinson, John Mansley (1968). *An Introduction to Early Greek Philosophy.* Boston, MA: Houghton Mifflin.

Rogoff, Irit (2003). *Terra Infirma: Geography's Visual Culture.* Abingdon: Routledge.

Robbin, Tony (2006). *Shadows of Reality: The Fourth Dimension in Relativity, Cubism, and Modern Thought.* New Haven, CT: Yale University Press.

Rose, Gillian (1993a). 'Distance, surface, elsewhere: a feminist critique of the space of phallocentric self/knowledge'. *Environment and Planning D: Society and Space*, 13, pp.761-81.

Rose, Gillian (1993b). 'Some notes towards thinking about the spaces of the future'. In: Jon Bird, Barry Curtis, Tim Putnam, George Robertson, Lisa Tucker (eds.), *Mapping the Futures: Local Cultures, Global Change.* London: Routledge. pp.70-83.

Ross, Rebecca (2006). 'Perils of Precision'. In: Janet Abrams & Peter Hall (eds.), *Else/where: Mapping - New Cartographies of Networks and Territories.* Minneapolis: University of Minnesota Design Institute. pp.184-189.

Russell, B (2000). 'Headmap Manifesto', republished as 'Headmap 3 Redux' (2003). [pdf] Available at: <http://www.technoccult.com/library/headmap.pdf> [Accessed 10th May 2013].

Sadler, Simon (1999). *The Situationist City.* Cambridge MA: MIT Press.

Sant, Alison (2006). 'Redefining the Basemap'. *Intelligent Agent, [online]* Available at: <http://www.intelligentagent.com/archive/Vol6_No2_interactive_ city_sant.htm> [Accessed 10th June 2012].

Scott, John., & Gordon Marshall (2009). *A Dictionary of Sociology.* Oxford: Oxford University Press.

Sennet, Richard (1974). *The Fall of Public Man.* Cambridge: Cambridge University Press.

Serres, Michel & Bruno Latour (1995). *Michel Serres with Bruno Latour: Conversations on Science, Culture, and Time.* Ann Arbor, MI: University of Michigan Press.

Shakespeare, William (1590/2002). *The Comedy of Errors*. Oxford: Oxford University Press.

Shand, Adam (2001). 'The Wireless Commons Manifesto'. [online] Available at: <http://www.wirelesscommons.org> [Accessed 18th December 2012].

Siegelmann, Hava (1998). *Neural Networks and Analog Computation: Beyond the Turing Limit.* Boston, MA: Birkhäuser.

Sloterdijk, Peter (1998, 1999, 2004). *Sphären: Blasen* (Vols.1, 2 & 3). Frankfurt am Main: Suhrkamp.

Slowik, Edward (2010). 'The Fate Of Mathematical Place: Ontology, Objectivity, and The Theory Of Lived-Space From Husserl To Casey'. In: Vesselin Petkov (ed.), *Space, Time, and Spacetime (Fundamental Theories of Physics,* Volume 167). Heidelberg: Springer. pp.291-311.

Smite, Rasa & Marc Tuters (2004). *Transcultural Mapping (Acoustic-Space #5).* RIXC, The Centre for New Media Culture.

Smith, Richard (2003). 'Baudrillard's nonrepresentational theory: burn the signs and journey without maps'. *Environment and Planning D: Society and Space* 21(1), pp.67-84.

Söderström, Ola (1996). 'Paper Cities: Visual Thinking in Urban Planning'. *Ecumene*, 3(3), pp. 249-281.

Southern, Jen & Chris Speed (2010). 'Handscapes: Reflecting upon the use of Locative Media to explore Landscapes'. *Proceedings of Digital Landscape Architecture Conference, Aschersleben, Germany, May 2010.* [pdf] Available at: <http://www.kolleg.loel.hs-nhalt.de/landschaftsinformatik/ Fileadmin/user_upload/ _temp_/2010/Proceedings/Buhmann_164-172.pdf> [Accessed 11th December 2012].

Soja, Edward (1996). *Thirdspace: journeys to Los Angeles and other real-and-imagined places.* Oxford: Blackwell.

Space Syntax (n.d.). *Space Syntax*. [online] Available at: <http://www.spacesyntax.com> [Accessed 15th December 2014].

Speed, Chris (2010). 'Developing a Sense of Place with Locative Media: An "Underview Effect"'. *Leonardo*, 43(2), April 2010, pp.169-174.

Speed, Chris (2011a). 'Kissing and making up: time, space and locative media'. *Digital Creativity*, 22(4), pp.235-246.

Speed, Chris (2011b). 'The Map is not the Territory: a creative approach to developing locative and social media', Scottish Technology Showcase 2011, SECC Glasgow 7th June 2011.

Speed, Chris (2014). Interviewed by Dan Frodsham, Edinburgh, 22nd May 2014.

Stengers, Isabelle (1997). *Power and Invention: Situating Science.* Minneapolis, MI: University of Minnesota Press.

Straw, Will (2010). 'The Circulatory Turn'. In: Barbara Crow, Michael Longford, Kim Sawchuk (eds.), *The Wireless Spectrum: the Politics, Practices and Poetics of Mobile Media.* Toronto: University of Toronto Press. pp.17-28.

Strongman, Luke (2008). '"When earth and sky almost meet": The Conflict between Traditional Knowledge and Modernity and Polynesian Navigation'. *Journal of World Anthropology*, 3(2), pp.48-110.

Swyngedouw, Erik (1997). 'Neither global nor local: "glocalization" and the politics of scale'. In: Kevin R. Cox (ed.), *Spaces of Globalization: Reasserting the Power of the Local.* New York: Guilford.

Tanaka, Atau (n.d.). '*Net_Dérive'.* [online] Available at: http://www.ataut.net/site/Net-Derive [Accessed 12th September 2013].

Tarkka, Minna (2010). 'Labours of Location: Acting in the Pervasive Media Space'. In: Barbara Crow, Michael Longford, Kim Sawchuk (eds.), *The Wireless Spectrum: the Politics, Practices and Poetics of Mobile Media.* Toronto: University of Toronto Press. pp.131-145.

The Economist (2004). 'A Brief History of Wi-Fi'. *The Economist*, [online] June 10th 2004. Available at: <http://www.economist.com/node/2724397> [Accessed 20th October 2012].

Thielmann, Tristan (2011). *ISEA 2011 Istanbul/ Beyond Locative: Media Arts After the Spatial Turn.* [online] Available at: <http://isea2011.sabanciuniv.edu/panel/beyond-locative-media-arts-after-spatial-turn>
[Accessed 16th March 2012].

Thongchai, Winichakul (1994). *Siam Mapped: A History of the Geo-body of a Nation.* Honolulu: University of Hawai'i Press.

Thrift, Nigel (1996). *Spatial Formations.* London: Sage.

Thrift, Nigel (2004a). 'Movement-space: The changing domain of thinking resulting from the development of new kinds of spatial awareness'. *Economy and Society*, 33(4), pp.582-604.

Thrift, Nigel (2004b). 'Intensities of feeling: Towards a spatial politics of affect'. *Geografiska Annaler*, 86 B (1), pp.57-78.

Thrift Nigel (2004c). 'Remembering the technological unconscious by foregrounding knowledges of position', *Environment and Planning D: Society and Space* 22(1), pp.175-190.

Thrift, Nigel (2009). 'Different atmospheres: Of Sloterdijk, China, and Site'. *Environment and Planning D: Society and Space*, 27(1), pp.119-138.

Thrift, Nigel (2011). 'Lifeworld Inc – and what to do about it', *Environment and Planning D: Society and Space,* 29, pp.5-26.

Thrift, Nigel (2012a). 'The insubstantial pageant: producing an untoward land'. *Cultural Geographies*, April 2012, 19(2), pp.141-168.

Thrift, Nigel (2012b), in Merriman, Jones, Olsson, Sheppard, Thrift, Tuan, 'Space and Spatiality in Theory'. *Dialogues in Human Geography*, 2(1), pp.3-22.

Thrift, Nigel (2014). 'The "sentient" city and what it may portend'. *Big Data & Society*, [online] April-June 2014, 1(1), pp. 1-21. Available at: <http://bds.Sage pub.com/content/1/1/2053951714532241> [Accessed 23rd November 2014].

Thrift, Nigel & Shaun French (2002). 'The Automatic Production of Space'. *Transactions of the Institute of British Geographers*, 27, pp.309–335.

Tufte, Edward (1990). *Envisioning Information.* Connecticut: Graphics Press.

Tufte, Edward (2001). *The Visual Display of Quantitative Information*. Cheshire, CT: Graphics Press.

Tuan, Yi-Fu (1997). *Space & Place: The Perspective of Experience.* Minneapolis: University of Minnesota Press.

Turconi, Cristina (1997). 'La mappa di Bedolina nel quadro dell'arte rupestre della Valcamonica'. In *Notizie Archeologiche Bergomensi*, 5, pp.85-113.

Turnbull, David (1989) *Maps are Territories*. [online] Available at: <http://territories.indigenousknowledge.org> [Accessed 27th January 2015].

Turkle, Sherry (1996). 'Who Am We?' *Wired,* [online] January 1996. Available at: <http://archive.wired.com/wired/archive/4.01/turkle_pr.html> [Accessed 20th June 2012].

Tuters, Marc (2010). 'Forget Psychogeography: The Object-Turn in Locative Media'. [pdf] Cambridge, MA: Massachusetts Institute of Technology. Available at: <http://web.mit.edu/comm-forum/mit7/papers/Tuters_DMI_MIT7.pdf> [Accessed 20th July 2014].

Tuters, Marc & Kazys Varnelis (2006). 'Beyond Locative Media: Giving shape to the internet of things', *Leonardo*, 39(4), pp.357–363.

Tuters, Marc (2012). 'From mannerist situationism to situated media'. *Convergence: The International Journal of Research into New Media Technologies* 18(3), pp.267-282.

Urban Tapesties (2005). Urban Tapestries. [online] Available at: <http://research.urbantapestries.net> [Accessed 6th August 2014].

Varnelis, Kazys (2009). 'Against Situationism'. [blog] 13th July 2009. Available at <http://varnelis.net/blog/against_situationism> [Accessed 20/06/2014].

Virilio, Paul & David Dufresne (1999), 'Cyberesistance Fighter: An Interview with Paul Virilio'. [online] Available at: <http:// http://www.apres-coup.org /mt/archives/title/2005/01/cyberesistance.html> [Accessed 10th June 2013].

Von Borries, Friedrich., Steffen P. Waltz, Matthias Bottger (eds.) (2007). *Space Time Play: Computer Games, Architecture and Urbanism; the next level.* Basel/Boston/Berlin: Birkhauser.

Von Uexküll, Jakob (1926). *Theoretical Biology* (trans. D. L. Mackinnon). London: Kegan Paul.

Wagg Society (2002a). *Waag Society: Organisation*. [online] Available at: <https://waag.org/en/organisation> [Accessed 23rd May 2013].

Waag Society (2002b). *Amsterdam Realtime*. [online] Available at: <http://realtime.waag.org/en_index.html> [Accessed 11th May 2013].

Wagner, Roy (1986). *Symbols that Stand for Themselves.* Chicago: University of Chicago Press.

Wainwright, Joel & Joe Bryan (2009). 'Cartography, territory, property: postcolonial reflections on indigenous counter-mapping in Nicaragua and Belize'. *Cultural Geographies*, 16(2), pp.153-178.

Warf, Barney (2009). 'From Surfaces to Networks'. In: Barney Warf & Santa Arias (eds.), *The Spatial Turn: Interdisciplinary Perspectives.* Abingdon: Routledge. pp.59-76.

Wark, Mackenzie (2004). *A Hacker Manifesto.* Cambridge MA: Harvard University Press.

Weizman, Eyal (2005). 'On extraterritoriality'. Transcript of introductory address at *Archipelago of Exception: Sovereignties of Extraterritoriality Conference, Centre for Contemporary Culture, Barcelona, Spain*. [online] Available at: <http://www.publicspace.org/en/text-library/eng/b011-on-extraterritoriality> [Accessed 27th November 2013].

Whatmore, Sarah (2003). 'Generating Materials'. In: Michael Pryke, Gillian Rose, Sarah Whatmore (eds.), *Using Social Theory: Thinking Through Research.* London: Sage. pp.89-104.

Wheeler, Michael (2013). 'Martin Heidegger'. *The Stanford Encyclopedia of Philosophy,* [online] Spring 2013 Edition, Edward N. Zalta (ed.). Available at: <http://plato.stanford.edu/archives/spr2013/entries/heidegger/> [Accessed 14th March 2014].

Wilken, Rowan (2012). 'Locative media: From specialized preoccupation to mainstream fascination'. *Convergence: The International Journal of Research into New Media Technologies*, 18(3), pp.243-247.

Wilken, Rowan & Gerard Goggin (eds.), (2015). *Locative Media.* New York: Routledge.

Wollen, Peter (1999). 'Mappings: Situationists and/or Conceptualists'.
In: Michael Newman & Jon Bird (eds), *Rewriting Conceptual Art.* London: Reaktion Books. pp.27-46.

Wood, Denis (1992). *The Power of Maps.* New York: Guilford Press.

Wood, Denis (1993). 'The fine line between mapping and map-making'. *Cartographica*, 30(4), pp.50-60.

Wood, Denis (2003a). 'Cartography is Dead (Thank God!)', *Cartographic Perspectives*, 45, Spring 2003, pp.4-7.

Wood, Denis (2003b). 'PDPal'. [online] Available at: <http://www.walker art.org/collections/artworks/untitled-2236> [Accessed 20th May 2012].

Wood, Denis (2006). 'Map Art'. *Cartographic Perspectives*, 53, pp.5-14.

Wood, Denis (with John Fels & John Krygier) (2010). *Rethinking The Power of Maps.* New York: Guilford Press.

Woodward, David (1987). 'Introduction'. In: David Woodward (ed.), *Art and Cartography: Six Historical Essays*. Chicago: Chicago University Press, pp.1-9.

Zeffiro, Andrea (2012). 'A 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.