

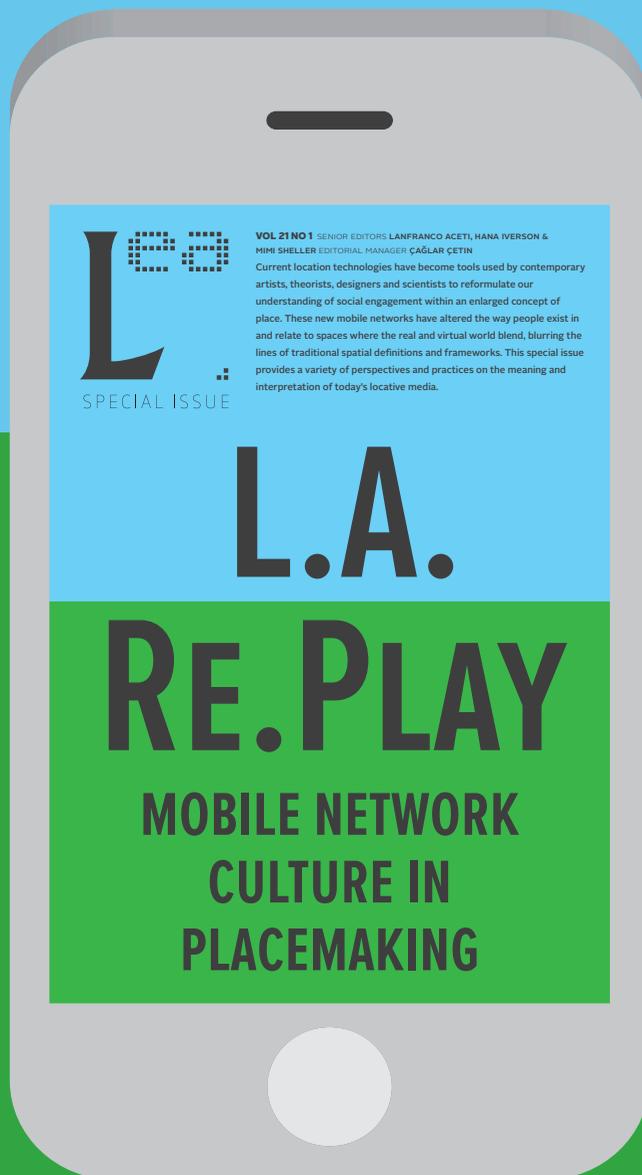
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Current location technologies have become tools used by contemporary artists, theorists, designers and scientists to reformulate our understanding of social engagement within an enlarged concept of place. These new mobile networks have altered the way people exist in and relate to spaces where the real and virtual world blend, blurring the lines of traditional spatial definitions and frameworks. This special issue provides a variety of perspectives and practices on the meaning and interpretation of today's locative media.



LOCATIVE AWARENESS

A Mobilities Approach to Locative Art

by

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INTRODUCTION

In the past decade there has been a developing interdisciplinarity between the sociology of mobilities¹ and locative art practice. In the sociology of mobilities artists are often cited for their role in the development of locative media,² and have been credited with influencing the “current condition of location awareness.”³ This text explores a sense of ‘locative awareness’ emerging in art practice through the context of mobilities research.

The term ‘locative media’ was coined in 2002 to describe an emerging interest in newly available more accurate Global Positioning System (GPS) data⁴ that enabled artists to work more easily with location data. Initially, locative art was described as two general types: ‘annotative’, in which layers of data, images, text and video are mapped to specific locations and browsed by moving through those environments, and ‘phenomenological’, involving the tracing of movement through landscape.⁵ The project *34 North 118 West* by Knowlton, Spellman & Hight (2002)⁶ is a formative example of annotative work. It combined historical research and contemporary storytelling to add geolocated layers of narrative to an area of Los Angeles

ABSTRACT

Over the last decade the impacts of global mobilities have become increasingly visible in the parallel developments of locative media in art practice and a new mobilities paradigm in the social sciences. In 2006, in a special issue of *Leonardo* locative art was described as two broad areas of annotative and phenomenological practice. This paper uses the new ‘critical mobilities’ approach that has arisen in recent social science to suggest a broadening of those categories to include situated and embodied, mobile, relational, networked, experimental and multiple practices. I argue that this multiple, entangled and assembled description of locative media contributes to a new sense of ‘locative awareness’.

that had formerly been a rail-yard. Participants walked through the space with an early tablet PC and their location triggered images, sounds and texts to appear, juxtaposed with the current physical landscape. Teri Rueb’s work *Drift* (2004)⁷ also used this annotative method, but the geo-located sound samples moved in and out with the tide, so a sound that might have been heard on the beach at low tide could be heard in the town at high tide, adding temporal rhythms to the way the content was layered over the land.

From a phenomenological perspective artists Daniel Belasco Rogers and Sophia New have used GPS to track their own journeys on a daily basis, thus making maps of the regions that make up their daily lives,⁸ while artists such as Hamilton, Southern & St Amand made tracks of multiple participants⁹ and Esther Polak and Ieva Auzina followed the journeys of human and non-human actors¹⁰. The *Milk* project¹¹ by Polak and Auzina, for example, tracked farmers and cows

in their fields in Latvia, and followed the milk as it was transported to the Netherlands, used to produce cheese and then sold. GPS tracks of journeys have also been used in conjunction with other data such as stress levels or sound to make maps of subjective experiences of place.¹²

Over the past decade, utopian and dystopian discourses have gathered around locative media and urban computing.¹³ In the field of digital art, curator Andreas Broeckman noted that the term ‘locative’ relates both to the potentials of enriching shared physical spaces and the darker capacity of being able to locate users, suggesting that locative art risked becoming “an avant-garde of the ‘society of control.’”¹⁴ Artists working in the early days of locative media were making public audiences more aware of the potential of GPS while correspondingly, and sometimes unintentionally, trail blazing and advertising its commercial potentials¹⁵. These artists were also filling a

critical gap by building human-centred applications that “raise fundamental questions about the nature of public space and surveillance” in a way that was said to be unprecedented in the development of any other technology.¹⁶

In parallel sociologists writing about the development of locative media and locative mobile social networks (LMSN), have cited the role that artists played in its development,¹⁷ suggesting that locative artists have had an impact in the development of mobile methods in social science and investigating the politics of mobile media and LMSN's.¹⁸ Locative art as a genre has been exhibited and discussed at international digital arts festivals such as the *International Symposium on Electronic Art* (ISEA), *FutureEverything*, *Conflux* and *Radiator*, and in special issues of journals such as *Leonardo*, *Digital Creativity* and *Artforum*, and the scope of this work has expanded in relation to broader issues of mobility. Throughout the text I refer to artworks, some of which are known within the field of locative media, others that relate to the wider field of mobilities.

The mobilities paradigm in social sciences has also emerged as an interdisciplinary research area over the past decade, studying the mobilities and immobilities that are defining features of social life. Mobility and immobility refer to the physical movement of goods, objects and services; the travel of people for work, leisure, migration and escape; imaginative travel in images and media; and communication and virtual travel through connected technologies.¹⁹ GPS devices have been used in mobilities research for their capacity to gather quantitative data about the movement of people,²⁰ however, GPS is not just a data collection tool, it is also a system that is deeply entangled with mobility. Büscher, Urry and Witchger suggest that analysis of mobilities and mobility systems “where each is in an adaptive and evolving relationship with each other” is

a form of post-human analysis, and that “the powers of ‘humans’ are co-constituted with/by various material agencies.”²¹ Drawing on the work of Bruno Latour, they suggest that people have never been simply human or social but are socio-material assemblages that are often made through movement and (im)mobility. I use the term assemblage in this article to refer to heterogeneous collections of human, non-human and technical actors that are associated with and act upon each other, in ongoing and emergent processes.

There is a developing dialogue between the study of mobilities and locative art in recent exhibitions such as *LA Re.Play* (Sheller, Iverson & Hight 2012)²², *Dislocations* (2011), *The Mobility Project* (2011) and *Re-Drawing Boundaries* (Leonardo Electronic Almanac, 2011-13), but also in research networks like *Mobile Lives Forum* and *PLAN: Pervasive and Locative Arts Network* (2005), arts conferences and festivals such as *Futuresonic* (2006) and *Tracing Mobility* (2011), and social science conferences including *Mobilities in Motion* (2011), *Local & Mobile* (2012), *College Arts Association* (2012) *Differential Mobilities* (2013) and *Mobility Futures* (2013).

In this interdisciplinary context artists have moved beyond annotative and phenomenological practices. A new sense of ‘locative awareness’ is emerging that goes beyond annotative and phenomenological descriptions and that is closely related to the concerns of the mobilities paradigm. This new sense of locative awareness expands an understanding of what is at stake in changes brought about by technologies of location and distance, not only in art practice but in examples in practical and social use including the interlinked benefits and problems of location based communication for: social interaction and connection; navigation and communication between emergency services; and increased efficiency in fleet tracking and transport services.

There are six aspects of ‘locative awareness’ that I will outline, they are not new in themselves but their combination produces new relationships to location: *situated and embodied* awareness, the way that the world is experienced through the senses and in situated action;²³ *mobile* awareness, experienced through movement;²⁴ a *relational* awareness of place brought about by social and participatory interactions that are performed and through which location is enacted;²⁵ an awareness of *networks* that are connected to presence in space and that extend that presence;²⁶ an *experimental* awareness, the process through which actions test, explore, observe and critique in location;²⁷ and an awareness of the *multiplicity* of perspectives that we inhabit. The next section begins by describing a broader landscape of GPS technology, and then outlines how the six aspects of locative awareness emerged within art practice and social science research and led to this area of work. The final section is a more theoretical discussion exploring how the six aspects of locative awareness are entangled together.

LOCATING GLOBAL POSITIONING SYSTEMS

In order for artists to work with GPS they must participate in vast networks, from the US Department of Defense that developed the Navstar GPS satellites, via commercial companies like *Tom Tom* and *Garmin* who produce GPS devices, to the individual satellite navigation (“sat nav”) device that gives directions for walking or driving. GPS operates technically on scales that range from the planetary (satellites at 20,200 km above the earth) to the sub-atomic (when electrons in atoms change energy levels, they emit microwave signals that are used to produce extremely accurate atomic clocks that are used by GPS devices²⁸). The scale of navigation that GPS is used for ranges from globe-spanning international flights to the detailed

and local mapping of individual animals in the wild. In locative art projects GPS has been used to map traces of movement from long Antarctic voyages²⁹ to familiar local journeys.³⁰ On these different scales, GPS entangles distance and proximity: in its technical configuration, in its practical use in navigation, in its conceptual enlisting of territory, and in its creative use in artworks. Its vertiginous scope connects the global and the local, the sky and the ground, globalization and being in the world.

Global positioning systems are a part of a long and well documented history of mapping³¹ and of articulations of relationships between time and space,³² including (but not limited to) military reconnaissance, political structuring through surveying and bounding, commercial sale of space as property, and histories of social and cultural change. The measuring and quantifying of space involves exploration, staking claims to territories, re-naming places and colonial conquest. The division of space into a measured grid is therefore a political and commercial ordering device, and alongside clock-time made way for control and surveillance of the resulting unified and structured times and spaces, a legacy that runs through GPS technologies.

Geographer Doreen Massey³³ challenges a traditional conceptualization of space. To imagine ‘space’ as co-ordinates on a surface has effects on people inhabiting that space, not least when voyaging leads to conquering. Massey argues that space is the product of interactions between a multiplicity of things, and that these spatial relationships are political. Space is the co-existence of multiplicity, what Massey calls “coexisting heterogeneity”, and it is always in process, or under construction. This distinctly spatial description of multiplicity is useful for three reasons: First, it highlights that things co-exist, at the same time and in relation to each other, across distance. Second, because things in space co-exist they have important

effects on each other; and third, if spaces and multitudes are the product of ongoing inter-relations, it is not possible to be outside of space or to stop acting in the ongoing construction of space – themes that I will return to throughout the paper.

GPS technologies are inextricably tied to the contexts and histories of global techno-politics. Global mobilities of goods, people, cultures and media make experiences of the local also experiences of global connection and, as Massey suggests, a parochial sense of the local as something authentic and closed should be rethought as a “global sense of the local” in which everyday objects, people, food and information have travelled from distant places and become part of daily lives.³⁴ With a similar regard for how practices on the ground construct ideas of the global, anthropologist Anna Tsing suggests that “[a]s soon as we let go of the universal as a self-fulfilling abstract truth, we must become embroiled in specific situations. And thus it is necessary to begin again, and again, in the middle of things.”³⁵

The GPS is, therefore, a situated and partial mode of knowledge production and everyday lived practice, a device that combines the grid of Geographical Information Systems (GIS) with lived and local experience. It works on global scales, not as a unified whole as represented by the Cartesian map – the latitude, longitude and altitude readings of a GPS – but as the negotiation of a series of specific and located practices that bring about both local and global relations.

POSITIONING LOCATIVE ART

Locative art often offers participants the opportunity to explore alternative located practices that make global relations visible in new ways and in specific conditions, and that create space to reflect on these

technologies that are often invisibly embedded in everyday networked, public and private life.³⁶ Locative art practices have grown out of multiple aspects of historical and contemporary art movements. What follows is a partial description of those relationships as they relate to the six aspects of locative awareness, and explores how they are entangled with each other and more broadly with mobilities research.

Embodied and Situated Action

Within the field of locative media there is a strong link to walking and art, a history too broad to mention in depth here.³⁷ Artists such as Richard Long and Hamish Fulton had moved away from object-based practice in the 1960's to bring art closer to everyday life, in work that was conceptual, environmental and related to performance art in its embodied and durational form.³⁸ Through the practice of walking the work engaged with what it means to be physically within a landscape, experiencing it from a specific place and time. As Ingold and Vergunst suggest:

*If knowledge and footprints appear equivalent, it is because knowing is doing, doing is carrying out tasks, and carrying out tasks is remembering the way they are done.*³⁹

More recently, works like *The Missing Voice: Case Study B* by Janet Cardiff and George Bures Miller⁴⁰ use the situated physical presence of an audience in particular locations, and their sensory engagement with that environment to introduce layers of narrative through physical discovery in a specific location. In the field of locative media the group C5 who explore the “possibilities of generative, algorithmic relations between big data and human movement across the landscape”⁴¹ use physical exploration and computer generated algorithms as research tools to explore landscape and place experienced through the body and the data it produces.⁴²

Movement

A unique engagement with location that is gained through movement has been observed and used by both artists and social scientists. The Situationists International are often cited as a precursor to locative art, as artists extend their legacy in works that observe, critique and intervene in everyday life on the street by walking as a *derive* (drift) or *detournement*. The Situationist's intention to break away from everyday walking habits by following programmatic instructions is referenced in *.walk* by Socialfiction.org,⁴³ a set of instructions that re-makes psychogeographical walks as written software.⁴⁴ The app *Serendipitor*, by artist Mark Shepard,⁴⁵ also encourages participants to consciously interact with their surroundings while being directed, indirectly, from a to b.

In the social sciences video studies of people walking together have been used to analyse the “on-going situated accomplishment” of the often taken for granted nature of walking together.⁴⁶ As a mobile research method the ‘go-along’ is a way of accessing more embodied and situational responses to a place than an interview.⁴⁷ Through walking together the situational becomes available for analysis revealing “the pre-reflective knowledge and practices of the body, or the most trivial details of day-to-day environmental experience.”⁴⁸ Walking in both art practice and social sciences therefore is seen to offer a processual and embodied method of reflecting on location.

Relationality

Locative art often invites an audience to contribute to a collective database of traces, memories, stories, or histories by participating in a walk or journey. The work is built through collective contributions to an “open work,”⁴⁹ and would not exist without this participation. This relational capacity of walking is described by Ingold and Vergunst as

*a profoundly social activity: that in their timings, rhythms and inflections, the feet respond as much as does the voice to the presence and activity of others. Social relations, we maintain, are not enacted in situ but are paced out along the ground.*⁵⁰

The three central motivations of participatory art: empowerment of the audience, sharing of authorship and concern for community and collective responsibility⁵¹ are often a key element of locative art projects. Audiences are invited to make collective tracks or tracings of their movements,⁵² or to annotate their local environments with comments, histories,⁵³ poems⁵⁴ and narratives.⁵⁵ Stanley Brouwn's walks and their concern with measurement, distance and relationality are also precursors to this mode of working. In *This Way Brouwn* (1960-1964), he requested sketches from people in the street instructing him how to get from one location to another.⁵⁶ The relationality of Brouwn's walks, and the ambulatory and discursive mode through which public space is explored preface the work of artists like Simon Pope (2012), Rebecca Birch (2011) and Misha Myers (2011), who all walk or travel with participants in relational and dialogical art practice. In the field of locative art this relationality has been developed in ‘shared encounters,’⁵⁷ that take place in both physically co-present situations and at a distance.

Interaction in public space has been widely studied in the social sciences⁵⁸ and how those interactions are stretched by physically mobile and mediated lives is revisited in the sociology of mobilities⁵⁹ and particularly in the articulation of “netlocalities”, the relationships between networks and location.⁶⁰ Christian Licoppe and Yoriko Inada have done detailed work in analysing social interactions through large quantities of user data, gathered over several years, from locative games such as *Mogi*.⁶¹ Through ethnomethodological analysis they describe how recognising

physical co-location in the mobile game interface leads to an expectation of upgrading to a copresent meeting,⁶² and that negotiation is needed to ignore this expectation without seeming rude, demonstrating that social interaction is stretched by locative media.

A further dimension of relational walking is the notion of walking with others *at a distance*, either imagining the presence of the other, or maintaining mediated interaction, as Amy Sharrocks does in the work *Lost & Found* (2010) in which participants walk and observe their surroundings while Sharrocks navigates and directs from a distance via a mobile phone call, and as they share their proximate and distant experiences of the same walk; or Marie Christine Katz who walks together with others at a distance using directions shared via *Twitter* (2013). In both of these projects artists are grappling with the experience of live relational movement with proximate or distant others through communications networks, using place, movement, technology and social interaction as the medium of the work.

Networks

The study of networked urban environments features in many disciplines, and encompasses ubiquitous computing in objects and environments,⁶³ changes brought about by networked public spaces,⁶⁴ the impact of mobile interfaces⁶⁵ and the emergence of the sentient city.⁶⁶ Artists have worked with systems of real time communication for many decades, again a history too broad to describe in detail here. In 1969 Jack Burnham described an art of real time systems “which gather and process data from environments, in time to effect future events within those environments.”⁶⁷ As locative media locate and contextualize engagement with networks they make participants aware of real time systems, networks and databases as “electronic background time-spaces” that radically change how we conceive of urban and public space.⁶⁸

More recently the investigations of artist Trevor Paglen into systems of military secrecy reveal the networks of information, technology and power that are implicit in many technologies. These investigations include: revealing the hidden flight records of military carriers; exposing secret military prisons; and making visible the deployment of spy satellites. By making

these mobility systems visible Paglen’s work extends awareness of networks that are invisibly active in the background of global mobilities.

Experimentation

In both art and design there has been a move over the past 40 years towards participatory experimental modes of working. In the Fluxus movement and ‘happenings’ of the 1960’s and 70’s instructional works, sometimes via telephone or the postal system, built on the idea that “doing is knowing” and an experiential mode of art making. Donald Schön describes the reflective potential of action and experimentation:

*The practitioner [...] reflects on the phenomena before him, and on the prior understandings which have been implicit in his behaviour. He carries out an experiment which serves to generate both a new understanding of the phenomena and a change in the situation.*⁶⁹

More recently the exhibition *Do It*⁷⁰ developed the idea of the instructional artwork, to observe the effects of translation and action, and the impact that local conditions have on the way that instructions are carried out. This experiential and experimental approach is echoed in design practice as a “designerly way of knowing,”⁷¹ a process of envisioning possibilities and trying them out in physical materials and embodied practices. Similarly the sociology of science and technology has focused on technologies as they are studied in use,⁷² and more recently mobile, inventive and live research methods have been developed to investigate interdisciplinary, emergent and live happenings, and to engage with the live and emergent nature of technology use and data production in creative and experimental ways.⁷³ In this context locative art works can be seen to invite audiences to actively experiment with spatial technologies in situ, and through embodied experience of a technology, place and events to understand them in new ways, thus producing a different ‘locative awareness.’

Multiplicity

Networked space facilitates connection to multiple perspectives, and locative artists often work with a hybrid space made up of both the aerial perspective of a map or satellite interface and embodied local

perspective. Aerial views have often been theorized as separate, distanced and set in opposition to everyday life on the street. Michel de Certeau describes the view from a tall building as the distanced point from which the city that is written by the actions of its inhabitants becomes legible.⁷⁴ Henri Lefebvre suggests that to be on the street is to be grasped by its rhythms, whereas the view from a window or balcony puts the street into perspective from which it can be analysed.⁷⁵ Ingold describes the earth as seen from above as a globe that is artificially separated from human living, as opposed to the world as sphere, an environment that surrounds and which is co-produced through movement.⁷⁶ These descriptions regard the view from above as a place where the life of the city can be read and analysed, detached from lived and embodied experience. Locative art, however, entangles these perspectives so that they act on each other.

LOCATIVE AWARENESS IN ACTION

Embodied and situated action, movement, relationality, networks, experimentation and multiplicity combine fluidly in a wide variety of locative art practices as described in the previous section. The following section focuses on the work of British artist Nikki Pugh to explore locative awareness in a specific context.

In the work *19,264 seconds of qualitative and quantitative data (Curzon Street, 2010)* Pugh played with the technically located and situated nature of GPS by repeatedly walking a fixed route around a specific part of the city with a GPS device in each hand. She then processed the data to draw a line between each pair of co-ordinates and made a drawing of the situated experience of walking in the city. If the GPS was not affected by its environment the lines should describe the distance between her hands. In some rare cases this does happen, but more usually there is a line representing anything from 2 to 20 metres in discrepancy. Pugh reveals how these changes correspond to features in the urban landscape: a large open space

Figure 1. *19,264 seconds of qualitative and quantitative data (Curzon Street, 2010)*, Nikki Pugh, 2010. © Nikki Pugh, 2010. Used with permission.



makes short lines when both GPS devices give similar and relatively accurate readings, but near tall buildings and other architectural masses the lines become longer and more haphazard. As located devices, GPS receivers rely on time-coded radio signals broadcast from a shifting constellation of satellites. If the signal reaches the receiver by an indirect route (e.g. by bouncing off a building), rather than by a direct path, the minute time differences are enough to disrupt the subsequent positioning calculations. The work *Colony* (2011 onwards) developed from the processes used in *19,264 seconds of qualitative and quantitative data (Curzon Street, 2010)*, and in the first few experimental iterations participants carried a large chrysalis-like form made of bubble wrap with two GPS sensors embedded in its extremities.

Small motors made the form tremble in response to the GPS 'fingerprint' of different kinds of locations according to different narrative aims. When pro-

grammed to tremble in open spaces, the object took on a sense of agoraphobia; when programmed to be sensitive to built up or enclosed spaces it gained a sense of claustrophobia. Although these works use GPS technology they are now responsive objects displaying a kind of 'locative awareness'. The participant's *senses* have been extended to now 'feel' new information about their environment. As they become *mobile* this sense becomes tuned to the specificity of the technology, they are aware of the GPS and the wider *network* of satellites in relation to this environment. Their walk is an *experimental* 'feeling out' of the situated technology. Each iterative version of *Colony* is developed through workshops in which *participants* are able to reflect, critique and discuss this new way of sensing the environment, and in a more socially relational version of *Colony* a set of sashes respond to a central walker's broadcast GPS data, as a *relational* experiential walk. These experimental works by Pugh are an example of how 'locative awareness' is made

Figure 2. *Colony*, Nikki Pugh, 2011. © Nikki Pugh, 2011. Used with permission.



apparent in the work of an individual artist, however the sense that I'm describing is also emerging across and between works in the field of locative art.

The six aspects of locative art that I have described come together as a significant orientation towards an experimental, participatory, spatial and networked art form that is well situated to ask critical questions of the complex systems at play in mobile lives. The next section is a brief theoretical investigation of the territories within which this work operates.

PARTIALITY AND COLLECTIVE EXPERIMENTATION

The GPS signal and track can be seen as a system of vision that allows us to see position, movement and direction by using a global network of satellites. From a Science and Technology Studies (STS) perspective they can be seen as partial (incomplete and open), in that a GPS device is affected by its surroundings, and situated in specific devices, databases and visualizations. Haraway argues that it is crucial to acknowledge the partiality of systems of knowledge production:

The moral is simple: only partial perspective promises objective vision. This is an objective vision that initiates, rather than closes off, the problem of responsibility for the generativity of all visual practices. Partial perspective can be held accountable for both its promising and its destructive monsters. ⁷⁷

Although GPS uses global networks to function in practice GPS devices produce partial and processual views, assembled with other partial views in an understanding of landscape. Locative art therefore has the potential to produce and access data *in situ*, to draw attention to this partial perspective and to gather networks together, through paths of movement. Anthro-

pologist Tim Ingold uses ethnographic studies of the movement practices of indigenous hunter-gatherer communities in North Eastern Canada, Australia and Alaska to explore the role that movement has in perception of the environment.

Our perception of the environment as a whole, in short, is forged not in the ascent from a myopic, local perspective to a panoptic, global one, but in the passage from place to place, and in histories of movement and changing horizons along the way. ⁷⁸

From a phenomenological perspective a landscape is not simply a pre-existing physical environment that a locative media user walks through and experiences; rather places and people are always in a continual state of coming into being, and this is what Ingold calls a "dwelling perspective." In his description, knowledge is not a static, pre-formed object to be discovered, but a process that unfolds through action and movement. A dwelling perspective is made up of a pattern of activities or a "taskscape"; however Ingold's emphasis on embodiment often dismisses the perceptual experience available through technologies that he sees as bereft of embodied action. Locative media produces a different kind of taskscape that is also networked and generates a multiplicity of connected and shared spaces that are both proximate and distant. Locative awareness, acting in new ways through locative art, contributes to the ongoing co-constitution of environments and people, and changes the way that participants perceive and create the world.

A phenomenological perspective suggests that movement is a continuous flow, not a series of points occupied in sequence. However, the tracking of movement and the marking of specific locations with GPS are fundamentally dependent on a grid of points. This relationship between gridded and mapped space and movement was made visible in early locative media

projects such as Masaki Fujihata's *Mersea Circle* (2003), which uses video footage in a 3D model of a GPS track, fixed to co-ordinates where the video was filmed. Although the video is a moving image, it is still fixed to a static point on a mapped line, reducing a sense of flow to a set of points. The grid of calculation is less apparent in work such as *Colony* (Pugh 2013), and the work *Aura* by Steve Symons (2007) which uses GPS to read a participant's location but immerses them into a flow of sound which changes gradually and which the participant changes as s/he moves. The work is, however, still based on a grid of latitude and longitude data.

The ubiquity of computing embedded in objects and environments enables "many millions of calculations continually to be made in the background of any encounter";⁷⁹ the increasing speed and quantity of calculations allows for mapping of a world that is moving and unfolding like a river, not static like a surveyor's map. These constant background, on-the-move, calculations change qualitative experiences as spatial technologies expand our reach.

Feminist theorist Karen Barad suggests that objects and agencies of observation are inseparably tied together in intra-actions;⁸⁰ rather than being pre-existing static entities they come about through them and with them. If GPS is thought of as a system of vision, or an agency of observation, it is also inextricably linked with other objects in the intra-actions between satellites, people, terrain, sky, phone networks, Cartesian mapping, navigation and military reconnaissance. All are entangled in locative art to different degrees, and come together in specific ways in different locative art applications and the practices that are enacted through them. It is not that these networks are just associations and connections. I use Barad's⁸¹ term "entanglement" to develop analysis of GPS in which intra-actions create human and non-human agencies

that are more strongly bound together in motion and action, both socially and materially, rather than simply assembled or associated. In Pugh's work, for instance, the GPS is not acting alone but is entangled with buildings, weather, the way that it is carried, even the small differences in the ways that each device operates, and the GPS does not exist outside such situated contexts.

Collective experimentation is a term used in public engagement with science to describe projects in which "situations emerge or are created which allow [people] to try out things and to learn from them, i.e. experimentation."⁸² Many locative art projects provide participants with opportunities to try out new, and often critical or creative technical configurations of GPS *together with other people*, making technologies and interactions available for discussion, through embodied and situated experimentation.

These kinds of methods are also used by organizations like *Arts Catalyst*, who have worked with artists to envision and enact different cultural relationships to science and technology. In the *Arctic Perspective Initiative* artists Peljhan & Biederman (2007 ongoing) have worked closely in collective experimentation with a group of indigenous people in northern Canada to develop new open-source and mobile technologies that operate both on-the-move and at-a-distance,⁸³ such as modifying a drone to view ice-floes from above, and using it in dialogue with traditional navigation skills in order to navigate safely across them.

Collaborations between designers, technologists, practitioners and design ethnographers in the field of ubiquitous computing also use a form of collective experimentation in design processes. The PalCom research project⁸⁴ identified two problems in working with ubiquitous technologies: firstly, that the invisibility of ubiquitous computing makes it unavailable to peo-

ple – it is hard to know what is going on and therefore how to work with it, trust it or subvert it. Secondly, that working with new technologies requires new practices to develop, and therefore it is impossible to predict how they might be used. They devised a process in which working with technologies in situations that were "as realistic as possible" rather than in the studio or lab, enabled them to work directly with the opportunities, constraints, problems and possibilities that "arise concretely" in action. This enabled the technological potentials and limitations to become palpable in the conversations and experiments that occurred between users, researchers, technologists and developers. This notion of things becoming palpable and available for discussion through experimentation is also evident in LMSN's and locative artworks.

THE VIEW FROM ABOVE

Locative artworks are also connected to the concerns of Feminist Science and Technology Studies (FSTS), that scientific knowledge is situated in practices, bodies, histories and cultures.⁸⁵ In the work of Donna Haraway, the 'view from above' or 'view from nowhere' is used as a figure to critique totalizing visions of scientific objectivity:

*I am arguing for politics and epistemologies of location, positioning, and situating, where partiality and not universality is the condition of being heard to make rational knowledge claims. These are claims on people's lives; the view from a body, always a complex, contradictory, structuring and structured body, versus the view from above, from nowhere, from simplicity. Only the god-trick is forbidden.*⁸⁶

Haraway suggests that we need to produce situated knowledges, that is, partial embodied 'views from

somewhere,' in order to be accountable and responsible for our actions and for the multiplicity of bodies and positions. When using live location data in a map or satellite image, aerial and street-level views become mobile with the partial and situated view of the walker.⁸⁷ The locative media participant can often annotate the map and act on the aerial perspective as they move, and through these media develop a dialogue between overview and "underview."⁸⁸

To think this problem in reverse, one could ask how a 'view from nowhere' is made from multiple situated actions in physical space, which relates to the history of mapping, combining the gestural traces of a narrated journey and map-making in which the narratives that produce the map are standardized.⁸⁹ Ingold suggests that what the map has left out is movement. Locative art however offers new ways in which the movement of mapping and the task of map-making are brought closer together, in which maps can change according to local user movement and input, whether to distant users via networks or to a database.

In order to learn about the GPS technologies' relations, we must look at how knowledge assemblages are coproduced with social and spatial relations. In a negotiated understanding of the GPS trace as a remnant of movement it is possible to bring together a "multiplicity of local knowledges."⁹⁰ Haraway uses the figure of the view from above to stand in for a view from nowhere. For Haraway figures are abstractions but they also have an impact in the world. While these abstractions are not generalizable, inhabiting the figure changes us in our modes of entanglement.⁹¹ She identifies herself with the ground as the location of being situated: "we learn to be worldly from grappling with, rather than generalizing from, the ordinary. I am a creature of the mud, not the sky."⁹² The figure of the sky can however be just

as messy as the ground; it is full of weather, constellations, gases, ozone, volcanic ash, microbes, drones, bacteria, space junk and thousands of people in flight. The view from above and in motion is a partial and situated view from somewhere and bodies must be put back into views from above in order to find ways to become accountable for actions made through these representations.

We must realise that both the views from above and from below can be restrictive and revealing, deceptive and determinative, indulgent and insightful, necessary but wholly insufficient. ⁹³

The urban geographer Edward Soja's description of 'thirdspace' is useful here; he suggests that space is both real, imagined and simultaneously "realandimagined." ⁹⁴ These three ways of thinking about space, like the figure that is both real and imagined, suggest that how we imagine and how we use figures are important in how space is produced.

The artist Simon Faithfull's *Escape Vehicle No 6* (2004) is a live performance in which a weather balloon, with a networked camera and an office chair attached, is launched and travels from the ground to the edge of space, sending live film footage back to the audience. As the chair standing in for the situated body travels shakily above the ground, ascending into the sky, the fragile body and the visual perspective of this height is imagined, launched into the extreme territory of usually military or scientific perspective. Nicola Triscott, director of Arts Catalyst, discusses this work alongside Felix Baumgartner's jump from space made in October 2012, suggesting that the poetic resonance of these events is that "it adds to the store of meaning that we construct around the falling body, and to our perceptions of space, fragility and risk." ⁹⁵ This sense of the body at height contributes to a reading of aerial perspectives as situated views.

As we live with the aerial perspective increasingly closely in everyday life, using *Google Earth* and sat nav devices to navigate, and as drones are increasingly used in policing, warfare, environmental monitoring and emergency response, artists are investigating how figures are entangled with realities and thereby also shape socio-technical assemblages, societies and cultures. We are in a process of learning how a view from above has impact in everyday lives, and how to connect the experience of embodied emplacement in landscape through movement with the vertiginous satellite views from above.

GPS was initially developed for navigation by a US defense department project, but was quickly used in targeting, on-board missile guidance, and, increasingly, for drone piloting. The use of GPS removes the body of the pilot from the site of warfare, with serious consequences for both pilot and target. ⁹⁶ Artists and social scientists have engaged with making visible the "personal and human experience" of this action at a distance. ⁹⁷ The artist Omer Fast's work *Five Thousand Feet is the Best* (2012) uses re-enacted interviews with drone pilots to articulate and complicate the personal and situated impacts of acting at a distance through drone technologies. Bodies are therefore paradoxically not only disappearing but also being made visible by remote viewing, and correspondingly pilots are also affected psychologically by actions that although made at a distance are nonetheless deadly. ⁹⁸

CONCLUSION

The central theme of this paper is the multiple, entangled and assembled nature of locative media. The GPS device as a singular instrument held in the hand suggests an individual track and an autonomy of movement in an empty space of GPS co-ordinates unfettered by social or material impact. Through the

complex relationships including the six aspects of 'locative awareness' I suggest that instead of this singularity, GPS technologies and locative media are multiple, situated and partial socio-technical assemblages. This multiplicity is most clearly demonstrated in location based social networks, but as a fundamentally situated and situating technology GPS always entangles multiple temporalities, bodies and impacts in its tracks.

The concept of locative awareness brings together the complex and entangled nature of locative technologies: they draw attention to situated and embodied experiences of the world through movement; they are relational and produce social connections in both proximate and distant locations; they produce and articulate networks and databases that create an ongoing background flow of calculation and information; and they produce hybrid and multiple perspectives through experimental and social encounters. Through the multiple capacities of locative awareness locative art offers opportunities to grapple with the profound effects and implications of GPS technologies. ■

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