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Self-Tracking Cycling Data as Representations of Landscape

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Abstract

The representation of landscape has changed considerably in the arts since the 19th Century. From the grand and sometimes fantastical paintings of the apocalyptic sublime, to the more topographically correct contemplative sublime; from the concern for light over form in impressionism, to the intensity of colour saturation in post-impressionism; from emotive expressionism to the fractured abstraction of cubism; from its evaporation in abstract expressionism and dematerialization in conceptual art to its reclamation in walking art; from photographs taken on journeys, to objects found along the way; from words that capture a sense of place, to films that immerse us in those places; from room sized panoramas to virtual reality CAVEs. This paper aims to map out a contemporary typology of landscape representation. Specifically, it attempts to locate self-tracking data art as a new form of landscape representation, one that traverses a spectrum of imagery, from isomorphic representations of real places, through objective mapping of experience and on into the realm of abstracted subjectivity. In doing so it positions the author's own work within this wider context along side other artists that are engaged is similar practices.

Keywords: Landscape, Self-Tracking, Data Art

A Brief History of Landscape Painting

In the 1800s the flourishing of landscape painting was driven largely by the sublime ideals of Romanticism. The concept of the sublime is that landscapes (and landscape related art) impress upon us through their sheer size and grandeur an effect that is at once beautiful and terrifying in equal measure. The pure wildness of wild landscape has no care for us; its beauty is as dangerous as it is beguiling and we are

inconsequential in relation to its indifference to us. Painting thus focused on rendering lifelike landscapes and scenes of vast empty spaces, colossal mountains and grand vistas with people engaged in the view, tiny against the mammoth backdrop or not present at all. Many of the paintings of this era attempt to capture this sense of landscape; any of the works of Caspar David Friedrich or Fredric Edwin Church would serve as good examples. In attempting to represent the terrible perfection of the sublime the huge scale of landscape was the star of the show aiming to induce a sense of sheer awe in the viewer. By the time the impressionists were engaged in landscape painting, concern for the sublime had all but vanished. The focus had shifted from the vastness of landscape to painting 'en plein air' with the goal of capturing the ever-changing play of light on the subject. Rather than painting large canvases (Monet's water lilies being the exception), the focus was on multiple smaller canvases or series that showed the effects of changing light in the landscape. Monet was perhaps the greatest advocate of this technique, his haystack series being a case in point. Advents in new paint technologies such as highly consistent manufactured tubes of paint and lightweight easels and painting equipment had made this revolution possible. And scientific discoveries about the nature of light were driving an interest in colour, which led to bright fresh paintings often executed outside of the studio.

Concern with colour was only increased as the post impressionist, such as Paul Gaugin and Vincent Van Gogh took over, then the Fauves, such as Henri Matisse or the expressionists (e.g. Franz Mark or Wassily Kandinsky). Landscape painting became less about rendering the subject in a realistic way and more about capturing the feeling of being in a particular place. It moved away from realism and towards abstraction, away from topography and towards expression. First Cezanne (tentatively) and then Picasso (totally) broke through the concept of rendering a scene from only one viewpoint.

Cubism shattered the illusion of immersion completely and favoured a different approach to capturing the totality of landscape through a fragmentary multi-perspective approach.

By the middle of the 20th Century abstraction had taken over completely. Arguably, the Abstract Expressionists had taken the idea of landscape to its furthest painterly point. Rather than painting nature in a representational way some of them were claiming 'to be nature', as Jackson Pollock did with his action painting. Helen Frankenthaler's diffuse and transparent works are perhaps the most recognizably landscape like; while John Diebenkorn had moved from gestural representations of place to formal abstraction and Willem De Kooning seems to have left all attempts of representation behind entirely focusing on the brief and fleeting experiences of travelling through places quickly by car (Casey, 2005). All of these works pay little heed to the notion of an objective topographical representation of reality and tend much more towards a subjective abstracted depiction of the sensation of being in the landscape.

Panoramas, Photography and Immersive Media

Panoramic painting can be considered as a special case of painting that is specifically motivated by trying to trick the viewer into believing they are actually immersed in the depicted location rather than their real surroundings. Artists such as Robert Barker or Anton von Werner, for example, attempted to render large room size paintings that surrounded the viewer much as a real landscape does. Their focus was on rendering the subject in as much detail and topographical accuracy as possible in order to immerse the viewer in the landscape. As has been pointed out by other scholars (Grau, 2003), this tradition goes right back to ancient Roman times when frescoes were painted on villa walls to achieve a similar effect. In this sort of work we find the roots of virtual reality,

the attempt to immerse the viewer in an alternative world to the point that they feel present there more than in actual reality. It is driven by an isomorphic hyper-real aesthetic that is almost photographic. Indeed, photography is the natural successor to panoramic painting because of its hi-fidelity nature [now used to great effect in the ubiquitous panoramic features of our smart phone cameras]. Early photography itself had a huge role to play on the perception of landscape as it evolved. Major works by the likes of Carlton Watkins and Ansell Adams in the States, set the standard for landscape photography using large format cameras to capture the vast landscapes of Yosemite and other mountainous regions (Casey, 2005). Much of their work owes a great deal to the aesthetic of the sublime as many of their images focus on the grandeur of the great American landscape. Indeed, the high-fidelity nature of photography is very well suited to representing the sublime, as it is so isomorphic and topographically correct. If representations of landscapes are attempts to transport the viewer to the places they stand in for, panoramic painting and large format photography paved the way for increasingly immersive media that is driven by an iconic imperative.

Over time the panorama became reconfigured through cinematic technology, first as the Cinerama, then the Omnimax, the IMAX, and now the 3D cinemas that are commonplace today (Grau, 2003). Each of these technological advances increasingly attempts to convince the viewer that the alternative reality presented to them is more real than the theatre in which they are viewing it. Indeed, this goes further with the invention of the 3D head mounted display (HMD) and cave automatic virtual environment (CAVE) technology that completely takes over the available field of view. These completely immersive environments are attempts to make a person feel present in an alternative reality not just immersed visually but physically as well. CAVE's are particularly good at this because they encompass the whole body and allow a certain

freedom of movement complete with motion tracking and parallax views that early panoramic painters could only have dreamt of.

There are many significant examples of virtual environments now and the technology is employed regularly in simulations of real events such as flight simulation or cargo ship pilot training. In such environments isomorphism is paramount. The aim is to make the simulation feel as life like as possible and for the environment to behave as realistically as possible both in terms of the programmed simulation of the landscape e.g. changing weather conditions, but also the pilots agency in managing the situation. It is worth pointing out that the author has had some experience working in presence research. The BENOGO project [2002-2006] was a European funded research project tasked at looking at understanding the sense of place achievable within virtual representations of real places (Benyon et al, 2006; McCall et al, 2005; O'Neill, 2005; Smyth et al, 2015). The research not only aimed to improve the technology of image based VR, but also to understand what it is about real places that can or cannot be transferred to virtual environments. Some of these things are crucial for experiencing a sense of place. For example being able to see high-fidelity rendered images of a place but not being able to move around in it is problematic. Moreover, things like temperature, humidity, smell and sound all play a role in experiencing a sense of place. Even the static nature of the images can affect the presence felt in a virtual place as compared to a real one. In short, the technology is always apparent, even if we do become immersed in the environment. It is, as Casey points out, impossible to fully render the totally of a landscape because it "exceeds the scope of any given perceived object" (Casey, 2002). Because landscapes are so vast and multifaceted, representations of them are inherently reductive, even when the focus is on representing them with imagery that is almost indistinguishable from reality. Thus, one has to reconsider the

effectiveness of isomorphic realism in the rendering of our experiences of landscape. No doubt it has certain strengths in terms of showing us what places look like and if convincing enough we can feel present in an alternative reality but in many ways it falls short of rendering other facets of that same experience.

Largely this can be boiled down to issues of embodiment/disembodiment. Tele-presence for example allows you to feel that you are co-located in two different places at once. Being embodied in one location while simultaneously feeling that you are present in another, through the cameras and controls of remote operated vehicles, such as submarines or lunar landers. The remote vehicle acts as an extended body that allows you to operate over great distances. This is different to being immersed in a virtual environment, where the task is to somehow make the body feel as though it is inside a computer-generated environment. Something that is arguably harder to achieve (Lombard and Ditton 1997; Witmer and Singer, 1998).

Some experimental immersive environments have focused less on recreating how things look and more on what it might feel like to be in them. Charlotte Davis' *Osmose* and *Ephemere* being a case in point, where the aim is not to represent real places but to immerse the viewer in a translucent data space controlled by breathing and balance (Paul, 2003). These kinds of experiences tend to focus on feelings of 'presence' rather than high-fidelity immersion. While these experiments are interesting, arguably they are not representations of landscape at all. At least not of real landscapes like those created by the painters and photographers already mentioned. They tend to be fictional or invented spaces that have different rules of engagement and necessary limits in terms of their scope and operation. Nevertheless, they do represent a different dimension of experience that is akin to being in a landscape. By eschewing isomorphism and visual

fidelity, they explore other aspects of being in landscape and the effects that can have on an individual.

To recap, we can conceive of the development of artistic representations of landscape, since the 19th Century, as existing on a fairly broad spectrum. At one end we have representations that focus on engendering a sensation of being in a place by attempting to render representations of landscape that are iconic, isomorphic and topographically correct (sublime landscape painting, panoramas and virtual representations of real places). By making representations of place that look like the real thing, they attempt to immerse the viewer in an experience that simulates the sensation of being in that place. Conversely, at the other end of the spectrum we have representations of landscape that tend to abandon the facsimile all together (expressionism, abstract expressionism and subjective embodied interactions). These representations focus much more strongly on replicating the sensations themselves. They are less concerned with creating simulations that let users have a visual experience similar to being there. They are more concerned with representing the felt experiences that the artists have had in those places and in doing so attempting to communicate something about those experiences to an audience that my recognise within them experiences of their own.

Walking Art

One group of artists that took this concern with experience to a different level were the Walking Artists. Richard Long is widely credited with kicking off the walking art movement with his work "A Line Made by Walking" in 1967. Driven by the desire to experience the landscape over the need to represent it, Long was a pioneer of the protocol (Long, 1994). His early work was often characterized by using maps, on which he would draw lines and circles that would determine the shape of his walk. He would

then act out the shape of the walk by enacting the rule of following the shape of the line on the map in the real world. This wasn't always possible, as the terrain would sometimes prove impenetrable e.g. a vertical cliff face or slope that was impossible to traverse. His fellow artist, Hamish Fulton, used similar principles. At all times the 'art' was considered to be the act of walking and by accepting that objects could not capture the totality of that experience, they freed themselves from the need to represent landscape in increasingly high fidelity, isomorphic or topographically correct ways. This meant that they could create new tangential ways of representing the experiences they had with landscape. Sometimes the output was the map itself. At other times it was stone circles made on location or sometimes even just statements of facts about the walk itself, rendered in large vinyl letters on gallery walls. Generally though these ephemeral entities were often gathered together in book form to provide a specific documented outcome (Long, 1994, Fulton, 2001).

Malone and Adams, used similar principles when making their work JFK in 1997. Their protocol was to walk non-stop from Downtown Manhattan to JFK Airport, following the straightest path possible. Along the route they would share a camera, when one of them saw something that interested them he would take a photograph and immediately pass the camera to the other in order to take a photograph of what was directly opposite. The result was 243-paired sets of random photographs that document their 11.5-hour journey across various New York neighbourhoods. Again the outcome took the form of a book (Malone and Adams, 1997).

Similarly, Tixador and Poincheval traced a 750 kilometer line from Nantes to Caen and Caen to Metz using a compass as their guide. Their aim was to reach the art school gallery in Metz for the opening night of their show. When they arrived, tired bedraggled and unkempt, straight from the tip, they showed unedited footage of what

they had filmed with their video camera along the way. Later outputs consisted of an edited video and an illustrated travel diary that documented their experiences (O'Rourke, 2013).

In all these cases the focus has shifted from attempting to render a representation of a likeness of landscape as some kind of totalising object and towards the idea of documenting the experience in full realisation that what emerges as a representation is a fragmented multifaceted view of an experience over time, space and place. This approach emphasises the lack of our ability to capture the full bandwidth of the landscape experience foregrounding the experience itself as the artwork and the objects that represent it as mere documentation after the fact.

Self-Tracking and Data Mapping

In the same way that technology has changed the way we view landscapes through the advent of photography, IMAX and virtual environments, it has also affected the way in which we trace our paths across them. For example global positioning systems (GPS) have had a huge impact on our mapping and way-finding capabilities. In the hands of artists engaged in walking practices these technologies have become exciting tools for creative practice.

Masaki Fujihata's *Impressing Velocity* [Mount Fuji], (1992-94) is a pioneering example. Using a head mounted video camera, a GPS receiver and a laptop in a rucksack he tracked his journey as he climbed mount Fuji. By recording changes in the speed of his climb he was able to use this data as a variable to affect a 3D model of the volcano upon return to his studio. The resulting outcome was a radically distorted 3D image of the volcano that reflected the drop in his speed as he neared the summit (O'Rourke, 2013). Arguably, the employment of early self-tracking technology begins to deepen the notion of representations as attempts to capture aspects of experiences. In

this case the tracking of speed as a bodily felt experience that is intrinsically linked to the qualities of the terrain that exhaust the artist over time. The distorted view that emerges does not look like Mt Fuji but it more accurately represents what it's like to climb it. For the first time we see artwork that acknowledges the embodied and embedded nature of being in landscape through the use of data visualisation technologies and it appears alien to us.

Data artist Laurie Frick has also made several pieces of work related to her walking activities. Using a Fitbit, mytracks and a catcam she hand collects and hand builds collages based on her counting activities and photographs she takes at certain points on her journeys. Her *Floating Data* project is based on walks around her city neighbourhood that she mapped from memory and then compared to GPS tracks along the same routes. She used thumb counters to keep track of things she saw and kept note of the order things came in. She brought all of this data together to make patterns that represented her daily encounters with her urban environment, which were laser cut into sheets of aluminium and hung from the wall. All of this work culminated in an iPhone app called FRICKbits that allows any user to do similar things digitally. A kind of data driven psychogeographic art making tool. Again, the outcome looks nothing like the place itself but embedded in it are traces of the reality of experience over time.

Likewise, Jen Southern's approach to self-tracking is similar but much more socially oriented. She tends not to track herself but focuses on tracking other people as part of her projects. In *Running Stich* she and her collaborators built a real-time GPS mapping system that projected participants tracks across Brighton onto the gallery wall. Each of these tracks was then sewn into a hanging canvas (acting as the screen) to leave a record of each individual trace of activity within the larger 'tapestry ' of movement across the city. In a similar vein, *Unruly Pitch* tracks the progress of the 'Uppies and

Downies', mass football game that takes place once a year across the town of Workington, UK. The artists used GPS trackers on players, Drone footage, GoPro video, Digital photography and sound recordings to capture the action that took place during the match. The artworks that emerged from this process were threefold. A replica ball embossed with GPS tracks; Animated GPS tracks that reveal a video of the giant scrum and a digital map of the players tracked during the game (Southern, 2017). This project in particular highlights the need for multiple modes of data capture and visualization to give a range of views on what is a complex unfolding of an event in a particular place and time.

Since 2004 Christian Nold has been making emotional maps of different places across the world using his Bio Mapping methodology as part of his art practice (Nold, 2007). His *San Francisco Emotion Map* (2007) for example is the result of a five-week artist residency that involved 98 participants exploring the Mission District. Nold invited members of the public to go for a walk while wearing his Bio Mapping device, which records the wearers' emotional response to their environment through galvanic skin response and GPS data. The results of the walks were then mapped, using coloured dots (that represent the strength of the response) and personal annotations that relate to their experiences. As well as mapping their movement through the city (like Frick) Nold manages to capture an additional layer to the psychogeographical experience, which melds an objective data driven view of brain waves with a subjective response to place in the form of words. Highlighting the multifaceted nature of experience.

Nold's work is not dissimilar to the work of Arlene Ducao and her team who produced the *Mindrider* project (Ducao, 2014). *Mindrider* (or *Multimer* as it is now known) is an EEG device that measures brainwave activity and maps it in relation to GPS data, to give a picture of arousal/stress level related to moving across the city. In

it's original guise it was a component in a bicycle helmet and the resulting maps highlighted the difference between stressful and peaceful cycling within the streets of Manhattan. Now the project has expanded and is being rolled as a device that amalgamates multiple travel activities with other data sets about neighbourhoods in order to produce multi-layered info maps about the city.

Tangentially, Brian House has also used cycling for one of his data projects. Capturing his breath rate, heart rate and cadence as he cycled to his studio one morning, while wearing an action camera to record the journey he worked with a composer to transpose the data into music to provide a soundtrack to the video he'd made. It is not a direct data mapping but a piece of music closely informed by the data he captured. There are also a plethora of 'Strava Artists' that are using the mapping software to create line drawings on maps by cycling particular routes that will result in a picture of horse or a face or some other rudimentary image on the map itself. Additionally, it would of course be impertinent not to mention the seminal work "Legible City", by Jeffery Shaw (1989-91). In different iterations of this project, Shaw builds virtual representations of real cities (Manhattan, Karlsruhe, Amsterdam) but replaces the buildings with fictional text related to the cities. The participant/viewer is then enabled to manoeuvre through these text based virtual cities by an adapted stationary bicycle that converts actual physical activity into movement in the virtual space (Paul, 2003).

These kinds of self-tracking/data mapping projects allow us to look beyond what is immediately visible. They trace hidden elements of experience across familiar territory and open new windows onto hitherto unseen facets of sensation and experience, making the familiar unfamiliar again. While they take a great deal from the original walking practices of Long and others, they let us see our journeys and our interactions with the spaces we inhabit in new and deeper ways. The cycling pieces in

particular are significant to the author as he himself is making artworks that combine cycling and art practice with data from self-tracking activity (O'Neill, 2018; forthcoming).

Methods and Rationale for Making Work

In his art making practice the author is attempting to establish what kind of representations he is making. Each of his artworks is more of a question than a statement: A question about the power of different representational vehicles in terms of grappling with the age-old problem of expressing the inexhaustible experience of landscape. As a semiotician, he is interested in the way in which different kinds of representation (iconic, indexical or symbolic) signify different aspects of experience (O'Neill, 2009, O'Neill and Benyon, 2015). At the heart of this work is an interest in the ways in which digital technologies both enable and disable new experiences of landscape. Without new self-tracking technologies his work would not be possible but the questions at the heart of it are: What kind of representation does this technology give us? How can we use them effectively? And how does it affect the way we both experience and express our relationship with landscape?

It is a brute fact that it is impossible to represent the total experience of being-in-landscape as it is too big and too multifaceted and involves all our senses to comprehend. The experience is instantaneously multimodal and potentially synaesthetic, where as representations tend to be uni-modal (e.g. painting appealing only to the visual sense). Naturally, it would appear that multimodal approaches to representing experiences should increase the bandwidth available for representations. However, even multimodal representations fall short of the reality of the 'detotalising totality' of landscape. The upshot being that we must take on board that all representations of landscape, even if they manage to 'usher in' the 'topos of the topic'

and ‘re-place the place’ within a certain landscape (Casey, 2002) are only reductive windows briefly opened onto the reality of experience. As such, if we build multimodal representations of experiences of being-in-landscape, of being-in-place, then we are building mosaic, patchwork presentations of that experience. Such an approach should acknowledge, not hide, the fact that this is an approach of the digital. An approach that follows the logic of sampling in the same way that digital images are made up of very high frequency samples of light and digital music is made up of very high frequency samples of sound. To this end, digital tools and digital practices seem particularly apposite in terms of providing the necessary equipment for such a task.

Moreover, given the nature of the all encompassing experience of landscape that appeals to all the senses and their “synesthetic unity”, representations of such should explore the cross-modal relationships between the senses in order to investigate new ways to present aspects of experience, particularly in order to avoid the guaranteed failure of attempting to fully replicate the totality of experience of landscape through simulation.

The authors work has increasingly begun to engage with these issues and the material presented here is his first attempt to bring multiple art making strategies together that explore the boundaries of the digital representation of the experience of cycling in the landscape.

Results

King of the Sidlaws (2017) was an exhibition of work made for a solo show at Centrespace, Dundee Contemporary Arts. The work was based on personal data tracked while mountain biking in the Sidlaw hills on the outskirts of Dundee, Scotland. The terrain there is very challenging, in places very steep going up and coming down. A range of data was captured using iPhone apps, in order to describe the experience of

being out cycling in this environment:

1. A GoPro Hero 4 Session camera was worn on the authors bicycle helmet. It was programmed to take photographs every sixty seconds as the journey unfolded on one loop of the Sidlaws trail. Additionally, it was also used to capture video from various offshoot downhill routes that extend off the main trail.
2. Cyclemeter, was used to track GPS co-ordinates as the author travelled up/down over and around the hills. In conjunction with additional sensors it also tracked altitude, speed and heart rate.
3. Motion Logger, was used simultaneously to capture the gyroscopic forces acting on the authors body. The iPhone was essentially strapped to the authors lower back turning it into a motion capture devise capable of tracking six degrees of motion as x,y,z co-ordinates and associated G-forces.

Photographs (Slide show) Video works

From a semiotic point of view it is clear that the photographs and video footage captured with the GoPro camera are the most iconic of the representational types. In terms of the photographs, an automated protocol was used where by a photograph was taken every sixty seconds during a journey round one loop of the main Sidlaws trail. While there is a certain logic to this process of automation, it also brings with it a kind of randomness. The time gaps are set and periodic but there is no control over the taking of the photograph itself. The image captured is simply the image that is in front of the camera at exactly 60 seconds. The number of photographs taken overall (and in certain places) depended on how fast or how slow the author cycled round the loop. The author aimed to maintain a steady pace similar to a high level training session. Overall the whole loop took forty-two minutes to ride. The resulting forty-two photographs were presented in the gallery space over the exact same time scale, each photograph on

screen for exactly sixty seconds. Inevitably the uphill sections take longer to traverse than the down hill sections due to changes in slope and speed, therefore there are more photographs of up hill sections than down hill, this is the normal experience of cycling.

This disparity between uphill and down hill partly motivated the change to video for the shorter downhill only sections. There are a number of downhill trails that have been 'secretly' built by mountain bike enthusiasts within the Sidlaw range. They are essentially 'off piste' and not mapped in any significant way. Taking GoPro video of such trails has become normal practice within the MTB community, some users post them online while others simply keep them amongst their own group of friends. The author sought to draw on this 'vernacular practice' and make it part of his art, documenting, in a similar way, his descents of these hidden trails and sharing them in the gallery space. (Figure 1). These short video excerpts were shown back to back on a smaller monitor opposite the screen showing the photographs. Each short video was also related to a small data painting hanging on the adjacent wall.

Figure 1: Automatic photographs, video footage and gallery display.

Paintings

During all of these activities the iPhone apps were gathering the GPS, speed, altitude, heart rate and body motion data. All of this data was then used to make data paintings (O'Neill, 2018) that are linked to the photographs and video. One large piece was made that represents the long route round the Sildaws. Each square represents a GPS co-ordinate and the colour of that square is determined by the mixing of speed, altitude and heart rate data as transposed to RGB colour channels (see O'Neill, 2018). Thus the image reveals an indexical representation of the journey in terms of effort and speed in relation to the technicalities of the terrains changing slope. The mostly green hues highlight slight changes in altitude while the strong yellows reveal steep climbs where a great deal of effort was needed to cycle up them. The bluer hues highlight the opposite longer downhill sections where significant speed was built up. Several smaller pieces were made that correspond to the video footage of the shorter hidden downhill only sections. Thus each experience of the main route and the shorter trails is rendered both iconically and indexically as two facets of the same particular experience in that particular place on that particular day. Thus visually the experience of what the landscape looks like is portrayed in static images and in the motion of the video while at the same time some of what the experience felt like is communicated through a system of colour coded paintings that capture ephemeral data that can not normally be seen (Figure 2).

Figure 2: Data painting and gallery display

Installation

To extend the investigation of representations further, the author decided to make a time-based installation using the data from the body motion data in conjunction with the speed altitude and heart rate data (see O'Neill, forthcoming). Based on one of the shorter hidden downhill sections the data was transposed to RGB channels as before but then also mixed with the body motion data to determine the timing and location and size of a moving dot of colour on a projected screen in a black room. The motion of the dot is entirely determined by the body motion data and moves vigorously across the screen as a representation of the authors own body during the decent of the chosen downhill section. The colour changes according to changes in speed, altitude and heart rate as established in the data paintings. Additionally, the same data has been used to drive a soundtrack to the installation. Using the Beads library in Processing, the author coded

several synthesisers to ‘play’ the data of the descent. Thus the visual animation and the accompanying soundtrack are locked in step with one another as a dual representation of the physical experience of handling a mountain bike at speed over rough terrain (Figure 3).

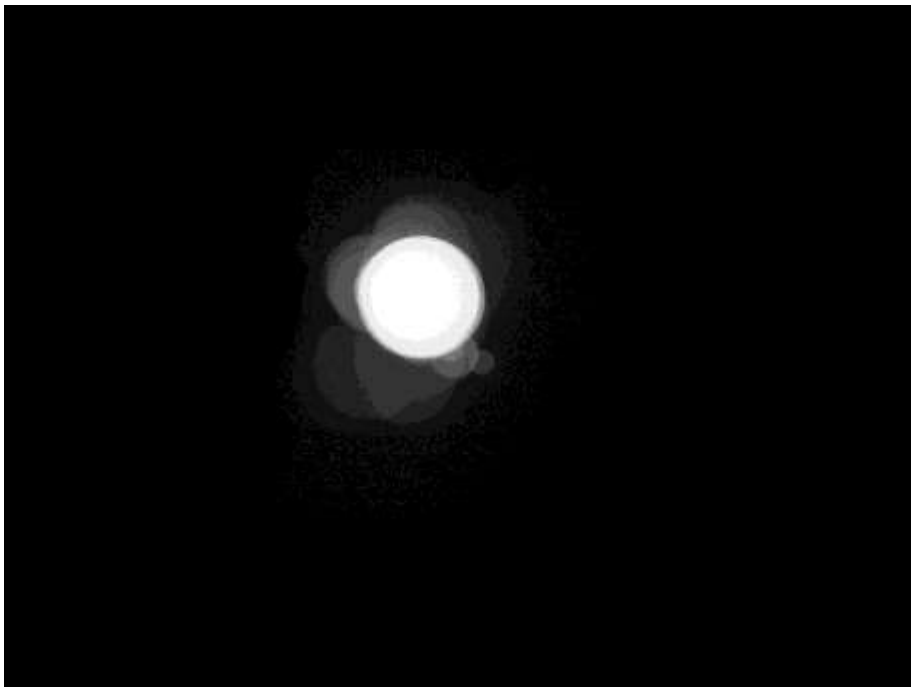

Figure 3: Still image from the animated data installation

Discussion

As the project developed, the exploration of representations became more and more data driven and thus moved from iconic onto indexical and even symbolic forms. While the outputs are less and less ‘lifelike’ in a visual sense, arguably, they become more lifelike in an embodied sense. Yes, the installation is represented in an utterly abstracted form but the underlying data, the onscreen movement and the sonic output are all deeply linked to the real time body movements of the author as he rode his bicycle. So, one has to consider whether this kind of representation is more real or less real than the static photographic image taken of the same landscape. Perhaps it is because we are not used to this kind of data being presented in such a way that it feels quite alien. Perhaps it is

because we will always favour the visual (as it is our main perceptual sense) over the others in terms of understanding landscape. Indeed, our traditional understanding of landscape has a rich history of visual representation that his hard to ignore, as we have seen. However, new tools and new forms of output offer new ways to represent landscape and with them to develop new ways to question our relationship to landscape. In our increasingly technologically pervasive lives where data has invaded the everyday it should be no surprise to see such data representing landscape in new ways, after all GPS has been doing so for a long time already.

The work presented here is an attempt to extend the boundaries of landscape representation in line with this increasing pressure from within the digital age to see everything through the eyes of data. In attempting to locate such practice within the context of other representational strategies the aim is, not only to position the authors own work, but also to problematize the whole notion of representing landscape. All forms of representation are reductive in one form or another. Where Iconic representations reveal the way things appear to us, they conceal other aspect of the experience. Likewise with data, it has the objective power to make the invisible visible but we need to be able to contextualise this power in relation to other representational types and to reconcile its strengths and weaknesses in relation to expressing the totality of our experiences.

Towards a Typology of Landscape Representation

Edward Casey writes eloquently about the problems of representing place in terms of both landscape painting and map making (Casey, 2002). He asks us to think about why we make such representations when the vast expanse of landscape is already enough in itself. He also highlights the fact that our representations are always destined to fall short due to only ever being able to render specific aspects of landscape rather than the

totality of our embodied experience of it. In short, he clarifies Fulton's aphorism "An object cannot compete with an experience" (Fulton, 2001), which frames much of walking art practice. However, Casey points out that representing landscape is something we have been doing for over nine thousand years. He argues that it is something that we cannot help doing and that representations of landscape are already "ingredient" in our experience of landscape in that "The brute being of landscape calls for… an insistent represented being as part of its very identity". (Casey, 2002 p xiv). Given that we are driven to make representations of landscape by the very insistence of our existence within it, we must confront the problem of how is it possible to represent landscape when:

"As an encompassing detotalized totality, landscape proffers to us a maximized 'circumambient array'…Precisely as maximally circumambient, that is, as surrounding the human subject on all sides in an actively comprehensive way, landscape exceeds the scope of any given perceived object. Appealing as it does to all bodily senses and to their synesthetic unity, landscape is panperceptual… As a panperceptual unity, landscape defies any simple imitation, that is to say, any effort to reduce it to the kind of definite object (or group of objects) that can be grasped in a single apprehension and, therefore, in a single image… How is one to represent, in what medium and style, something that is at once elusive and omnipresent, a whole and yet not a totalization, perceived by no single sense but by all the senses in a com-position that is itself problematic?" (Casey, 2002 p 6)

Casey's statement quite well captures what is at the root of all the various kinds of representations of landscape discussed so far. That is, it highlights the all encompassing, never ending multifaceted nature of our experience in the landscape and our limited capacity for apprehending and representing the vastness of its scale the

detail of its microcosm. And yet it seems that it is this inability to capture all of it at once that encourages us to keep trying to represent it over and over again. Our experiences of being in landscape are an inexhaustible supply of inspiration for representations of what it is to be human. We cannot be human without landscape. Landscapes and beings (and social relations between beings) are deeply entwined and interdependent with one another.

In later work Casey develops the idea of a continuum of mapping related to artistic landscape representations (Casey, 2005). Within it he identifies four types of mapping practices that are highly useful in terms of describing a range of art works related to landscape. Presented here are direct quotes from Casey's typology for the sake of clarity in preserving his careful explanations:

Casey's Four Types of Mapping

- **Mapping of:** *"To make a map of something is to make a map of a particular place or territory in the effort to capture its exact geography, its precise structure, its measurable extent. Cartography is the institutionalized enterprise that concerns itself with the objective mapping of locales and regions; its aim is mensuration in accordance with the strictest arithmetic and geometric and geodesic standards." (Casey, 2005 pxx).*
- **Mapping for:** *"Mapping is for something, and not strictly of something, when it is designed expressly for some particular purpose. For example, You Are Here Maps… usually posted in very public spaces… enable the viewer to get to a particular location in the most expeditious way. They do not pretend to cartographic accuracy; rather, their point is to provide a schema of how to move most efficiently across a portion of (implicitly or explicitly) gridded space." (Casey, 2005 pxx)*

- **Mapping with/in:** *"concerns the way one experiences certain parts of the known world: the issue is no longer how to get there or just where "there" is in world-space, but how it feels to be there, with/in that very place or region, whether the feeling itself is one of amazement or boredom, duress or ease. I divide up the word within in order to signal the internal complexity of this experience. On the one hand, the viewer of such a map is drawn in rather than encouraged to hover above, as in the case of many cartographic representations. On the other hand, one experiences oneself as with the landscape instead of apart from it. The with is of special interest. For one thing, it connotes the withness of the environing earth, which is to say the circumambient landscape in which we are stationed at all times. But it also signifies the "withness of the body"…that is, the fact that we encounter things by means of a body as a constant companion and effectuator of experience. The two withnesses entail each other: I am with my surrounding place to the extent that I am experiencing it with my body; and I am with my body to the extent that I experience the landscape laid out around me. I exist with both at once." (Casey, 2005 pxxi)*
- **Mapping out:** *"To the degree that I find myself with/in the living landscape, I am part of that landscape, just as it is part of me. The boundaries between myself as mapmaker and the earth I map – boundaries that become strict borders in the case of the official cartographer, who is a representative of a "major science" –are porous when I feel a given landscape… Mapping out [is about] getting the experience into a format that moves others in ways significantly similar to (if not identical with) the ways in which I have myself been moved by being with/in a particular landscape… Mapping out does not mean tracing out the mere outlines of objects in the landscape; it means following out the lineaments of the earth, putting down its main marks, limning its first features; a procedure of a decidedly nonmajor*

or renegade science, since it does not pretend to regulate the representation or even to make a representation at all in any conventional sense." (Casey, 2005 pxxii)

Casey's four types describe artistic mapping practices across a spectrum from the essentially objective/cartographic at one end to the subjective/absorbtive at the other. This spectrum is very helpful in terms of organizing the kinds of representations of landscape that we explored earlier. However, in order to make this task a little simpler it would also be useful to include an additional semiotic spectrum that runs perpendicular to Casey's mapping typology. On the vertical axis we can place Casey's typology with his objective cartographic mapping *of* at one end and subjective mapping *out* at the other. On the horizontal axis we can establish iconic isomorphism at one end and symbolic/abstract representation at the other. This new axis is essentially a semiotic spectrum that covers the range of different kinds of representational types already existent in semiotic theory, and with which Casey is familiar. The space described by these two axes then allows us to place different kinds of representation of landscape within a basic grid like structure. This adapted semiotic theorization of Casey's different mapping types provides a framework for locating different types of landscape representation in relation to each other. It gives us a map of representational types if you will, see Figure 4 below.

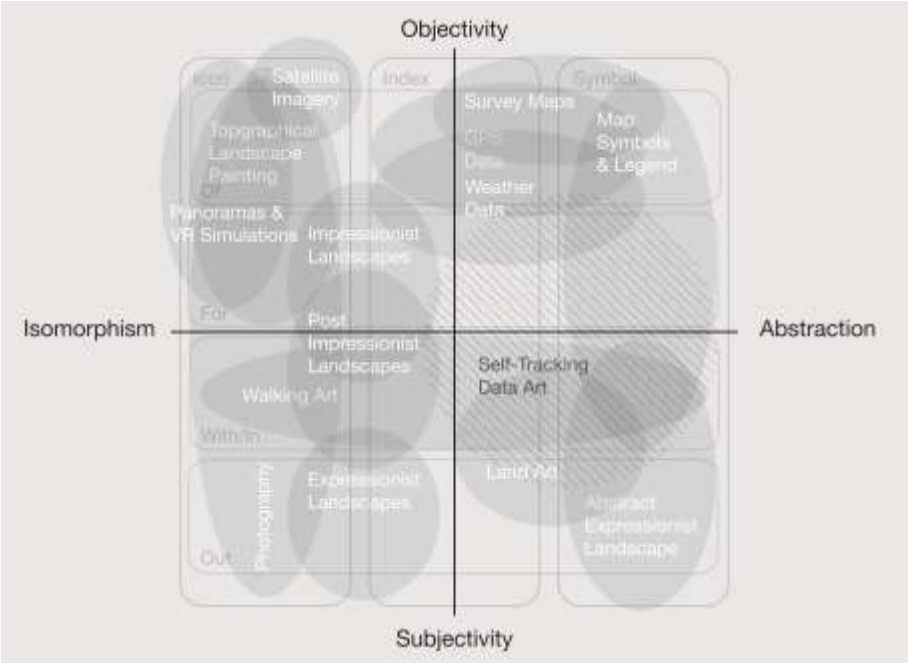

Figure 4: A Landscape Representation Typology Map

The space between Isomorphism and Objectivity would contain mostly iconic and indexical representations of places such as topographically accurate paintings or photographs of real places, aerial photography, panoramas and virtual reality simulations of real places/events and, at the less isomorphic end, Impressionist paintings.

The space between Objectivity and Abstraction would contain indexical and symbolic representations of places. Essentially this space covers survey maps and all the elements that we find in map legends: the roads, railways, viewpoints, etc. This space is essentially pictographic in a visual sense but it may also contain elements of language, such as names that refer to the ‘things’ or ‘places’. Additionally it also contains data as symbolic representations of landscape e.g. GPS co-ordinates, grid references, distances etc.

The Abstract-Subjective space would contain representations that aim to symbolically capture the absorbtive experience of being in the landscape. Much less

about how landscapes look and much more about what it feels like to be in them. This is the realm of sensation rather than perception. Abstract expressionist and gestural painting sit here. As does Land Art and a large part of Walking Art. Importantly, Self-Tracking Data art (and the authors own work), that uses the sensing of bodily data, sits in this space although it crosses the boundaries into the more objective realm as it also uses other forms of data such as GPS.

The last, Subjective-Isomorphic, space would contain expressive work that bears some kind of indexical or iconic resemblance to the subject matter. Post Impressionist and Expressionist painting, as well as some emotive forms of photography and elements of Walking Art fit here. Some virtual environments might also fit here if they are more bodily oriented than visual (e.g. *Osmose* or *The Legible City*).

This map is by no means exhaustive. It is simply a first attempt at locating a number of representational types within a framework that helps explain their relations and differences. There may be many other elements that are not included as yet and their boundaries are by no means set. Indeed, the exploration of representational types in the authors own works identifies several different types of semiotic activity ranging from: Iconic photography that is an objective record of a moment in time at a particular place, through indexical 'data-paintings' that somehow sit between the objectivity of data collection and the subjectivity of felt experience, and on into symbolic representations of real time experience rendered as installation art. The point being that increasingly, new digital technologies are simultaneously allowing us multiple different perspectives on our world at different levels of granularity and type. Artworks, such as the authors, and several other artists, are often blurring the boundaries between these types of representation so it is helpful to be able to identify how these different types relate to one another within the context of representing experiences of landscape.

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