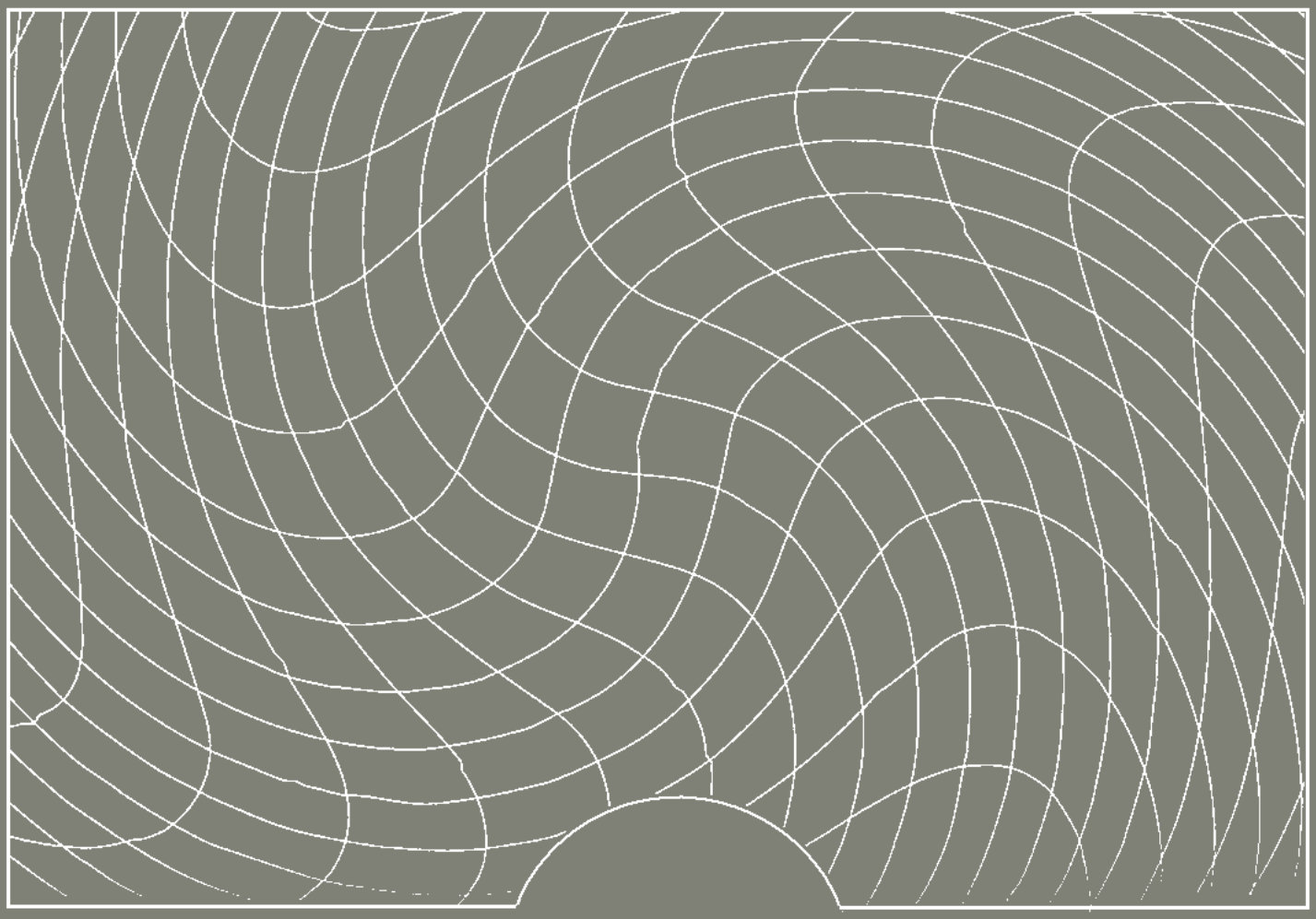

Edward John Zammit
5375797
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AR1A066
Architectural History and Theory
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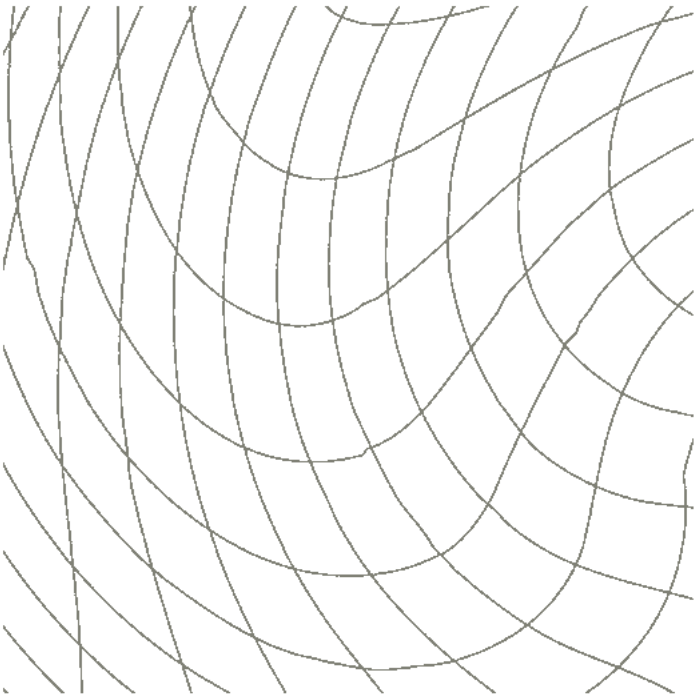
TU Delft
Chair of Architecture Theory
2021

Tracing the map

Exploring experimental cartographic alternatives
and their potential contribution to the improvement
of architectural surveying



“Given detachment and a careful angle, all destinations are predictable. And even though on any printed landscape, directions never tell you where to go, maps are an evening comfort to the traveller, a pencil line will quickly take him home.”

Transcript from archived poetry reading,
author unknown.

Source: <aporee.org>

CONTENTS

INTRODUCTION: MAP & TERRITORY

“The map is not the territory”

- Alfred Korzybski

The survey, and a landscape of snows [1]

Cartography as a practice has always been inexorably linked to any discipline that can be associated with space. The connection of map and territory has laid the foundation of our understanding of the contemporary world. Lines once drawn on a canvas that supposedly represented the Earth have created countries, borders and territories. In this sense, the map is an analogous instrument: what one finds at a particular point on a map, is what one would expect to find on its respective real-life location, and vice versa.

But what one doesn't find on a map, raises concerns. The uncharted is the embodiment of the unknown, but the unknown is what instils the need for exploration and understanding. Denis Wood in *'The Power of Maps'* (1992) [2] argues that "No map can show everything," (…) "Could it, it would no more than reproduce the world, which, without the map, we already have. It is only its selection from the world's overwhelming richness that justifies the map." (Wood 1998)

Cartography's relation to geography has led to our understanding of maps as a purely scientific object. The conventional understanding of maps and their concurrent aestheticisation, has become to be directed mainly to the cartographic 'survey'. James Corner in *'The agency of mapping: speculation, critique and invention'*[3] (1999) argues that the significance of such an image is attributed to its supposed accuracy. "As expertly produced, measured representations, such maps are conventionally taken to be stable, accurate, indisputable mirrors of reality." (Corner 1999)

However, considering the heavy relevance on the *'survey'*[4], and its widely integrated use in contemporary architecture and urban planning, issues start to emerge from the previously mentioned cartographic limitations. Surveys are designed for multi-purpose use and abide by very specific regulations of scale, contour intervals, and accuracy specifications. Their widely accepted accuracy throughout modern history means that the government agencies, the industry, and the general public has come to regard them as the most accurate possible representation of a geographical area.

Despite this, we should remain skeptical about this 'hyper-accuracy' of information and keep in mind that, just like any other cartographic representation, surveys show only selected features. We have become accustomed to maps that only survey the 'permanence' of our built environment: streets, pavements, houses, parks, bridges and tunnels.

In today's context, it has become easy to see why such information is considered significant. The human perception of our environment

[1]
Turchi, P. (2011). Maps of the imagination: The writer as cartographer. Trinity University Press.
"A wide landscape of snows" is a reference to the book's second chapter by the same name, which investigates the 'blanks' in maps and stories, things left out on purpose, and the inferences that the viewer must make.

[2]
Wood, D., & Fels, J. (1992). The power of maps. Guilford Press.

[3]
Corner, J. (1999). The agency of mapping: speculation, critique and invention (pp. 213-252). na.
Corner's text follows an argument that runs parallel to this essays', presenting a critical analysis focusing specifically on maps done by architects.

[4]
The term 'survey' refers specifically to visual inspections done in an area where work is proposed. It is seen as the standardised method of 'mapping' that has become associated with determining precise locations for construction works.

has shifted drastically thanks to the mainstream implementation of satellite imagery in utilitarian software such as *Google Maps* [5]. Geographic data has become simplified to overhead hyper-detailed, state-owned satellite images, or high-polygon three-dimensional reconstructions of significant landmarks.

[5]
Throughout the following chapters, Google Maps will constantly be referred to as a case study.

Jean Baudrillard in *'Simulacra and simulations'* (2000) [6] states that now, "it is the map that precedes the territory". There are no more 'blank spots' on a map. One already has a visual, preconceived idea (arguably artificial) of what the territory is, even before stepping on it. The contemporary map has been reduced to a visual simulacrum.

[6]
Baudrillard, J. (2000). Simulacra and simulations. na.

Changing perceptions of geography in the field of architecture

However, the 'permanent features' of a surveyed area are far from representative of the space. Postmodern theory has seen the deviation in the definition of a site as a grounded and fixed physical location. Miwon Kwon in *'One place after another'* (2002) [7] argues that over the past thirty years, the 'site', specifically in the field of advanced art practices, has become "a discursive vector—ungrounded, fluid, virtual". (Kwon 2002)

[7]
Kwon, Miwon. "One place after another." Site-specific art and locational identity (2002).

This expanded view of the site, and the move from space being regarded as a strictly defined location owes itself to the increasing relevance of a broad range of fields ("anthropology, sociology, psychology, natural and cultural histories (…)") in spatially related disciplines. (Kown 2002)

In Lucy Lippard's 'The Lure of the Local: Senses of Place in a Multicentered Society' (1997) [8], Lipard is aware of the increasing genericness and homogeneity of place, set in motion by the rapid growth of capitalism. She describes the site as "the intersections of nature, culture, history, and ideology", something that should be understood and preserved. Our sense of place is "the geographical component of the psychological need to belong somewhere, one antidote to a prevailing alienation." (Lipard 1997)

[8]
Lippard, L. R. (1997). The lure of the local: Senses of place in a multicentered society (p. 9). New York: New Press.

The map as a medium for revolutionary forms of perception

In this sense, we begin to understand the sheer importance of the role of mapping in today's environment. The hyper-accurate 'survey' becomes dangerously deceptive: a homogeneous representation of redundant, so-called 'permanent' features of a landscape which does very little to document the varying dimensions of space. In the age of capitalism, where time is money, homogeneity in cartography has become a widely accepted norm. The standardised approach

of ‘surveying’, while quick, efficient, and seamlessly integrated into the workflow of architecture and other spatial disciplines, is largely undeveloped and homogenised.

The word ‘experimental’ in the context of the essay is meant to suggest a take on mapping as a self-reflexive practice, which does not only look at cartography as an ontological condition but rather, a practical discipline that can be actively improved upon through experimentation. [9]

In this sense, the essay is ultimately a critical approach to the systematized rules, standards, tools and instruments used in contemporary cartography. It understands the ‘site’ and its representation as something that is integral to our understanding of space, and consequently, considers maps as a critical part of the spatial design processes. The formulated arguments will set the stage for the map as a means of countering the trends of the dominant capitalist culture: a contextually appropriable tool that is both scientific and sensual, capable of revealing obscure spatial truths and peeling the many layers of our perceivable reality.

[9]
Paglen, T. (2008). Experimental geography: From cultural production to the production of space. Experimental geography, 28, np.
The application of the word ‘experimental’ in this context is appropriated from Paglen’s definition of ‘experimental geography’

CHAPTER 1: MATERIALITY IN CARTOGRAPHY

“All too often, mapping tends to be dismissed as a commanding, hegemonic instrument. Yet to persist in this position is to risk producing a notion of mapping that is restricted, placed wholly in the service of domination. What remain obscured are the nuanced representational edges of cartography, the diversity of cartographic practices, and the varied potentials of different mapping processes.”

- Bernd Weissmuller

The map as a physical instrument

To tackle the instrumental value of the map, we will start by applying theories in the field of *Object-Oriented* philosophy [10] to the disclipline of cartography. Through this, we will temporarily deviate from questions of spatial representation and instead attempt to understand the physicality of the cartographic object.

Christian Jacob in *'The Sovereign Map'* (2006) [11], observes that "maps establish a new space of visibility by their distancing of the object and their replacement of it by a representational image". However, we must understand that the map itself is also an object whose own functions 'result from its materiality, from the specific pragmatics of its viewer's body and gaze". (Jacob 2006)

He goes on to explain that to define a map, we often resort to explain what it represents rather than what it is. Comparing it to "written or spoken language", the cartographic object never draws attention to itself but rather, is an "absence of noise" that would otherwise hinder its understanding. Jacob argues that through history, maps have only been seen in the context of their being, as an object dictated by the non-human objects and places that they represent.

The map as manifestation of a process

Kitchin and Dodge in *'Rethinking maps: new frontiers in cartographic theory'* (2011) [12] propose a departure from this method of thinking, suggesting "a shift from ontology (how things are) to ontogenesis (how things become)." By this definition, a cartographic object becomes the physical manifestation of a process: an operating, material instrument. By noting this, I am attempting to further distance the notion of the map as a tool of territorial power and control, and opting for understanding how mapping performs through its material being.

For instance, the tribal stick charts used by the Marshallese *(fig.1)* [13] were a vernacular solution to navigating the islands across the Pacific Ocean. Lacking the invention of the astrolabes, sextants and compass, the tribes would use an open framework of coconut frond midribs, and seashells representing islands. These maps were used to chart ocean swells, and the directions they followed between the islands. The stick chart is in every sense a purely cartographic object: a collage of salvaged environmental objects, juxtaposed to form a very specific instrument.

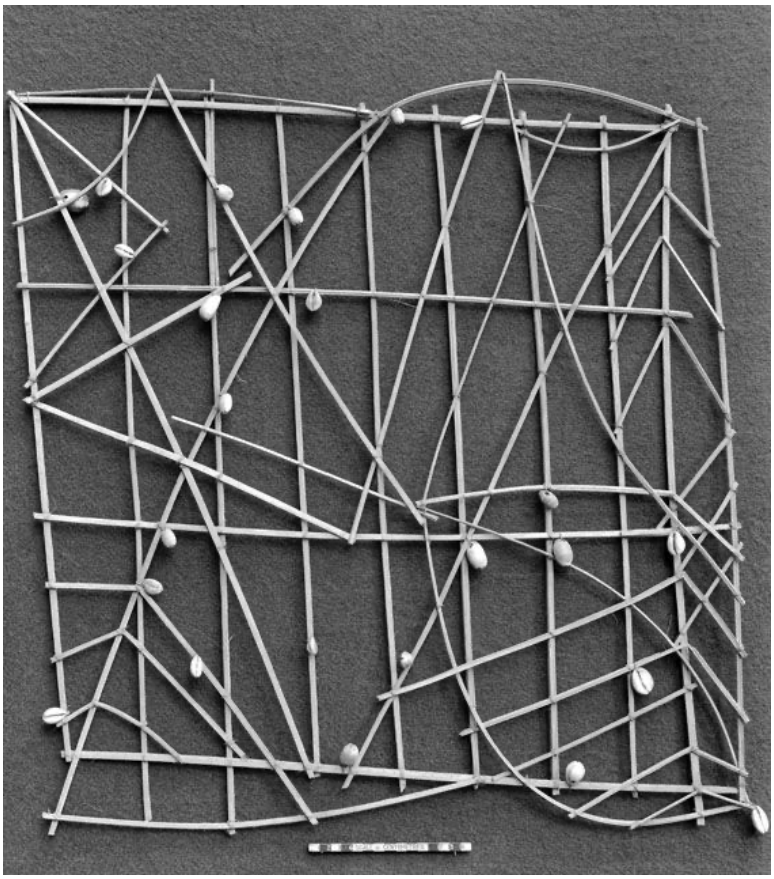
This open definition of the map will help us understand the cartographic object as something more than just a physical paper that can be folded, closed, crumpled and torn, but a materially

[10]
The term 'object-oriented cartography' was originally coined by Tania Rosetto in her book 'Object-Oriented Cartography: Maps as Things' (2019). It derives arguments from Object Oriented Onthology, a Heidegerrian form of metaphysical thinking in which non-human objects experience their existance, outside of our definition of consciousness.

[11]
Jacob, C. (2006). The sovereign map: Theoretical approaches in cartography throughout history. University of Chicago Press.

[12]
Dodge, M., Kitchin, R., & Perkins, C. (Eds.). (2011). Rethinking maps: new frontiers in cartographic theory. Routledge.

[13]
(fig.1)
Image sourced from:
Fabrizi, M. (2021). Sculptural Cartography: How The Marshall Islands Inhabitants Used Stick Charts To Map The Waves
From <http://socks-studio.com/2014/01/16/sculptural-cartography-how-the-marshall-islands-inhabitants-used-stick-charts-to-map-the-waves/>



(fig.1)

(fig.2)

unbound entity derived from a process. Like in the Marshallese stick charts, new forms and juxtapositions of material can directly influence the function of the map.

Physical surface and Digital Interface

As one would expect, the digital age has been pivotal in the redefinition of the materiality of cartographic objects. In her book *'Object-Oriented Cartography'* (2019)[14] , Tania Rosetto distinguishes the pre-digital map surface from that of the digital, stating that for the latter, the "surface" of the cartographic object has become replaced with the "interface".

The interface signifies a new degree of interaction and navigability: the digital map no longer needs external instruments to be read and processed. One no longer needs to use a magnifying glass to get a larger visual of a specific area, but now zooms in, pans back out, and drifts between scales instantaneously.

Whereas the paper surface "may be associated with an aesthetics of long-term use, affection, slow accumulation of notes, static spatial knowledge, while digital surfaces such as smartphone touchscreens may be associated with slipperiness, dynamism, hapticity, and multiplication of actions" (Duggan 2017b) [15]

Inhabiting the digital surface

The digital map surface is non-static, simultaneously containing countless projections, scales, and orientations. The digital map is occupied entirely by digital objects, which appear to us as colourful and visible beings. Understanding the substance of such objects, Hui Y. in his essay *'What is a digital object'* (2012) [16] explains that "At the level of programming they are text files; further down the operating system they are binary codes; finally, at the level of circuit boards they are nothing but signals generated by the values of voltage and the operation of logic gates." (Hui 2012)

However, Hui Y. also notes that if one tries to understand the digital object as a compilation of 1s and 0s, in a reductionist point of view, there is not much that one can understand about the digital being. Instead, we "should grasp the digital as a new technique to manage data in comparison with the analogue". (Hui 2012)

In fact, this analogous nature of the digital in its need to represent non-human objects is what reveals its shortcomings when applied to the discipline of cartography. The term Computer or Machine Vision describes methods used to process high dimensional data gathered from the 'real world' drawing from machine learning and

[14]
Rossetto, T. (2019). Object-Oriented Cartography: Maps as Things. Routledge.

[15]
Duggan, M. (2017). The Cultural Life of Maps: Everyday Place-Making Mapping Practices. Livingmaps Review, 3, 1-17.

[16]
Hui, Y. (2012). What is a digital object?. Metaphilosophy, 43(4), 380-395.

artificial intelligence algorithms to produce symbolic outputs (the digital object). [17]

The generation of three-dimensional structures from gathered data, especially in the field of cartography, requires many assumptions which can only be solved through approximations.

In *'Postcards From Google Earth' (fig.2)* [18] New York based artist Clement Valla discovers "strange moments where the illusion of a seamless representation of the Earth's surface seems to break down." Clement does not describe these faults as glitches but rather, "the absolute logical result of the system"

"They reveal a new model of representation: not through indexical photographs but through automated data collection from a myriad of different sources constantly updated and endlessly combined to create a seamless illusion; Google Earth is a database disguised as a photographic representation. These uncanny images focus our attention on that process itself, and the network of algorithms, computers, storage systems, automated cameras, maps, pilots, engineers, photographers, surveyors and map-makers that generate them." (Valla 2010)

What Clement Valla calls *'The Universal Texture'* is a composite map containing a large collage of imagery, mapped over an approximated 3D model of the Earth: a landscape of seemingly analogous digital objects. Through these uncanny images, it becomes clear that Google Earth is essentially a colossal database disguised as an accurate, photographic representation. [19]

[17]
For more information on the role of the contemporary digital object and its relation to automation, refer to:
Amaro, R. (2019). As if. From <https://www.e-flux.com/architecture/becoming-digital/248073/as-if/>

[18]
(fig.2)
Images and text sourced from the project's official website: <http://www.postcards-from-google-earth.com>

[19]
Valla, C. (2012). The Universal Texture. From <https://rhizome.org/editorial/2012/jul/31/universal-texture/>

(fig.3)

This shift in materiality is not exclusive to how the map is read, but is also deeply integrated into how it is produced. Much in the same way that the paper map is a physical manifestation of scribed lines, made through compasses, rulers and pens, the digital map is generated through lidar scanners, satellites and 360 degree cameras propped on Google cars *(fig.3)* [20].

The digital deviation from analogue instruments in which the cartographer would manually draw the map, has now evolved into a process in which the lines are drawn through automation: a direct result of the vectorisation of collected geographical data.

The idea of a self-generating cartography leads to an interesting paradox. Leaving mapmaking to digital instruments means that for most of the process, human supervision is either very minimal or purely non-existant. In this way, we end up with maps that contain more information than we can comprehend. Every inch of the paper map is engrained in the mind of the one that draws it, but the secrets of the digital map are known only to the machine that has generated it. As human beings, we can never understand the digital map fully: every pixel has come to contain information that is potentially useful. [21]

[20]
(fig.3)
The image is a snapshot taken from film-maker Ernesto de Carvalho's 2016 short documentary "Nunca é noite no mapa" (It's Never Nighttime in the Map). In the film, he constantly refers to the map as something immaterial, which eventually takes the form of a car roaming around his neighbour-hood.

[21]
In 2000, satellite imagery from Harun Farocki's 1988 film Images of the World and the Inscription of War was used in court as evidence against attempted Holocaust falsifications. The case centred around the presence of four small holes in the ceiling of the concrete roof of the structure, which supposedly appear in the film, in which every filmgrain represented a geographical area of half metre squared.
From:
Weizman, E. (2017). Forensic architec-ture: Violence at the threshold of de-tectability. Princeton University Press.

De-materialising the map: MASRAD

In later years, an emerging deviation from self-generating digital approaches to cartography has become more popular. While the return to the hand-drawn map is among the more common, other approaches have been particularly focused on attempting to free cartography from the limits of pre-digital and digital materialities that have become associated with the practice of mapping.

In such cartographies, the de-materialisation of the map allows it to take on new structures and new definitions. For example, 'MASRAD'[22], is a "project in progress for building a platform for organizing, archiving and availing oral history collections." Being a direct reaction to the censorship of satellite images over Palestine of testimonies which collects stories and narratives from the land that has been removed from the map.

In a sense, this cartography becomes one of knowledge production. It is a direct result of limits imposed on it by the 'traditional map', and attempts to find alternative ways to perceive the territory that it represents. In this case, the cartography does not take shape through surveying, measuring and drawing but rather, through cataloguing, indexing, transcription, segmentation, anonymisation, and publishing.

[22]
For more information on MASRAD, visit their website at <https://masrad.org>

CHAPTER 2: MATHEMATICAL PROJECTIONS

“How to choose? This is the question, for the answer determines the way the earth will look on the map…. The selection of a map projection is always to choose among competing interests, to take … a point of view.”

- Denis Wood

The Orange Peel Problem

In the year 1930, Claudius Ptolemy stated that upon wrapping the entirety of Earth around a sphere, it takes on the shape of its own, without any distortion. However, placing the Earth on a sheet of paper, the image will require a certain adjustment.

This phenomenon later became known as 'The Orange Peel Problem': if you were to translate the geometry of an orange peel and lay it on a flat plane, you would have to distort it, pull and push it in several directions. Interestingly, there exists virtually an infinite number of ways in which you can flatten the orange peel.

Comparing two of the most widely accepted projections in cartographic history: Mercator's projection of the Earth's surface and Buckminster Fuller's Dymaxion projection, reveals two very different geographic structures. Both visualise the same planet and the same areas, but while the Mercator map stretches the surface without cutting up the metaphorical 'orange', the Fuller map divides the sphere into triangular bits which when flattened, form a polyhedron.

In the former, the compass directions are made parallel, distorting the form quite heavily in the process, especially at the poles, while in the latter, all areas of the globe are represented equally simultaneously with relatively little distortion.

Arguably, there is no 'right' and 'wrong' projection. Both are equally valid (and invalid) representations of the Earth. As described by Denis Wood et al in *'The Power of Maps'* (1992)[23], projections "offer space for space, abstraction for abstraction". They are codes: "an interpretive framework, a set of conventions or rules, that permits the equivalence of expression" (Wood 1992). It is through the projection that the map image is molded and given, it allows us to refer and relate to the space that we will occupy and experience.

[23]
Wood, D., & Fels, J. (1992). The power of maps. Guilford Press.

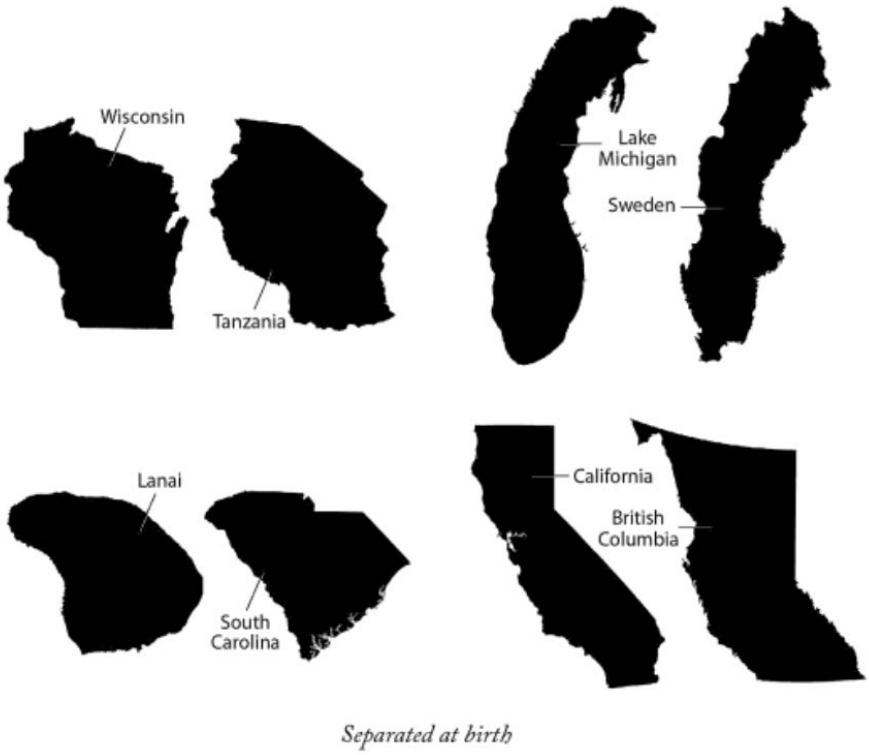
Perception through projection

Taking this definition even further, we should understand that becoming aware of the geographical and mathematical machinations of a map's projection is the first step to understanding a cartography. In "MapHead", Ken Jennings explores the interesting notion of map shapes 'seperated at birth'. *(fig. 4)* [24]

Reducing the overhead views of Lake Michigan and Sweden to flat shapes and looking at them side by side, reveals two nearly indistinguishable forms. In this reduced state, these shapes are simply hollow forms. To give them meaning, and start to mentally process the fact that they are geographic volumes, we unknowingly

[24]
(fig. 4)
Image from:
Jennings, K. (2012). Maphead: Charting the wide, weird world of geography wonks. Simon and Schuster.

apply projections to them. We become aware that, when reproduced side by side, Lake Michigan is being projected at a smaller scale than that of Sweden, and that in the former, black ink represents water, while in the latter the black is projected as land.



(fig.4)

The digital projection

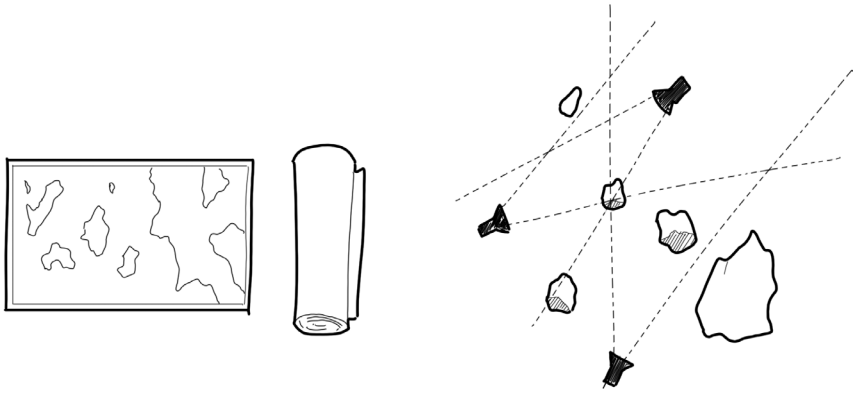
By the time computers were developed, we had already grown accustomed to our geographic environment [25]. The geographic image of the Earth has largely remained unchanged since the advent of the digital: we were already aware that the Earth is round, or that the continents are laid out in the way they are. In this sense, the digital has not been propelled by major paradigm shifts in geographical understanding.

However, complex projections that are too difficult to draw manually can now be plotted very quickly through cartographic software. Projection parameters can also now easily be changed, meaning that infinite projections of a specific area can be instantaneously generated.

This has created a new understanding of the cartographic object. *(fig. 5)* [26] Whereas the physical, pre-digital map simultaneously contained the drawing of territory visualised through a particular projection, the digital map now presents us with an image of a non-physical, digital object (a model) that can be explored and distorted as much as needed.

[25]
Historically, significant steps forward in the evolution of the cartographic projections have always been prompted by major geographical discoveries. For example, the increase in knowledge during the renaissance and the discovery of the spherical nature of the Earth, led to the development of calculus which gave the cartographer the necessary tools for accurate charting.

[26]
[fig. 5]
Conceptual diagram by author



physical object *digital object*

(fig.5)

When we look at a digital cartography, we are no longer witnessing an act of mapping but rather, a generated view (one of infinite possible views) of a non-physical, analogous territory.

This digital way of producing cartographies has given us a new degree of freedom in representation. This allows us to generate maps with very specific projections, tailoring to very particular needs. For instance, some preserve size, some preserve shape, while others are more accurate over east-west distances and others are preferred for north-south spans.

Selective point of views

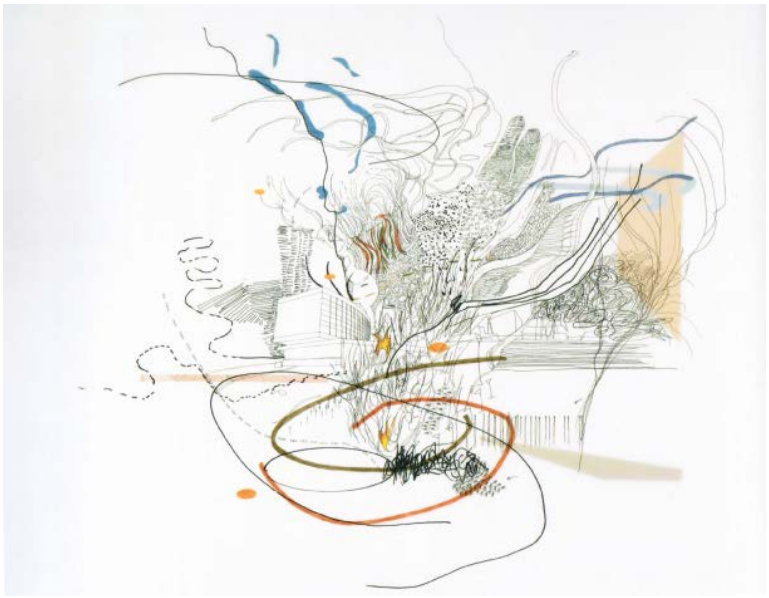
In this sense, an interesting relationship can be drawn between the mathematical projection and the maps content: distorting certain content of a map, leads to a more clear visualisation of another type of content. In more broad terms, for instance, to get a clear projection of the poles, we must succumb to heavy distortion at the equator, and vice versa. But removing ourselves from the global scale, and returning to the scale of the site, how is all of this translated?

Since the 1990's, Franz Ackermann has developed a series of mixed media 'Mental Maps', documenting his experience while wandering through different parts of city *(fig. 6)*. His maps are largely a juxtaposition of different architectural and landscape elements: roadways, passageways and conduits are overlaid and superimposed over one another. Julie Mehretu applies similar techniques of spatial collage, by fusing together elements from real geographic spaces to create new, unimagined geographies. She uses directional arrows and linear vectors to expand and compress the new places she creates. *(fig. 7)* [27]

Such efforts in contemporary cartographic art are representative of the need for a more personal approach to cartography. Consequently, the most notable deviation from traditional maps is, once again, the projection.

[27]
Both examples were discovered on artist Sara Graham's blog 'CityMovement' which contained very helpful thoughts and observations that contributed to the formation of this chapter's argument.
Graham, S. (2012). Do Maps Create or Represent Reality?
From <https://citymovement.wordpress.com/2012/05/09/do-maps-create-or-represent-reality/>

(fig.6)



(fig.7)

Maps such as the ones developed by Ackermann and Mehretu somehow drift across the marked surfaces of the traditional overhead map, deviating entirely from overhead vision and employing a distorted, somewhat first-person perspective. Once the map is freed of its navigational function, and once it is expected to perform a new function (in this case, that of recording experience at the street level), the cartographic projection is distorted, adjusted and appropriated accordingly.

Interestingly, both of these examples predate the popularisation of Google Street View, which is arguably a relevant digital translation of the two artist's works. In the case of StreetView, it is a first-person projection that, while seamlessly integrated into the top-down algorithm of GoogleMaps, also stands as an entirely independent cartography. The street-view cartography has a different kind of 'unmapped space': the top-down view is concerned with mapping all areas of a neighbourhood through satellite imagery, without much concern for mapping detail on street level, while the Street View

acknowledges the value of a more humanitarian, eye-level approach of understanding space, favouring one perspective at a time rather than the networks and street connections mapped by the former.

The two maps exist as entirely seperate entities: the user drifts along the streets of a neighbourhood, without relating to the top-down perspective, and vice versa. The two cartographies come together through a seamless transition: one map ends, and the other starts where the last one left off.

Returning once again to the current state of the architectural 'survey', we should be made aware of the unwillingly deceptive nature of the standardised top-down view projection. As previously stated, this selective projection is not concerned with the human-scale: it presents a point of view that is virtually unattainable by potential users of a space. Needless to say, this projection is highly advantageous for more practical reasons, due to its minimal distortion of spatial dimensions. This is especially useful in the later stages of a design project where more technical issues are addressed, concerned with size, project boundaries, geographical features, etc.

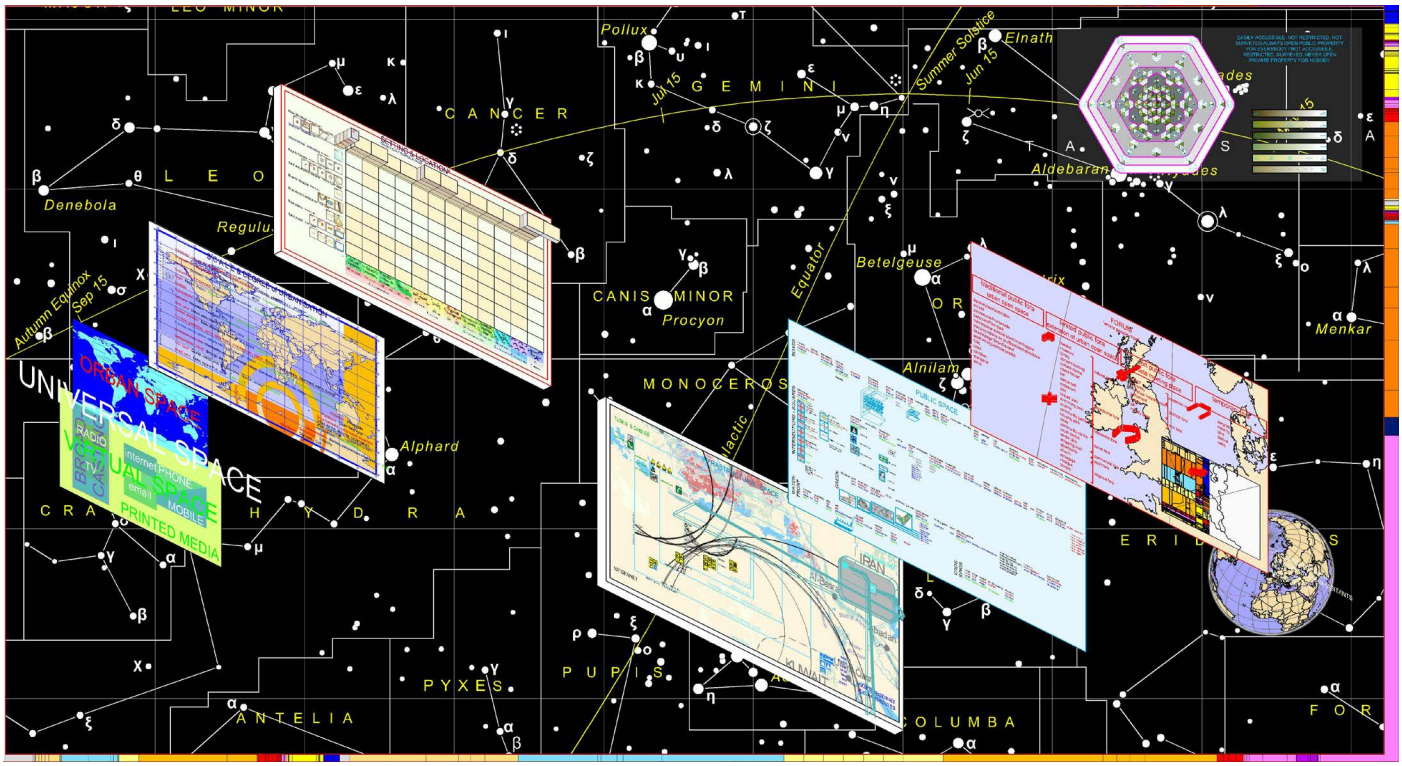
Experimental projections

However, this chapter aims to understand a conceptual system of projections that could prove increasingly useful in the earlier stages of site understanding, through the use of new points of views: new projections. Consequently, now that the digital impact of facilitating the visualisation and transitioning of projections has been explored, we will conclude by analysing contemporary efforts in the combination of numerous projections simultaneously.

As in the poster of 'Orban Space: Analysis', composed by T.O.P Office's Luc Duleau *(fig.8)* [28], the combination of different projections in one map can relate different dimensions of cartography, and create a more coherent understanding of a space through different scales of specificity. The drawing, as part of the office's ongoing discussion of how to think about public space on a global scale, maps out contemporary concerns about population growth, uneven food production, and pollution. The map juxtaposes both two-dimensional and three-dimensional projections in axonometry: geographical maps, diagrams, tables and graphs, each specifying a particular kind of information.

Relationships are connected between these different projections, and layered in a way that facilitates the reading of the map's different layers. Finally, in the background is a starry sky mapping the location of the Earth on an 'orban' scale, as part of the discussion of how these factors could expand far beyond our reach, on an even bigger scale.

[28]
(fig. 8)
Information and visuals retrieved from:
Davidts, W., Chatel, G., & Vervoort, S. (2012). Introduction: Luc Deleu: TOP office: Orban Space. Luc Deleu: TOP office: Orban Space, 7-13.



(fig.8)

[29]
(fig. 9)
The referenced map, as well as other cartographies of Longhouse Cave and other landscapes, was retrieved from Corner's highly influential book 'Taking measures across the American landscape'
Corner, J., Corner, J. M., & MacLean, A. S. (1996). Taking measures across the American landscape. Yale University Press.

Retreating to a comparatively much smaller scale, James Corner's *'Longhouse Cave'* (fig.9) [29] is a 14 x 20" panel that maps the cave by the same name, located in Masa Verde, Colorado. The natural formation was once inhabited by Anasazi tribes that took advantage of its natural shelter, defensibility, abundance of materials, flat slate floor, and the spring line which provided a convenient source of water in the arid environment.

Corner maps the space through somewhat of a collage methodology by resorting to different scales, projections, and visual standards to document multiple dimensions of the landscape. In the central and most representational visual, Corner presents a floor plan of the cave's entrance, documenting the interior of the Anasazi homes. To both its left and right side, are two smaller scale diagrams that track the movement of shadow over the priod of a day, both during the Summer and Winter solstice. At the top and bottom side of the drawing are the largest scale diagrams, two halves of a simplified outline of the cave's interior, mapping the presence of petroglyphs etched into the rock by the Anastazi.

Looking at the two examples, both as attempts to reconstruct the understanding of geographical space through the redefinition of the cartographic projection, we start to unerstand the map a tool through which its maker can bend, distort and adapt the space according to the scope of their representation. It should come as no surprise that Corner has been criticised for taking too many liberties with his maps, and his work has been interpreted by some as not even maps but rather, works of art which celebrate the cartographic aesthetic.

However, these claims are often one-sided, understanding cartography in the westernised, standardised sense. These ‘scientifically’ accepted surveys, are only seen as means to an end, and not an end in themselves: they become parts of an even bigger process, one that is often capitalist in nature. The survey is a map that has become integrated into processes that simplify and standardise geography, to the point where it becomes systematised in a way that space is only perceivable in terms of dimensions and contours.

What better way to destroy this systemisation of the map, than by destroying the top-down projection? [30] We should start by regarding the concept of ‘accuracy’ in top-down maps as a human construct, given meaning that is only perceivable by us. As Rob-Grillet states, “the hallucinatory effect derives from the extraordinary clarity and not from mystery or mist. Nothing is more fantastic ultimately than precision”[31]. For new kinds of possible perceptions to emerge, standards must be deconstructed. Only then can we begin to see the value in distortion.

[30]
This argument runs parallel to the De-constructivist approach to understanding systems, originated by Jacques Derrida.

[31]
The quote was retreived from John Heiduk’s ‘Mask of Medusa’, in which the author engages in conversation with filmmaker Alain Rob-Grillet as he discusses the literary work of Franz Kafka.
Hejduk, J. (1985). Mask of Medusa: works, 1947-1983. Rizzoli International Publications.

(fig.9)

CHAPTER 3:
THE DILEMMA OF SELECTION

“Exploration is not so much a covering of surface distance as a study in depth: a fleeting episode, a fragment of landscape or a remark overheard may provide the only means of understanding and interpreting areas which would otherwise remain barren of meaning”

- Claude Levi Strauss,
‘Tristes Tropiques’

A thought experiment on the complete map

'On Exactitude in Science' (1946) by Jorge Luis Borges [32], tells the story of an unnamed empire, whose cartographers set out to chart a 1:1 scale map of the entire land, laid across it and coinciding it point for point. After the chart was complete, the generations that followed considered the immense map as useless, abandoning it and leaving it to the mercy of nature and the elements, which start to inhabit it.

While the map's contents are never described, we can take some liberties to imagine what they might have been: at that scale, the map would not only depict the natural reliefs and landscape of the empire, but would most probably have charted the location in time of every human being, animal, and object in the empire. At that scale, the presence of the map will have significance impact on the territory itself. As Umberto Eco noted in his thought-experiment *'The Impossibility of Drawing a Map of the Empire on a scale of 1 to 1'* (1982) [33], the chart would block "the sun's rays or any atmospheric preciptation, [..] altering the ecological equilibrium" (Eco, 1982) of the land that lies beneath it. At that colossal size, Eco also points out that the empire's inhabitants will no longer inhabit the land, but rather, would begin to live in the map itself.

Taking on such a task, despite its absurdity, stems from the very foundations of our humanity. The overarching axiom of mapmaking has always derived from what Henri Lefebvre would refer to as 'the production of space', first explained in 'La Production de l'Espace (1974) [34]. In brief, Lefebvre explains that humans create the world around them, while in turn, humans are created by the world around them. In this sense, the human condition becomes somewhat of a feedback loop between human activity and our material surroundings. By this definition, the role of maps in contemporary culture is that of understanding our place in the world: the map becomes a mediator between us and the space we inhabit. The need for understanding our place in the world through the act of mapping, traces back to the need to understand what makes us human.

Reverting back to the context of the short story, if one was to take it in the context of this thesis' *'Chapter 1: The Map as a Material object'*, we could critique the materiality of the map itself, and the practical issues that arise from the size of such an object. However, we will use this chapter as an opportunity to observe the content of map, rather than its technicalities. In this chapter, we will concern ourself with the map as an instrument of gathering knowledge and information.

[32]
'On exactitude in science' was retrieved from Borge's 'Collected Fictions'
Borges, J. L., & Hurley, A. (1999). Collected fictions.

[33]
'The Impossibility of Drawing a Map of the Empire on a scale of 1 to 1' was retrieved from Eco's 'How to Travel with a Salmon: and other essays'
Eco, U. (1995). How to Travel with a Salmon: And Other Essays. HMH. Chicago

[34]
Lefebvre, H., & Nicholson-Smith, D. (1991). The production of space (Vol. 142). Blackwell: Oxford.

The benefits of selection

Jorge Luis Borges tells us of an empire that is striving for an unattainable degree of knowledge. The empire is attempting to strengthen itself through the understanding of its surroundings: a degree of understanding that is so exhaustively detailed that it can never be achieved. Realistically, the reason why the contents of the map are never explained, is because they can never be listed. Such a hyperdetailed map would mean that there is theoretically an infinite number of objects that have to be recorded.

However, this is precisely where the 1:1 map fails in function. What good, if any, is a map that is crammed with detail? What happens when a map has too much information? For the following section, we will take a temporary excursion and attempt a crticial approach to what will be refered to as the 'oversaturated' map, by understanding primarily how we as humans process our environment.

Physicist Werner Heisenberg once noted that "What we observe is not Nature, but Nature exposed to our method of questioning." (Heisenberg, 1958) [35] Arguably, most would agree that there is a world external to us, a world that we observe and process through our sensorial experience. Our senses gather information belonging to the outside world, while our brains process that information, allowing us to develop an understanding of it. Through history, our understanding was always facilitated by scientific tools: we understand the concept of temperature through the use of the thermometer, or we process the passing of time through the clock. The efficiency and utility of such instruments owes itself to its specificity: they become different tools for understanding different fractions of reality.

[35]
Heisenberg, W., & Northrop, F. S. C. (1958). Physics and philosophy: The revolution in modern science (p. 256). New York: Harper.

Like any other scientific instrument, the map allows us to process a very selective degree of dimensions in our environment. Consequently, just like the thermometer or the clock, the map is only truly efficient when it is concise and direct. Only then can it be read easily.

An atlas of selected fragments

On the argument of specificity in maps, the word 'atlas' becomes especially relevant. Gerardus Mercator originally coined the term in his 1595 work *'Atlas sive cosmographicæ meditationes de fabrica mundi et fabricati figura'* (translated to *'Atlas, or Cosmographic Meditations on the Fabric of the World and the Figure of the Fabrick'd'*). For Mercator, maps were only a part of specific meditations of encyclopedic proportions. The *'atlas'*, which would mean a complete collection of such maps, would then encompass everything. In this sense, Mercator suggests a deviation from maps

being seen as singular, seperate objects. They instead become individual instruments recording different things, and only once joined in an ‘atlas’, can produce a faithful representation of reality.

In *‘Everything Sings: Maps for a narrative Atlas’* (2010)[36], Dennis Wood imagines “an atlas with a structure ordered to tell a story greater than those told by each individual map”. Explaining the initial motivation behind the project, Wood recalls teaching environmental perception to landscape architecture students at the North Carolina State University in 1974. He explains how through cartography, he directed the students to focus selectively on aspects of the landscape which are usually overlooked: “the way the land smelled, the way it felt in their legs when they walked it, the sound of the wind in the oaks after all the other leaves had fallen, the way twilight made all the difference”.

[36]*Wood, D., & Glass, I. (2010). Everything sings: Maps for a narrative atlas (p. 1). Los Angeles, CA: Siglio.*

(fig.10) [37]

(fig.11) [37]

Such knowledge, while essentially 'useless' :"nothing a developer or a bank could monetize" (Wood, 2010), echoes Mercator's quest for a faithful representation, the main difference between the two being that Wood's does not aim to cover the whole globe, but rather, a small neighbourhood in Raleigh, North Carolina called *'Boylan Heights'*. What results are a series of maps visualising the same geographical area, serving as "fragments of a much longer poem out of which a passable semblance of the whole has been reconstructed." (Wood, 2010) The project contains all kinds of maps [37], ranging from obvious ones (such as a map of fences, one of graffiti, and another showing the mailman's daily route) to more abstract cartographies (such as a map visualising how many times specific locations have been named in a newsletter, or the 'Police Calls' map, with codes for the different types of calls that were made to 911 over a six month's period.)

[37]
(fig.10) charts the number of times a specific address in Boylan Heights has been mentioned in the local newsletter while ***(fig.11)*** takes an even more specific approach of the same area, by mapping the Jack O'Lanterns put outside of people's homes on halloween
Both maps retrieved from:
Wood, D., & Glass, I. (2010). Everything sings: Maps for a narrative atlas (p. 1). Los Angeles, CA: Siglio.

"Neighborhoods are experienced as a collection of patterns of light and sound and smells and taste and communication with others, and here, in this atlas, I've tried to catch those patterns in black and white and arrange them so that the larger pattern, the pattern of the neighborhood itself, can emerge by flipping through the pages." Wood also emphasises how none of the maps represent Boylan Heights 'tout court' but rather, each map aims only to catch "a note or two of a world in which everything's singing." (Wood, 2010)

Each of the maps of Boylan Heights are created on different levels of abstraction and for different purposes. In a sense, each map is an abstract, peculiar instrument that can gather an unusually niche kind of data. Taking a closer look at each of the maps, one can notice that there is no background drawing relating the gathered information to a geographic space. Instead, the data floats independently.

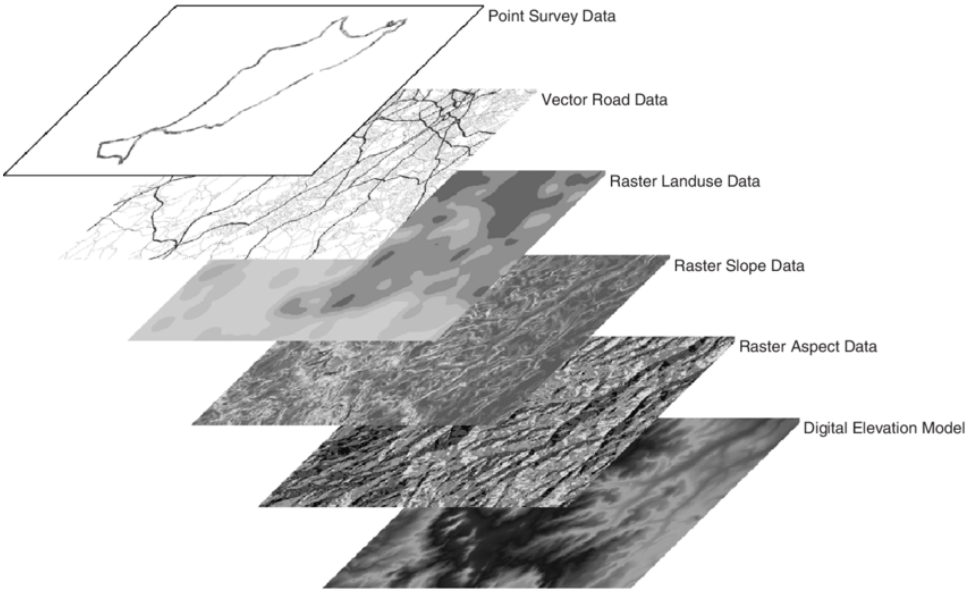
GIS as a digital atlas

Interestingly, this methodology of organisation of data can be closely compared to GIS (Geographic Information System). In a nutshell, GIS works through the basic understanding that most data somehow contains a geographical component: most information that can be gathered (in the case of Wood's maps, this can be fences, graffiti, mailman route, newsletter mentions, police calls, etc) can be attributed to a particular spatial location. In GIS, these geo-located data sets are stored as layers in a digital map that once combined, compose a map of varying overlays of information. *(fig.12)*[38]

[38]
(fig.12)
Image retrieved from:
Dodge, M., Kitchin, R., & Perkins, C. (Eds.). (2011). Rethinking maps: new frontiers in cartographic theory. Routledge.

In this manner, a digital map that makes use of GIS is an 'atlas' by Mercator's definition: each layer of data is a specified fraction of reality. This somewhat 'layered' approach to understanding our

environment opens up a plethora of different possibilities for the contemporary discipline of digital cartography. Maps can now be generated from any sort of recorded data. We have arrived at a point where mapping can represent any fragment of what we can see and experience.



(fig.12)

Proposing an instrument-centred methodology for the post-digital map

The question now, has become a matter of instruments. The future of the digital map is limited only by the boundaries of the tools that we use to compile the data. How can we develop specific instruments for the gathering of equally specific data, beyond the human act of walking and observing? After a brief understanding of what 'knowledge' makes up a readable, efficient map, this chapter will now conclude by proposing a fresh understanding of the methodology of cartography, informed mainly by the previously discussed points.

The advance of technology, while it may suggest a future of an automated system of data gathering, should always have its roots at the scale of human intervention. In today's context, our primary concern should not be 'how to map', but rather, 'what to map'. Through this way of thinking, the foundations of every cartographic process should firstly become a concern of what specific fragment of reality should be conceived, and how the mapping of such fragment will contribute to helping us understand the space in a more contextual manner. Only after this fragment has been established, should we start developing instruments that will aid in the gathering of data,

and consequently, in the building of a cartography. In this sense, automation becomes a tool that aids in the gathering of a human defined and human oriented form of knowledge. The following examples will aim to highlight this suggested paradigm shift.

In 2017, Zaha Hadid Architects in collaboration with data analytical platform *HABIDATUM*[39], derived a data-driven argument for increased walkability in multiple areas of central London. The project consisted of compiling urban data, and then process it through mapping to study the relations between pedestrianization and socio-economic trends. As stated in the project's report, "urban data produced via digital devices presents an opportunity to discover new insights." Data is directly collected from numerous sources, to determine a spcific understanding of central London. Social media is used to determine districts' popularity according to the number of geo-located posts and eventually, an estimation of a district's 'happiness' is calculated through the online engagement with such posts. In a seperate map, commercial density is calculated by directly processing pedestrians' money flow data through electronic fund transfers that occur throughout central London's commercial districts.

Setting aside the questionable large scale implications of the project, the phone and the credit card readers become extensions to the cartography. They take the role of digital instruments capable of reading data that can be attributed to a location. Interestingly enough, the cartography understands these instruments as objects that are so engrained in the pedestrian's daily lifes, to the point where the instruments start to be regarded as the pedestrians. The map's weakness in this sense, lies in its assumption that every pedestrian engages in social media or uses electronic fund transfers.

On a smaller scale, Christian Nold's experiments in Emotion Mapping are also worth worth mentioning. Having built a so called 'Bio-Mapping' device which uses a self-built biometric sensor *(fig.13)* [40] to record Galvanic Skin Response and Global Position System (GPS), Nold set up as a series of participatory workshops that invited people to borrow the device and go for a walk in Greenwich. The bio-sensor measures changes inthe sweat leavel of the wearer's fingers, indicating certain changes in 'emotional intensity'. Through the GPS, this data would then be linked to the walks taken by the participants. What emerges from the process are a series of maps which indicate the intensity of physiological response at any particular point: spikes in the map occur when a participant crosses over a busy traffic crossing, or passes through an unfamiliar, potentially intimidating neighbourhood. *(fig.14)* [41]

Through this map, we begin to see the city of Greenwich as a series of events which has a direct physical change on our body. The

[39]
Refer to:
HABIDATUM: Walkable London Data Analytics (2017).
From <https://habidatum.com/projects/walkable-london-data-analytics>

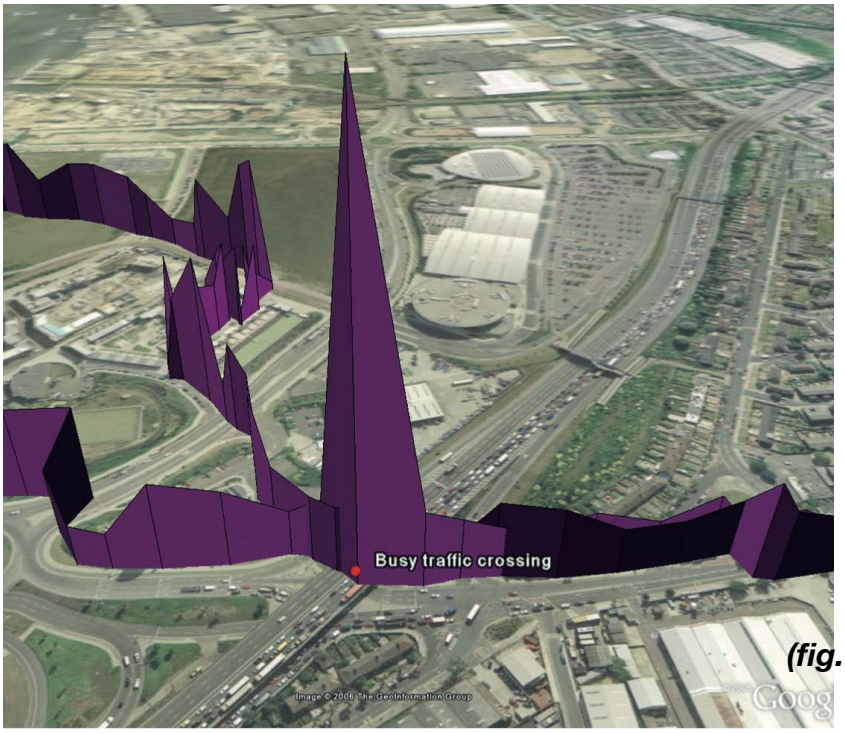
[40]
(fig.13)
The 'bio-mapping' device, designed and produced by artist Christian Nold
Image retrieved from:
Nold, C. (2009). Emotional cartography: Technologies of the self. Softhook.

[41]
(fig.14)
The data acquired from one of the participant's route is imported into Google Earth, linking it to a geographic locoation. A significant peak in psychological response occurs when the participant crosses a busy traffic crossing, signifying a change in mindset.
Image retrieved from:
Nold, C. (2009). Emotional cartography: Technologies of the self. Softhook.

sensor in this sense, becomes a physical extension of the human being, capable of recording our bodily functions. The instrument is no longer external, like the phone and the credit card: we do not actively engage in the collection of data but rather, the instrument becomes almost intrusive, intrinsincly linked to our physical being. ‘Biodata’ in this sense, could not be selective and manipulated, as it becomes the raw expression of our reaction to our environment.

Both of these examples present us with a somewhat clear vision of the future of data collection. On one hand, our heavy reliance on external digital tools in our everyday life means that there are now, countless ways of recording human activity through our online and digital traces. However, the human body itself also presents us with a plethora of different possibilities that can be mapped.

(fig.13)



(fig.14)

CHAPTER 4: MAPPING AS A COMMUNAL ACT

“Worlds are made. Moreover they are made through seemingly banal practices”

- Nelson Goodman

(fig.15)

Cartography by non-cartographers

At the turn of the 20th century, the birth of modernism saw a paradigm shift in methods of thinking across most discliplines. Being largely a reaction to traditionalist ideaologies, it came with a predisposition for resistance. In architecture, it saw the refusal of conventional form and material, retreating to the bare and the essential. In the visual arts, it saw the birth of Dada, Surrealism, Gerrit Rietveld, Kurt Weill and Bertolt Brecht. [42]

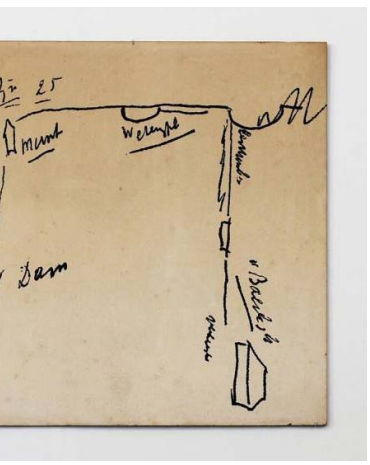
Cartography as a professional field however, remained largely unchanged. For the most part, it had failed to reflect the radical cultural changes occuring at the start of the 20th century. Curiously, cartography's presence in art grew significantly in the 1960's with the popularisation of conceptual art, when all kinds of new forms and media, found objects and documents, such as maps, entered art's terrain. It was at during these times, through the discipline of art when cartography started becoming more self-aware of its ability to generate new forms of thinking and feeling about a space.

In his project *'This way Brouwn'* during the early 1960s, Stanley Brouwn would approach strangers on the street asking them for directions, eventually exhibiting all the maps that were drawn for him *(fig.15)* [43]. In 'A line made by walking', Richard Long etched a line into a landscape, by walking across it repetitively. *(fig.16)* [44]

[42]
For more on the role of cartography during early modernism, refer to:
Curnow, W. (1999). Mapping and the expanded field of contemporary art. na.

[43]
(fig.15)
Retrieved from <krollermuller.nl>

[44]
(fig.16)
Retrieved from <tate.org.uk>



(fig.16)

Similarly, other discliplines started making use of cartographic techniques. For example, Otto Neurath, philosopher of science, sociologist and political economist, developed a way to describe social, technological, biological, and historical phenomena in a "world language without words," (Wood, 2010) a kind of pictographics he called Isotype. Harry Beck's map of the London Underground is also just as significant, having a background as a technical draughtsman rather than a cartographer. [45]

[45]
Wood, D., & Glass, I. (2010). Everything sings: Maps for a narrative atlas (p. 1). Los Angeles, CA: Siglio.

The de-institutionalisation of cartography

According to Denis Wood, during the 60s, even with other discliplines facing such big changes, cartography as an academic disclipline was still "taught as a craft with vellum, bow compasses, quill pens, and Leroy lettering templates." (Wood, 2010) Professional cartography's reluctance to reinvent itself, meant that cartographers were never approached with radical 'modernised' commissions. The cartographer was seen as someone only trained in traditional techniques, "a technician, someone to keep the cartography lab running smoothly while completing enough research to satisfy the provost when it came to promotion". (Wood, 2010)

Amidst this change, the field started becoming less institutionalised, and less centred around the cartographer. When people wanted a specific map, they would resort to doing it themselves. This uninstitutionalisation, coupled with a new understanding of the potentials of mapping (as described in the previous chapters) ultimately led to the advent of a new form of cartography: one that is less 'centralised', and one that recognises the importance of multiple contributors with backgrounds in disciplines that are seperate from cartography.

It is important to emphasise on this paradigm shift surrounding cartography, since these foundations of a more open-sourced form of mapping have become fundamentally intertwined with contemporary mapping systems that we use on a daily basis. Locations in Google Maps have ratings that are contributed by other people who have visited before us, and are littered with photographs, notes and recommendations by other 'explorers'. Very recently, users also have the option to change the map directly: add missing roads by drawing lines, quickly rename roads, change road directionality, and realign or delete incorrect roads.

The difficulties of collaboration

Naturally, the ideal vision of the open-source cartogoraphy raises some concerns. The most obvious deals with the quality of the knowledge that is being contributed to the system: when you have

such a multidiscilpinary open-source methodology, how does one guage which information is accurate and which is misleading.

More importantly however, the main concern in the long run, arises from the very tools and mechanisms of the internet. Such tools of contribution have, as artist Manuel Gnam stated, “flattened nearly everything consumable onto the same ontological level and streamlined it into a ratable ‘experience’ and a popularity contest” (Gnam, 2020) [46]. Such open systems of contribution open the possibility of abuse and misinformation, that is inherently tied to human error. The more opinion-based a certain map is, the more prone it is to misinformation. Consequently, the most reliable open-source mapping method is one that is as far removed as possible from opinions and bias.

[46]
Retrieved from Meghan Rolvien’s interview with artist Manuel Gnam.
Rolvien, M. (2020). Lake Gullible. From <https://www.e-flux.com/architecture/confinement/359906/lake-gullible/>

Collaborative ‘worldmaking‘

According to Zeynep Devrim Gürsel, “worlds are made. Moreover, they are made through seemingly banal practices.” The term worldmaking in this context suggests that through representation, we can both understand and build the realities in which we live. In the context of Gürsel’s essay ‘Worldmaking frame by frame’, she identifies ‘representation’ as visual representation through photography. Gürsel suggests that “worldmaking involves both ideological and material structures”, drawing from methods applied in open-source photography workshops set in particuar cities, in which the construction of a ‘world’ revolves around the co-contribution of photographers’ works taken in such locations. In this sense, the worldmaking exercise becomes documentation-oriented, a method in which a group of contributors have a mutual tool of documentation, in this case photography.

The discipline of cartography can learn a lot from this methodology. Drawing from the prior chapter, and understanding the ‘atlas’ as a compilation of different fragments of what we conceive to be ‘reality’, mapping should strive for an open-source system in which the contributors have a level plalying field, and in which they contribute only to a specific small-scale fragment. In this way, the participant’s contribution is purely qualitative and documentative.

Being amongst the first efforts in digitally driven participatory mapping methodologies, theirwork was an online map developed as part of the GreenMapSystem environmental movement in 1999.[47] The project dealt with the mapping of Loe Pool in Cornwall, Britain, and the cartography consisted entirely of first-hand experiences of the space, working closely with a number of contributors who were treated as co-developers, through walking, talking, and recording in the landscape in the landscape. The cartography was entirely non-hierarchical, and instead adopted a crowd-sourced system

[47]
Unfortunately, the organisation’s website (theirwork.org) is no longer in use and the project has concluded.
The information used in this text as well as *(fig.17)* have been sourced from:
Dodge, M., Kitchin, R., & Perkins, C. (Eds.). (2011). Rethinking maps: new frontiers in cartographic theory. Routledge.

The map adopted three seperate disciplines into its methodology: the first being psychophysical geography, which ensures the map is emotive and personal, the second being phenomenology, which favours sense-driven first person documentation, and lastly ethnography, which ensures a collaborative and open mapping system. When combined, these create a methodological framework through which open data is sourced and collected.

The fully developed software, which is unfortunately no longer running, consisted of the Loe Pool visualised in a simple geographical map interface. Scattered all around it, were drawings, notes, diagrams and poems, each individually created and placed by one of the many collaborators. *(fig.17)*

(fig.17)

Similarly, another more recent, more large-scale approach to such an open-source mapping method is Radio Aporee [48], a cartography of recordings from all over the world, made up of over 17,000 field and location recordings from different urban, rural and natural environments, made entirely of user submitted contributions. As explained by itsfounder Udo Noll, the collaborative process is integral to the scope of the map: if rules are too tight, potential contributors may get discouraged from sending their sounds, which would negate the whole work.

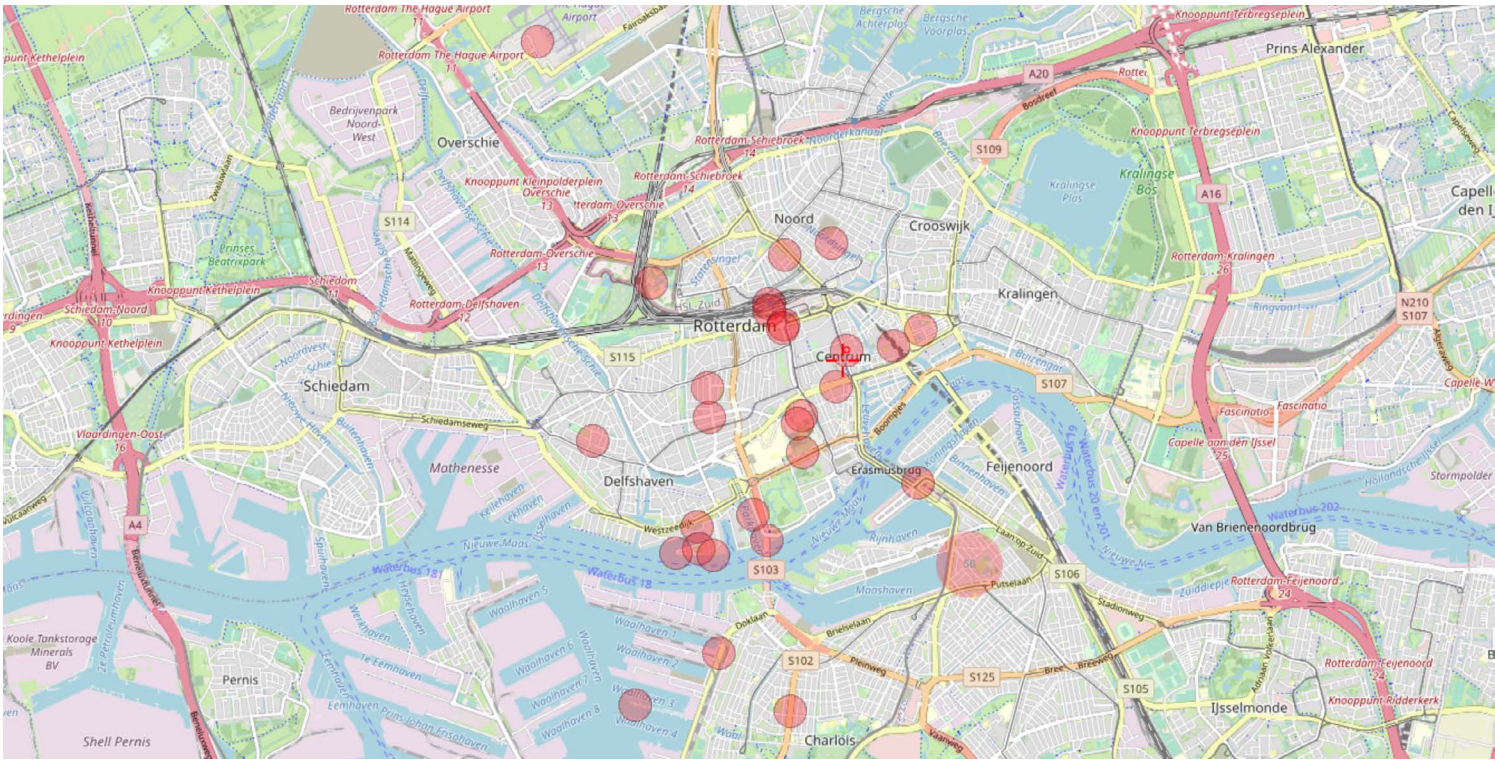
By approaching a place on the map, you recognise what others have been interested in, sound-wise. Contributors can add a different angle, detail, recording from another time of day. This system enables ad-hoc sound research groups, people that don't necessarily know each other, but show a mutual interest in a location. In this sense,

[48]
For more information on the project, as well as Udo Noll's other artistic contributions, visit ***< https://aporee.org >***

the gathered data is not opinion-oriented, but is documentation in the purest sense. Imagine such a pratice over many years, and its immediately clear that this structure can become a valuable resource.

As further explained by Noll, when a landscape is co-created, it “there are traces inscribed into it, traces of the presence of others, what they have heard. From talks with other contributors, I know that many others share the same experience, the field is an extended one. It’s shaped by personal connotations, our experience, and hints we may receive from others. Sonic surveys in a landscape of consciousness. [...] These thousands of recordings are taken from real environments. It is real time spent out there listening: shared time, shared ears” (Noll, 2017) *(fig.18)* [49]

[49]
Screencap of Rotterdam in the aporee platform. Each red circle is a collection of sounds recorded in that particular geographic area.
Retrieved from <https://aporee.org>



(fig.18)

CONCLUSION

(...) an abstract machine in itself is not physical or corporel, any more than it is semiotic; by function, not form (...). The diagrammatic or abstract machine does not function to represent, even something real, but rather construct a real that is yet to come, a new type of reality

-Gilles Deleuze
'A thousand plateaus'

Throughout the writing of the essay, the process of formulating a critical approach to cartography was one of constant conversation between the practice of cartography, and the geographical space that it deals with: the map and the territory. Subconsciously, the writing process was formulated by a constant reiteration between the two states. Despite the scope of the essay ultimately being a critical understanding of the methodology of cartography, it would not have been possible to formulate an argument without referring to the actual, geographical 'space' that the map represents.

Throughout the process, the definition of 'space' that I was constantly referring back to was inherently Deluzian. Contemporary geography was not understood as an empty container within which processes take place, but rather, it was understood as a direct manifestation in which these processes themselves are organised. In this realm, cartography came to be understood as nothing more than one of these 'processes': an action that is no less integrated and related to a site than walking through it or interacting with the space's elements.

In Deleuze and Guattari, reality is somewhere in between the extensive and intensive, somewhere in between what is identifyable and measurable, and what is not. By understanding this, we can look at the mapping process in a similar light: it becomes something that should not be treated as a strictly scientific process but rather, a conceptualisation that goes along with the indeterminacy and differences that define the processes of the real world.

The reductionist approach of fragmenting the map into seperate chapters proved fundamental in formulating the crux of the essay's argument. Categorising what makes up the 'map' helped outline the process of cartography as something that is not necessarily bound to other processes. Every chapter was an extraction of the process, which could be critically analysed as a seperate, unconnected entity, with each one of these entities being distorted individually.

Firstly, this critical approach led to an understanding of the 'map' as an object that should not bound to any particular material. Often, the effectiveness of a cartography can be expressed only through its materiality, or more interestingly, its non-materiality. Different physicialities, especially in the digital age, allow new and innovative methods of reading cartographies.

Secondly, the map should not be confined to the boundaries of mathemetical projection and scale. Breaking away from the hyper-detailed, measurable top-down aesthetic of the traditional map, reveals a plethora of alternative uses for a cartography.

Thirdly, a critical approach to the ‘map that describes everything’ led to a more fragmented approach to mapping information. Through proposing a system in the form of a structured ‘atlas’ rather than a singular map, fragments of reality can be independently recorded with specific tools and instruments.

Lastly, problematising traditional, centralised cartography methods led to the suggestion of a more ad-hoc, interdisciplinary method of mapping. Collaborative mapping, especially with the aid of digital connectivity, reveals cartographies shaped by collective experiences,

Through outlining all of this, it should be emphasised that in conclusion, the essay is in no way proposing a singular cartographic model that can be used as a ‘one map fits all’. On the contrary, the culminations of the arguments have helped formulate the map as a process that reflects the geographical site and all of other processes happening within it.

In this sense, the map should be designed for the environment in which it will be used in. The process of the map’s ‘becoming’ should be drawn from it’s materiality, the user’s desired point of view, the instruments available, and the input of interdisciplinary contributors. The map becomes an open framework, unique to its intended use.

Despite the urge to resort to a singular model of mapping, we should be aware of the effects that homogeniety in spatial representation has on us. Cartography should be understood as a self-reflexive discipline that shapes our perception of space, just as much as it is shaped by space itself.

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