Data and the experience of place; the use of data in contemporary spatial and cultural studies

Anastasia Karandinou

Big data and Artificial Intelligence (AI) are increasingly discussed in the last few years, and are significantly influencing a number of disciplines. In parallel to that, the notion of 'data' is increasingly encountered in spatial, creative and cultural studies. Processes, methods and vocabularies from sciences are borrowed, discussed and tweaked, and new cross-disciplinary fields emerge. Several recent projects attempt to use data to map, measure and quantify the intangible; aspects of the human experience that were previously only addressed in a qualitative manner. This often demonstrates a genuine desire to comprehend human behaviour and human experience of different environments, and to – possibly – inform design processes accordingly. At the same time, this opens up questions as to why this desire and curiosity emerged now, how it relates to recent technological advances, and how it converses with the cultural and methodological context of the disciplines it engages. Questions are also raised as to how the use of data and data-informed methods may serve, support, promote and/ or challenge political agendas.

In this book, a range of projects on the theme of data, architecture and the experience of place are presented. The projects reveal a desire to break the conventional boundaries of disciplines, and an inquisitive tendency to explore new territories; territories for which new methods and processes are currently being invented and debated. In this chapter we will look into the main themes that each project presents, and the main questions that recur or emerge through each discourse.

Data and the sensuous

The use of hard data, and the cross-over between the digital and the physical is being increasingly addressed in design disciplines, architecture, arts and urban studies. Artists and designers increasingly make use of hard data to interpret the world and/or create meaningful and sensuous environments and design objects. Architects attempt to measure neurophysiological data to understand better the human experience in spaces. Designers script parametric processes to translate data into responsive, meaningful or aesthetically intriguing installations. Scientists and architects/ artists/ designers collaborate to visualise data in new, creative ways so as to trigger and reveal further connections, interpretations and readings.

Practices such as the above attempt to break down the traditional dichotomy between 'data' and the 'sensuous' or 'experiential'; a discussion that relates to the earlier and affiliated dichotomy between the 'digital' and the 'physical'. Recent practices attempt to translate elusive, ephemeral and intangible aspects of a place into solid data. In other instances the solid data are interpreted and represented in a way so as to be perceived by the different senses and experienced in an immersive manner. In this context, methods and conceptual frameworks of different disciplines need to engage in a dialogue; and through these cross-disciplinary practices, new strategies and processes emerge. This publication aims to present

collaborative projects, where methods from more than one discipline are involved. This publication also addresses how collaborators from different disciplines can work together to address current design, spatial and social issues. For example, the measurement of neurophysiological data, in an attempt to understand human experience, is a recurring theme in this book. Could the mapping of the brain activity help designers gain a better understanding of human experience in different spaces? Could the use of EEG (Electroencephalography), eye-tracking and other neurological or physiological data inform our understanding of human experience? And could that inform design? Could physiological data be used in parallel to other methods – such as observation and interviews – to assess navigation, human comfort or levels of stress in different environments? Can these processes lead to a deeper understanding of the human nature? What is the potential of such processes and what 'dangers' do they entail? Who commissions these studies, and how are the results interpreted and used? How can we avoid the results being transcribed into oversimplifying design 'recipes', exploited by purely-profit-driven developers or stake-holders?

One could read the data-driven mapping of emotions and human experience as a contemporary re-invention or re-interpretation of the Situationsts' attempts to map ambiences; territories of different atmosphere or mood. These territories cannot be described through solid edges, but through other less tangible attributes (Constant *et al.*, 2001; McDonough, 2002). Hence what the Psychogeographers called ambience or mood could be re-visited or re-interpreted with the use of neurobiological data-driven or data-inspired methods. Contemporary EEG kits and applications record brain waves and translate them into mood-categories, such as engagement, stress, calmness, etc.; and this could be interpreted as a different type of a Psychogeographic map. Data driven processes open up new strategies for mapping the human experience and the ambience of places – and, as every new tool and type of mapping, this can offer a different and enlightening understanding. Counterarguments need to be acknowledged, as the dominance of data-driven (on neurophysiological-data-driven) processes may displace the discourse on the aesthetical, cultural, social, political context and dimension of place; how can we avoid neurophysiological data becoming the only or main drive for design, ignoring aesthetics, cultural and political context? (Wood, 2010; Moran, 2013; Karandinou and Turner, 2018)

Questions addressed through the projects presented in this book include: How can human emotions be categorised, grouped, mapped, and lead to either new types of mappings of urban environments or to inventive design processes and products? How can data, such as flows and movements in the city, demographic patterns (drawn from dating apps), environmental data, narratives, stories and articles, be organised and mapped in new meaningful ways, revealing hidden and unanticipated links? How do AI processes facilitate that? What *is* and what *is not* computed and represented, and how the relationship between the two drives decision and policy making?

Inherent paradoxes; positivism and phenomenology

An emerging issue and challenge in cross-disciplinary projects, which is not often opened up is the inherent contradiction, or paradox, of the methods used in different disciplines. In architecture, spatial and cultural studies, research is often driven by open ended questions and by an open – often phenomenological – engagement with processes. In contrast, in other disciplines, such as natural sciences, the methods follow a positivist approach, which emerges from a Cartesian analytical way of seeing the world. There is often a specific and clear hypothesis which the experiments prove right or wrong. The underpinning philosophical stance – although often not explicitly stated – drives a project's methods, processes, and places it within a discourse.

Architects and designers studying the experience of place, often follow methods emerging from a phenomenological approach; they attempt to gain a better understanding of a place by exposing themselves to it, by observing it, by mapping various aspects of it, by performing different tasks within it, and hence encountering it in a number of different ways. In this context, the immersion that such processes allow is what leads to the understanding and knowledge sought after.

For Husserl, who established Phenomenology and influenced architectural research processes, understanding occurs through exposure and immersion in a situation (Husserl, 1999). According to Dermot Moran, 'Husserl wants to explore experience in a pure manner, unsullied by assumption' (Moran, 2002). As Jenson claims, drawing from Husserl's writings, phenomenology is more interested in seeing than analysing, and is associated to an open reading and describing of the world (Jenson, 2014). The discourse of mapping and understanding places, in the context of architecture and spatial studies, is influenced by this phenomenological context. James Corner, in the 'Agency of Mapping', argues for a kind of mapping that is generative; a kind of mapping that reveals – through the processes it undertakes – what was previously unknown. He interprets and describes mapping as an open-ended process; as a process which allows for the unexpected to be revealed. As Corner (2002) claims, the mapping's 'agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen or unimagined, even across seemingly exhausted grounds'. He draws from Deleuze and Guattari's post-stucturalist thinking and considers mapping as an open-ended process of questioning, mark-making, revealing, re-addressing and re-adjusting the question; as an engagement, an involvement in an exploratory journey (Corner, 2002; Perkins, 2003; Deleuze and Guattari, 2004).

Hence, we need to acknowledge some kind of paradox, when projects draw from two seemingly contradictory worlds; a positivist, scientific set of methods, and narrative-based phenomenology-inspired processes. Methods emerging from different disciplines start developing a dialogue with one another and new processes, methods, and theoretical frameworks emerge. We need to acknowledge that within this transition, processes seem at times conflicting with the established premises.

For example, at times, processes borrow tools from the sciences, but then develop a post-structuralist and phenomenology-inspired narrative, without using the data as absolute solid evidence for the validity of a hypothesis. (We will not elaborate on the relationship between Phenomenology and Post-structuralism here; we only acknowledge some affinity with regards to how these perspectives have informed architectural thinking (Stoller, 2009; Reynolds, 2010).) At times, processes involving data collection, data visualisation, and data-driven discussion, show an affinity with scientific methods, but also develop a narrative that does not follow the positivist conventions. The relationship between

transcendental and naturalistic approaches has been broadly discussed in the context of philosophy, and less in the context of cross-disciplinary spatial studies (Petitot *et al.*, 1999; Gallagher, 2015). Moran, in his essay '"Let's Look at it Objectively": Why Phenomenology Cannot Be Naturalized', discusses critically this issue, and claims that the two – phenomenology (and transcendental philosophies) and positivism – are in some sense incompatible. Referring to Husserl, he says '[f]or Husserl, objectivism takes a stance that does not know it is a stance' (Moran, 2013). Positivism assumes that objectivity is possible, which is not the case for transcendental philosophies, whereby there is no such thing as the 'objective' or 'neutral' observer. The potential of some new data-driven tools can fascinate and allure one with their seemingly objective nature. Moran refers to the example of the Google street view to demonstrate that naturalists assume that the ever increasing degree of detail offers objectivity, whereas, as he suggests, for phenomenologists each position is dependent on a specific point of view. Through the projects presented in this book, one of the aims is to reflect on the nuances of the cross-over of these different threads of thought, on the contradictions, as well as on new potential paths, methods and conceptual frameworks.

Phenomenology, transcendental philosophies and AI

The recent advances in AI neural networks allow us to rethink phenomenology and post-structuralism theories in a new way. Like AI neural networks use a huge number of data (or experiences, let's say) to learn from, without necessarily formulating solid visible/ accessible 'rules', similarly a phenomenologist might argue that engaging with processes and activities in a non-necessarily 'scientific' way, exposes one to new understanding (of places/ human experience, etc.). There seems to be a parallelism between this kind of AI and the phenomenological approach. Both draw experience and understanding from exposure to large data-sets or processes, and learn without necessarily formulating solid theories (as we know them) or pinning down a specific visible/comprehensive algorithm. The recent advancements in deep learning and AI neural networks reframe the theoretical discourse and relationship between positivism and phenomenological approaches. Daskalakis' chapter introduces some of the key notions of data science, statistics and AI, and discusses the potential and challenges if this emerging new field.

AI has been defined in a number of different ways and describes a number of different things – from Alan Turing's machine, and attempt to imitate human intelligence, to recent neural networks whereby AI 'trains' AI to perform complex tasks. Deep neural networks are inspired by the way biological neural networks work; layers of artificial neurons process the input information and 'learn' by being exposed to a large amount of data – examples. During this self-learning, neural connections become strengthened or weakened depending on the correlations validated or not – similarly to what we understand as 'trial-and-error' (Müller, 2016; Ertel, 2017; Wolchover, 2017). Recent AI deep neural networks have been described as a 'black box' due to the fact that the 'learning' process – the way in which the neural network trains itself – is not fully understood and cannot be fully defined. As Bleicher describes them, 'the most capable technologies – namely, deep neural networks – are notoriously opaque, offering few clues as to how they arrive at their conclusions' (Bleicher, 2017). Natalie Wolchover describes it as follows:

> ‘After a deep neural network has “learned” from thousands of sample dog photos, it can identify dogs in new photos as accurately as people can. The magic leap from special cases to general concepts during learning gives deep neural networks their power, just as it underlies human reasoning, creativity and the other faculties collectively termed “intelligence.” Experts wonder what it is about deep learning that enables generalization — and to what extent brains apprehend reality in the same way.’ (Wolchover, 2017)

Both the initial algorithm, as well as the context – the numerous examples – formulate the ‘intelligence’; and the fact that the numerous examples (inputs) are not fully controlled, makes the output not fully controlled or predictable either. This seems equivalent to how humans learn; by exposure to numerous data/ images/ information, which are processed in a ‘black-box’-like way. It also seems equivalent to phenomenological approaches, which argue for an understanding that emerges through exposure, immersion, engagement, experience, and without a formulation of solid rules and algorithms.

With the above, I am not proposing a clear correlation between these theories – or worlds – that use quite different vocabularies and emerge from different traditions and philosophies; I am only opening the question as to how this parallelism could possibly offer new thinking tools.

New prototypes

Ducao’s, Davis’ and Wagner’s chapters present new prototypes, which translate environmental parameters or aspects of the human experience into data, to be used either for mapping and designing urban environments, or for creating meaningful and useful aesthetic patterns and objects. Arlene Ducao examines new methods, devices and technologies for recording and mapping human neurophysiological signals, for gaining a better understanding of human experience. She presents ‘Mindrider’ and ‘Multimer’; prototype systems that she initially designed and made as a researcher at the MIT Media Lab, and later developed further through her own start up. Ducao presents a series of uses that she tested through multiple experiments, and her critical thoughts on the potential value and use of these new digital systems. Mindrider monitored - with the use of EEG embedded in the cyclists’ helmets - the brain activity of cyclists in Manhattan, and categorised their experience in relationship to levels of concentration/ relaxation. The maps produced were analysed in conjunction with other datasets for these areas of the city. Significant correlation was found – as possibly expected – between areas of high concentration and areas of bike collisions, showing that cyclists are more concentrated in areas that may be – or feel – of more complex traffic pattern, and hence of a higher risk for an accident. Through their statistical analysis, Ducao and her collaborators observed that areas of high concentration and areas of high relaxation were consistent across the users (with p value 0.03). This showed that certain mental states are significantly associated with objective/pragmatic characteristics of a specific place. The Multimer system is evolving and is used by Ducao and her team for mapping and analysing human experience in various environments and in collaboration with different companies and industries. Multimer monitors data such as brainwave, heart rate, steps (pedometer), acceleration, geo-locates them and correlates them with other datasets (depending of the nature of each experiment/ application). It involves the wearable kit, and the mobile or

cloud app, which processes the data, and in recent studies involves participants that move in the city on foot, by bicycle or car.

Her most recent study, funded by the US National Science Foundation (NSF), involves over 100 participants and attempts to correlate, through the use of Multimer, physical aspects of areas of Manhattan with the physiological and cognitive states of the user. Ducao critically discusses how, these new systems can be used to respond to the requirements of different companies and sectors – such as advertising, real estate etc. – while securing that the concern for the human remains a central priority. Ducao expresses her belief in the 'human scale' and presents her interpretation of this notion, associating it mainly with walkability. She refers to design examples, such Le Corbusier's buildings and urban planning, or Robert Moses' masterplan of NY, which started from social and inclusive manifestoes, but then subverted into less inclusive/ socially aware/ human-centred solutions, in favour of efficiency or profit. Similarly, she refers to Robert Propst's 'Action Office' designed with the human in mind; to increase privacy, flexibility and movement for the office worker – but was then transgressed into the conventional space-saving cubicle. With these concerns in mind, Ducao opens up the terribly crucial issue of inclusion, in the age of 'Big Data'. As research involving Big Data affects all aspects of human life and interaction, and informs critical political and social decision making, Ducao stresses out the importance of inclusion of all types of people, so that the outcomes of relevant research do not reflect only a mainstream majority/ the most represented types of people, but all.

Felecia Davis looks into how emotion and/ or information can be communicated and experienced through smart textiles. Davis presents her MIT-based research project 'FELT'; a computational textile wall panel and a series of experiments conducted to explore the relevant human response. The smart panel is of large scale (150x180cm), white, and its surface moves and transforms over time. The visual patterns - shapes of the fabric and the movement of the components of its surface are inspired by behavioural patterns observed in nature. Davis examines how the notion of 'emotion' has been discussed in different theories and concludes that it has been generally described as the interpretation of a stimulus, which then results in either a bodily response or a feeling. Referring to Darwin, and reflecting on the issue of expression, Davis presents the categorisation of messages emitted (by humans or animals) in two types; messages sent by inference and messages sent for communication. A bird opening their feathers as an evolutionary response to danger is not an intentional communication of 'anger'; it helps its survival and the emotion of 'anger' is only inferred. In contrast, other messages are expressed deliberately in order to communicate an emotional state and purposefully influence the response of the others. Through series of experiments, Davis tested the response of participants to still and moving FELT designs, experienced – at different stages of the experiment – visually or also by touch. She analysed the participants' responses in order to find out correlations between shapes, patterns and emotions inferred. She also analysed how the introduction of the tactile experience of the patterns (instead of only the visual) altered the participants' response. Parts of the interview involved rating the inferred emotion with a number-scale, and other parts involved open conversation, which brought up metaphors, memories and feelings associated with certain patterns, shapes, textures and movements. It is revealing how the patterns of computational textiles are interpreted and perceived by the users/ participants, and associated with personal references, homely memories and poetic metaphors. This demonstrates the design potential of

such systems and the power of designing with both the tactile and visual in mind – increasingly facilitated in the context of computation.

Although traditionally computation was associated with the purely visual, over the last few decades it increasingly facilitates designing that addresses different senses. Davis' exploration of the potential of different patterns, textures, movements of the FELT – addressing clearly both the visual and the tactile sense – is aiming at opening new directions for designing with computational textiles and introducing new uses and applications.

Matthew Wagner presents two prototypes that he is currently developing; the AuralSurface and the WallFlower. The AuralSurface monitors the sound levels of an interior environment and responds in real-time in order to increase or decrease the acoustic dampening. Felt sheets are being designed to move and deploy to absorb sound, depending on the decibel volume in the equivalent area of the room. The WallFlower is an interactive surface, which responds in real-time to the levels of light; its panels contract to allow the right amount of light into the space depending on the weather and lighting conditions. Both prototypes aim to feed real-time data into a responsive design element. Its purpose is both practical and aesthetical; Wagner is researching how these responsive elements can be automated to address the practical need for adequate sound and light quality in an office environment, with an aesthetically unique and intriguing intelligent wall panel. In parallel to building and testing physical components of the prototypes, Wagner's team uses an immersive virtual environment to test different variations of the form of the prototype, its movement and the algorithms that control it.

Environmental, physiological and neurophysiological data

The studies presented in chapters 6, 7 and 8 record and analyse physiological and neurophysiological data in order to gain a better understanding of human navigation, the effect of spatial thresholds and the correlations between pragmatic spatial parameters and the user's experience.

Trevor Keeling, Etienne Roesch and Derek Clements-Croome measure physiological data with the use of wearable sensors, to assess the human experience and comfort in an office environment. More specifically, they measured certain parameters of the physical environment – temperature, light levels (luminosity and light temperature), sound levels and CO2 – in parallel to measuring the user's heart rate and skin conductivity. The experiment was conducted with 50 participants and involved both recorded data and a questionnaire. Keeling et al aim at developing methods for managing and assessing complex data sets, in order to understand how specific changes within a physical environment affect the experience and physiological response of the user. They make an interesting distinction between stimuli that have a very low impact on human physiology and mainly affect how a user consciously perceives their environment (such as a disturbing light) and stimuli that have a significant impact upon the human physiology. Keeling et al argue that findings from research that assesses only one parameter (i.e. only sound levels) has limited value, and reflect on the need for more complex models, which explore

simultaneously the effect of different parameters, and attempt to correlate the nature and intensity of their impact.

One of their main observations was that higher sound levels are at times associated with higher heart rate. This observed pattern needs further testing to be validated, but already forms a significant hypothesis for further research. Also, the fact that this pattern does not apply to all participants make us think that some sounds are more disturbing than others, regardless of their loudness. Hence, one of the main remarks is that some parameters, such as sound, although initially treated as a one-dimensional parameter, in reality is not. So some parameters need to be treated differently to others, as their degree of complexity varies. This may seem obvious in the case of sound and temperature, but it opens a very interesting discussion as to how we simplify certain stimuli in order to analyse them in a scientific way. Other stimuli may be more complex than temperature or sound, and harder to categorise as one-dimensional or not. Another interesting observation is that correlations observed are limited due to the overall comfort level of the environments tested. It seems that the conditions of all office spaces tested were fairly comfortable and ordinary – without huge fluctuations of temperature, noise or light, which would have mapped in much more obvious ways on the physiological recordings.

Examining the relationship between environmental parameters and human response is also valuable – besides raising the above-mentioned questions and issues – in creating general guidelines as to the required levels of temperature, light, sound, etc. for an environment of a specific function (i.e. office space), and in understanding how deviation from these conditions may lead to a less comfortable experience or reduced productivity either for all people or for a significant majority.

In parallel, it makes one reflect on what *IS* comfort and productivity, and whether it should always be a priority. Are there compromises in other aspects of human experience made, in favour of comfort and productivity, as we conventionally perceive them? Mallinson (2004) in her article 'Metaphors of Experience: The Voice of Air' provocatively argues that buildings – and spaces in general – become increasingly controlled, and points out how the exposure to a fluctuation of temperature, rain or the wind may be an enlightening, immersive and desirable experience. This discussion is not aiming at suggesting that we should design offices exposed fully to the elements of nature. It only raises an open question with regards to some values (i.e. conventional measurable comfort) that may become panacea and addressed as absolute universal and timeless desires, and not as culturally, socially, politically, historically loaded, and place and time specific – to a certain extent – conventions.

Bridget Snaith and Sven Mündner examine the potential of the use of EEG technology for recording and analysing navigation in an urban environment. Their attempt is to quantify – to measure and represent – how effectively people can navigate in a specific environment. They discuss the potential value of an objective, solid method for measuring this type of human experience. Their hypothesis and arguments make one reflect on the increasing need and desire to quantify and measure aspects of the human experience, and the subsequent current debates on this issue. One would ask, is there a real need to quantify certain aspects of human experience and make the intangible measurable, or is it a by-product of the increasing tendency for solid data and scientific (or scientific-looking) proofs? They reflect themselves on these issues, by discussing the complexities of the relationship between research and an actual live design project, as well as the limitations of several methods and processes tested. Snaith and

Mündner discuss how the use of solid data, which would help one map and comprehend better the human experience, could make a design proposal more persuasive. Objective evidence that a design proposal would lead to better navigation, would be more convincing to a potential developer, client or funding body.

Their research discusses both methods, processes and practices, as well as a specific case study – a navigation experiment in Thamesmead. Snaith and Mündner were commissioned by the current owner of Thamesmead, the social housing provider Peabody, to propose how navigation should be redesigned more effectively for the pedestrians of the area. Thamesmead was designed as a 'new town' in the 1960s by the Greater London Council, with high-speed roads and separate paths for pedestrians, some of which – as the authors claim – include confusing intersections. Groups of volunteers were asked to navigate at key-parts of the pedestrian paths network. Throughout the different stages of the experiments, the team of researchers used combined methods involving –amongst other – semi-structured interviews, questionnaires, focus groups, workshops, and observation of the way-finding process of the experiment participants. At a key-stage of the experiments, Snaith and Mündner observed that participants navigated more successfully to their desired destination when temporary signs (designed by the researchers) were installed along the paths, as opposed to participants who only used a map. The researchers acknowledge the limitations of their findings, which are mainly due to the small number of participants. Still, though, the small sample, analysed in conjunction with the interviews, focus groups and workshops with the local community, can lead to a research hypothesis, to be tested and validated further. It worth mentioning that this research process led to interesting findings beyond the questions that were originally set. For example, the interviews revealed how aspects of the existing system of signage misled the participants' navigation (rather than help them). Hence, for some participants it was not necessarily the researchers signage (or lack of it) that allowed them or not to navigate successfully, but other aspects of the environment. Some of the observations of the researchers make us reflect on the recurring theme in this book, of the relationship of quantitative and qualitative methods, and the paradoxes and complexities of the processes that navigate through these methods and their variations.

Dorothea Kalogianni and Richard Coyne examine the experience of spatial thresholds in VR, with the use of EEG. In collaboration with their Masters students, they designed a number of virtual environments, which included different types of thresholds; transitions between environments of different qualities and character. Users could experience and navigate in these environments with the use of a head-mount VR display (Oculus). This set up was used for a series of pilot experiments. The participants navigated in the VR environment, while their brain activity is monitored with a portable EEG device (Emotiv). Questionnaires and interviews with the participants followed. The researchers used the Emotiv application 'Affective Suite', which translates the EEG signals into four states; excitement, engagement, frustration and meditation. Although the algorithm is not released by Emotiv, hence works as a 'black box', the validation of this algorithm (published in several studies) shows that it can be used as an indication of broad categories of cognitive/ emotional states. Kalogianni and Coyne analyse the individual EEG and interview responses of each participant to gain a better understanding of how people experience thresholds of different types. A few participants, for example, show through their EEG recordings an excitement peak before the crossing of the threshold, whereas their engagement remains high for much longer, after the crossing of the threshold and while exploring the new environment. This observation might be a starting point for understanding deeper what happens in one's brain when exploring new

places, and moving from one environment to another. How do we interpret this transition from excitement to engagement in a cultural context, and what does it mean in neurophysiological terms? This pilot study opens intriguing questions which are being examined further in their upcoming experiments.

GIS data; navigation, emotions and gender issues

Negar Ahmadpoor and Tim Heath present their research on how people navigate in an urban environment with and without the use of a GPS. They argue that new information systems and technologies allow for new ways of inhabiting and experiencing places. Hence the old vocabulary and understanding of how people use space may no longer be valid or perfectly accurate. For example, with the use of smart phones - and embedded GPS apps – the way-finding process changes. One may be looking for different clues as opposed to before the emergence of these technologies. Additionally, the verbal narrative of how you can reach a place and the instructions that one may give another as to how to find a location change as well. In this context, one would ask, what are, hence, the implications for the designing of places, and more specifically for the designing of urban environments? Ahmadpoor and Heath start addressing this issue by exploring how the use of GPS changes how people navigate, and more specifically how the recognition of landmarks affects their way-finding. Their experiment is conducted in Nottingham, with 76 participants. The participants were asked to navigate from a given point, to 8 different specific destinations; half with the use of a GPS and half without. The first stage of their data analysis shows that non-GPS users did better in the task of recognising landmark buildings, shown to them in photos, after their way-finding activity. Ahmadpoor and Heath examined, then, the characteristics of the landmark buildings that were better remembered as opposed to those that were not. They present a very interesting graph showing a series of buildings which are best remembered by both groups (GPS users and non-GPS users), and a series of buildings that are remembered by non-GPS users, and not by the GPS users. These are the instances, in the graph, where the biggest gap in level of remembering is observed between the two groups. The researchers observed that the historically and culturally significant buildings, buildings that were different to their context, and ‘buildings with unique architectural qualities’ were more remembered by GPS users as well.

The above raises an interesting question with regards to how one describes or interprets what makes a building memorable. What do we define as ‘historically and culturally significant’? One could argue that this may be different to an architectural expert or historian, and different to other inhabitants of the city. For example, some monuments of modernism are hugely admired by architects, and form significant landmarks in their reading of the city, whereas the same buildings may be less noticeable by others. Another interesting discussion that the authors initiate has to do with how these findings may inform design practices. A ‘reflex’ response might be to create ‘memorable’ buildings, so that both GPS and non-GPS users notice some landmarks. However, we need to be critical with this kind of direction for various reasons. On one hand, memorable buildings may also be the terribly badly designed ones. The density of ‘different’ buildings also needs to be considered; too many different buildings may be questionable. On the other hand, this argument could be totally flipped around and questioned altogether. Should design

be directed by the kind of buildings people notice while navigating using a GPS, or not, to what extent, and why? Ahmadpoor and Heath's reaserch opens all these exciting questions for further debate.

Roua Ghosh and Samer El Sayary attempt to create a map of emotions in order to gain a better understanding of human experience in an urban environment. Their aim is to correlate specific spatial attributes and sensuous stimuli to the emotions invoked, and to assess any observed patterns. In this chapter, Ghosh and El Sayary present an overview of how the notion of 'emotion' has been defined by different theorists. They also present the different ways in which human emotions have been categorised and grouped in the context of different cultural and psychological studies. Ghosh and El Sayary attempt to record and represent in the form of a layered map the emotions experienced by a number of people in areas of Beirut's central district. They designed and conducted an experiment with 30 participants, who were asked to walk along a route in the centre of Beirut, and complete a questionnaire. The questionnaire focused on three senses – vision, sound and smell – and on three main categories of emotions – enjoyment, fear and anger. The questionnaire comprised of a set of two tables, for each individual key-area of the journey: The first table was asking the participants to assess the intensity of the different visual, sonic and smell-related sensuous stimuli and describe the elements of space that they associate with each. The second one asked the participants to assess the level of each emotion (enjoyment, fear, anger) and describe the reasons; the spatial elements associated with that emotion. In this study, the participants are asked to both self-map the sensuous stimuli they perceive, their emotions, and also to interpret them; to present what they think is the spatial element that leads to each. It seems that the researchers aimed to create a new variation of a psychogeographic map of Beirut city centre, based on the emotions and interpretations of the people who took part.

Phevos Kallitsis looks into how data retrieved from online dating apps reveal narratives about the use of public space, the evolution of different demographics in the city, the human interaction, and the changing culture within specific groups, such as the gay community. He uses these data as a starting point for a range of discussions, including the relationship between narratives of the virtual and the physical, the issue of sexuality, privacy, identity, communication and presence of the gay community in areas of the city. His work shows how through raw data, retrieved though apps that use geo-location, complex narratives and interpretations for the life in a city can emerge. Data, such as the number of users of a social/dating app at different parts of the city, in different moments in time (different times or days of the week), can reveal patterns of the human behaviour and interaction. Kallitsis attempts to use data to gain a better understanding of the human experience. For example, he looks into how, when, where people intending to interact through an online dating platform are. Additionally, he attempts to correlate the human presence and interaction appearing on the digital app, with the density and activities observed in the physical city. He uses the metaphor of the map and discusses place as seen through a set of two overlaying maps; the conventional map of the physical space and the map of the presence and interaction in the digital online platform.

Kallitsis' case study is carried out in the city of Portsmouth, UK, and the dating app he used for his experiment was the Grindr; an online dating app, addressed mainly to gay men. Through his study, he observed that online dating apps do not reduce the face to face social and personal interaction; they rather offer an additional layer and possibilities in the human interaction. He examines how users at times

use the online platforms to conceal their identity, location and enjoy privacy, and how – in other instances – they use it to actually increase their visibility in the physical real space, by presenting their exact location through their online profile. Kallitsis also reflects on the issue of physical proximity. This type of app shows profiles of users within a certain area from your location. Hence physical location matters. Kallitsis discusses the issue of proximity; the relationship between the distance as shown through the app, and the actual distance, which may be involving physical geographical obstacles (such as the sea, physical boundaries, etc.). Kallitsis' observations make one reflect on how notions such as proximity, distance, density, availability, privacy, time acquire new meanings and connotation in the context of meeting/ dating apps and hybrid social interaction. The meeting place in a hybrid context can either be an online chat or an actual café; and the time to make yourself available and visible hence varies. Disappearing from the online grid may mean that one wants to be away from social interaction or it may as well be that one is in an actual physical meeting place such as a bar, with their app off. Through this chapter, we do not only observe the actual findings of the experiment, but we also find out about the author's general beliefs that reflect general social assumptions; such as the assumption that younger people use meeting apps more than older generations (contradicted by the findings), or that Saturday night is a busy time on meeting apps; again contradicted by the findings. It is also remarkable how seemingly simple data, such as where about in the city someone walks, can reveal quite a lot about their life and profile. This, at the same time, raises questions of privacy and power, when it comes to who manages and has access to the data.

Narratives as data and data as narratives: the politics of what we map

Alejandro Mieses Castellanos presents his advanced programming practice, through which he maps the use of words, their frequency, locality and interconnections, with the use of neural networks. He explores how this type of advanced mapping can reveal enlightening dynamics, relationships, gaps, narratives, of the contemporary discourses (in architecture and beyond) – not through the reading of the actual texts, but through a kind of meta-reading: Through feeding huge amount of data-texts into the algorithm, which then reveals patterns, dynamics, relationships, between words-notions. The densities, relationships, gaps, and other phenomena observed can be associated both to place – locations where the words were found – and to time, as this 'nebulous' transforms over time. At the moment, the software uses 2.25 billion words taken from Architectural journals and databases, to formulate this initial case study. Castellanos presents the critical discourse that drives this project. He raises the broader question – what is it that we are computing? And what about things that are not computed – or computable? Social and political issues that can only be handled and understood through narrative usually remain outside the – increasingly data-driven – discussions. Castellanos argues that most of human knowledge and experience is narrative-based, and not easily quantified and managed. He attempts then to examine whether and how through neural-networks computation, huge narrative-based databases can be mapped and looked at in a new meaningful way.

As Castellanos argues, each school of thought, each profession, each environment develops its own ‘vocabulary’ use of language. In certain environments, or schools of thought, some words are used more, and words are interconnected and used in a certain proximity with other words. Additionally the way in which words are used changes over time, as well as their relative proximity. As he mentions, the word ‘sustainability’ for example, brings instantly to our mind other terms, such as environments, emissions, etc.; its frequency and interconnections though change over time, and also change if seen in different contexts (i.e. construction-related industries VS social sciences discourse). Castellanos describes words as ‘neurons in brain tissue’. Words do not only carry the value that each user loads them with; they also carry the value-connotations created by how others have used them, how often they are used, and with what other words/ notions they are associated – and this complex and constantly transforming nebulous is what Castellanos aims to map, and draw meaning from.

Pablo Lorenzo Eiroa reflects on the political and ideological dimension of the data collecting, managing, representing and sharing processes. He reflects on how decisions with regards to data collection, organisation and management create ‘content’ and can potentially serve the interests of the body or organisation/ government/ corporation that leads those processes. Similarly, he points out how data collecting, management and representation processes can potentially reveal unpredictable narratives, generate new ideas and arguments. He points out that there are inherent biases in every such process. For example, the categories through which data is collected, cannot be neutral; they reveal pre-existing beliefs and biases. And as such, they project/ construct a reality. As Lorenzo Eiroa argues, ‘this apparently neutral process of measurement often projects categories to reality and may even determinate social behavior, normalizing models for a society being progressively engineered through feedback processes of measurement and representation’. One could argue that in the context of cultural studies, this issue has been addressed through the post-structuralism discourse. In such a context, Lorenzo Eiroa’s argument is not read as a call for objectivity. It is rather read as a call for opening up, revealing and discussing the inherent biases in indexing and data collecting processes. Through the experimental examples of data collection, juxtaposition and mapping that he presents, his arguments are read as a call for inventive data-collecting and representation processes that deviate from pre-accepted categories and destabilize conventional correlations.

Measuring the intangible

A recurring theme in this book is the tendency to quantify, measure and visualize intangible, or hard-to quantify things. The reasons vary; from genuine playful curiosity to the need to be convincing. Data-based evidence can make something that is either common sense, or intangible, appear objective and undoubted.

Contemporary computation allows for big data to be analysed quickly and effectively. This evolution is not only being used in areas where this has a clear practical output but has also influenced and informed research in other areas – areas in which the use of data is still very new, can be quite problematic, and can lead to controversial processes and outcomes; when – for example – data is used to map/ discuss/

analyse the ‘happiness’ of different cities, or ‘comfort’ of different environments, several philosophical questions raise. What is ‘happiness’; do we refer to the ‘eudaimonic’ or ‘hedonic’? (Kashdan, T. et al, 2008) Or to other aspects of it? Can it be measured? And aren’t the criteria used for measuring it dependent upon cultural, social, political contexts? Similarly, as discussed earlier, the assumed desirable condition of ‘comfort’, or of ‘productivity’, or easiness of way-finding can be debatable. One would argue that the issue objectivity-subjectivity has been already addressed through the post-structuralism discourse, by explicitly making the context an inherent part of the phenomenon observed (Thompson, J., 2008). However, studies measuring things such as ‘happiness’, ‘comfort’, or equivalent debatable parameters, often leave out the potential discussion on the contextual nature of such terms.

One might also wonder whether at times things are discussed in terms of ‘comfort’, ‘productivity’, ‘happiness’, ‘easiness’ of navigation, etc. in order to meet the current needs of the market, the calls of the funding bodies or the agendas of relevant stakeholders. Williamson et al discuss how knowledge has a different meaning for academics, researchers, policy makers, commercial industries, etc.; an issue that funding bodies and other institutions at times do not open up, assuming that knowledge has the same essence for all. In this context, Williamson et al argue that, ‘for the lobbyists knowledge is a means to an end. It is either successful in these terms or not. It has no further interest’ (Williamson, Cloonan and Frith, 2011). With regards to the above, the projects presented in this book, trigger two main threads of questions: how data and information are organised, processed, dealt with, to allow discussions that we believe are meaningful and inclusive, and, in parallel, how the issue of emerging data-oriented practices itself shifts the research methods, and challenges the theoretical and discipline-related context of thought. On one hand, this book explores new territories and cross-disciplinary collaborations which use data in new inventive ways and contexts, to understand and map the experience of place and creative inventive design projects. On the other hand, it discusses how the handling of data, the meta-design of what we choose to measure and how is not ‘innocent’ and ‘neutral’, but can potentially follow or drive meaningful, desirable, ethical – or not – political, cultural and social agendas.

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