## **BEYOND THE BLUE DOT** RETHINKING GOOGLE MAPS' ROLE IN SHAPING URBAN PERCEPTIONS

Al-Crafted, NightCafe. All Intellectual Property Rights Reserved.



José Cano Núñez

Erasmus Mundus Master Course in Urban Studies 4CITIES

Academic Year: 2021 – 2023

Submission Date: September 1, 2021

Supervisor: Prof. Diego A. Barrado Timón – UAM

Second Reader: Ass.-Prof. Kristin Veel - KU

## Acknowledgements

I want to give special thanks to my supervisor, Diego, for accepting that first change of topic that has allowed this thesis to emerge. Google Maps was not the topic assigned to me, and it took me some time to realise I was too obsessed to let it pass. What a pleasant surprise how you were immediately on board. Thank you for always being willing to talk about the "last" of my problems and for your quick answers. I am grateful to have a supervisor who shows appreciation and respect for his students and has excellent knowledge of so many topics. Thank you so much for making this challenging process a little more enjoyable.

Secondly, I would like to thank all my fellow 4citizens. I feel lucky to have shared this experience with all of you. Whenever friends or family ask me, I summarise the past two years by saying that I have never met so many unique and intelligent people in one single place. I know there's no room you cannot fill with your passion and knowledge. Special mention to the 16 people who, at the end of the semester and while writing their thesis, took several hours to carry out an "experimental walk" through the neighbourhood of La Latina, Madrid. Without you, there would have been nothing to present today.

To my wonderful Pepe Sánchez-Molero Martínez (yeah, my best friend is called Pepe, too). I cannot believe that we ended up sharing a career in urban studies, but it's one of the most incredible things that has happened to me. I was completely lost before every single one of our calls, but you always managed to get me back on track by the end of them.

Finally, I want to thank Pippa Winship for all her support over the last few months. Thank you for your corrections, comments, and, quite frankly, for helping me through stressful times. Thank you for sharing some of your knowledge with me. I can't wait to call you Dr. Winship. As one of your first supervisees, I can give good references.

Thanks (and maybe sorry) to everyone who listened to me during the past year, going over and over, up and down and ranting about Google Maps. Your patience will be rewarded. I don't know how, and I don't know when. But it will.

### Abstract

#### English

Urban walking is a popular mode of mobility, providing opportunities for exploration and orientation. As cities become complex and life accelerates, effective navigation becomes more challenging. This has led, particularly amongst younger generations, to widely adopt navigation applications such as Google Maps into their walking experience. Research on the effects of this continuous guidance and mediation has stated that using this technology negatively affects spatial cognition and awareness. However, more literature should discuss the subjective reasons behind its use and other consequences. This thesis examines how young foreigners perceive shifts in their urban experience when using Google Maps, with additional inquiries exploring potential improvements to navigation systems and the effectiveness of qualitative methods and experimental walks in enhancing user reflexivity.

The study conducts four exploration walks in the neighbourhood of La Latina (Madrid) using Google Maps and situationist dérive, incorporating photography, messages, and post-walk focus groups to examine citizens' perceptions of navigation app use. This methodological approach provided an empirical and qualitative investigation of Google Maps through small, in-depth group research, identifying and encouraging the 16 participants to reflect on their reliance on Google Maps. Results show that young foreigners have a broadly positive opinion of Google Maps. However, this does not prevent them from identifying the negative consequences of the application. The focus group and photography premise effectively generated reflexivity in the participants. The app's presence in everyday life is intense. It affects urban exploration positively (providing a convenient and reliable way to navigate unfamiliar areas) and negatively (leaving little room for spontaneity and minimising attention to detail). Our results support the argument that anxiety has shifted from navigating (destination anxiety and agoraphobia) towards an extreme reliance on the phone (nomophobia, fear of not having your phone). Compared to other studies, experimental walks and other situationist tools could be implemented to generate complementary ways of exploring navigation applications. This is needed to go beyond regular concerns and produce meaningful alternatives and improvements to Google Maps that minimise the negative consequences on spatial awareness, exploration and spontaneity. Further research on algorithmic urban navigation from the user perspective is crucial to identifying invisible mobility patterns and creating an alternative, more conscious and present way of traversing the city.

#### German

Das Gehen in der Stadt ist ein beliebtes Mobilitätsmittel, das Möglichkeiten zur Erkundung und Orientierung bietet. Da die Städte immer komplexer werden und sich das Leben beschleunigt, wird eine effektive Navigation immer schwieriger. Dies hat dazu geführt, dass vor allem jüngere Generationen in aroßem Umfang Navigationsanwendungen wie Google Maps in ihre Geherfahrung integrieren. Forschungen über die Auswirkungen dieser ständigen Führung und Vermittlung haben ergeben, dass die Nutzung dieser Technologie die räumliche Wahrnehmung und das Bewusstsein negativ beeinflusst. In der Literatur sollten jedoch auch die subjektiven Gründe für die Nutzung und andere Folgen erörtert werden. In dieser Arbeit wird untersucht, wie junge Ausländer Veränderungen in ihrer Stadterfahrung wahrnehmen, wenn sie Google Maps nutzen. Darüber hinaus werden potenzielle Verbesserungen von Navigationssystemen und die Wirksamkeit qualitativer Methoden und experimenteller Spaziergänge zur Verbesserung der Nutzerreflexivität erforscht.

Im Rahmen der Studie wurden vier Erkundungsspaziergänge in der Nachbarschaft von La Latina (Madrid) unter Verwendung von Google Maps und situationistischem Dérive durchgeführt, wobei Fotos, Nachrichten und Fokusgruppen nach den Spaziergängen einbezogen wurden, um die Wahrnehmung der Bürger bei der Nutzung von Navigations-Apps zu untersuchen. Dieser methodische Ansatz ermöglichte eine empirische und qualitative Untersuchung von Google Maps durch eine kleine, eingehende Gruppenforschung, bei der die 16 Teilnehmer identifiziert und ermutigt wurden, über ihre Abhängigkeit von Google Maps nachzudenken. Die Ergebnisse zeigen, dass junge Ausländer eine weitgehend positive Meinung von Google Maps haben. Dies hindert sie jedoch nicht daran, auch die negativen Folgen der Anwendung zu erkennen. Die Fokusgruppe und die Fotografie haben bei den Teilnehmern effektiv Reflexivität erzeugt. Die Präsenz der App im Alltag ist intensiv. Sie beeinflusst die Stadterkundung positiv (sie bietet eine bequeme und zuverlässige Möglichkeit, sich in unbekannten Gebieten zurechtzufinden) und negativ (sie lässt wenig Raum für Spontaneität und minimiert die Aufmerksamkeit für Details). Unsere Ergebnisse stützen das Argument, dass sich die Angst von der Navigation (Angst vor dem Ziel und Agoraphobie) zu einer extremen Abhängigkeit vom Telefon (Nomophobie, Angst, das Telefon nicht zu haben) verlagert hat. Im Vergleich zu anderen Studien könnten experimentelle Spaziergänge und andere situationistische Instrumente eingesetzt werden, um ergänzende Möglichkeiten zur Erforschung von Navigationsanwendungen zu schaffen. Dies ist notwendig, um über die üblichen Bedenken hinauszugehen und sinnvolle Alternativen und Verbesserungen zu Google Maps zu entwickeln, die die negativen Folgen für das räumliche Bewusstsein, die Erkundung und Spontaneität minimieren. Weitere Forschungen zur algorithmischen Stadtnavigation aus der Nutzerperspektive sind entscheidend, um unsichtbare Mobilitätsmuster zu erkennen und eine alternative, bewusstere und präsentere Art der Stadtdurchquerung zu schaffen.

## **Table of Contents**

Acknowledgements	1
Abstract	2
English	2
German	3
Table of Contents	4
List of Figures, Tables & Maps	6
List of Images	7
Chapter I – Introduction & Research Question	8
Chapter II – Literature Review	11
Physiognomy and urban walking.	12
How we moved - Behavioural Geography and Wayfinding	13
A new turn – Changes in movement and space	15
Walkability studies	17
Psychogeography and contemporary practices	19
Smartphones and the walk	21
Google Maps and the city	22
Atmoculture and algorithmic navigations	26
Chapter III – Research Methodology	28
Preliminary survey – Using Google Maps	28
Experimental walks – A multiple methods approach.	29
Preparing the walks – Google Maps vs. Dérive	29
Destination and time scarcity – La Latina and the landmarks	30
The third variable – Tentative improvement of spatial awareness	32
Spatial memory – Mapping the route, remembered vs real	34
A destination-based dérive? – Changes to the classical tool	35
Self-reflexivity – Trying the methods before implementing them	36
The walks and the focus group	37

The focus group – A space for reflection	
Chapter IV – Research Findings & Results	42
Initial Survey – Preliminary findings	42
Usage – A smartphone love-story	42
Awareness – Looking at your surroundings?	45
Feelings – No Anxiety, All Good	46
Experiences – Reflections, Criticism & Dependency	47
Maps – Visualising the Routes	48
Dérive – When navigation skills matter	50
Dérive I	51
Dérive II	53
Google Maps – Looking at your phone	54
Google Maps I	55
Google Maps II	57
Visual narratives – Photography as a mindset	57
Landmarks – Find it; take a pic	59
Qualitative Photo Analysis – Pick one, tell me why	60
Dérives	61
Google Maps	63
Spoken narrative – The Focus Groups	67
Navigation Model - Use it but make it your own	67
Urban Experience – Exploration and spontaneity	69
Reflections – Experience, data, and improvements	71
Chapter V – Discussion	75
Walking and behavioural geography	75
Speed, the gazes and walkability	76
Smartphones – Distracted and mediated	78
Chapter VI – Conclusion and recommendations	80
References	82
Appendices	

## List of Figures, Tables & Maps

Figures
Figure 1. Factors used to develop the pedestrian indices, Maghelal & Capp (2011)18
Figure 2. Madrid Touristic Areas Map – Detail of La Latina
<b>Figure 3.</b> Survey Results – Q6. How often do you use your smartphone when walking around the city?
Figure 4. Survey results – Q9. How does the use of Google Maps make you feel?43
Figure 5. Survey results – Q11. Which Google Maps functionality do you mostly use?
<b>Figure 6.</b> Survey Results – Q15&16. When walking, how often do you check your surroundings and Google Maps?45
<b>Figure 7.</b> Survey Results – Q22. Would you like Google Maps to offer new ways of navigating the city that made you more aware of your surroundings?46
<b>Figure 8.</b> Survey results – Q11. Which Google Maps functionality do you mostly use?
Tables
<b>Table 1.</b> Themes found in the phone and walking literature review
Table 2. Routes and landmarks used for the experimental walks
Table 3. Messages sent during the experimental walks
Table 4. Basic information about the experimental walks
Table 5. Probe questions and examples of follow-up questions         40
Table 6. Distribution of photos taken
Table 7. Landmarks photos   60
Table 8. Structure of the online appendices       90
Maps
Map 1. Identified landmarks for the experimental walks by type – Must-see, Intermediate and Unusul
Map 2. Dérive I – Differences and similarities between remembered and real routes50
Map 3. Dérive II – Differences and similarities between remembered and real routes. 52

	Map 4.	. Google Maps I – Differences and similarities between remembered and real	54
<b>Map 5.</b> Google Maps II – Differences and similarities between remembered and real	Map 5.	. Google Maps II – Differences and similarities between remembered and real	56

## List of Images

Image 1. Silent map of the area of study given to the participants
Image 2. Iglesia de San Pedro el Viejo. Steeple and back of the building
Image 3. Differences between remembered and real walk – Researcher test
Image 4. Example of exchange of messages during the walk – 5- and 10-minute mark, participant Clara (GM I)
Image 5. Example of flyer given to the participants – Rules, places and space for notes
Image 6. Space used to conduct the focus groups – Corrala de la Autónoma41
<b>Image 7.</b> Cleaning the data – Example from draft to map. Maps from Participant Clara. 
Image 8. Viaduct of Segovia. Significant landmark used by Participants Teo and Paco
Image 9. Selected photos (D1). Vertical photos left to right: Pilar, Manu and Isabel. Horizontal, Álex
Image 10. Selected photos (D2). Vertical photos left to right: Teo, Paco and Teresa. Horizontal: Elena
Image 11. Selected photos (GM1). Vertical photos left to right: Clara, Lea and Rocío. Horizontal: Alba
Image 12. Selected photos (GM2). Vertical photos left to right: Iván, Sara and María. Horizontal: Dani

### **Chapter I – Introduction & Research Question**

When I lived in Brussels for the first time, one of the things I wanted to accomplish was to get familiar with the city. And to do so, I walked a lot and explored the town. One of the things I did was to go every day to the Vrije Universiteit Brussels (VUB) from my apartment near Avenue Louise. A 40-minute walk that went a bit like this:

- Go a bit down Avenue Louise.
- Go left and up towards Matonge.
- Walk past Chau d'Ixelles, then once in Matonge, pass a lovely square with a church.
- Go to the right down the road.
- Walk straight for the rest of the time, ending near the university.

It was an easy, straightforward route, but it took me multiple days back and forth to feel comfortable not doing it with Google Maps. I was a bit annoyed by this, but I was in a new city.

The more I walked this route, the less I used Google Maps and the more I tried to focus on details: the lovely square is called Saint Boniface, and they have a couple of places to drink and an excellent pizzeria; in my way, I came across a Lidl that I got stuff from; the dinosaur graffiti that I walked pass was the Museum of Natural Sciences; there was a costume shop on my way; passed by a Brazilian restaurant that looked good; and so many more little things. When I stopped using Google Maps, I was very proud of myself, as I felt I could finally orient myself and get out of its influence. Brussels was known to me, and to do so, I only had to walk this route every day.

However, as with every good story, something happened. After a month of this walking routine, I finally joined my colleagues for a drink. And the place selected was Place Jourdan, which was supposed to be a famous spot for drinks and, obviously, pommes. I searched Google Maps for directions, as I usually do, not even considering where I was heading. Go a bit down Avenue Louise, then go left and up towards Matonge, walk past Chau d'Ixelles, past (now) St. Boniface, go to the right, and walk in a straight line. And turn left—the same route, just a turn away. I have walked past one of the most relevant squares in Brussels dozens of times and never realised how close I was. I hadn't stopped to think for a moment about what existed along my route, what I was missing out on by precisely following the path Google had once marked out for me. In my mind, I was already doing enough by reducing my use of Google Maps, but it was still limiting my possibilities of exploring the city.

I remember sharing my experience of relying too heavily on digital technologies for navigation with some of my colleagues and friends. At first, I felt embarrassed telling them I had been passing by a beautiful location daily without even noticing it. However, to my surprise, many shared similar stories of getting lost or missing out on unique experiences due to their dependence on GPS and Google Maps. It was comforting to know that I wasn't alone, and it sparked a productive and engaging conversation about the impact of technology on our ability to navigate and explore the world around us. While digital tools help us navigate unfamiliar territory, they can also hinder our ability to experience and appreciate our surroundings fully.

Forgive me for the very personal example (we'll soon return to academic writing), but it stuck with me. From that moment on, my interest in Google Maps and how it affects us when navigating the city, especially people of my generation, increased. In particular, I was interested in how the use of Google Maps affected the spatial cognition of the users, understood as awareness, but also a feeling of belonging and exploration (mental maps) and navigation capabilities. The current digital era has reached an unprecedented peak in the last decade, and a wide variety of smartphone usage effects are visible in several fields, with urban studies not being an exception.

This is how this thesis was born. Our questions have become more specialised as we become more familiar with the literature in an ongoing attempt to propose something original to research in this field. As we will see in the literature review below, a respectable number of papers have been devoted over the last decades to testing the adverse effects of applications such as Google Maps on our spatial and navigational capabilities. However, one of the limitations of these studies is that they do not delve into why people use Google Maps. The effects on the urban experience are also understudied, and the leading authors need to be made aware of how widespread Google Maps is, rarely including the participants' opinions.

One of the biggest concerns of using Google Maps should be losing on personal exploration and spontaneity, as we support the premise that smartphones nowadays are mediating the urban experience. This is a problem, as most of the literature deals with proving adverse effects on navigation capabilities while not being able to develop new strategies to either reduce its use or tackle its central issues. There's room for the latter. However, a qualitative approach must be implemented to include the participants as valuable subjects that can reflect on their own Google Maps usage. Because of that, we decided to focus our research on young foreigners' perceptions when walking in Madrid, as well as evaluating new qualitative methods to gain a deeper understanding of urban navigation tools.

Out of this group, international students in Madrid are a diverse and dynamic group of young people who contribute to the city's cultural richness and global perspective. These characteristics are mainly accompanied by a short stay duration and a massive interest in knowing and experiencing the city. However, unlike tourists, they will live in and not only visit the city. This fundamental difference made them an ideal research group on using Google Maps, considering that their information about the place is limited, but their motivation and time availability to explore the city is high. A smaller target group will allow producing more meaningful outcomes and recommendations to solve potential issues in the use of Google Maps. For example, if one result of the research is that students using Google Maps daily are more likely to feel dependent on that technology to move, then we could intervene in the university.

Thus, the following research questions drive this study of using Google Maps.

# 1. How do young foreigners perceive changes in their way of experiencing the city using Google Maps?

We identified two sub-research questions to enrich the initial one, focusing on more detailed aspects of these user perceptions. The last one aims to incorporate research reflexivity by evaluating how alternative methods could be particularly effective in this field to study the effects of Google Maps.

1A. Based on the user experience and the collected data, how can we improve Google Maps and navigation to reduce the negative consequences in exploration and spatial cognition?

1B. How effective are qualitative methods and experimental walks in creating participant reflexivity on their use of Google Maps?

To answer these questions, we will organise four exploration walks in La Latina (Madrid), using Google Maps assistance and the Situationist drifting method. We will also incorporate photography and messages as data collection methods and spatial awareness modifiers during the walks. After each walk, a focus group will be held to reflect on the sensations documented by the participants, directing the conversation on their use of urban navigation apps. With varying claims made regarding the effects of algorithmic navigation, ranging from highly technophilic to warnings of functional stupidity, this thesis aims to provide an empirical and qualitative investigation of this subject matter through small group research, seeking to identify citizens' perspectives on the use of navigation applications. Research on algorithmic urban navigation is imperative to recognise the disparities that privately owned and cryptic technology firms generate within the urban environment. Further studies and evidence can contribute towards promoting the democratisation of the hidden mobility patterns, ultimately creating an alternative method of traversing the city.

This thesis will follow a clear and structured format, beginning with a comprehensive literature review exploring a series of publications on the (de)augmented experience of walking using a mobile phone, mainly but not exclusively concerning algorithmic mobility applications such as Google Maps or Apple Maps. In doing so, we produce an informed state-of-the-art review and identify gaps in our current knowledge and methods. As a result of this deep dive into the literature, the methodology section will digest the mixed methods approach chosen for this research, which has been briefly introduced, including data collection and analysis methods. The results section will present the findings of every technique used, with a particular interest in photography, spatial memory and focus group analysis. The discussion section will interpret the results and their implications, comparing them with the most relevant literature. Finally, the conclusion will summarise the essential findings and their significance and offer suggestions for future Google Maps research.

### **Chapter II – Literature Review**

In his book "Practices of Everyday Life", Michel de Certeau (1984) reflects on walking and its rhetorical characteristics. In a very effective way, but not without contradictions, he compares the practice of walking to speaking. The three classic characteristics he identifies are the present, the discrete and the phatic, each fundamental to the subsequent development of the rhetoric of walking (De Certeau, 1984). By comparing it to a conversation or language, De Certeau is making it approachable for a broader audience: the present is the vocabulary, it has everything in it to be able to communicate, but without a particular order, it does not mean anything. The discrete is this order: by selecting some words and organising them in a sentence, we are giving specific content to it, inherently different to any other sentence we could develop. The phatic is when someone talks or reacts to them in a broad sense, interacting with what they just said in a way that effectively changes the content, creating, in this way, a unique conversation.

Thus, bringing it back to the walk, the present is everything and nothing; all the elements that a person can interact with and what makes the possibilities during the walk close to infinite and that are continually changing—for example, a road, a building, some construction work, a streetlight, among others. On the other hand, the discrete is the selection of the elements of the walk that makes a walk different from others. For example, by choosing a path, we are no longer taking another one, and therefore, the elements presented in that second path are excluded from our experience. The phatic could then be understood as the spontaneous encounters that initiate, maintain or interrupt contact with the present and the discrete. For example, things that could not be foreseen, like running into a former friend, an accident in the street, or even feelings. These changes make every walk inherently unique, even those that follow the same discreteness.

In the case of walking with Google Maps, the experience diverts from what De Certeau envisioned. The present, the infinite possibilities of the walk still exist when we use Google Maps. However, another potential implication is the disappearance of the discrete in favour of the concrete, which is the route proposed by the application's algorithm. Another form of discreteness is achieved by actively letting Google Maps choose the elements of their walk. However, the critical difference is how the individuality of the walk disappears, introducing a mediating agent in the form of navigation assistance. This undeniably affects the capacity to be interpellated by the phatic. Spaces, environments, and locations can still be perceived. Even if it is just by being distracted by the phone or the rigidness of following the most effective path, the potential spontaneous experiences within a walk are limited. Thus, the phatic is affected, and, in doing so, the uniqueness and the enhanced experience of a walk are at risk. Nonetheless, it is essential to study the effects of algorithmic mobility applications on the quality of the walk and the perception of the city.

Michel de Certeau also comments on the differentiated experiences and perspectives of practising everyday life, distinguishing urban planners and citizens (De

Certeau, 1984). In the case of the planner, they know the street plan and the building layout from a bird's eye, as well as the possibility to change the built environment. This perspective imitated God from on high (De Certeau, 1984), which is no longer unattainable for the average citizen, thanks to algorithmic mobility applications such as Google Maps. With new-found exhaustive precision, the citizen navigates the city with the security of someone experiencing the correct reading, which is opposed to what De Certeau proposes in his work (De Certeau, 1984). Likewise, the growing transnational connectivity forces us to consider whether there are purely local everyday life practices. In this sense, applications such as Google Maps or Earth allow us to travel and locate spaces with unimaginable security. De Certeau also considers that the experience of a stroller transforms each spatial signifier (existing elements such as monuments, street names or buildings used to guide the walking experience) into something else and unique (De Certeau, 1984). However, what is the role of Google Maps in this conversation, and how does it mediate between the walker, the stroll, and the city? Furthermore, how does the Google Maps user experience this change in their daily mobility patterns?

In this literature review, we will explore a series of publications on the (de)augmented experience of walking using a mobile phone, mainly but not exclusively concerning algorithmic mobility applications such as Google Maps or Apple Maps. In doing so, we produce an informed state-of-the-art review, identify gaps in our current knowledge and methods and propose an original methodology and practice.

#### Physiognomy and urban walking.

When someone talks about walking, one rarely thinks that they did not know how to do it at one time. In the literature on cognitive and social development, many studies certify that the central development moment is when a baby begins to walk independently (Walle, 2016). From then on, the baby gains the autonomy to shadow its adult references, interacting with them more frequently and, for some, beginning to learn a language.

However, it is unnecessary to go back to early infancy to understand the importance of walking. Walking, explicitly wandering, is inherently human. It is almost like breathing, the unconsciousness that enables the brain to think. Aristotle founded the school of Peripatetics in the 400th century BC, named after the covered walks in which the mind flew and the philosophers thought (Furley, 2016; Macauley, 2000). Having been a stroller, Nietzsche does not fail to mention the indispensability of walks in his work. Kierkegaard's famous words to her niece Jette about walking resonate exceptionally well with this thought: "(...) Thus if one just keeps on walking, everything will be all right" (Kierkegaard, 2013). They are not the only ones. Great thinkers have used walking to keep their minds active and produce knowledge.

Walking in the city is a daily and everyday practice. Compared to other means of urban transport, its use is much higher and varies significantly in distance and routes (Lyons, 2020). Therefore, it is unsurprising that walking occupies a significant space in urban theory. A classic example is the flâneur, a literary type developed by the French poet Baudelaire (1863) and identified as an urban archetype by one of the first

sociologists, Walter Benjamin (1969). According to Baudelaire himself, the character has many attributes, including the practice of passionately observing crowds of people and the events they produce (The Painter of Modern Life). Thus, the flâneur executes De Certeau's phatic to an extreme by actively searching for ways to engage and interact with people and environments during their walks.

In Paris: Capital of the Nineteenth Century (Benjamin, 1969), the German essayist Walter Benjamin reflects on the characteristics of the French capital through walking. He mainly discusses the Parisian arcades and the world exhibition from a dual perspective: architectural, with new materials such as iron construction and the beginning of the use of glass; and social/economic, with the importance of the luxury market in developing Magasins and the consequences of world exhibitions. He also includes his description of the flâneur, whom he considers to be mainly of bourgeois origin, "seek(ing) refuge in the crowd, in which the familiar city lures the flâneur like a phantasmagoria" (Benjamin, 1969, p. 53). Benjamin criticised how the flâneur participated in consuming commodities, portraying its gaze as a further representation of the capitalist system (Benjamin, 1969). The classical reflexivity attributed to this archetype is nevertheless confronted with socio-economic reality, and for him, it is impossible to separate it.

#### How we moved - Behavioural Geography and Wayfinding.

Kevin Lynch's 1960 iconic "The Image of the City" focuses on the city's legibility through two-dimensional essential components, such as landmarks, nodes, paths, boundaries, and districts (Lynch, 1960). However, he recognises from his mental maps that landmarks are cognitively the most straightforward spatial form to recognise and locate themselves around.

Behavioural geography is the intersection between geography and psychology and has been recognised as a relevant way of approaching urban studies. One of the most relevant authors in this area was R.G. Golledge (1993), who coordinated together with T.Garling the book Behaviour and Environment: Psychological and Geographical Approaches. A masterpiece on spatial and psychological cognition, this book walks the reader through behavioural geography, including multiple reflections about traditional wayfinding. Early Golledge's work reflects on how difficult it is to represent individual spatial knowledge and how limited the academic production in this area is. However, people tend to have a limited way of expressing their spatial knowledge compared to trained geographers and researchers. Still, they have that knowledge buried in their heads, similar to how everyone can experience the three principles of De Certeau's rhetoric of the walk.

In the same chapter, Golledge (1993) explains how geographic distance is easily understandable for the average person, while cognitive distance is more challenging to comprehend. In short, people can easily relate to metric distances, such as kilometres. However, they tend to have a more significant issue with understanding the mental representation of accurate distances in our environment, something crucial to creating our cognitive maps. McDonald and Pellegrino (1993) also identify two forms of acquiring spatial knowledge; the primary learning involves actively moving along the route, while the second requires studying a map of the route (McDonald & Pellegrino, 1993). The new technological advances and algorithmic navigation challenge this intuitive way of achieving spatial awareness. When using Google Maps, on top of both happening simultaneously, we must consider the route suggestion and steps to follow. The sum of primary and secondary learning through Google Maps has yet to be effectively studied. Assessing if the effects on spatial awareness are positive or negative at this stage is speculation. Some authors have applied the "functional stupidity" argument, initially envisioned for managerial studies, to spatial knowledge. This idea basically implies that a practice that can work well for an individual or organisation in the short term could have long-term negative consequences. However, we will see later that there are indications in the literature pointing out a decrease in spatial knowledge acquisition without the need to utilise these arguments.

In a more recent study, Falko Schmid (2007) describes individual spatial knowledge differentiating between major, minor and inferred places and different levels of familiarity within environments. Major places are purposefully visited for longer durations; minor are not as relevant to the user, and inferred are only recognisable through their relation with other major places (Schmid, 2007). To exemplify it, for a student in Madrid, a major place would be the university, city centre or a particular train station like Atocha or Chamartín; a minor place may be an area of the outskirts that they rarely visit, such as the neighbourhood of Vallecas; and an inferred place could be the stations in between the major station and the university, for example, Nuevos Ministerios. However, he specifies that to be familiar with an environment, people need full knowledge of a place, which, in our opinion, is impossible to achieve. Thus, partly familiar spaces are those with no perfect knowledge, and unknown environments are the ones that were never visited and therefore did not produce any insight into the person. This extreme vision, nonetheless, is used by him to conclude that when facing an unknown environment, people use their previous spatial knowledge of familiar and partly familiar spaces to navigate this new area better (Schmid, 2007). For example, the previous experience of commuting to university by metro would help someone understand how to do the same even if the route and destination are utterly new to the individual. Despite being relatively recent, there is still no remark from Schmid that, nowadays, algorithmic urban navigation eliminates that fear of the unknown and lostness.

Finally, Jafarpour and Spiers (2017) use a different methodology to study time and space through familiarity, supporting the argument that Golledge (1993) already made about the differences between geographic and cognitive distances. Their study shows how familiarity with an area affects space and time differently through mental maps and walk evaluation. In the former, the size of the space increases, and greater familiarity with the area makes the space involuntarily perceived as more significant. Paradoxically, the greater the degree of familiarity, the easier it is to underestimate the time needed to navigate the area (Jafarpour & Spiers, 2017). These results support the idea that time and familiarity are related. We can assume that familiarity (or lack thereof) is one of the primary motivators, coupled with time constraints, encouraging the use of algorithmic mobility applications. Other studies present that travel mode has a strong effect on spatial knowledge and cognitive maps (Mondschein et al., 2010). Research has shown that travelling employing active modes that require active navigation, such as the bicycle or the car, leads to higher quality mental maps (Chorus & Timmermans, 2010). However, this last study fails to acknowledge the inference in walking that mobile phones have. This explains why other modes of transportation produce higher-quality mental maps than walking, which is understood as one of the most active ways of navigation. Even if transportation modality affects the way of learning about the city, how do the societal changes affect the ways of navigating in the city?

#### A new turn – Changes in movement and space

The classic and romantic way of wandering may have disappeared for good as time has changed our societies, speeding them up and completely reimagining the mobility of people (Sheller & Urry, 2006) and information (Castells, 1996). Paul Virilio's dromology (2006) provides an interesting perspective on the promenade's changes. The theory developed in 1977 by the French author and architect in Vitesse et Politique illustrates the changes towards a society based on speed and the rise of time over space, all caused by military technological development (Virilio, 2006). Some critics dismiss this theory as pseudo-scientific, but something still resonates with his ideas today. The global world, the networked society, and the mobility turn are partly a consequence of this increase in speed. The smartphone we all carry is the epitome of an accelerated and technologically dependent society. However, Virilio's approach focuses on the negative consequences of these changes on society and humans (Sander, 2021). The point now is not to fight against technological progress but to find the logic that drives it and ensure that they are not just another instrument of control and promotion of the consumer society.

It is crucial to start with two of the most relevant turns social sciences have experienced in the last decades: mobility and the visual turn. Mobility has been at the centre of academic study for the last decades. Breaking with the localist tradition, the reality of the global world led the prominent authors behind the "mobility turn", Sheller and Urry, to propose a paradigm shift in the social sciences (Sheller & Urry, 2006). Ultimately, social science studies should extend beyond studying each city, space, or population independently of what was happening in the global context. The immediacy of the internet, the possibilities of encountering other cultures, increasingly frequent migrations and the globalised economy all bring about a degree of interconnectedness that academia must recognise. Castells' information society exemplifies this acceleration through new enabling technologies, which do not require physical or human movement to be mobile (Castells, 1996).

However, the mobility turn is broader than large global movements. Walking is closely related to mobility turn, as this practice is the primary way we relate to urban space. Despite this, there is a tendency in walking studies to homogenise the characteristics of walkers, leaving aside the capacity of walking to broaden our social and mental horizons, health, and sense of belonging to the city. Rebecca Solnit is one of the authors who, in her book, Wanderlust (2001), reflects on the importance of walking in art, politics and life. In her book, the politics of mobility that Tim Cresswell (2010) defends can be observed in the example walks or the struggle for human rights worldwide during the most challenging moments of the 2008 financial crisis (Solnit, 2001). According to Solnit, the walk has an explicitly political variant, which cannot be replicated by other forms of mobility, making it the primary form of movement (Solnit, 2001).

Tim Cresswell, one of the main contributors alongside Sheller and Urry to the new mobility paradigm, discusses walking as a practice that exemplifies this academic shift (Cresswell, 2010). From his perspective, three main differences in mobility can be perceived in walking: the physical movement itself, the representation and the practices that occur during mobility (Cresswell, 2010). The walk would therefore have a part that is walking and the physical and geographical displacement characterising any movement. The representation of this would involve the narratives and meanings created around walking, such as with demonstrations or marches. Finally, the practice relates to everyday life and how mobility and walking generate experiences, atmospheres, and daily practices.

The other significant shift in the academic landscape that affects this study's subject is the visual turn, a relevant part of the cultural turn (Dokovitskaya, 2006). This paradigm shift in human and social studies begins in the arts, prioritising the intersection with other fields instead of creating new ways of visualising work. An easy example in the art world would be producing a video documentary of creating a new sculpture, enhancing the final product with all the other information that was previously lost. Francisco Ventrella's (2015) definition focuses on exploring "visuality as both socially constructed experience and as what makes social experience possible" (Ventrella, 2015; p. 207). This author's detailed explanation of the visual turn concludes that although its origins are found in art history, postmodernism research has used visual components, disseminating several definitions through diverse disciplines (Ventrella, 2015). Moreover, the potential of the visual turn resides in how it interconnects and develops over disciplinary boundaries (Ventrella, 2015).

Within this paradigm shift, we must undoubtedly emphasise the play of gazes and how these have developed in the last decades differently. All the senses interact during the walk to give us a complete experience. However, the vision has been particularly challenged. Walter Benjamin's (1969) flâneur and walk through the Parisian arcades are perfect examples of this aesthetic consumption. Today, according to Sharon Zukin (2008), people are especially attracted to spaces that show authenticity, something we mainly identify through the gaze. What could be called the consumer gaze makes certain forms of business prevalent in certain areas, encouraging the vicious circle of gentrification (Zukin, 2008).

Closely related to visual turn and the consumer society, we must talk about Urry's tourist gaze (2011), one of the most relevant theories of recent years that reflects the consequences of global tourism and the importance of this gaze in doing so (Urry & Larsen, 2011). However, in the latest revisions of his work and according to other authors,

the tourist gaze is part of us whether we visit a new place or not (Urry & Larsen, 2011). Nowadays, people seek to experience their cities through Instagramable sites (Boy & Uitermark, 2020), tourist landmarks, and many others. In doing so, social media, particularly Instagram, create new landmarks by posting something. This even affects people's mental maps, as these digital representations of landmarks have a life of their own once posted, producing social interactions and responses that change how a place is experienced. The tourist gaze is no longer reserved for travellers but is part of how we see things through the creation of desire and expectations (Boy & Uitermark, 2020).

The last of the gazes we are concerned with is the most relevant to the study we are proposing in this paper. Since the introduction of smartphones, which are particularly useful for the immediacy and availability of cameras (Foster, 2009), there has been a growing interest in the digital gaze. The relationship to the tourist gaze is identifiable (Urry & Larsen, 2011), as new ways of virtualising the historic city and heritage have become a daily practice in the tourist sector, with little criticism to the potential negative implications (Barrado-Timón & Hidalgo-Giralt, 2019). However, it is interesting to explore the digital gaze itself. The discussion lies in whether the digital possibility enhances or detracts from the walking experience and how what authors call "Pervasive Enhanced Reality" (Grubert et al., 2017) can provoke stress and adverse effects on humans. Enhanced reality is already changing the way people interact with their real environment.

A very fruitful line of research in this arena is Pokémon Go, the most giant augmented reality game (Shen, 2019). Researchers worldwide recognised this mobile augmented reality game's never-before-seen impact and quickly researched the psychological aspects behind its success (Kaczmarek et al., 2017; Rauschnabel et al., 2017; Shen, 2019; Yang & Liu, 2017; Zsila et al., 2018). Different papers showed similar results on how people valued the exploration of the physical environment and the spatial component of the game more than the premise itself (Rauschnabel et al., 2017; Shen, 2019). Pokémon became a fun excuse to exercise (Althoff et al., 2016), walk and subsequently experience and look at the city through another lens. Spatial and landmark awareness of the city could have been explored more, but the general agreement is that the effects were beneficial (Kaczmarek et al., 2017; Yang & Liu, 2017).

#### Walkability studies

This consumerist pressure (Zukin, 2008) identified within the visual turn also affects the daily promenade, encouraging political authorities to create areas dedicated to capturing the attention of passers-by. Pedestrian and walkable spaces can generate an economic boost, unlike road traffic, which rarely consumes through footfall (Arup, 2016). One of the most recent reports on the benefits of more walkable cities by Arup (2016) shows that in the case of the city of London, this type of pedestrianisation generated a 65% increase in shopping (Arup, 2016). However, according to Wang and Yang (2019), "walkability is defined as the extent to which the built environment is friendly to people who walk, which benefits the health of residents and increases the liveability of cities" (Wang & Yang, 2019, p.1) and not about making streets more money.

Recent literature reviews have examined the factors considered relevant in creating walkability indexes. Hall and Ram (2018) discuss WalkScore, a popular openaccess tool used to measure walkability. Developed by a real estate firm in the US, WalkScore measures the shortest distance to a group of preselected destinations, block length, and intersection density around the origin. The authors note that the 42 walkability indexes they analysed use WalkScore differently, typically as an independent variable when creating an accumulative index. WalkScore helps measure density and service access in a specific location, but limitations in measuring walkability have been identified by other researchers as well.

On the other hand, Maghelal and Capp (2011) execute an in-depth analysis of the variables taken into consideration by 25 pedestrian indices, the first dating from 1993 and the last one from 2008. There is a contrast between the previous WalkScore study since these two authors agglomerate the variables in different scopes of interest, and density is one of the least valued. The following table by the authors is handy for visualising the academic priorities when producing a walking index (Maghelal & Capp, 2011). Unsurprisingly, land use and the existence of a sidewalk and roads, both physical measurements of the built environment, are the top factors to be considered. Even though the infrastructure is essential for more walking neighbourhoods, a quick view of the main factors reveals a need for psychological variables.

Figure 1. Factors used to develop the pedestrian indices, Maghelal and Capp (2011)

	Design						Density	Diversity	Quality	x
						Lateral				Comfort/
Author	Distance	Sidewalk	Roads	Intersection	Vehicles	Separation	Demographics	Land-Use	Safety	Convenienc
Allan-WPI	X	*	*	*	•	+	-		-	*
Bandara-GSPS	X		X	* :		2	5 <b>7</b>	х	-	X
Bradshaw-WI	2	х			х	7	х	х	Х	Х
Dixon-PPM	-	х	X	Х	Х	X	2	X	1	-
DOT	÷	X	Х	Х	X	X	31	2	-	X
FDOT-LOS	8	X	X		X	X		8		
Fort Collins-LOS	X	х	х	х					х	Х
Khisty-QLOS	X	X	x	X	х		-	x		X
Moudon -PIPDS							x	x	+	
Moudon-PLI1	2	2		S			X	x		
Moudon-PLI2			4	÷ (		9	x	x		
Portland-PDI	×	x	x	*	x				÷.,	*
Portland-PEF		x	X	x			-	-		
Portland-PPI	x						-	x	-	
Gallin WA-LOS		x	x	x	x	х		x	X	х
Wellar-BWSI		-	200	x		-	a	2	2	-
Dannenberg-WAT	-	x		x	x	x				x
Highway Manual-										
LOS	2	-	4	X	-		х	2	-	2
Saelens et al-										
NEWS	2	× .	Х	8			X	x	X	X
Frank et al- WI	X		Х				-	x		+:
Rodriguez et al		х	Х				x	x		
(BEI-W)	÷.			8		8			-	÷.
McCormack et al		х	X	Х	х			X	X	X
(WI)	-					7	7			
Kim et al (LOS-I)		х	2	*			x	X		*
Hoehner et al		Х	Х	Х	Х	Х		X		X
(ANC)	2						5		<b>*</b> 0	
Shah (PI)		X		Х			-	X	X	X
Total occurrence	6	15	14	12	10	6	8	16	6	11

Reproduced from Maghelal and Capp (2011), Table 3, pp, 11. No copyright infringement, under the premise of Fair Use in research.

Figure 1 clearly shows how walkability studies have provided a way of quantifying the environment by aggregating a set of variables. This is particularly the case with those topics related to the design of the built environment that affects the walk. However, there is some misunderstanding of quality. Future walkability research must acknowledge quality and psychological assessments beyond safety and comfort. To do so, a potential measurement for De Certeau's phatic could deepen the understanding of spontaneity and the feeling of being interpellated by the urban environment (potentially, contemplative variable or diversity) and how those things affect the quality of the walk.

#### Psychogeography and contemporary practices

Even as an intensely researched topic, the history of walking in the 20th century is closely related to sociology and art. First, the Dadaists began to produce their art in contrast to the known places, identifying the magical and surreal components that would produce, among other motifs, the surrealist movement and it is well-known "wandering" (Careri, 2009). Francesco Carreri explains this in his book Walkspaces (Careri, 2009), focusing his development on these artistic movements and those that will develop later. Among them, Carreri concludes, like many others, the importance of the Parisian Situationist International (Careri, 2009), which began with Guy Debord's Theory of the Dérive in 1958. The result of this French artistic movement is the development of psychogeography to interact with the urban environment.

However, psychogeography was born practically simultaneously in different parts of the world. The first was revolutionary and artistic in Paris in the mid-century (Wood, 2010). The second, more academic, was in the United States, at Clark University under Robjer J. Beck and, later, the influence of Kevin Lynch (1960) and his mental maps (Lynch, 1960; Wood, 2010). From different places, Denis Wood highlights the novelty of linking subjective sections closer to psychology with the physical urban environment and using novel, aesthetic techniques centred on the human experience (Wood, 2010). For example, maps were torn apart and put back together to encourage getting lost, and activities like aimlessly exploring the city were reinterpreted as protests towards a capitalist society. These concepts connected to actual and widespread political and social action, most notably influencing the 1968 riots in Paris, which prominently featured Situationist visuals and chants (Wood, 2010).

The Situationist International, led by Guy Debord, posed around 1955 the revolutionary need to alter everyday life through art and overthrow the prevailing system. Scared by the functionalist drift within urban planning and the sheer amount of power that the planner had, this group of artists had the clear objective of promoting spontaneity in the city (Pyyry, 2019, p. 321). To this end, as its name suggests, it sets out to create unexpected and utopian situations and moments within the urban fabric, distinguishing it from the flâneur's contemplative vision. They needed to intervene, as urban spontaneity and everyday life were being threatened by new and robust global power dynamics related to capitalism after the Second World War, in the form of having to come up with strategies to challenge them (Careri, 2009).

The Situationist current was very contextualised and revolutionary, leaving some relevant psycho-geographical tools in their midst. Foremost among these was the dérive or drift, an explanatory, destinationless wander through the city streets, detecting and mapping ambiences (P. Smith, 2010, p.104). With the added objective of locating ambiences within the city, the drifting practice focuses on small groups of people who, for a limited time (maximum of one day), let themselves be carried through the city by their subjective sensations and preferences (Wood, 2010). Since its first uses and articulation in Guy Debord's Theory of the Dérive (1958), its use has ceased to be context-dependent, used in various ways in the academic and artistic world.

That is the case in the contemporary artwork of A.E. Souzis, who uses his art projects as an example of creating environments in modern psychogeography (Souzis, 2015). For example, by creating Temporary Autonomous Zones in which mobile phones cannot be used, he encourages individual reflection on the (over)use of the phone when walking, thinking, and interacting with other people (Souzis, 2015). Utilising these new ways of relating with space is an explicit psychogeography learning that can be easily implemented in Google Maps research, similar to what Souzis made to criticise excessive smartphone use (2015).

Similarly, Smith reflects on the successive deaths and resurrections of psychogeography, collecting current examples of "detournement" activities, and the modification of the normal functioning of something to critique and rethink it (P. Smith, 2010). Some of the most interesting ones try to dismantle the tourist gaze (Urry & Larsen, 2011) through misguided or missed opportunities guides, in which the reader is challenged to walk around and get to know unknown city areas. However, this approach needs to recognise the modern acceptance of the tourist gaze as its own when it comes to consuming cities (Urry & Larsen, 2011), whether they are tourists or local citizens. As we already established, historic centres can only be understood by acknowledging the effects of this gaze, which directs and poses changes to our urban fabric and how we interact with it.

Noora Pyyry currently delves into the new empiricist posthuman research, giving up on systematicity and using the dérive and photo-walks as a tool focused on the journey, not the results (Pyyry, 2019). His photo walk through Vilanova de Gertrus only follows the noises of the city and the youth of the groups that produce it, using hangingout-knowing. Data creation is, thus, secondary to the researcher's purpose. Similarly, Pyyry also researches the urban environment by searching for what Jane Bennet defines as enchantment, events of simultaneous immersion and disconnect with the world (Pyyry, 2016).

lain Sinclair (2003), sometimes referred to as the last Situationist, reflects in one of his most famous essays, London Orbital, his acoustic walk along the M25, which should lead to nothing and runs through the outskirts of London. Through this, the author underpins reflections on Britain's economic and political state, mainly concerning real estate speculation and the industrial heritage in Greater London (Sinclair, 2003).

One of the criticisms of situationist theory is the lack of reflection on one's responses after interacting with the atmosphere (Bridger, 2014). The dérive, at its core,

benefits from having prior knowledge and a certain level of introspection. However, situationists have no reflexivity about the existence of prior opinions, expectations, and experiences that interfere with drifting and observed environments. In that case, the dérive can shift from a playful wander to an influenced one. Ultimately, as Bridger does for the city of Manchester (2014), if the subject and object of the drift are the researchers themselves, the practice requires an autoethnographic component to reduce these possible methodological interferences (Bridger, 2014).

As we have seen from recent interventions, the psychogeography package of tools is no longer utilised against the excessive all-mighty planner. Nevertheless, it has been relevant because another all-mighty actor took the spotlight. During this literature review and the rest of this thesis, we argue that technology and, more critically, the intense worldwide use of the smartphone has made the Situationist premises more relevant than ever.

#### Smartphones and the walk.

The number of smartphones has increased significantly over the last five years, with the latest estimates identifying a penetration rate of 75% of the global population (GSMA, 2022). Despite geographical variations, most people can access and use these devices daily (GSMA, 2022). The literature on mobile phones concerns this widespread usage in many ways from various disciplines. An exciting field of study for this thesis focuses on the risks of distracted walking and the implications for public road safety. This research commonly relies on observation at intersections (Basch et al., 2014), where the risk of fatalities is considered most significant. In doing so, the focus is on generic phone use, with limited attempts to differentiate use.

Mwakalonge et al. (2015) provide an analysis of the public policies put in place to combat this risk of distraction, the examples being mainly awareness campaigns. The review produced by these authors in 2015 has aged poorly, focusing on calls or listening to music as the key factors (Mwakalonge et al., 2015). However, current studies on walking behaviour in public spaces highlight looking at the phone, texting or using apps as the most frequent and distracting practices (Argin et al., 2020; Lim et al., 2017). Exciting papers are also beginning to study walking with their mobile phone in their hand without using it, a widespread practice according to the authors of a recent study in Spain (Fernández et al., 2020). This practice could be related to what is known as nomophobia (no-more-phone), the fear of disconnection from your mobile phone, which frequently becomes physical (Yildirim & Correia, 2015).

Key terms/concerns	Approaches	Example references		
Distracted walking,	Observation, policy	Mwakalonge et al.,		
intersections safety,	analysis. Proposing	2015; Lim et al., 2017;		
fatalities, smombie	solutions using your	Basch et al., 2014;		
(smartphone + zombie),	smartphone.	Kamiyama et al., 2019		
risk-management,				
innovative solutions,				
young people				
Spatial awareness,	Including lab	Plummer et al., 2015;		
dual-task interferences,	experimentation and	Yildirim & Correia,		
nomophobia	self-assessment of	2015;		
	smartphone usage			
Smombie, post-flâneur,	Observation, but with a	Argin et al., 2020;		
texting, walking-speed,	higher level of	Fernández et. al., 2020		
spatial awareness, gaze	description.			
analysis				
	Key terms/concerns Distracted walking, intersections safety, fatalities, <i>smombie</i> (smartphone + zombie), risk-management, innovative solutions, young people Spatial awareness, dual-task interferences, nomophobia Smombie, post-flâneur, texting, walking-speed, spatial awareness, gaze analysis	Key terms/concernsApproachesDistractedwalking, intersectionsObservation, policy analysis.policy analysis.fatalities,smombie solutions using yoursolutions solutions smartphone.your smartphone.risk-management, innovativesolutions, solutions, young peoplesmartphone.Spatialawareness, awareness, nomophobiaIncluding self-assessment of smartphone usageSmombie, post-flâneur, texting, walking-speed, analysisObservation, but with a higher description.		

Own elaboration based on literature review

Concerning the methodologies, this literature body often relies on observing open spaces. In their study, Argin et al. (2020) identify different practices within walking. They use a scale of smartphone usage that ranges from the post-flâneurs (a person who interacts with the digital and real-world in equal measure, revelling in the augmented experience) to the smombie (a play on words used in this branch of research that refers to smartphone and zombie; Argin et al., 2020). The study identifies phone usage for navigation purposes, concluding that this practice is among the least distracting. They explain that most people observed need to stop to read a map and then look around for indications to know if they are indeed going in the right direction. However, Argin et al. (2020) and this body of literature do not draw any conclusions about individuals' spatial knowledge, focusing only on the degree of distraction during walking.

#### Google Maps and the city.

Finally, we address the elephant in the room: How do the different bodies of literature and authors deal with the implications of extensive/daily use of Google Maps? What are the academic priorities when researching satellite and algorithmic navigation, GPS, and other ways of naming this phenomenon? A systematic review of the literature available confirms that the study of navigation applications such as Google Maps is varied and nascent. Nonetheless, most papers we will discuss in this part of the literature review have been produced in the last 10 years, many in the last couple of years. It is essential to understand that, even if some of them are not addressing Google Maps directly, the success of this application and its extensive worldwide use is the catalyst behind the flourishing of this interesting academic topic.

The priorities, however, have shifted as Google Maps became a more prominent application. Studies on the geography of information (Graham et al., 2015) sustain many of the technological concerns that have proven to be a basis of the literature. According to Graham et al. (2015), the geographies of information refer to the geographic distribution and characteristics of information, either as a standalone phenomenon or as a representation of underlying processes (Graham et al., 2015). It involves studying the spatial differences in access, production, use, and representation of information, as well as examining the power dynamics and control over what information is made visible or invisible in different geographic contexts (Dibazar & Naeff, 2023; Graham et al., 2015). During the past decade, Google Maps has been increasing the coverage of the world. However, these concerns are still relevant everywhere, as there are unanswered questions about how Google produces and publishes data. Excitingly, Graham et al. use OpenStreetMaps (one of Google's biggest competitors focusing on the co-creation of maps with its users) to prove global data production inequalities. It would be interesting to see in which way Google Maps' private efforts follow this conclusion, mainly when talking about unregistered areas such as the Brazilian Favelas and how mapping these areas may have positive and negative consequences (Dibazar & Naeff, 2023)

The use of Google Maps primarily concerns scholars that study the field of spatial knowledge and cognition. Early studies, such as Parush et al. (2007), were concerned with the potential negative consequence of relying too heavily on automated systems, such as navigation aids, which can result in users becoming "mindless" of their surroundings and neglecting the development of essential spatial knowledge. According to the authors, this could make individuals, particularly users for whom wayfinding is a critical and frequent part of their duties (f.ex., taxi, bus, or truck drivers), less equipped to effectively navigate when the automated system fails or encounters errors (Parush et al., 2007). In their virtual study, a method that we will see is very used in cognitive studies of navigation, they were able to identify that continuous position indication can improve wayfinding performance, but they needed to prove the effect on long-term spatial knowledge. Another study, nonetheless, checked this on 50 regular drivers for three years, arguing that individuals with greater GPS habits exhibited reduced use of spatial memory strategies, decreased cognitive abilities and difficulty in learning navigational information (Dahmani & Bohbot, 2020).

However, this concern has only been amplified as Google Maps became more used, shifting towards the consequences of a more multimodal use of Google Maps, particularly considering the effects of walking. A fascinating study conducted in Vienna by Gartner and Hiller (2009) studied the impact of the display size by testing with 30 participants the differences between navigating the city with a paper map and the exact same map displayed on a smaller device (smartphone). After the route, they were asked to perform tasks to evaluate their orientation, confirming that display size influences spatial knowledge acquisition and the ability to orientate and navigate unfamiliar areas (Gartner & Hiller, 2009). The authors recognised the need for further research on how the maps are presented (media) and other forms of aid, as they could affect spatial acquisition similarly.

Answering the previous question, multiple authors have researched the effects on spatial knowledge acquisition of navigation aids. A real-world study in the city of Salzburg confronted three navigation prototypes developed for this research aimed to reduce pedestrians' cognitive workload during wayfinding (Gardony et al., 2013; Huang et al., 2012; McMahon et al., 2015). The mobile map-based interface used egocentric map views, the AR-based interface used view-based live camera pictures with overlays, and the voice-based interface provided "turn right/left" like instructions (Huang et al., 2012). However, to the researchers' surprise, there were no significant differences in spatial knowledge acquisitions, with very comparable poor results for the three prototypes. The fact that no clear advantage emerged supports the "divided attention argument" that suggests that the use of navigation aids impairs spatial memory due to divided attention between navigation and processing the information (Huang et al., 2012). Gardony et al. (2013) reinforce this argument in their studies by showing, in a virtual environment, that the group with aid (verbal and tonal) initially showed a better path efficiency but a significantly worse spatial memory than the control group. However, augmented reality navigation aid has been proven functionally more effective than regular maps (paper map and Google Maps) on adults with intellectual disabilities (McMahon et al., 2015), which opens new research possibilities on how aids affect spatial mental maps.

Similarly, some studies have tried to improve and change the conditions of the information displayed on the map. Following a videogame approach, some authors have compared three types of maps, one of them being a custom map with directional information for off-screen landmark locations (A. D. Smith et al., 2022). In this way, they have proved that landmark persistence, or the consistent representation and updating of a symbol that represents a given landmark, benefits orientation judgement compared to a static map or Google Maps (A. D. Smith et al., 2022). In a similar videogame-like approach, one of the most extensive studies conducted in wayfinding created a videogame to test hundreds of thousands of people's wayfinding skills to compare them with real-life later, showing that correctly curated virtual environments could be used to properly study people's wayfinding skills (Coutrot et al., 2019).

Another of these virtual studies also utilised eye-tracking technology to study the effects of GPS-guided navigation on spatial knowledge and wayfinding abilities (Hejtmánek et al., 2018). A virtual location was curated, with fake names and a map with a plotted navigation path, so people were asked to follow the trail and learn about the environment. After 90 minutes, they were asked to draw the route on a map and fill in the location and landmarks they remembered (Hejtmánek et al., 2018). The eye-tracking novelty showed a negative relationship between participants' time looking at the maps and their spatial knowledge accuracy. They were less capable of representing and recalling spatial information (Hejtmánek et al., 2018). This information sustains the argument that utilising Google Maps affects our navigation skills and spatial memory, one of the primary concerns of the literature.

Toru Ishikawa's work has been pushing the boundaries of navigation studies and spatial cognition, being one of the leading worldwide experts on the topic (Ishikawa, 2019; Ishikawa & Nakamura, 2012; Ruginski et al., 2022). His work explores the

relationship between the experience of using different navigation tools and performance in wayfinding and spatial orientation tasks. Using a set of diverse methods throughout his career (virtual and real-world experiments included, with a clear focus on the latter), this author has effectively proven that the use of navigation tools such as Google Maps has adverse effects on spatial memory, as well as potentially reducing the individual wayfinding skills of long-term users (Ishikawa, 2019). One of his last co-written studies with 50 regular drivers with different levels of GPS usage found that individuals with greater GPS habits exhibited reduced use of spatial memory strategies, decreased cognitive abilities and difficulty in learning navigational information (Ishikawa, 2019). Some of his research utilises self-report questionnaires and real-world navigation tasks to investigate this relationship, which he and his colleagues have also shown in a similar experiment in Tokyo with 250 survey participants and 70 participants that followed GPSguided and paper-maps routes (Ishikawa, 2019). Ishikawa and his peers are perfect examples of how real-life experiments must be implemented to guarantee results, not only as measurable ones but also to produce reflexivity among participants (Ishikawa, 2019).

We can see a broader interest in navigation tools use and measuring real-world environments. The recent paper by Savino et al. (2021) changed how research has been done by addressing a widespread issue. Mobile map applications like Google Maps are widely used, but more is needed to know on how they are used in the real world (Savino et al., 2021). To research this, they were able to collect and analyse data during unsupervised usage of Google Maps, using a wrapped version that they called Map Recorder (Savino et al., 2021). And on top of that, they did it with two groups, locals and tourists. With the goal of collecting detailed and organic user behaviour, they were able to see how locals showed a higher percentage of map exploration, a tendency to search for specific places and some specific usage patterns (Savino et al., 2021). The importance of this study to this thesis is how they used the term "map-view manipulation" to refer to the actions and interactions performed by users on a mobile map application, such as panning, zooming, glancing and map loading times (Savino et al., 2021). This interaction is crucial to understand how people physically engage with these applications, as a way of digitally exploring the surroundings, and it may be behind their success.

A recent systematic review on inclusive design for mapping applications already criticises how academia has been keen to communicate that navigation tools harm the user (Ruginski et al., 2022). However, much as what happened with the premises of Virilio's dromology, we are no longer in the time to fight the use of mobile navigation applications but to help redesign it in a way that amplifies the users' navigations skills (Brügger et al., 2016, 2018; Thrash et al., 2019), building on their personal preferences and on the way they perceive environmental information, which is multimodal and effectively redundant (Ruginski et al., 2022). Even though there are ways of addressing navigation systems, mainly visually and verbally, the researchers are confident that "the area is ripe for future research from an individual perspective" (Ruginski et al., 2022). Some conclusions are already taken from this research on the design, one of them avoiding visual clustering and non-essential information, which is something previous research supports (Ruginski et al., 2022).

Research has highlighted the imperative to enhance navigation applications, exemplified by the ubiquitous Google Maps, to preserve their undeniable benefits, such as convenience and security, while mitigating potential adverse consequences (Brügger et al., 2016). These applications have undeniably revolutionised how we navigate our world, making unfamiliar terrains accessible and guiding us with a sense of assurance. However, it is time to produce new forms of using them that improve spatial awareness and knowledge. Brügger has been a prominent researcher striking to improve navigation systems, most of the time by employing new methods to empirically test potential changes (Brügger et al., 2016, 2018, 2019). Similarly to what Kamiyama et al. (2019) has tried within the literature of distracted walking, her research is extraordinarily relevant to this thesis, as it has opened a window to reconsider using Google Maps.

However, one of the gaps in the literature on Google Maps that we hope to help tackle is actively including the users in the conversation, generating reflexivity as a first step towards improving navigation systems. Little to no research has utilised people's opinions on navigational systems. Speake and Axon (2012) produce one of these rare examples by interviewing geography students to know their opinions on how satellite navigation affected their spatial awareness, producing some reflexivity. They also suggest exploring attitudes towards using "Sat Nav" is essential for cartographic and geographic communities. The article highlights the need to understand the changing perspectives on wayfinding, navigation, and map design in the context of increasing reliance on navigation technologies (Speake & Axon, 2012). Another paper from a different discipline analysed social media (Reddit) comments on using Google Maps (Kanchev & Chopra, 2015) with few practical conclusions.

#### Atmoculture and algorithmic navigations.

Another extra step that recent studies have shown is how algorithms affect how we navigate the city. The relationship between spatial awareness and navigation exists, but this research explores new topics. The term coined by Andrea M. Brighenti and Andrea Pavoni (2021) as atmoculture reflects the role of algorithmic urban navigation in interacting with city atmospheres. In this way, it adds to atmosphere theory the "fog of data" (Brighenti & Pavoni, 2021, p.12), understood as the insurmountable amount of information processed by these applications. By exploring atmospheres, spaces and trajectology through algorithmic urban navigation, Brighenti and Pavoni (2021) indirectly reflect on how everyday practices need to be addressed from the hybrid space framework developed by De Souza E Silva (2006).

Despite taking Virilio's dromology as an essential premise, atmoculture reflects on the trade-off between smartphone reliance and the safety and convenience of using these applications. Thus, in the words of these authors, the fact that urban mobility apps are expressly designed to increase efficiency and amplify the subjective feeling of dominating space provokes a series of paradoxes within atmoculture (Brighenti & Pavoni, 2021, p.3). Firstly, helping navigate the city and complex urban life hinders people from doing it alone. Secondly, considering thousands of invisible things (algorithmic processing of very different data) makes spatial awareness irrelevant for the user.

Atmoculture explicitly states that anxious spaces characterise today's cities and how algorithmic mobility does not solve these dynamics despite promising (and to some extent, achieving) greater convenience of mobility (Brighenti & Pavoni, 2021, p. 14). Thus, we propose adding the conceptions of spatial awareness to the study of Google Maps-assisted walking. Time and space have been primarily studied within what is known as everyday life practices. In a very intuitive way, the limited nature of available time means its efficient use is essential (Shove et al., 2012, pp. 92-95). There is a conflicting relationship between our time and the number of practices we can carry out, which provokes the need to prioritise. This limitation of existence causes us to run when we are late for a meeting and characterises us as unique with each decision we make. This conflicting and competitive view of time (Shove et al., 2012) would be linked to the walk with a goal, direction, and purpose. At the same time, the vision of time as something created by our practices would correspond more to the walk as leisure and enjoyment.

The concept of atmoculture ties this literature review together, including elements of all the topics we have researched. As we have been able to see, the traditional process of walking and particularly spontaneity has changed in the last decades, mainly through three events. Firstly, the post-II-Word War capitalism boom, exemplified by the extensive power held by the urban planner with the vision of restructuring the city at any cost, resulted in the Situationist International and their revolutionary artistic practices to recover spontaneity. On top of that, there was a boom of overconsumption that led to the development of novel consumption patterns, such as conspicuous consumption, that altered how people interacted with space by transforming it into a commodity. Second, the rise of the network society, which extensively amplified the role of speed in our society, exemplified in the literature by the mobility turn and, in so, establishing the perfect conditions for the next step. Finally, the appearance and consolidation of the smartphone that has been proven to profoundly change society in so many ways, making it difficult, arguably impossible, to do even the simplest of tasks without its help. This literature review will sustain the decisions made in the methods, as we will see later.

### **Chapter III – Research Methodology**

This methodology section outlines the systematic approach and techniques used to gather and analyse data to study the perceptions and perspectives of young and international users of Google Maps. We have used a mixed methods approach that utilises various tools to study this. Firstly, a small quantitative survey was conducted to collect data on the frequency and use of Google Maps. As a next step, we selected the perceived neighbourhood of La Latina to conduct a real-life experiment to challenge the navigation skills of our participants. To successfully execute a set of walking tours, we identified different landmarks in the area, categorising them by relevance. The tours introduced two types of dynamic: the guided walk, in which participants had to follow Google Maps to a tee, and secondly, the dérive walk, in which participants were asked to wander through the same area, inviting them to get lost in the process. The dynamics will be further explained later; however, participants were asked to respond to questions and use photography to document parts of their walk. Finally, after each walking tour, a focus group was conducted to gather in-depth feedback and insights from participants on their experiences using Google Maps and their perceptions and attitudes towards the city.

This rich approach responded to one particular objective of this thesis: to validate different real-life methods of producing information on navigation systems. Virtual methods, extended in this field, were unavailable and discarded for this research. The methods were carefully curated to produce reflexivity in the participants and incorporate their opinions into research, something that we have seen as a particular gap in the literature.

#### Preliminary survey – Using Google Maps

Early in the process, we decided that conducting a quantitative survey before our qualitative study provided several benefits. This procedure is used in Google Maps research, as it informs the rest of the methods, including a preliminary understanding and establishing a baseline for comparison. In our case, we had an added benefit in mind. As noted by Creswell and Plano Clark (2017), conducting a quantitative survey prior to a qualitative study can help to identify potential participants based on their responses to the survey questions. This can be particularly useful in identifying participants with diverse experiences and perspectives and identifying potential cases or situations that may be of interest for further exploration in the qualitative phase. Thus, a preliminary survey was particularly important for our research, considering the nature of the following steps, which needed involved participants.

Thus, the survey aimed to gather information on how and why international students use Google Maps and if they think their perceptions of Madrid have changed from using it, among others. Likert scales, multiple-choice, and open-ended questions were used to respond to these queries. We organised the survey into three sections:

Basic Information, Distracted Walking and Google Maps. A summary of the questions can be seen in the provided online annex. The different questions tried to respond to literature or information understood as crucial for the success of this research. Particularly in the distracted walking literature, there is a tendency to undervalue the importance of Google Maps and other navigation applications (Argin et al., 2020), which we wanted to check throughout the research.

Different social media channels (Facebook and WhatsApp groups) were used to recruit participants. On top of that, we contacted some organisations devoted to Erasmus students. Despite these efforts to guarantee a broader audience, with a set goal of 50 to 100 participants, difficulties have impeded to achieve that number of respondents, as we will see in the analysis and results sections. Nonetheless, the survey's primary purpose has still been achieved: to obtain precise information about Google Maps users to enrich the rest of the methods used in this research. Some estimate 40 thousand international students come to Madrid yearly, which makes representativity entirely out of the reach of this thesis. However, as we will see later, the results still show some interesting trends.

#### Experimental walks – A multiple methods approach.

This thesis has always aimed to conduct a real-life experiment creatively exploring the differences between navigating the city with and without Google Maps' constant mediation. The psychogeography premises were particularly relevant. Initially, the aim was to carry out a strict dérive, as originally envisaged by Debord. However, the reality is that the tools that Debord and the rest of the Situationist International left as a legacy have diversified over the years, demonstrating a vast number of variants that particularly suit the research needs. Because of that, we decide to adapt the classical dérive to our needs, including other aspects, to guarantee more suitable data collection. We understand and acknowledge that the walk that resulted without the mediation of Google Maps would not strictly classify to what research understand under dérive. However, we will use the term in the following parts of this thesis to simplify its description.

We must differentiate between primary and complementary methods to understand how the walks were implemented. The distinction is easily comprehensible, as the primary method can be understood independently, while the complementary method expands on the data collected during this one. What this means to our research is that the walk and the focus group are our primary methods. At the same time, messages interaction, photography, and memory maps complement and expand on the previously mentioned ones.

#### Preparing the walks - Google Maps vs. Dérive

As we have seen in the literature review, one of the big problems in developing a method to study how Google Maps is used is how to generate a situation equivalent to everyday life. If we add that this research aims to make a comparison with a dérive, the complexity is even greater. Some studies have proven that giving complete freedom to

the participant and recording real-life use for extended periods is a successful strategy (Savino et al., 2021). A fruitful comparison is also possible by utilising virtual environments, in which the variables are carefully curated to guarantee that different types of walks are comparable. However, the project's length and the technical software needed to implement these two possibilities made this impossible for this research.

Faced with these challenges, we devised an original method that mimicked reallife usage of Google Maps and could still be implemented for the dérives. This was done by providing destinations and time scarcity. On top of that, we introduced a third variable to explore how Google Maps can be improved to ensure greater spatial awareness. Once the walks were conducted and before starting the focus group, participants were asked to draw the route they followed as they remembered it, similar to what Hejtmánek et al. (2018) did in a virtual study.

#### Destination and time scarcity - La Latina and the landmarks

To begin with, organising the walks, we identified the need to select an area that was dense, liveable, and interesting and presented a challenging street grid. The perceived neighbourhood of La Latina, located in the heart of Madrid, adjacent to other areas of great tourist interest such as Austrias, Sol-Gran Vía, Lavapiés and Madrid Río, perfectly responded to all these needs. Its streets of medieval origin are primarily irregular and narrow leading to squares. Many of these streets were located outside the walls that delimited the inner city, on the outskirts of the old medieval Madrid, serving as lodgings for many merchants who came to the city to sell their goods. This commercial tradition has given its name to many streets and squares, such as the Plaza de la Cebada, where the market was once held, the Plaza de los Carros, the Plaza de la Paja and the Rastro itself, the city's most famous open-air market.

The municipality has identified this neighbourhood in its latest Touristic Areas Map (Figure 2). It is renowned for its vibrancy and multiculturality, as well as a strong local identity, that has drawn interest from researchers such as Aramayona Quintana and Batel (2022). These authors studied how moral ownership and 'belonging narratives' around places legitimise or contest urban changes, identifying La Latina as a powerful example of their argument.

Inspired by the rich literature on wayfinding that identify landmarks as crucial elements to build spatial knowledge, mainly the classic written by David Lynch and a more recent study conducted by Ishikawa and Nakamura (2012), we decided to use this type of spatial signifiers to guide our walks. We then identified the different landmarks by significance, using the number of reviews and average evaluation on Google Maps. The result was three levels of significance that are self-explanatory: Must-see, Intermediate and Unusual/Niche. We chose 21 landmarks in the study area, with the corresponding coordinates and a short description. To facilitate the later search in Google Maps, we included Plus Codes, a shorter and more manageable version of coordinates with full coverage in the Google Maps platform.





Following the rule of small groups to conduct a dérive (P. Smith, 2010, p.104), we decided that every walk would have four participants. Thus, the next step was creating four routes, each uniquely connecting five landmarks. To do so, we decided to use one Must-see, two Intermediates and two Unusual landmarks per route and limit the walk experience to approximately 25 minutes. To create time scarcity without making the walk impossible, connecting the different landmarks in a route following Google Maps had to be within less than a 5-minute margin. To avoid participants walking in the same direction, considering that the walk started simultaneously in the exact location (Plaza de la Cebada), a different first spot was selected for each of them. Because of these adjustments, only 15 landmarks were selected for the routes, as shown in Table 2 and Map 1.

	Landmarks	Significance	Time
Route A	Plaza del General Vara de Rey (South) Calle de la Cava Baja Museo de San Isidro (Plaza de la Paja) Remains of the Christian Wall Calle de Calatrava	Intermediate Intermediate Must-see Unusual Unusual	23 minutes
Route B	Plaza de la Cruz Verde (North) Viaducto de Segovia Royal Academy of Engineering Calle de la Cava Baja Mural JM Yes	Intermediate Must-see Unusual Intermediate Unusual	22 minutes
Route C	Real Congregación de San Isidro (North-East) Casa Lucio (Restaurant) Mural JM Yes Iglesia de San Pedro el Viejo Capilla de San Manu Letrán	Must-see Intermediate Unusual Intermediate Unusual	21 minutes
Route D	Real Basílica de San Francisco (South-West) Remains of the Christian wall Calle de la Cava Baja Calle de Calatrava Iglesia Virgen de la Paloma	Must-see Unusual Intermediate Unusual Intermediate	23 minutes

**Table 2.** Routes and landmarks used for the experimental walks

Own elaboration

#### The third variable – Tentative improvement of spatial awareness

Once the routes and landmarks were determined, we introduced two ways of recollecting data that could simultaneously provide an excuse for the participant to be more aware of their surroundings. The first one was the use of photography. As we have seen with Pyyry's (2019) psychogeography research, photography walks tend to produce a more substantial relation with the environment. The mind is focused on identifying potential scenes worthy of capture (Pyyry, 2019). However, we also did not want to completely transform this experiment into a photo-walk, as it was still crucial to create reflection within their participants about their navigation strategies and the way Google Maps (also the lack off) made them feel. To do so, we decided to limit the number of photos to only 5 per participant, with the advantage of better showing the individual's preferences. Participants were asked to take photos with their smartphones, thus, creating a potential real-life scenario if this practice was a relevant improvement to Google Maps.





On top of that, being a self-determined walk without supervision, one of the risks was for people to forget about their experiences. Because of that, we devised a message strategy that asked a couple of questions at every 5-minute mark, as we can see from Table 3.

		g the experimenta				
	5 minutes	10 minutes*	15 minutes	20 minu	tes*	25 minutes
Questions	Your approx description of How are you A word or 2 t	ximate location f surroundings) feeling? hat describes the	(landmark, walk experier	street, or nce until now	short	Last thoughts on the experience.

Table 3. Messages sent during the experimental walks

\* After the first experimental walk (GM I), messages were no longer sent in the 10- and 20-minutes mark.

#### Own elaboration

By asking these short questions, we guaranteed that we had live data of the walk, which was particularly helpful in locating users and tracking their experiences and feelings. At the same time, it creates a forced moment of being aware of their surroundings, looking for the location and introspectively evaluating their mind. The messages were sent via Signal, a free, privacy-focused messaging and voice talk app, to create a similar real-life scenario again and to minimise data protection issues. After conducting the first walk, participants stated that the 5-minute mark was too tight, thus changing it to three messages for the rest of the walks (at 5, 15 and 25 minutes).

#### Spatial memory – Mapping the route, remembered vs real.

The last preparation was to develop a way to evaluate how spatial cognition, particularly spatial memory, was affected by the different walks. Following examples in the literature, particularly Hejtmánek et al. (2018), we created a map without any information for the participants to draw their respective routes from memory, as seen in Image 1. Considering that Hejtmánek et al. were working in a virtual environment that already tracked the actual route (2018), we had to come up with another way of comparing the differences between remembered and real. We asked the participants to track their walks through recording apps such as Strava, a tool used by runners and cyclists to have the exact locations of their routes. Some of them also utilised Google Maps, which was an exciting finding. In general, we were able to successfully track the walk from 12 out of the 16 participants due to some technical issues in some of the participants. As we will see later, this significantly enriched the analysis's discussion about spatial memory and navigation strategies.



#### Image 1. Silent map of the area of study given to the participants

Silent Map of the area of study. References of Main Metro Stations. Created by author with Snazzy Maps. Own elaboration with Snazzy Maps.

#### A destination-based dérive? – Changes to the classical tool

The only difference between the dérive and the mediated walk is that participants were forbidden to use Google Maps to locate themselves. Testing time scarcity, spatial awareness, and memory were crucial for a rich comparison. But what about the landmarks? Despite dérives being traditionally aimless, we kept the landmarks and the identified routes to direct the intention of the walk and, in doing so, incorporated a unique variable for this group. Wandering without a goal is, people, would argue, a pleasant activity or at least an unusual one. We utilised landmarks to create destination anxiety, which would align with daily life and sparkle reflections more than Google Maps. Needing to be at a location makes time crucial for the Google Maps user. Thus, without providing destinations, time would have become less critical.

We define destination anxiety as the anxious consequences of the fear of not having to go anywhere and of not reaching a particular destination. Implementing it would also help us understand if people could devise alternative navigation strategies to locate places without using Google Maps. To keep the positives of a mindless walk, we clarify that the landmarks were there only as guidance and that locating all the spots was not crucial for the experiment's success. However, as we will see later in the analysis, the dérive participants considered it challenging to locate all the places, showing that the destination anxiety was successfully created and producing exciting reflections from the users.
# Self-reflexivity – Trying the methods before implementing them.

Self-reflexivity in research is essential because it allows researchers to critically examine their own biases, assumptions, and positionality in the research process. It involves reflecting on one's role and influence in shaping the research design, data collection, analysis, and interpretation. This implies many things in research; however, from the most straightforward and most understandable point of view, we took it as a chance to achieve a higher level of introspection with our methods (Finlay, 2002). To do so, we wanted to ensure that the complex methodology was still understandable and explore how we would do this experiment, particularly in the case of the dérive.

We conducted a one-person dérive and explored the area of La Latina ourselves for an extended period (45 minutes). The previous knowledge of the area was completely different because of how closely we researched it to locate the landmarks. However, the feeling was similar: having a couple of destinations to see but not using Google Maps to find them. Photos were taken during the walk, and interestingly, lots of them were of different types of street signage, making it clear that signs were vital when feeling lost. At the same time, the area proved to be vibrant and spontaneous encounters happened quickly. Per our field notes, we interacted with kids playing hide and seek near Jardin del Principe de Anglona and watched people talking in bars, among others.



Image 2. Iglesia de San Pedro el Viejo. Steeple and back of the building.

Authors photos

During our walk, we encountered previously unidentified landmarks, such as Calle Calatrava, that made it to the final selection because of their aesthetical characteristics. Similarly, the Iglesia of San Pedro el Viejo was added to the final routes (Image 2). Even if it is a smaller church with less repercussion in the area, its steeple's prominence made

it stand out as a landmark. In summary, besides visiting the already identified landmarks, this self-reflective experiment showed that we needed to explore the field to guarantee that we were not missing "hidden gems". We were open to including these based on our subjective experience in the walk, which does not affect the selection quality but consciously corrected our previous decisions.

Finally, after the walk, we did the same experiment of drawing the walk by memory to compare it with the actual route later. As shown in Image 3, considering that we had previously seen the area, we realised the task was challenging. We got mixed feelings because of the mistakes, but it produced a self-reflection on our extensive use of Google Maps and how it affected our navigation skills. Thus, we experienced how the methods were particularly effective at making people reflect on their usage of navigation applications.



Image 3. Differences between remembered and real walk - Researcher test

Authors' image

# The walks and the focus group

The following table (Table 4) summarises the organisation of the different groups. We ended up doing four walks, two of each type. To guarantee the anonymity of the participants, new names were given to them. As a gesture to the city in which we are conducting the experiment and the study, all the names are among the most common in Spain.

	Date	Walk	Participants	Focus Group
Google Maps I (GM I)	19th May 2023	10:50 – 11:15	Clara, Lea, Alba, Rocío	11:30 – 13:00
Dérive I (D I)	19th May 2023	17:20 – 17:45	Álex, Manu, Isabel, Pilar	18:00 – 19:30
Google Maps II (GM II)	22nd May 2023	10:45 – 11:10	Dani, Iván, María, Sara	11:30 – 13:00
Dérive II (D II)	16th June 2023	17:15 – 17:40	Teo, Paco, Elena, Teresa	18:00 – 19>30

Own elaboration

On the day of the walk, participants were given clear instructions on a little flyer that provided them with their unique landmarks and space to take notes, as seen in Image 5. The landmarks were identified and located using the previously introduced Plus Codes, a shorter coordinates code implemented by Google Maps. Image 4 shows an example of the interaction during the walk, with previously curated messages sent every 5 minutes in the first walk or three times in the rest of the cases.

**Image 4.** Example of exchange of messages during the walk – 5- and 10-minute mark, participant Clara (GM I)



Authors' image with permission from participant Clara



Image 5. Example of flyer given to the participants - Rules, places and space for notes

Authors' image

# The focus group – A space for reflection

After every walk, the focus group was immediately conducted in Corrala de la Autónoma, a historic "corrala" on Carlos Arniches Street owned by the Universidad Autónoma de Madrid, hosting the Museum of Arts and Popular Traditions. The space (Image 5) was reserved for the duration of the focus groups to guarantee that there were no interruptions and that the recordings were of high quality. In qualitative research, Kitzinger (1995) introduces the focus group methodology and emphasises that focus groups can encourage participation from individuals who may feel reluctant to be interviewed individually or feel they have nothing to say. Even if they do not provide a precise minimum length, focus groups tend to be between 60 and 90 minutes long, and we followed this approach. Regarding the number of questions, we decided to have three probe questions as an introduction to the main topics we were interested in and a couple of following questions for each topic in case the discussion did not flow. A schematic of the questions can be found in Table 5.

During the focus groups, we took notes to ensure that unspoken information was recovered. We needed our biases not to be evident, which in this case, meant avoiding showing any preference for a specific navigation strategy. We struck a balance between letting people freely speak, coming up with interesting topics, and guaranteeing that the three main questions were answered. Each focus group was transcribed and analysed with coding software MAXQDA, searching for common themes. As we will see later in the analysis, this produced a healthy conversation and exchange of ideas.

	Content
Initial questions (Q0)	Short explanation of the research and warming-up questions
Example of follow-up questions	<ul> <li>I would like to start with each of you shortly recapping your walk. Briefly, try to explain how your walk was, the feelings that produced on you and a potential early reflection on your use of Google Maps\</li> <li>You took some photos. Could you please select one and tell me why you took it?</li> </ul>
Question 1 (Q1)	How does using Google Maps influence your sense of place and personal experience as a walker?
Example of follow-up questions	<ul> <li>Does Google Maps limit or enhance your ability to discover hidden aspects of the city?</li> <li>Have you noticed any changes in your personal exploration and discovery while using Google Maps?</li> </ul>
Question 2 (Q2)	Were you surprised by anything during your walk? Did someone or something got your sudden attention?
Example of follow-up questions	<ul> <li>Do you feel a sense of connection or detachment from the environment?</li> <li>What other things, apart from the landmarks, did you notice during the walk?</li> </ul>
Question 3 (Q3)	After doing the experiment and talking for a bit, what are your general thoughts on using Google Maps and other navigation tools? *

#### Table 5. Probe questions and examples of follow-up questions

\* For Q3, no follow-up questions were prepared, giving complete freedom for conversation to start. Own elaboration

In developing our mixed methods approach, we aimed to study how people use Google Maps and actively involve them in the research process. This diverse methodology was chosen to thoroughly examine the topic and gain a well-rounded insight into how individuals interact with Google Maps. By utilising research reflexivity, as evidenced by our involvement in the experimental walk to intimately experience the process first-hand, we got a better picture of the method and the potential results. This process enriched our methodology significantly.



Image 6. Space used to conduct the focus groups – Corrala de la Autónoma.

Author s' image

# **Chapter IV – Research Findings & Results**

# Initial Survey – Preliminary findings

Although the number of participants is limited, the initial survey shows some exciting perspectives regarding using Google Maps. With 27 responses, representativity was not the focus. However, it serves as an initial introduction to the topic. We will analyse some of the most relevant questions related to four main themes: usage, spatial awareness, feelings, and experiences with Google Maps.

### Usage – A smartphone love-story

Most initial survey questions aimed to clarify certain aspects of the participants' daily use. Questions 6 and 9 sought to discern the importance of Google Maps and other navigation apps compared to other smartphone activities. A significant 73.1% of the participants acknowledged using their smartphones always or often while walking. These data demonstrate that smartphone usage has become a reality in our generation. Only two individuals responded that they do not usually use their phones while walking, which accounts for 7.7% of the respondents. However, what is particularly interesting is how the smartphone is used. Question 9, which immediately follows question 6 (excluding those who answered "Never," 0 participants), employs a Likert scale to observe the activities that participants engage most frequently with their phones while walking. Figure 4 confirms certain prevailing notions in the literature on distracted walking (Argin et al., 2020; Basch et al., 2014; Fernández et al., 2020), as we will see later in the discussion.



**Figure 3.** Survey Results – Q6. How often do you use your smartphone when walking around the city?

Own elaboration based on survey results

Despite the limited data, the results show three clear winners regarding the majority usage: listening to music or podcasts, sending messages, and using navigation apps to navigate the city. However, there are apparent differences in how the responses are distributed for these three options. While listening to music is the option that most people rate as a 5, the difference is minimal compared to Google Maps. In contrast, the rest of the responses are distributed almost evenly across the scale. This indicates that for those who enjoy listening to music or using these apps, it is essential to do so while walking, but it depends on a pre-existing interest. On the other hand, the use of Google Maps is universal. In addition to being the second highest rated with a 5 (34.6%), the remaining 63.4% fall within the other top levels of the scale. Everyone uses Google Maps with at least some frequency, which is unique compared to the other options.

	1	2	3	4	5
Music/Podcast	15,4%	19,2%	15,4%	11,5%	38,5%
Messaging	3,8%	26,9%	19,2%	26,9%	23,1%
Calling	50%	15,4%	26,9%	7,7%	0%
Social Media	34,6%	26,9%	15,4%	15,4%	7,7%
Watching video	92,3%	0%	3,8%	3,8%	0%
Orientation (Maps, etc.)	0%	0%	23,1%	42,3%	34,6%
Reading	80,8%	19,2%	0%	0%	0%
Holding it	30,8%	11,5%	19,2%	30,8%	7,7%

**Figure 4.** Survey results – Q9. How does the use of Google Maps make you feel?

Darker colours signify higher proportions. Gradients and shading on figures are for illustration and visualisation purposes and do not

reflect statistical significance.

Own elaboration based on survey results

This is hugely significant, as currently, navigation apps are considered less relevant in the distracted walking literature, either as less frequent practice or one that affects the user's distraction less. These results should be replicated in a survey with more participants. However, these preliminary data demonstrate that the use of Google Maps by younger generations and, more specifically, international students is significant and requires further study. On the other hand, less frequent practices include consuming videos or reading, which makes sense given the higher level of distraction involved. Other modes of transportation might tolerate more intense phone use, but walking requires more interaction, as the literature suggests.

The data collected in the previous question align well with the following one: participants demonstrated using Google Maps daily for 42.3% of the respondents or at least several times a week for 50%. No one responds that they do not use it, consistent with the previous question. By adding the results from question 11 (Figure 5), we can conclude that most users primarily use three functionalities in Google Maps, namely Route Finder (92.3%), Public Transport Information (96.2%), and Explore/Search (92.3%). The relevance lies in how Google Maps, in a city as dependent on public transportation as Madrid, is used frequently to access information about times and transportation options. The integration of this information is the most remarkable success of Google Maps.

	I don't know this	I don't use this	I use this
Route Finder	7,7%	0%	92,3%
Public Transport Information	0%	3,8%	96,2%
Street View	3,8%	69,2%	26,9%
Local Guides	42,3%	46,2%	11,5%
Explore/Search (restaurants, shops,)	0%	7,7%	92,3%
Your Timeline	46,2%	38,5%	15,4%
Offline Maps	15,4%%	53,8%	30,8%

Figure 5. Survey results - Q11. Which Google Maps functionality do you mostly use?

Darker colours signify higher proportions. Gradients and shading on figures are for illustration and visualisation purposes and do not reflect statistical significance.

Own elaboration based on survey results

On the other hand, "Local Guides", a program initiated by Google in 2016 to encourage honest recommendations, is unknown to 42.3% of the respondents or not used by 46.2%. Similarly, 46.2% are unfamiliar with "Your Timeline", Google's option that records all your daily movements, allowing you to access and review your past locations and movements. A more in-depth study could reveal how this lack of awareness might be linked to greater or lesser concerns about Google's data usage. If we relate this to question 21, which asks whether people are concerned about data usage, the limited number of responses does not allow for significant conclusions. However, it is worth

noting that almost half of those who are concerned (6 out of 13) are individuals who do not use Your Timeline functionality, while a higher number of people who are not concerned are among those who are entirely unaware of this feature (6 out of 10).

# Awareness - Looking at your surroundings?

One of the significant concerns regarding using Google Maps is that it may negatively affect our way of navigating and exploring. This is particularly true in this study, which focuses on the difficulty of feeling engaged with the spontaneity of urban space. Therefore, understanding how respondents perceive their relationship with their surroundings using Google Maps is particularly interesting. However, questions 15 and 16, regarding how often they look at their phone and surroundings, reflect a potentially contradictory situation (Figure 6).

**Figure 6.** Survey Results – Q15&16. When walking, how often do you check your surroundings and Google Maps?



Own elaboration based on survey results

While using Google Maps, people continue to look around quite frequently (Always + Often = 65.4% of the respondents), and if we include the Sometimes option, it encompasses virtually all the responses. People perceive that despite frequently checking their phones for directions (in question 15, Often and All the time sum up

to61.5%), using Google Maps still requires a certain level of engagement with the physical context to ensure they follow the directions correctly. The results align self-perceived and observed behaviour (Argin et al., 2020), with some studies discarding navigation apps as particularly distracting.

The other aspect that awareness could affect is the ability to navigate without algorithmic assistance. In this survey, we asked users how they believe Google has affected their navigation skills. Surprisingly, we could talk about a technical tie, with opinions divided on whether it has a positive or negative effect. This can be explained by the feeling that exists, as we will see in other parts of this analysis, that Google can be used in very different ways depending on one's navigation skills and interest in being able to locate themselves in the city independently.

Finally, in this section, it is essential to observe the results of question 22 (Figure 7), where a vast majority would gladly accept an alternative option within Google Maps that allows them to be more aware of their surroundings. This indicates that there is room for proposing alternatives and improvements to the use of Google Maps, which is one of the critical questions in this study.

**Figure 7.** Survey Results – Q22. Would you like Google Maps to offer new ways of navigating the city that made you more aware of your surroundings?



Own elaboration based on survey results

# Feelings – No Anxiety, All Good

Finally, the last two sections we want to address are closely related. In the section we are currently discussing, we aim to understand how using Google Maps affects the walking experience. Therefore, question 18 is fascinating. As stated by atmoculture, the Google Map user's anxiety perception is virtually minimal, while feelings of security, control, and relaxation are very high. We are witnessing a clear trade-off, in which people consider mobility and navigating the city as practices that induce stress and anxiety, so they trade exploration and fun in exchange for feeling in control and relaxed during their commutes. At this point, it is interesting to see if anxiety is observed in participants later in the process. Atmoculture argues that using Google Maps only changes the nature of the experienced anxiety, from agoraphobia, fear of the unknown and public spaces, to

nomophobia, fear of not being able to use the phone (Brighenti & Pavoni, 2021). Some of the results of the experimental walk will show how many of the dérive participants felt frustrated and angry about not being able to locate their landmarks, as well as talking about an extreme reliance on their phones.

Additionally, users favour using Google Maps when asked how much they agree with the following statements (Figure 8). This will be corroborated later in the section dedicated to the focus groups. Participants feel that they have achieved a higher level of familiarity with the city while considering that they can explore it more efficiently and better. Apart from the widespread feeling that Google Maps has changed how they move (80.8%), other statements receive more contested responses. A clear example is the statement, "It has made me aware of my surroundings," where there is an exact distribution between Agree and Disagree. Therefore, this is a topic that requires more research, and we will explore it further in the analysis of the spoken narrative.

	Disagree	Don't know	Agree
Made my experience of the city more enjoyable	7,7%	30,8%	61,5%
Narrow down my options when exploring the city	26,9%	23,1%	50%
Allowed me to explore the city more efficiently	19,2%	3,8%	76,9%
Made me more connected with the city	30,8%	34,6%	34,6%
Allowed me to become more familiar with the city	11,5%	11,5%	76,9%
Made me less aware of my surroundings	42,3%	15,4%	42,3%
Changed the way I move around the city	0%	19,2%	80,8%
Limited spontaneous encounters in the city	26,9%	23,1%	50%

Figure 8. Survey results - Q11. Which Google Maps functionality do you mostly use?

Darker colours signify higher proportions. Gradients and shading on figures are for illustration and visualisation purposes and do not reflect statistical significance. Own elaboration based on survey results

# Experiences – Reflections, Criticism & Dependency

One of the conclusions is that many people have experiences or opinions about Google Maps. In that regard, we could select several, but we want to differentiate three types of responses to the last open-ended question. The first of these are reflections about its use, where some individuals talk about utilising points of interest to discover new areas, the possibilities offered by crowdsourcing to show them new parts or places in the city, and how useful it is for biking navigation, among others. A comment repeated a couple of times is how they prefer to use Google Maps as little as possible as a more conscious way of walking. This different use can be understood as taking ownership of the application and shaping it to the user's will and preferences. For example, the following quotes reflect this perfectly:

"Often I also look up the way but don't start the navigation, meaning I just use it to get a general idea of which direction I have to head but then tend to take the way/streets that look most inviting to me. However, this is, of course, different when I actually have to be somewhere on time."

"Overall I see Google Maps directions more as a suggestion, and very rarely will follow the route they present directly, unless I have limited time to reach my destination."

The second type of response includes specific criticisms about generic issues such as connectivity problems, unclear navigation in certain areas (e.g., crossings or roundabouts), or scenarios where Google is not precise enough and causes people to get lost. Paradoxically, another person comments that it does not work well for biking, which some others had mentioned in an opposite way. This indicates that the experiences of using Google Maps vary depending on users' navigational abilities and experiences, making it clear that there is not a single way to navigate the city with Google Maps, but rather many.

Lastly, some comments reflect on the dependency on Google Maps. Whether through individual stories, such as one participant who ran out of battery and wandered around Madrid for 2 hours, having to talk to people to finally find the night bus that would take them home (and they had taken before). The people who were asked are at least capable of recognising their excessive use of Google Maps. One participant articulates their feelings about using Google Maps simply and effectively:

"This survey has made me realize how reliant I am on Google Maps for literally everything. I don't think it makes me know the city less, or explore less - but it does make me less confident in feeling like I know the route (even if I actually do)."

These thoughts will be repeated in other parts of this analysis and reveal a kind of sadness about losing something without entirely knowing what.

# Maps – Visualising the Routes

An effective way to demonstrate the impact of the different walks in the La Latina area is through maps. After organising the four walks, two guided (using Google Maps) and two dérives, and having the 16 participants complete them, they were asked first to recall their walk from memory. As a result, we have the 16 original maps on which the participants drew their route from memory and the actual route for those who used some

form of tracking. When processing these maps, which in many cases had errors or the participants' real names, the decision was made to redo them, resulting in 16 maps with coded names and more evident content. Lastly, based on these intermediate maps, GIS (Geographic Information System) digitalisation was used to process the information and generate new ways of discussing it. In summary, the method followed allows us to make the most of the georeferenced data obtained from the four walks and the 16 participants, as seen in Image 7.



**Image 7.** Cleaning the data – Example from draft to map. Maps from Participant Clara.

Own elaboration

To analyse it, we divided the maps into different Groups. We will analyse the differences and similarities between the remembered and real routes. Four participants were not able to track their walks. Nonetheless, we will discuss some of the characteristics of their walks and try to relate them to other methods.

Dérive – When navigation skills matter

Map 2. Dérive I – Differences and similarities between remembered and real routes.



#### <u>Dérive I</u>

Two participants tracked their walk in the first dérive, while two did not. Isabel is a user of Google Maps who showed high levels of distress during the experiment. As we will see later, Isabel shared a photograph of a statue at the beginning of Calle Arganzuela. She also mentioned that she remembered seeing a significant slope on the same street where she took that photo and decided to follow it. However, this is not reflected in her remembered map. Additionally, she mentioned in the messages sent during the walk that she was at one point in Puerta de Toledo, searching for one of her landmarks, the Real Academia de Ingeniería. Her strategy was to explore the area she was familiar with, close to the universities. However, this is not reflected in her remembered route. Although not necessarily indicative of an error, her remembered route shows that she passed before the Iglesia Virgen de la Paloma but did not mention it. Although we do not have an accurate route to compare, some clues lead us to believe that the remembered route presents significant errors.

On the other hand, one of the comments also repeated by Pilar is the need to be open to being prompted by the clues offered by the urban environment. As we will see later, Pilar's strategy is to move inductively, observing and identifying elements in space to try to locate the required landmarks. In this regard, Pilar comments and shows through images that she has been at the Real Basílica de San Francisco, as seen on her map. There, she tried to use this inductive method to locate the Remains of the Christian wall, venturing into the space near the Basilica, without success. One clear error is that Pilar mentioned having passed Calle de la Cava Baja, which cannot be observed on her map. However, the rest of her descriptions and her demonstrated ability to locate the Real Basílica lead us to believe that her spatial memory can effectively trace landmarks.

Regarding participants Álex and Manu, there is a difference between their routes. Álex remembers his route almost accurately, something he attributes to his experience as a cyclist (he needs to know basic orientation to avoid getting lost) and his mobility strategy, walking only a little in the same direction and trying to make circles. We can observe that in his route, as he first takes a short walk around Mercado de la Cebada and Teatro de la Latina and then does something similar in the northeast part of the area. This minimises errors, sacrifices exploration opportunities, and ensures more excellent spatial memory.

Manu makes more errors, though they may be minor initially as he identifies the direction. However, towards the end of his route, he makes a mistake that shows different directions, indicating higher disorientation. His mobility strategy involves orienting himself on a map of the La Latina metro station right from the beginning. Manu is more predisposed to observe his surroundings to locate the marked landmarks. The fact that all participants in this dérived walk discussed this inductive approach in one way or another, along with the creation of mobility strategies, leads us to believe that in the absence of a guided walk with Google Maps, it is necessary to come up with new ways to ensure control over the walk





Own elaboration based on original

maps by participants

### <u>Dérive II</u>

In the second dérive, all participants could track their real walk. The first quick conclusion is that, except for Participant Paco, there are significant differences between routes. Starting with the outlier, Paco demonstrates nearly perfect spatial memory, with no errors except for a minor correction and a brief incursion into the Viaduct of Segovia, which the tracking device could have easily missed. The main difference for this participant, as he points out, is that his primary mode of transportation is a bicycle. Both bicycle users who participated in the dérive show better spatial memory. The number is small, but it could align with other studies. On the other hand, participant Elena demonstrates reduced spatial memory. The details of her walk could be more precise, and in her mind, she walked through an area she did not cover. The point where the two lines are closest is Puerta de Toledo, the only landmark that Participant Elena remembered visiting before, so it makes sense that her prior knowledge makes memory and reality converge.



Image 8. Viaduct of Segovia. Significant landmark used by Participants Teo and Paco

#### Authors picture

Participants Teo and Teresa, on the other hand, present opposite scenarios. Both demonstrate accurate knowledge of the directions they took, but Teo remembers his walk as shorter, while Teresa recalls it as much longer. Teo's evident simplification of the route is related to his strategy of searching for a place he was familiar with, the Viaduct of Segovia (Image 8), and orienting himself from there. However, he shows inaccuracy in the small movements and, ultimately, demonstrates spatial memory focused on wayfinding and directions rather than details. On the other hand, Teresa believes that the covered space is much greater than reality, but this does not lead to taking shortcuts or straight lines. Instead, Teresa recalls details in the route that resemble the actual walk. As we will see later, her mobility strategy shows a predisposition to get lost and explore, which is significantly different from other participants. Could this feeling of having covered more ground result from a more random approach to exploration?

#### Google Maps – Looking at your phone

Map 4. Google Maps I – Differences and similarities between remembered and real routes



### Google Maps I

When talking about Google Maps, the first group provided much information to compare the differences and similarities between the remembered and actual routes since all four participants could track their routes. We can distinguish between two groups: the first composed of participants Clara and Lea, where significant errors exist, especially in the case of Lea, and the second one in which participants Alba and Rocío, while still making errors, have a remembered walk closer to reality.

Starting with the first group, participant Lea was a true newcomer to the area and fell among the extensive users of Google Maps in the study. On multiple occasions during the focus group, she admits that her dependency on Google Maps is total, using it daily. Furthermore, she is the only participant in the Google Maps groups who did not manage to see all the marked landmarks, as she got lost despite using Google Maps. As a result, the route she remembers has little to do with the real one, except for a moment near the Viaduct of Segovia, where she spent quite some time pondering her next steps. Given that this is one of the few moments where the actual route aligns with the remembered route, this specific lack of orientation anchored the space in her spatial memory. It might be interesting to explore alternative uses of Google Maps, paired with photography, where individuals must stop and look around at certain moments.

The case of Clara is interesting, as in the spoken narratives, she is one of the participants who explains how she uses alternative methods when using Google Maps, mainly looking at the route at the beginning and using the application as little as possible. Therefore, intuitively, her spatial memory would be more trained than other participants. The shapes are similar, especially at the beginning, but the location is inaccurate. As she suggests in her messages, she feels like she is retracing her steps, which justifies why her memory contains more of these scenarios than what occurred.

Participant Alba, another Google Maps user, makes errors. However, as mentioned earlier, the walk's directions and overall shape are similar, except for a specific detour to observe JM Yes's mural and a mistaken ending in the remembered route. The errors are minor when this participant is on major roads, like at the beginning, and a certain spatial memory can be recognised. This can be explained by the subsequent ease of identifying a long road and, at the same time, having fewer difficulties remembering fewer turns. In short, participant Alba can remember the general shape of the journey, although she makes mistakes in some parts. Finally, Rocío, familiar with the area, is particularly good at orienting herself on major avenues but needs more accuracy when venturing into smaller squares and streets. Something significant is that she is one of the few participants whose mistake was initially right, while the correction made it wrong.



Map 5. Google Maps II – Differences and similarities between remembered and real routes

#### Google Maps II

The second group of Google Maps participants demonstrates something exciting. Despite having only two people who tracked their routes, the group presents the best absolute results when remembering their routes from memory. In addition to Dani and Iván, who remembered their routes almost perfectly, we can compare the routes remembered by María and Sara with the actual routes of Alba and Rocío from the previous group. The reality is that María's drawing is almost perfect compared to Alba's actual route, and something similar occurs with Sara's route compared to Rocío's. The explanation could be that Dani is once again a cyclist, while Iván followed the directions of their Apple Watch for the first time, which could facilitate their orientation without having to use their mobile phone screen. However, the case of Sara and María has yet to have a clear explanation beyond their attempt to use Google Maps as little as possible when moving around the city, and therefore, potentially more practice in remembering their routes. However, this has not provided with an advantage to other participants, so there may be other reasons behind their better spatial memory.

A study with more participants could identify if this alternative use is what produces better results. The three users who mentioned using a bike daily have demonstrated a greater ability to remember their routes almost precisely. In contrast, users who admit to using Google Maps daily have shown different levels of errors, from having trouble locating themselves entirely to making mistakes in recalling route details. Most users can have a general idea of the direction and orient better around long and straight streets, something the participants mentioned during the focus group. Errors in these cases are, therefore, less frequent. Ultimately, besides gathering information about the participants' spatial memory, starting the focus group with this exercise also triggered a particular stimulus and predisposition to talk about and recognise navigation apps' effects on our daily lives, wayfinding capabilities, and the different characteristics of our mobility. Therefore, this exercise prompted a richer discussion that engaged the participants in reflection, which was one of the objectives of this study.

#### Visual narratives – Photography as a mindset

As previously mentioned, our participants were asked to take a limited number of photographs during the experimental walks. This limitation was intended to recreate a similar feeling to that of disposable camera photographs, where each photo carries significance. In this way, the five photos available to each participant become a relevant means of understanding the visual narrative of their walk and, more importantly, their experience. Two participants did not reach the maximum of five photos (with four photos each), while two others exceeded it (with six and fourteen photos, respectively). They were subsequently asked to select five photos each to ensure the analysis was unaffected. Consequently, we reduced the initial 90 photos to 78 for the following photographic analysis.

To facilitate the analysis of this relevant number of photographs, we have created 12 codes that describe all the photos. The purpose of this description is to conduct an initial comparison of the images taken, as seen in Table 6. The logic behind developing these codes is to discern the purpose of each photo. For example, "Scene," with the highest representation, refers to a situation where something is happening, or a creative or appreciative attitude is evident in the photo. Another specific case is the "Clue" code, which refers to the participants' efforts in the Dérive Groups to locate potential landmarks through clues, such as bar names or rooftops. Similarly, "Maps" refers to how one of the participants consulted the metro map to establish a mobility strategy; at the same time, Lea (Google Maps I) took a screenshot and uploaded it as one of their photos to mark the point where she had encountered an old acquaintance. In essence, the different codes not only respond to what is visible in the image but also to the potential intention of the users when capturing it.

Code	Photos	Percentage
Scene	15	19%
Street Sign	10	13%
Church	11	14%
Plaza/Street	7	9%
Landmark	7	9%
Building	7	9%
Bar/Restaurant	5	6%
Mural/Art	4	5%
Clue	3	4%
Balcony	3	4%
Мар	2	3%
Store	2	3%
Market	2	3%
Total occurrence	78	100%

#### Table 6. Distribution of photos taken

Own elaboration

Interestingly, the second most represented category is "Sign Streets," with ten photographs. This particularly intriguing phenomenon occurs more frequently in the dérive walks (7 instances). We can conclude that it is peculiar to be in an explorative mode and become more conscious of our surroundings. The subsequent analysis of the spoken narrative

corroborates one of the personal conclusions of the participants: raising their gaze in search of signs, clues, and landmarks, represents a shift from their usual way of seeing. One of the personal conclusions drawn by participants from both groups is that they raised their gaze more often during the experiment, a finding later confirmed in the spoken narratives.

# Landmarks – Find it; take a pic.

The quantitative analysis of the photographs reveals another interesting characteristic: the importance of landmarks. This is well-known to specialists in wayfinding and eloquently addressed by David Lynch (1960) in "The Image of the City." Landmarks are not only one of the primary ways to enhance our spatial memory, locate ourselves in the city, and create mental maps, but they also allow us to connect with the space and the city, getting to know its history. This rationale guided the selection of specific landmarks of different levels when planning the walks. Although it was effectively communicated that the experiment's goal was not to find all the landmarks and that they were simply there to guide the experience to some extent, most participants took it as a challenge to find as many as possible. This is perfectly reflected in the messages received during the walk, especially from the participants in the Dérive Group, who frequently used the term "frustration" when discussing their feelings or summarising the experience.

Therefore, it is unsurprising that 55.1% of the photographs (43) captured some landmark in the area. For this analysis, we have distinguished between landmarks that were part of the predetermined routes and other landmarks that could not be used due to the scope of the study or emerged naturally from the participants. Table 7 reflects this difference, demonstrating that more photos were taken of those landmarks identified for the study (37.2% of the total) compared to those not (19.2%). It is worth noting that the Segovia Viaduct was particularly photographed, with 3 of the images being practically identical (taken from below, showing the bridge). Visually, it is a highly significant landmark in the area, so this was to be expected. Similarly, the Mercado de la Cebada, where the walk started, was the most photographed unidentified landmark, which reflects its centrality in the neighbourhood.

Significantly, the guided groups present approximately 39% more photos of landmarks (25 compared to 18). However, it confirms the obsession of the participants in the dérive group to find the identified landmarks for their route, as almost all the photos, 16 out of 18, reproduce those landmarks. Therefore, fewer photos of landmarks suggest a greater appreciation for strolls and other forms of urban experience. Subsequently, not having guarantees to find what they are looking for encourages them to take more photos of the selected landmarks. At the same time, the significantly higher number of landmarks in the guided group could be explained by the certainty of seeing all the identified landmarks, as it only happened once a participant saw four out of the five landmarks. However, there was no obligation to photograph these landmarks, so another reason that could explain this prevalence is the finalist mentality promoted by Google Maps. As some mentioned in their messages, reaching a destination allows them to stop, take a photo, and move on to the next, limiting the "photographic exploration" and photos during the stroll. In simple terms, what they have in front of them is what someone has told them is worth photographing. This does not mean there is no room for

spontaneous photos in the guided groups, but the analysis shows that it is more common in the dérive groups.

	Name	Photos
Selected	Viaducto de Segovia	5
landmarks	Calle de la Cava Baja	3
	Iglesia de San Pedro el Viejo	3
	Plaza de Vara de Rey	3
	Real Basílica de San Francisco	3
	Real Congregación de San Isidro	3
	Calle de Calatrava	2
	Mural JMYes	2
	Museo de San Isidro	2
	Remains of the Christian Wall	2
	Iglesia de la Virgen de la Paloma	1
	Subtotal	29
	% of all Photos	37,2%
Other landmarks	Mercado de la Cebada	3
	Plaza de los Carros	3
	Plaza de la Paja	2
	Galerías Piquer	2
	Iglesia de San Andrés Apóstol	2
	Alpargatas Lobo	1
	Teatro La Latina	1
	Subtotal	14
	% of all Photos	17,9%
	Total occurrence	43
	% of all Photos	55,1%

Table 7. Landmarks photos

Own elaboration

# Qualitative Photo Analysis – Pick one, tell me why.

During the focus groups, immediately after the strolls, the participants were allowed to show one of their photos and explain it. From this exercise, we have gathered valuable information about visual narratives and exploration priorities. Below, we will briefly comment on these photos and the accompanying remarks.

#### <u>Dérives</u>

The first of the dérives proved particularly interesting due to the clarity with which they discussed specific issues. The selected photos accurately introduce the topics we will discuss next. Throughout the stroll, Álex communicated via messages that he was thoroughly enjoying it, taking his time, and not overly concerned about finding the landmarks. He argues that his photo of a dog sitting on a table is an explicit proof of the change in mentality during his stroll. The ability to be intrigued by the surroundings and scenes as unexpected as the one he captured results from not using Google Maps and adopting a photographic perspective. He reflects on how photography plays a role in pausing, thinking, and experiencing the city, considering these improvised moments as an impossible interaction with the city while navigating with Google Maps. He says:

"(...) navigating the city without a phone and with the photography mindset. You see the most random stuff and you're like. Ah, like a dog, there like a human, like this is so cute. And otherwise, you're just there, like going straight, you don't observe."

Participant Álex, Dérive I, Minute 23:04 – 23:58

**Image 9.** Selected photos (D1). Vertical photos left to right: Pilar, Manu and Isabel. Horizontal, Álex.





Own elaboration based on photos from participants

In contrast, the other photos reflect an inevitable regret when not finding the landmarks, showing a somewhat frantic search to locate them. Pilar was trying to find evidence to lead her to the sites. For example, in the case of her photo, she hoped to be near the Church of the Virgen de la Paloma because the sign on the bar read "Verbena de la Paloma." She mentioned trying to adopt a "detective gaze" during her stroll. However, she also reflected on her frustration and disappointment when she could not find the landmarks she sought. Manu, similarly, knew he had to find a church and suddenly captured a tower in her camera. However, to his surprise, the street did not continue, so he had to use the approximate direction to navigate the maze of streets. On the other hand, Isabel tells us how she photographed the statue at the beginning of Calle Arganzuela, hoping that "it would be something important." She struggled during the dérive exercise because she is a frequent user of Google Maps, and both during the messages and later in the focus group, she reflected on her dependence on using Google Maps.

**Image 10.** Selected photos (D2). Vertical photos left to right: Teo, Paco and Teresa. Horizontal: Elena



Own elaboration based on photos from participants

On the contrary, we find two types of photos in the second of the dérives. The first type is related to developing a mobility strategy, while the second type involves discovering new aspects of the area. Interestingly, Teo takes a photo from the top of the Viaduct and recalls it as a bridge he has walked on frequently. He even provides specific historical information about

the bridge, mentioning that it used to be a common place for suicides and that the addition of glass railings was made to prevent such incidents. This historically accurate story, shared with him by someone else, anchors the existence of the bridge in his spatial memory, becoming a crucial part of his mental map to navigate the area:

"I kind of knew that I had to go to this kind of spot to kind of reorient myself and kind of, like,... to know where I have to (go)."

Participant Teo, Dérive II, Minute 51:28 - 51:42

Urban navigation strategies are crucial for the dérive participants, as they still want to be able to orient themselves and ideally find the desired spots. Teresa shows an instinct in psychogeography as she decides to watch and move according to universal signals. During the messages, she mentioned how she observed a dog pulling its owner towards a street, found a person pushing a wheelchair filled with items, or was intrigued by the "Pause" t-shirt a man wore and decided to follow him. Teresa's examples are interesting, as she considers the experiment an opportunity for genuine exploration. The photo she showed to the group, capturing two dogs fighting and their owners trying to keep them apart, was another example of this approach, as she states:

"(...) I took this picture of these dogs that were fighting, and I was like, I'm not walking down this road, so I need to walk a different direction. (...)"

Participant Teresa, Dérive II, Minute 52:12 - 53:04

The other two participants decided to show something that surprised them or did not know beforehand in their photos. Paco reflects on two street signs—one "old and beautiful" with images and the other blue one with only the name. Upon further thought, he concludes that the ones with drawings are probably not the oldest. However, what is interesting, considering Paco's remarkable spatial memory, is that he "never realised" the existence of these artsy street signs, which are pretty standard in the area and other parts of Madrid. This may suggest that other forms of orientation skills are more developed for him, as he mainly moves around the city by bike and may not pay much attention to street names. On the other hand, Elena took an initially bold move and entered what she thought was an open courtyard, only to discover Greek statues and some antique shops. She was surprised by this discovery, but during the rest of her walk, she realised that the area was the site of El Rastro, a famous Sunday event in Madrid. It was during the dérive that she noticed the abundance of antique shops, making the connection to the area's origins.

# Google Maps.

The first group of Google Maps users follows a similar style. Interestingly, two participants are residents in the vicinity. However, Clara selects a photo of the back of the Mercado de la Cebada (Cebada Market) as a personal reflection. According to her, she has passed by the main facade of the market countless times, but it was only during the guided walk that she realised she had never seen the other facades. During her walk, Clara felt

frustrated about having to backtrack, which made her feel insecure and observed by people as if she were lost. Nevertheless, this photo exemplifies one of Clara's significant conclusions: she has many things to discover in her neighbourhood. Rocío, the second resident participant, selects a photo of a sign that reads "SOS, Madrid Centro, Vecinos en Peligro de Extinción" (SOS, Madrid Center, Neighbors at Risk of Extinction). She acknowledges that it is not the first time she has seen such a sign in her neighbourhood or even the city, which makes her reflect on the reality of her area, especially the tensions it faces. Her comments during the walk reflect the neighbourhood's tranquillity and enjoyment of her daily morning stroll.

**Image 11.** Selected photos (GM1). Vertical photos left to right: Clara, Lea and Rocío. Horizontal: Alba





Own elaboration based on photos from participants

On the other hand, Lea admits from the beginning that she does not know anyone in the neighbourhood. Recently moved to Madrid and is highly dependent on Google Maps. As we will see later, she is the only person in the guided group who only manages to see some of the five landmarks, as she gets lost on two occasions. Her photo is of an old artistic advertisement with tiles, and she tells us how her brother has a passion for collecting photos like the one she has taken. It is a way for her to connect with her brother through the space around her; in the same way, she has adopted his hobby as her own. Interestingly, she makes a spatial connection when locating a bar she wants to visit close to the mural.

"My brother is super, super into hand-painted sign writing. So when I am walking anywhere in Europe, I usually keep my eye out for things that I think he would find interesting."

Participant Lea, Google Maps I, Minute 18:53 – 19:07

Lastly, Alba presents a reality supported by the rest of the participants with her photo and comments during the walk—how they all looked up more than usual. Her scene is of stuffed animals on balconies in the city, curiously above the bar where Lea took her photo. When asked about it, Lea admits she noticed it too, but for her, the memory of her brother was more important than the "cute scene," in Alba's words. Alba concludes that she probably would not have noticed this during her daily walks because she was more focused on her surroundings due to the photography mission. As we have seen with other participants, photography seems to be an effective method to lift their heads from their phones.

"For me, definitely, yeah. I looked up a lot more than I would have. Just because knowing that you need to produce a photo, to me, one of the first things is like, the colour of the building, because I'm living in another country, so I was kind of looking at the colours of the buildings and that's how I saw the balconies."

Participant Alba, Google Maps 1, Minute 18:53 – 19:07

The second group of Google Maps users demonstrates another new way of exploring aesthetic interest, focusing on scenes where vegetation plays a crucial role. Iván takes a photo of a wall covered in small white flowers and describes how he felt "intoxicated by the smell" while walking. This makes it one of the few examples that involve another sense, indicating an evident visual prevalence when navigating. However, it could be interesting to explore photography (the quintessential visual method) to capture other senses. On the other hand, María shows us a photo that could initially be seen as just a mural. However, it is a place she was already familiar with and had photographed before. The difference this time was the tree behind it. The tree was less green during her first walk in the area, so she thought her photo could be more beautiful now. María solidified the image in her memory through that initial photo and its repetition, making it easy to locate that mural and the street where it was taken. Therefore, her spatial memory has improved through photography.

Similarly, Sara mentions how she deviates from the route marked by Google Maps to locate and photograph a restaurant. She recalls her recent trip to Portugal through the tiles on the building, as the country is known for its tilework. On the other hand, Dani's photo exemplifies the mobility strategies of the participants and how they locate themselves in space, similar to what Teo mentioned during the dérive. Additionally, Dani identifies a sound characteristic of Calle de Toledo that allows her to know when she is close or far from it, even if she is not entirely focused on her surroundings:

"So it (Calle de Toledo) was like the landmark for me. I was like, here I am. And then I was on my phone. And so I heard that I entered another atmosphere. I was not in the, like, sound of Calle de Toledo anymore. Like, Calle de Toledo was how I oriented myself."

Participant Dani, Google Maps II, Minute 30:17 - 30:43

**Image 12.** Selected photos (GM2). Vertical photos left to right: Iván, Sara and María. Horizontal: Dani



Own elaboration based on photos from participants

The conducted study reveals that photography can influence navigation in urban environments. Capturing moments through photographs establishes stronger emotional bonds between individuals and the urban landscape they explore, as expressed by some participants. These visual records act as mementoes, fostering a deep and personal connection with specific places and promoting a sense of belonging to the surroundings. While this short study highlights the enhancing effect of photography on the urban exploration experience, it would be interesting to conduct further research to understand how photography may affect wayfinding and awareness of surroundings in more depth.

# Spoken narrative – The Focus Groups

The main method and culmination of the walking experiment that articulates this thesis is the focus group. Within these four focus groups, what we have achieved is to learn about the participants' experiences both during the experiment and in their daily lives. The total content of the focus group follows guidelines, as outlined in the methodological section, aiming to create a space where participants can express their opinions about their use of Google Maps. The result, a total of 4 and a half hours of recording, is over 120 pages of transcription and a vast number of topics discussed. It would be interesting to discuss them in greater depth, but in order to focus the discussion on the most relevant topics for the purpose of the study and relate it to other methods used, we will concentrate on three aspects that we consider fundamental: the navigation model promoted by Google Maps and the strategies users develop; the effect of Google Maps on urban experience, exploration, and a sense of belonging; and, finally, other reflections from participants that arise in the context of the focus groups, mainly about data privacy, potential improvements, and changes in usage patterns after the experiment. Through the discussion of these three broad topics, we believe we can include an overall view of the conclusions drawn from the different focus groups.

#### Navigation Model - Use it but make it your own.

As we mentioned in other parts of the analysis, most participants have a predominantly positive opinion about using Google Maps. Thanks to Google Maps, participants navigate through the city, so they are particularly grateful for this tool. However, they are not indifferent to some criticism directed towards the application. One of the most evident conclusions is that participants make adjustments to take ownership of the application, maintain a sense of control and not simply succumb to the simplicity and comfort of guided navigation. We observe how Google Maps users develop different strategies depending on the mode of transportation they are using. A clear example is a shared response among almost all participants, which rejects using the directions functionality and exclusively relies on the route preview. This means the application is not a traditional navigator but a digital map highlighting the most effective route. Some explain their disregard for the directions functionality by preferring to see and actively interact with the entire map.

"For me it's so annoying, I never press the start. Because then I don't know where I am. You just zoom on it and I don't know. And that's typically the case where you go on the wrong direction and then you realize too late because you didn't have any idea what you were supposed to go through."

Participant María, Google Maps II, Minute 27:27 - 27:43

Moreover, even heavy users employ different strategies depending on the moment and context, indicating a personalised and adaptable approach to individual needs. For instance, participant Rocío mentions not using Google Maps when strolling with visitors; Clara, María, and Sara actively try to use Google Maps as little as possible, planning their route as a sort of challenge; Paco avoids entirely relying on Google Maps when familiar with the area; Iván uses

satellite view to orient himself with buildings; Alba frequently checks Google Maps while walking and listening to music, to name a few examples. The success of Google Maps lies in its versatility and ability to respond to specific user needs. Some people demonstrate that they do not enjoy following the predefined route, going as far as expressing a desire to be less dependent and challenge themselves. Additionally, we can observe this sense of control over the application through micro-changes made to the suggested route, such as crossing a square diagonally, jaywalking, or choosing one street over another for aesthetic reasons, to name a few. These minor changes are present in most participants and suggest a desire to rebel against guided walks. Participants show a deep understanding of their mobility strategies, often using this exact term. The following quote from Elena, taken from a longer intervention where she distinguishes her three ways of moving, perfectly reflects this level of reflection.

"I feel like there's three different ways that I normally move around. It's like the other guys were saying, if it's somewhere I know, I usually don't use Google Maps, I just walk, but I'm usually not enjoying the thing because I have a destination and I'm going there. Maybe I would check Google Maps if I've only gone a couple times and I wanted to make sure I'm going the right direction. (...)

(...) And then I think for places that I don't know at all then I keep following Google Maps (...) I feel like I'm doing the Pac-Man and eating all the little dots on my path, which is kind of cool, so I enjoy doing that. But then I'm really not observing the lot around me, except if I come to an interception and I have to like (orient myself).

(...) And then if I just go for a walk for fun, which I don't do a lot, I realize I usually just go somewhere. That, I think also I would start not using Google Maps and wander somewhere and be able to hang around. And then after a while, when I get tired of it and I want to go home, then I find Google Maps and just follow what's the most direct path that it says to get home. (...)"

Participant Elena, Dérive II, Minute 21:54-25:00

Despite this multitude of strategies, which also vary depending on the mode of transportation used, one variable causes a single form of using Google Maps: time. All participants mentioned that they follow Google Maps with extreme precision when meeting someone and running late, making time the common denominator for intensive use of Google Maps. This intuitively logical result is still interesting because it suggests that user preferences become secondary to the available time. Therefore, there may be a willingness to use algorithmic mobility differently, but scarce time makes it irrelevant. From this, we can conclude that these scenarios are more likely to cause distractions or inhibit spontaneity in urban exploration.

Another exciting aspect concerns mobility strategies developed in the absence of Google Maps. Participants in the dérive group explicitly talk about the need to employ "navigation strategies," such as making circles (Álex), asking strangers or looking for public maps (Manu), being more open to the signs in the environment (Pilar), initially locating themselves through a familiar landmark (Isabel, Teo, Paco), or more playfully, following strangers or allowing themselves to be engaged by the urban surroundings (Teresa).

Surprisingly, these ways of navigating the city are basic and, despite that, there is a clear feeling of lack of practice, as if they were strategies never used before. Related to this, some participants share stories about problems they encountered while navigating the city, the risk of becoming too dependent on technology, and at the same time, the almost infinite possibilities that Google Maps opens.

# Urban Experience – Exploration and spontaneity

One of the study's objectives was to explore how Google Maps users perceive its usage, especially in exploring the city and enjoying the urban experience. The study aimed to discover if something is lost in daily mobility when using Google Maps and, if so, how to recover it. The participants' opinions on this matter are varied. However, we can conclude that Google Maps is seen as a tool that positively affects exploration but takes away some of the typical spontaneity of urban environments.

In this regard, the focus groups consider Google Maps an enhancer of exploration and a detractor of detail. Similar to the mobility strategies discussed earlier, everything and nothing is possible with Google Maps, depending on how it is used. A significant number of participants perceive it as a tool that expands the possibilities throughout the entire city. Lea and Iván explain this particularly well in the following quote, distinguishing between the city and the details:

"I think because of Google Maps, I pay way less attention to the city, to the streets, to the scenes. But at the same time, it has also the opposite effect, Google Maps, that I have a feeling to know better the city because I can geographically see it from above, and I can geographically know where I am, where I have been. (...)

And Google Maps still has both effects in the same time, making me less aware of the present city, but more aware of the city."

Participant Dani, Google Maps II, Minute 41:44 – 42-24

"I think Google Maps definitely enhances your ability to discover new places. I mean, like there's different senses of discovery, for sure. Like for me, I think it definitely enhances my ability to discover places because Madrid is such a big city that there are places, there are neighbourhoods, areas that I know nothing about. (...) So in that sense I think it's good for discovery, but in terms of finding nice places that I enjoy, it's probably limiting. (...)

Like for what Dani said, I'm looking for straight lines on the way to get there more efficiently and quickly, and that I think usually limits your ability to find nice environments that are actually enjoyable for a pedestrian. It's about navigating, not enjoying the way"

Participant Iván, Google Maps II, Minute 44:04 – 45:21

Furthermore, Rocío, Iván, and Paco bring up something exciting in different sessions, discussing the definitive nature of Google Maps, which prevents being open to unexpected discoveries during the journey. Rocío and Iván talk about the A to B mindset induced by Google, but Paco elaborates on it interestingly, distinguishing between "path" and "space."

"If I use Google Maps, I can have a specific goal I want to get to. And all the space I move through to get there is kind of a path. Whereas if I'm strolling, if I don't have Google Maps and just move through the city, the street becomes the street, a destination or a place where I actually engage with my surroundings and not just space. I move through the kind of space I am actually in."

Participant Paco, Dérive II, Minute 35:49 – 36:14

Moreover, Google Maps is seen as an endless database about the city, explicitly used to mark places of interest with pins. Participants also mention points of interest to intuitively distinguish exciting sites in a new city, a strategy Manu follows in the cities she visits. Paco criticises this use for "reinforcing tendencies of congregation," which is closely related to the concept of atmoculture and the creation of consumption atmospheres. Nevertheless, it is noteworthy how quickly participants associate "exploration and discoveries" with restaurants and stores. There is little profound reflection among participants regarding the commodification of the urban experience. Even more remarkable and deserving of further study is how, when asked, people associate "discovery" with restaurants and bars but rarely with spaces or experiences. This mindset might be why people evaluate Google Maps as a positive tool for urban exploration.

However, Google Maps has caused a certain degree of spontaneity in the urban experience to disappear. Using the example of restaurants, participants in almost all groups reflect on how impossible it is to enter a restaurant without having previously read reviews. In the second dérive, participant Elena reflects on how she rarely pays attention to restaurant names because she rarely has to find one without the help of Google Maps. Similarly, she talks about how she felt capable of entering what seemed like a "private courtyard," following her curiosity and discovering Galerias Piquer during the dérive. At the extreme, the following paragraph reflects a conversation between participants Alba and Lea about not even trusting personal recommendations from friends over those of Google Maps:

<u>Alba</u>: "What would you do if someone had, like, (anonymised name) told you this place is bad, but the reviews were like 5?"

<u>Lea</u>: "Oh yeah, I would definitely trust her. But if she said to me this one is really good and it was 3.5 I would say, uuh. I don't know, I would play with the cards. It must be minimum of 4.3. It's not, like, I (don't have) that high standard. But it doesn't often work out the way, you know. (...)

I don't think I would walk into a restaurant without having looked at its reviews."

Short interaction between participants, Google Maps I, Minute 36:30 - 37:28

Finally, another purpose of the walking exercise, including using Google Maps, was to encourage interaction with the urban environment through photography, messages, and the goal of locating landmarks. The daily use of Google Maps differs from what was proposed in this experiment. However, precisely for that reason, the experience has resulted in more profound reflections during the focus group. Google Maps users do not need to relive an experience they have daily, guided navigation. Nevertheless, the fact that it presents minimal differences allows them to reflect in comparison to something. One conclusion is that participants within the guided groups distinguish apparent differences according to their natural way of navigating and exploring. We have seen this before in the photographic section, but people were more attentive to their surroundings, which made the experience more pleasant overall. To finish this epigraph, Manu powerfully reflects on the relationship between Google Maps and why he likes to explore on his own in the following quote:

"Because I know the difference in Google Maps. First of all, you get distracted by taking out your phone all the time. And then it takes you through the most direct route, not the most beautiful or interesting one, or sometimes not even the safest one. It just makes a straight line. So that happens sometimes. So for example in my neighbourhood, I know that there are some street at night that I shouldn't go to..."

Participant Manu, Dérive I, Minute 35:34 - 36:05

#### Reflections - Experience, data, and improvements

Being another objective to generate reflection among Google Maps users, this part is essential to understand the focus group. Creating a space for discussion immediately after conducting an exercise that challenges participants' navigation has enriched the exchange of ideas and experiences. We could reflect on all the topics covered in this regard. However, for the sake of efficiency and considering other methods in the study, we will focus on three sets of reflections: on the experiment, on the use of data, and finally, on improvement proposals.

As mentioned in the previous section, the experiment aimed to take participants out of their comfort zone. This is especially true for those who participated in the dérive, with many surprised at enjoying the walk. It did not take long for the existence of landmarks to observe to stop frustrating them, and negative feelings emerged. It is significant how, despite actively being informed about landmarks as a guide, not as a challenge or obligation, most participants felt compelled to try to find as many as possible. Though not particularly competitive people, in their words, they approached the experiment as a challenge to demonstrate their abilities even though the goal of finding all the landmarks was practically impossible.

The central reflection that all participants arrived at is a greater awareness of their dependency on Google Maps for navigating the city. Regardless of the group they participated in, the discussion space made people feel comfortable expressing moments when they felt lost without Google. It is significant how Google Maps becomes part of the experience even when it is not being used. A recurring comment is how the possibility of using Google in the future allows people to enjoy the walk. It is an invisible guarantee, seemingly ingrained in people's minds, which reassures individuals that they will reach their destination in any case.
Isabel, Álex and Manu had an exciting conversation about this, but other participants also talked about how knowing they could use Google Maps after the walk reassured them.

<u>Isabel:</u> "(...) So I know how to get there, and then I know something is central or whatever, and then from there off I'll let myself go for a few hours, and then I know I always have my phone and my portable charger, so I can get myself back where I need to be (...)"

<u>Álex:</u> (...) I consider myself as someone who tries to not use Google Map as an exercise to be familiar with the map, but that idea of I have Google Maps on as a backup. I think it's a game changer. It's definitely not the same as you don't bring with you at all and you have to wander without anything. (...)"

<u>Manu:</u> "(...) But I was like putting a random place in Google Maps and trying to get there and then I realized, ok I'm just going to stop using Google Maps, I'm going to intentionally get lost in these neighborhoods. But then again I know that I have the backup to go out to the main touristy street, I can use Google Maps again."

Short interaction between participants, Dérive I, Minute 33:15 – 35:00

This is also the case with Alba, who talks about how she does not use Google Maps when she goes for a run, but because she can use it to return home afterwards.

"(...) Because then when I go running, I don't use Google Maps, at all. Like I use Strava to track where I've been and just to know the distance. But if I'm going for a run, I allow myself to just go somewhere and then maybe Google Maps back. Probably Google Maps because I can't get back otherwise. But yeah, that's more of... I can go wherever. "

Participant Alba, Google Maps 1, Minute 9:00 – 9:34

Thus, we are talking about how the possibility of using it in the future already has calming effects, even when consciously intending not to use it or walk without mediation. This aspect demonstrates that the scope of the application and the assisted mobility through Google Maps is far greater than we could imagine, proving that the atmoculture premises on anxiety are correct.

Lastly, the need to take photos was a plus to the experience, but the messages during the journey were seen as bothersome. Initially, messages were sent every five minutes, but in subsequent groups, it was reduced to three messages (at 5, 15, and 25 minutes after starting the walk). This shows that, as we initially suggested, there are potential improvements that can gamify the walking experience and enhance its quality while improving users' wayfinding skills.

During the last part of the inquiry, the focus was on the concerns regarding Google Maps handling personal data. The overall feeling is similar compared to the survey, which reflected a 50-50 difference. Most participants are concerned about some functionalities, mainly unfamiliar ones. An example is how users discuss the functionality that tells how busy

a place is, or "Your Timeline". However, most participants do not consider it a severe problem. Two primary arguments were used in this case: firstly, the "I'm not interesting enough" or "I'm just a small person anyway" that does not acknowledge that the privacy concerns come from the sum of all the individuals; secondly, the "I'm happily paying for this service with my data", which is usually a second conclusion driven from the first argument. Since people feel their data is neither special nor concerning, they consider using a particular service, such as Google Maps, a fair trade.

The vast majority of participants were somehow concerned about the use of data; however, these two arguments are used to offer peace of mind. A particular eye-opening interaction in the second Google Maps group shows a deep conversation around the topic, being lván a strong defendant of the use of data and Dani and Sara trying to convince him to change his mind. In this interaction, which we show partially in the following quote, lván raises the question: Would you pay a monthly fee if it guarantees that Google will not collect and use your data? This situation produces a tense discussion about data concerns, ending with a surprising statement by Dani, talking about the "right to mobility" and not needing to pay in any way, money or data. However, this doesn't convince lván, which tells them to switch to another, more data-friendly maps provider if they are concerned. The following shortened exchange shows this tense situation.

<u>Iván</u>: Google's still getting my data because I'm going to use Google Maps no matter what. I'm just indifferent to it. I accept it as like I don't pay for this amazing service that I use every single day as an important part of my life, and if my data, my location data is the cost of that, I think it's a very worthwhile trade-off. And I mean, you don't even need to give it if you don't want to. So, if it really does concern you, don't (use) it."

<u>Sara</u>: "(...) But I don't want it in this commercial party, because they don't have our interests in mind. They have their own commercial interests, and the only thing they want to do with that is to sell it to other parties to make more money without any public good. (...)"

<u>Iván</u>: "Would you be willing to pay for this though? For a non... I mean, I think... Like, really though? We are students!"

<u>María</u>: "I don't know if I... I'm not complaining, I love that it's free. But then you still pay for your music or stuff, so if it would be like membership, family membership, I think people would buy it, of course they would, because how would you live without Google Maps?"

<u>Dani</u>: "No but I dont have this approach, it's public service. It should be a public tool that you have a right to mobility, it's in the Mexican constitution, like, a right to having a map with your dot on it. It's not that difficult. All the services are just an extract of the history, okay, that makes it pay."

<u>Sara</u>: "And they should be paying us for taking our data. I mean, we're already paying (with) our data and we're not getting anything for it."

Iván: "There's so many different Maps Apps that you can use though if you want to"

Short interaction between participants, Google Maps II, Minute 1:03:12 - 1:06:04

The previous interaction beautifully shows the conversation we wanted to spark by actively addressing this topic. There are minimal spaces for people to raise their questions about data policies, and the fact that Google Maps is such a powerful tool that everyone can instinctively understand makes the whole conversation more approachable. However, it is a communication success for Google to minimise these conversations by offering services related to the data collected. For example, Elena and Iván show excitement about their timelines or end-of-the-year travel recaps and were unbothered by the fact that to obtain that exact information, the application had to track their movements every single moment of the day for a whole year.

Finally, one of the questions we brought to the focus group tried to show if there was room for improvement. Again, the goal is for users to take ownership of an application they use daily and let them propose new tools that could be included. Participants were keen to give extra thought to the question and provided some minor improvements: different colour pins for organising restaurants and places saved in the map (María); better location in intersections (Lea); taking into consideration the time to get into the metro system (Iván); already curated tourist routes for visitors (Rocío); corrections of a bug that two people experienced, which produced the Google Maps app to get off navigation mode if the camera was opened (Lea; Clara); among others. Other ideas were generally spoken, such as when Manu says that the "most direct route (is) not the most beautiful or interesting one, sometimes not even the safest one".

Thus, the quality of the walk and safety are concerns that should be explored as potential improvements. However, when asked about the possibility of using a Google Maps alternative that would slightly divert people's path on their way to a place to show relevant stuff (for example, architecture, restaurants or plazas), an original idea that drove the interest in this field, the participants were not very receptive. The initial concerns are time and data. The first one is that even when knowing the place and time people are supposed to meet someone, they usually try to arrive sharply and spend the least amount of time commuting. A detour, even if minimal, would mean having to plan, adding another variable to the commute. This thought was initially identified as minimal, but it came out consistently as an issue in the focus groups. At the same time, people wanted Google to refrain from proposing relevant stuff to them, as they did not want to give more information about their preferences and hobbies. The guestion "how does Google know what I like" (Participant Clara and Rocío, Google Maps I, Min. 45:17) was raised. Some comments were also positive, such as an exciting tool for friends visiting or exploring a new city. However, it was seen as something different than a daily alternative to the more time-efficient Google Maps. These concerns may jeopardise the implementation of this idea. Nevertheless, more effort could be made to communicate the characteristics effectively before discarding the project.

# **Chapter V – Discussion**

This thesis is a methodological-driven study that explores the use of Google Maps by younger generations and international students in Madrid by actively including them in the conversation. To do so, we included an initial survey, four focus groups, and an analysis of visual and spoken narratives. The findings suggest that using Google Maps is significant among this group of young adults and that we cannot talk about one way of using Google Maps but more of a sum of possibilities. The previous section shows that most participants rely on Google Maps for their daily commutes, viewing it as a helpful tool and not having any plans to change its use actively. The lack of interest in the participant or user opinion on their use of navigation applications implies that they cannot recognise their behaviours, which we have disproven. In this chapter, we will compare the most relevant papers of our literature review with our results to locate potential areas in which our research supports or conflicts with the current state of the discussion.

### Walking and behavioural geography

Participants love to move with Google Maps. However, it is also the opinion of the participants that Google has limited spontaneity, even if the effects on exploration are unclear. For spontaneity, in the sense of De Certeau's phatic (De Certeau, 1984), our findings show that there has been a change that minimises spontaneous encounters. When using Google Maps, there has been less of a flâneur predisposition to the walk (Benjamin, 1969), sustaining our claim of a post-smartphone way of moving differently from the traditional one. Our experiment show, however, that faced with a sudden need to implement alternative navigation strategies, the dérived participants could implement them to a somewhat successful degree. As Golledge (1993) said, they had spatial knowledge deep in their heads. On top of that, this supports Schmid's argument and his theory of major, minor and inferred places, as some of our participants utilised their knowledge of a minor place (in two cases, the Viaduct of Segovia) to locate themselves and get a mental map of the area. Because of the development of mobility strategies close to what we would think traditional wandering has been, the risk of completely losing navigation skills because of using Google Maps is unlikely. Faced with the need, people can still navigate the city.

Similarly, understanding our example of the remembered routs as a sophisticated way of utilising cognitive maps, we have seen a similar result to what Jafarpour and Spiers concluded in their research. For example, Teresa remembered a much longer route while stating that she lived in the area and walked through it frequently, establishing a similar relation between time and familiarity. However, this would also imply that experience in the area only sometimes relates to better spatial memory, contrary to intuitive thinking and Golledge's work (1993). We agree with Jafarpour and Spiers's argument given the couple of examples we found in our results; still, we defend that extensive use of Google Maps may also be behind this phenomenon. As an immediate response from the navigation literature, this is the case in Parush et al. (2007), one of the most cited papers in the field. We must consider if the issues

of the participants locating themselves are a product of intensive Google Maps use. We can point out a couple of participants in which this was the case. However, our methodology only allows for making partial conclusions.

Lastly, this section highlights one finding that surprisingly merges with the literature. Research has shown that travelling employing active modes that require active navigation, such as the bicycle or the car, leads to higher quality mental maps (Chorus & Timmermans, 2010; Mondschein et al., 2010). In our study, it has been significant how the three participants (Álex, Dani and Paco) who remembered their routes more accurately are all avid bikers. Even if the use of Google Maps was not studied in Chorus and Timmermans's research, we must acknowledge that promoting the bicycle might improve navigation skills and spatial memory. This makes sense if we consider that Google Maps use while driving could be less comfortable, sometimes needing gear to be even feasible. However, the critical finding is how those skills are transferable to other modes of transportation, such as walking. Subsequently, promoting bike days such as the "Paseo Dominical Muévete en Bici" of Ciudad de Mexico, which has been opening the city's Paseo de la Reforma for bike traffic every Sunday for the past sixteen years, may be helpful to improve the quality of the mental maps of its citizens. Navigation studies have a fascinating new field of research ahead of themselves by comparing how Google Maps users approach biking and walking routes differently and its potential effects.

## Speed, the gazes and walkability

Virilio's dromology profoundly influenced our initial ideas about the effects of Google Maps. As we said, in Speed and Politics, this author reflects on how technological advances, of which he even mentions GPS, are making our society nearly unliveable. We expected that this idea would appear in our focus group. However, ideally concerning Sander's (2021) critique of Virilio, our participants show awareness of both the negative and positive consequences of their extensive use of Google Maps. Further research is needed, yet it is paternalistic from the research point of view to imply that people are unaware of societal changes produced by smartphones. Our results show an active decision to use Google Maps despite the potential negative consequences (speed, lack of awareness, loss of spatial knowledge, data privacy, among many others), as the positive effects significantly outweigh them. Said: People are not going to stop using Google Maps. We agree with Sander (2021) that, while being relevant, dromology has poorly aged due to its fatalistic and paternalistic perspective. Google Maps is a perfect example of how reality has changed. We will explore this idea further when talking about navigation research.

Our photographic analysis reveals the importance of the gazes during recreational walking. The fact that the most photographed category was landmarked supports Urry and Larsen's (2011) claims that the tourist gaze is no longer applied when travelling to new destinations but also daily. Instagram and social media have amplified this (Boy & Uitermark, 2020). However, the effects of Google Maps are more significant since participants did not mention social media during the focus group, and our survey shows orientation applications as significantly more prominent.

A comparative analysis of both applications on what people use the most to get their recommendations would be fascinating. Concerning the recommendations, our active listening approach has shown that the consumerist gaze of Zukin (2008) does indeed change by Google Maps. Interestingly, Google Maps redirects the consumer and tourist gaze through the phone. The most relevant implication is the commodification of mobility, by which Google Maps provides experiences, atmospheres and recommendations. If a place does not play by the rules of Google Maps, it does not exist. This is perfectly exemplified by the Mural JMYes, one of the landmarks identified that is not found by name in Google Maps, something which was evident for the participants. Other forms of arts like some of the graffiti or street signage shown in the photos further exemplify this experience. Research on the effects of Google Maps on the commodification of spaces is necessary, but while we wait, atmoculture premises accurately reflect this situation (Brighenti & Pavoni, 2021).

Finally, it comes to our attention how one of the most common strategies the participants utilise is rejecting to use the directions functionality and only using the route preview. In our study, people have shown many examples of slightly changing their use of Google Maps to get the impression that they are less influenced by it. This show that the concerns of Grubert et al. (2017) about the "pervasive enhanced reality" are still not as relevant when navigating the city. Our qualitative analysis proves that even people with a high opinion of Google Maps prefer to use it less invasively, not more. However, it has come to our attention that very recently (Google, June 2023), Google Maps has introduced two new features that perfectly depict what we were talking about, Immersive View and Glanceable Directions. The first one is doubling down on enhanced reality by using Artificial Intelligence "to fuse billions of images" to create a photorealistic 3D vision of landmarks; the second one is guite literally answering one of our findings by letting people track the trip progress right from the route preview, locating them as they walk the route and updating their estimated time of arrival (Google, 2023). This is a strategy to diversify Google Maps. However, it shows the validity of our small qualitative results, as Google is responding to one of our key findings: finding a way to reduce excessive use by finding alternative ways of using it.

Briefly, we discussed Maghelal and Capp's (2011) walkability research in the context of our study. Some participants have said that Google Maps detracts from the walk experience because they are less aware of their surroundings. Because of that, the current way of addressing walkability indices (Maghelal & Capp, 2011) should be partially changed. In line with our findings, we propose that urban legibility, either with different types of signage or other design choices, should be measured more objectively. Not being able to locate the landmarks when drifting was identified by the participants as particularly frustrating, thus taking from the otherwise pleasant experience of the walk. On top of that, it would ensure that faced with an unexpected issue, even the most avid Google Maps user would be able to locate themselves.

### **Smartphones – Distracted and mediated**

Studies in the field of distracted walking do not take navigation usage as particularly relevant, as seen in Argin et al. (2020), under the premise of interacting with the built environment to ensure that they are going in the right direction. Our initial results from the survey show a similar conclusion to those drawn by these authors, with people perceiving that even when using Google Maps intensively, they check their surroundings frequently. However, the question is whether we should extend the definition of distraction, considering that listening to music is among the highest distracting practices in this body of research, even though sight is still available. As a discipline based on observation (Basch et al., 2014), we think there is a scenario in which Google Maps adds a layer of distractions to other phone uses (Fernández et al., 2020). Plummer et al. (2015) recognise dual-task interferences in their research. However, we might be talking about multi-tasking interferences. Ultimately, it is surprising that there has not been, to our knowledge, any significant research done on how Google Maps distracts the user, considering that it was the most present form of smartphone usage when walking in the city, according to our research. An intersectional study from the distracted and the spatial cognition point of view would greatly benefit both bodies of literature, as we believe that Google Maps' use is significantly undervalued by academia.

On a different note, the research on spatial cognition and the effects on navigation skills has shown a particular interest in showing the adverse effects of navigation applications such as Google Maps in the last decades. Our study introduced some form of spatial memory measurements; however, we acknowledge that multiple unidentified variables could affect the validity of our results on this topic, as it was not our primary way of approaching it. Apart from the coincidental finding that biking experience affects spatial memory positively, as discussed before, there are not unexpected differences between the two groups. This led us to believe that previous navigation experience and usage of Google Maps is the actual difference, which the current literature is minimally interested in (Dahmani & Bohbot, 2020). Despite this, our participants have shown awareness of their long-term changes in navigation skills and were able to express it in very similar terms to what Parush et al. (2007) found.

Current studies neglect the extent to which Google Maps is already present daily by crafting virtual scenarios that have little implications in real life (Coutrot et al., 2019). MapRecorder, the recent experiment applied by Savino et al. (2021), shows interest in unsupervised usage research, which we agree is the way to move forward. Our participants' unsupervised walks show that we can give agency and credit to the subject to follow some simple tasks and reflect on them on their own, producing a new form of valuable results. This, paired with active listening, could enrich many of the studies in this field. An added layer will ensure that research is grounded in the human experience and, because of that, answer their issues.

On another note, our participants sometimes had issues answering the messages during the walk and talking about being distracted from the experience, particularly in the case of the Google Maps groups. The divided attention argument by Huang et al. (2012) is related to this. Our results show that when using Google Maps, people already focus a percentage of their attention on following directions. Thus, they feel more overwhelmed about answering a

message that takes them off the mediated walk. This was also the case with the two participants who experienced a bug that forced Google Maps to close whenever they wanted to take a photo. Significantly, a similar experiment with notifications by demand (Brügger et al., 2019) came to a similar conclusion. Our findings and Brügger et al. (2016, 2018, 2019) show that notifications may not have the expected result, making it particularly challenging to develop new ways of improving the spatial knowledge of Google Maps users.

Even though research is being done (Brügger et al., 2019; Kamiyama et al. 2019; Ruginski et al., 2022), it is our opinion that we need to resurrect situationist techniques to raise awareness of Google Maps' effects on our daily navigation and, more importantly, to come up with new ways of improving navigation applications from the perspective of the user. The results sustain two assumptions: 1. Google Maps is used daily and provokes a high level of mediation in the walk, affecting spontaneity according to the users; 2. There is, however, no indication that people will stop using the application, as it makes mobility significantly more manageable, and the added services help them navigate the city in different and unimaginable ways. Thus, instead of overly researching the already "proven" fact that applications like Google Maps are affecting our navigation skills negatively (Dahmani & Bohbot, 2020; Gartner & Hiller, 2009; Hejtmánek et al., 2018; Ishikawa, 2019; Parush et al., 2007) maybe is time to introduce the situationist premises back, exploring methods (Pyyry, 2016, 2019; Sinclair, 2003) and comparing them to the usual way of using Google Maps. Our study follows this structure, while still incorporating some of the classic elements used in the literature (surveys and spatial memory measurement through maps), and by doing so, it allowed for a high level of reflexivity from our participants. The photography premise had nice effects in creating awareness of the surroundings in both groups, making it a viable option to explore.

Atmoculture (Brighenti & Pavoni, 2021), even only being theoretical, is an excellent example of a new research area appearing from previous revolutionary theories within social sciences related to navigation applications. Our study sustains the claims of how Google Maps affect spatial cognition only partially but introduces experimentation and reflexivity in the design to ensure that participants are the ones asking themselves questions. In this study, many of the concerns that Brighenti and Pavoni (2021) appeared, particularly the ones that talk about algorithmic navigation curating individual atmospheres, were acknowledged by our participants. The importance of Google Maps in everyday decision-making and exploring is massive, and people are willing to lose spatial knowledge and provide Google with their data in exchange for convenience and safety (Brighenti & Pavoni, 2021). Our results support the argument that anxiety has shifted from navigating (destination anxiety and agoraphobia) towards an extreme reliance on the phone (nomophobia, fear of not having your phone). On top of that, the fact that exploring a city is now seen as a synonym for consuming the city (restaurants, among others.) proves that more research in line with the atmocultural premises is needed and that Google has incredible power to change people's behaviours.

# **Chapter VI – Conclusion and recommendations**

In this thesis, we explored the relation between young foreigners, Google Maps and the urban exploration experience. Building on theories about exploration and navigation, I argued as an initial premise that Google Maps mediated the walk experience, thus affecting spontaneity in the urban environment. Even though I was still interested in the consequences of spatial orientations, I decided to implement an innovative qualitative approach to study the user perspectives on how their use of Google Maps has changed how they experience the city. Alongside this central inquiry, focused on determining how young foreigners perceived the changes experienced when using Google Maps, I pursued two complementary research questions that illuminated different dimensions of the topic while fostering research and methodological reflexivity to enrich future research.

After explaining our findings in detail, we can conclude that young foreigners know the consequences of extensive Google Maps usage and can identify their reliance on the tool. The current study and the experimental walks produced a rich discussion that showed different issues. However, one of the key findings is that the participants had an overall positive opinion of the application despite being aware of their negative consequences, which they tried to actively (sometimes not successfully) reduce by implementing small changes to Google's intended designed purpose. Compared with the non-mediated walks, we could see apparent differences in feelings, with the dérive producing anxiety and frustration to some heavier users and needing to recover some essential navigation tools that have not been polished for a long time. These results align with the atmoculture premises we explored during our research, which state that anxiety has shifted from navigating (destination anxiety and agoraphobia) towards an extreme reliance on the phone (nomophobia, fear of not having your phone).

The original research question has been effectively approached, and the results show a fascinating academic field ahead of us. In urban exploration, Google Maps has shown to be a tool that enhances the overall possibilities of exploration while still deducting from the detailed experience and daily spontaneity. However, it is crucial to understand that none of the participants considered significantly changing their application use after the experiment.

This brings us to the first subquestion, on how to improve Google Maps based on the participant's opinions. Even if they were significantly positive, some general suggestions came from the focus groups. However, the critical finding is how photography provided a way of relating to the space and created mementoes of their walk that they could later relate to specific areas or experiences. On the other hand, the messages during the walk amplified the dependence on the phone, similar to what other studies have shown, thus resulting in a less effective strategy, even when forcing a more direct interaction with the surroundings. As I illustrated before, the thesis shows there is room to explore new and creative ways of improving Google Maps that focus on better ways to relate citizens with their environment and recommend photography as a high-potential alternative. As a limitation of this subquestion, the results were not enough to provide a more developed response to the spatial cognition concerns of the literature.

Finally, the final subquestion evaluates the potential of the qualitative methods used to generate discussion and reflexivity among Google Maps users. In this aspect, the results show that the participants could reflect on their use individually and collectively, thanks to the novelty of the experimental walks approach. The mix of all the methods and the strong connection between them fostered a particularly rich discussion within the focus group. The topics shown in this study are not more than a fraction of all the issues discussed from a personal and collective point of view. This research shows that people should be given the opportunity to be listened to when talking about navigational applications, as they can uncover usage patterns and improvements beyond survey responses. And, importantly, people enjoyed participating and doing something out of the ordinary and playful.

Thus, this research has been able to respond to the initial questions. However, one of the apparent limitations was the small participant sample size, consisting of fellow 4CITIES students. The first implication is that the preliminary survey results were insufficient and lacked any form of representativity. However, larger sample sizes were proven challenging to conduct despite my efforts. The second implication is that, because of the difficulties engaging with participants through the survey, I had to use 4CITIES to conduct the walks. One of the potential limitations is that the participants were particularly aware of urban dynamics and, thus, brought their own strong opinions about Google Maps to the study. Thus, repeating the study with a broader range of participants could be interesting to identify if the results differ.

On top of that, there is room for improvement when examining psychological responses to this exercises, due to limited experience with psychometric evaluations and methods. A multidisciplinary approach such as the one I recommended could solve these issues in the future. Besides, situationist practices are extremely useful in this new topic. I firmly believe, as stated in this thesis, that we need to resurrect situationist techniques to raise awareness of Google Maps' effects and to develop new ways of improving navigation applications from the users' perspective. There is much potential for further research on this topic, and it would complement well with current research on spatial knowledge and cognition.

The rapid pace of technological advancement has led to significant changes in our daily lives, including how we interact with the urban environment. Further research in navigation applications such as Google Maps should consider exploring other implications besides orientation and spatial cognition, mainly because of the application's potential to exacerbate existing inequalities and create new ones. An in-depth evaluation of how Google Maps promotes particular areas over others could complement the findings of this thesis and produce exciting results. Hopefully, this study explored a new methodology that could be used by other researchers interested in Google Maps to develop valid and competitive alternatives to the technology giant.

## References

- Althoff, T., White, R. W., & Horvitz, E. (2016). Influence of Pokémon Go on Physical Activity: Study and Implications. Journal of Medical Internet Research, 18(12), e315. https://doi.org/10.2196/jmir.6759
- Aramayona Quintana, B., & Batel, S. (2022). The 'Urban Village' versus the 'City for Profit': Querying NIMBY through a comparative analysis of touristification in Lisbon and Madrid. OBETS. Revista de Ciencias Sociales, 17(1), 47. https://doi.org/10.14198/OBETS2022.17.1.03
- Argin, G., Pak, B., & Turkoglu, H. (2020). Between Post-Flâneur and Smartphone Zombie: Smartphone Users' Altering Visual Attention and Walking Behavior in Public Space. ISPRS International Journal of Geo-Information, 9(12), 700. https://doi.org/10.3390/ijgi9120700
- Arup. (2016). Cities Alive. Towards a Walking World. Online report. Retrieved 16. November 2022, https://www.arup.com/perspectives/publications/research/section/cities-alive-towards-awalking-world
- Barrado-Timón, D. A., & Hidalgo-Giralt, C. (2019). The Historic City, Its Transmission and Perception via Augmented Reality and Virtual Reality and the Use of the Past as a Resource for the Present: A New Era for Urban Cultural Heritage and Tourism? Sustainability, 11(10), 2835. https://doi.org/10.3390/su11102835
- Basch, C. H., Ethan, D., Rajan, S., & Basch, C. E. (2014). Technology-related distracted walking behaviours in Manhattan's most dangerous intersections. Injury Prevention, 20(5), 343–346. https://doi.org/10.1136/injuryprev-2013-041063
- Baudelaire, C. (1863). The Painter of Modern Life and other essays. Phaidon Press, viewed 20 May 2022, http://ftp.columbia.edu/itc/architecture/ockman/pdfs/dossier\_4/Baudelaire.pdf
- Benjamin, W. (1969). Paris: Capital of the Nineteenth Century. Perspecta, 12, 163. https://doi.org/10.2307/1566965
- Boy, J. D., & Uitermark, J. (2020). Lifestyle Enclaves in the Instagram City? Social Media + Society, 6(3), 205630512094069. https://doi.org/10.1177/2056305120940698

- Bridger, A. J. (2014). Visualising Manchester: Exploring New Ways to Study Urban Environments with Reference to Situationist Theory, the Dérive, and Qualitative Research. Qualitative Research in Psychology, 11(1), 78-97. https://doi.org/10.1080/14780887.2012.719071
- Brighenti, A. M., & Pavoni, A. (2021). On urban trajectology: Algorithmic mobilities and atmocultural navigation.
  Distinktion: Journal of Social Theory, 1–24. https://doi.org/10.1080/1600910X.2020.1861044
- Brügger, A., Richter, K.-F., & Fabrikant, S. I. (2018). Distributing Attention Between Environment and Navigation System to Increase Spatial Knowledge Acquisition During Assisted Wayfinding.
  In P. Fogliaroni, A. Ballatore, & E. Clementini (Eds.), Proceedings of Workshops and Posters at the 13th International Conference on Spatial Information Theory (COSIT 2017) (pp. 19–22). Springer International Publishing. https://doi.org/10.1007/978-3-319-63946-8\_5
- Brügger, A., Richter, K.-F., & Fabrikant, S. I. (2019). How does navigation system behavior influence human behavior? Cognitive Research: Principles and Implications, 4(1), 5. https://doi.org/10.1186/s41235-019-0156-5
- Brügger, A., Richter, K.-F., & Fabrikant, S. I. (2016). Walk and Learn: An Empirical Framework for Assessing Spatial Knowledge Acquisition during Mobile Map Use. International Conference on GIScience Short Paper Proceedings, 1. https://doi.org/10.21433/B3113HC8K3JS

Careri, F. (2009). Walkscapes: Walking as an aesthetic practice (6th print run). Gili.

- Castells, M. (1996). La era de la información. Economía, sociedad y cultura. Vol. 1 México
- Chorus, C. G., & Timmermans, H. J. P. (2010). Determinants of Stated and Revealed Mental Map Quality: An Empirical Study. Journal of Urban Design, 15(2), 211–226. https://doi.org/10.1080/13574801003638095
- Coutrot, A., Schmidt, S., Coutrot, L., Pittman, J., Hong, L., Wiener, J. M., Hölscher, C., Dalton, R. C., Hornberger, M., & Spiers, H. J. (2019). Virtual navigation tested on a mobile app is predictive of real-world wayfinding navigation performance. PLOS ONE, 14(3), e0213272. https://doi.org/10.1371/journal.pone.0213272
- Cresswell, T. (2010). Towards a Politics of Mobility. Environment and Planning D: Society and Space, 28(1), 17–31. https://doi.org/10.1068/d11407
- Creswell, J. W., & Plano Clark, V. L. (2017). Chapter 1: The Nature of Mixed Methods Research. In Designing and conducting mixed methods research (3rd Edition, pp. 10-21) Sage publications.

- Dahmani, L., & Bohbot, V. D. (2020). Habitual use of GPS negatively impacts spatial memory during self-guided navigation. Scientific Reports, 10(1), 6310. https://doi.org/10.1038/s41598-020-62877-0
- De Certeau, M. (1984). The Practice of Everyday Life, trans. Steven Rendall, Berkeley.
- De Souza E Silva, A. (2006). From Cyber to Hybrid: Mobile Technologies as Interfaces of Hybrid Spaces. Space and Culture, 9(3), 261–278. https://doi.org/10.1177/1206331206289022
- Debord, G. (1958). Theory of the dérive. Situationist International, viewed 20 May 2022, http://www.cddc.vt.edu/sionline/si/theory/html
- Dibazar, P., & Naeff, J. (2023). On or Beyond the Map?
- Dokovitskaya, M. (2006). Visual culture: The study of the visual after the cultural turn. MIT.
- Fernández, C., Vicente, M. A., Carrillo, I., Guilabert, M., & Mira, J. J. (2020). Factors Influencing the Smartphone Usage Behavior of Pedestrians: Observational Study on "Spanish Smombies". Journal of Medical Internet Research, 22(8), e19350. https://doi.org/10.2196/19350
- Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. Qualitative Research, 2(2), 209–230. https://doi.org/10.1177/146879410200200205
- Foster, M. D. (2009). What time is this picture? Cameraphones, tourism, and the digital gaze in Japan. Social Identities, 15(3), 351–372. https://doi.org/10.1080/13504630902899200
- Furley, D. J. (2016). Peripatetic school. In D. J. Furley, Oxford Research Encyclopedia of Classics. Oxford University Press. https://doi.org/10.1093/acrefore/9780199381135.013.4870
- Gardony, A. L., Brunyé, T. T., Mahoney, C. R., & Taylor, H. A. (2013). How Navigational Aids Impair
  Spatial Memory: Evidence for Divided Attention. Spatial Cognition & Computation, 13(4), 319– 350. https://doi.org/10.1080/13875868.2013.792821
- Gartner, G., & Hiller, W. (2009). Impact of Restricted Display Size on Spatial Knowledge Acquisition in the Context of Pedestrian Navigation. In G. Gartner & K. Rehrl (Eds.), Location Based Services and TeleCartography II (pp. 155–166). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-87393-8\_10
- Golledge, R. G. (1993). Chapter 2 Geographical Perspectives on Spatial Cognition. In Advances in Psychology (Vol. 96, pp. 16–46). Elsevier. https://doi.org/10.1016/S0166-4115(08)60038-2
- Google. (2023, June 14). 3 Google Maps updates for trip planning and exploring. Google The Keyword. https://blog.google/products/maps/google-maps-updates-immersive-view-tripplanning/
- Graham, M., De Sabbata, S., & Zook, M. A. (2015). Towards a study of information geographies: (Im)mutable augmentations and a mapping of the geographies of information: Towards a study

of information geographies. Geo: Geography and Environment, 2(1), 88–105. https://doi.org/10.1002/geo2.8

- Grubert, J., Langlotz, T., Zollmann, S., & Regenbrecht, H. (2017). Towards Pervasive Augmented Reality: Context-Awareness in Augmented Reality. IEEE Transactions on Visualization and Computer Graphics, 23(6), 1706–1724. https://doi.org/10.1109/TVCG.2016.2543720
- GSMA. (2022). The Mobile Economy Report 2022. GSM Association. https://www.gsma.com/mobileeconomy/
- Hall, C. M., & Ram, Y. (2018). Walk score® and its potential contribution to the study of active transport and walkability: A critical and systematic review. Transportation Research Part D: Transport and Environment, 61, 310–324. https://doi.org/10.1016/j.trd.2017.12.018
- Hejtmánek, L., Oravcová, I., Motýl, J., Horáček, J., & Fajnerová, I. (2018). Spatial knowledge impairment after GPS guided navigation: Eye-tracking study in a virtual town. International Journal of Human-Computer Studies, 116, 15–24. https://doi.org/10.1016/j.ijhcs.2018.04.006
- Huang, H., Schmidt, M., & Gartner, G. (2012). Spatial Knowledge Acquisition with Mobile Maps, Augmented Reality and Voice in the Context of GPS-based Pedestrian Navigation: Results from a Field Test. Cartography and Geographic Information Science, 39(2), 107–116. https://doi.org/10.1559/15230406392107
- Ishikawa, T. (2019). Satellite Navigation and Geospatial Awareness: Long-Term Effects of Using Navigation Tools on Wayfinding and Spatial Orientation. The Professional Geographer, 71(2), 197–209. https://doi.org/10.1080/00330124.2018.1479970
- Ishikawa, T., & Nakamura, U. (2012). Landmark Selection in the Environment: Relationships with Object Characteristics and Sense of Direction. Spatial Cognition & Computation, 12(1), 1–22. https://doi.org/10.1080/13875868.2011.581773
- Jafarpour, A., & Spiers, H. (2017). Familiarity expands space and contracts time: FAMILIARITY EXPANDS SPACE AND CONTRACTS TIME. Hippocampus, 27(1), 12–16. https://doi.org/10.1002/hipo.22672
- Kaczmarek, L. D., Misiak, M., Behnke, M., Dziekan, M., & Guzik, P. (2017). The Pikachu effect: Social and health gaming motivations lead to greater benefits of Pokémon GO use. Computers in Human Behavior, 75, 356–363. https://doi.org/10.1016/j.chb.2017.05.031
- Kamiyama, T., Karashima, M., & Nishiguchi, H. (2019). Proposal of New Map Application for Distracted Walking When Using Smartphone Map Application. In S. Bagnara, R. Tartaglia, S. Albolino, T. Alexander, & Y. Fujita (Eds.), Proceedings of the 20th Congress of the International Ergonomics Association (IEA 2018) (Vol. 819, pp. 337–346). Springer International Publishing. https://doi.org/10.1007/978-3-319-96089-0\_36

- Kanchev, G. M., & Chopra, A. K. (2015). Social media through the requirements lens: A case study of Google maps. 2015 IEEE 1st International Workshop on Crowd-Based Requirements Engineering (CrowdRE), 7–12. https://doi.org/10.1109/CrowdRE.2015.7367582
- Kierkegaard, S. (2013). Kierkegaard's Writings, XIX, Volume 19: Sickness Unto Death: A Christian Psychological Exposition for Upbuilding and Awakening (Vol. 19). Princeton University Press.
- Kitzinger, J. (1995). Qualitative Research: Introducing focus groups. BMJ, 311(7000), 299–302. https://doi.org/10.1136/bmj.311.7000.299
- Lim, J., Chang, S. H., Lee, J., & Kim, K. (2017). Effects of smartphone texting on the visual perception and dynamic walking stability. Journal of Exercise Rehabilitation, 13(1), 48-54. https://doi.org/10.12965/jer.1732920.460
- Lynch, K. (1960). The image of the city. MIT press.
- Lyons, G. (2020). Walking as a service Does it have legs? Transportation Research Part A: Policy and Practice, 137, 271-284. https://doi.org/10.1016/j.tra.2020.05.015
- Macauley, D. (2000). Walking the city: An essay on peripatetic practices and politics. Capitalism Nature Socialism, 11(4), 3-43. https://doi.org/10.1080/10455750009358938
- Maghelal, P., & Capp, C. J. (2011). Walkability: a review of existing pedestrian indices. Journal of the Urban and Regional Information Systems Association, 23(2), 5.
- McDonald, T. P., & Pellegrino, J. W. (1993). Chapter 3 Psychological Perspectives on Spatial Cognition Thomas. In Advances in Psychology (Vol. 96, pp. 47–82). Elsevier. https://doi.org/10.1016/S0166-4115(08)60039-4
- McMahon, D. D., Smith, C. C., Cihak, D. F., Wright, R., & Gibbons, M. M. (2015). Effects of Digital Navigation Aids on Adults With Intellectual Disabilities: Comparison of Paper Map, Google Maps, and Augmented Reality. Journal of Special Education Technology, 30(3), 157–165. https://doi.org/10.1177/0162643415618927
- Mondschein, A., Blumenberg, E., & Taylor, B. (2010). Accessibility and Cognition: The Effect of Transport Mode on Spatial Knowledge. Urban Studies, 47(4), 845–866. https://doi.org/10.1177/0042098009351186
- Mwakalonge, J., Siuhi, S., & White, J. (2015). Distracted walking: Examining the extent to pedestrian safety problems. Journal of Traffic and Transportation Engineering (English Edition), 2(5), 327-337. https://doi.org/10.1016/j.jtte.2015.08.004
- Parush, A., Ahuvia, S., & Erev, I. (2007). Degradation in Spatial Knowledge Acquisition When Using Automatic Navigation Systems. In S. Winter, M. Duckham, L. Kulik, & B. Kuipers (Eds.), Spatial Information Theory (Vol. 4736, pp. 238–254). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-74788-8\_15

- Plummer, P., Apple, S., Dowd, C., & Keith, E. (2015). Texting and walking: Effect of environmental setting and task prioritization on dual-task interference in healthy young adults. Gait & Posture, 41(1), 46–51. https://doi.org/10.1016/j.gaitpost.2014.08.007
- Pyyry, N. (2016). Learning with the city via enchantment: Photo-walks as creative encounters. Discourse: Studies in the Cultural Politics of Education, 37(1), 102-115. https://doi.org/10.1080/01596306.2014.929841
- Pyyry, N. (2019). From psychogeography to hanging-out-knowing: Situationist dérive in nonrepresentational urban research. Area, 51(2), 315-323. https://doi.org/10.1111/area.12466
- Rauschnabel, P. A., Rossmann, A., & tom Dieck, M. C. (2017). An adoption framework for mobile augmented reality games: The case of Pokémon Go. Computers in Human Behavior, 76, 276– 286. https://doi.org/10.1016/j.chb.2017.07.030
- Ruginski, I., Giudice, N., Creem-Regehr, S., & Ishikawa, T. (2022). Designing mobile spatial navigation systems from the user's perspective: An interdisciplinary review. Spatial Cognition & Computation, 22(1–2), 1–29. https://doi.org/10.1080/13875868.2022.2053382
- Sander, C. (2021). Slow Movement on the Slope. In A. Million, C. Haid, I. Castillo Ulloa, & N. Baur,
  Spatial Transformations (1st ed., pp. 72–83). Routledge.
  https://doi.org/10.4324/9781003036159-7
- Savino, G.-L., Sturdee, M., Rundé, S., Lohmeier, C., Hecht, B., Prandi, C., Nunes, N. J., & Schöning, J. (2021). MapRecorder: Analysing real-world usage of mobile map applications. Behaviour & Information Technology, 40(7), 646–662. https://doi.org/10.1080/0144929X.2020.1714733
- Schmid, F. (2007). Formulating, Identifying and Analyzing Individual Spatial Knowledge. Seventh IEEE International Conference on Data Mining Workshops (ICDMW 2007), 655–660. https://doi.org/10.1109/ICDMW.2007.58
- Sheller, M., & Urry, J. (2006) The new mobilities paradigm. Environment and planning A, 38(2), pp.207-226.
- Shen, K.-S. (2019). Measuring the appeal of mobility-augmented reality games, based on the innovative models of interaction: A case study. SN Applied Sciences, 1(12), 1708. https://doi.org/10.1007/s42452-019-1763-y
- Shove, E., Pantzar, M., & Watson, M. (2012). Chapter 7, Representing the Dynamics of Social Practice in Dynamics of Social Practice Everyday Life and how it Changes. SAGE Publications. http://UCL.eblib.com/patron/FullRecord.aspx?p=880778

Sinclair, I. (2003). London orbital: A walk around M25. Penguin books.

- Smith, A. D., Priestnall, G., & Cross, J. (2022). Supporting spatial orientation during route following through dynamic maps with off-screen landmark persistence. Spatial Cognition & Computation, 22(1–2), 107–134. https://doi.org/10.1080/13875868.2021.1985122
- Smith, P. (2010). The contemporary dérive: A partial review of issues concerning the contemporary practice of psychogeography. Cultural Geographies, 17(1), 103-122. https://doi.org/10.1177/1474474009350002
- Solnit, R. (2001). Wanderlust: A history of walking. Penguin.
- Souzis, A. E. (2015). Momentary ambiances: Psychogeography in action. Cultural Geographies, 22(1), 193-201. https://doi.org/10.1177/1474474013519581
- Speake, J., & Axon, S. (2012). "I Never Use 'Maps' Anymore": Engaging with Sat Nav Technologies and the Implications for Cartographic Literacy and Spatial Awareness. The Cartographic Journal, 49(4), 326–336. https://doi.org/10.1179/1743277412Y.0000000021
- Thrash, T., Lanini-Maggi, S., Fabrikant, S. I., Bertel, S., Brügger, A., Credé, S., Do, C. T., Gartner, G., Huang, H., Münzer, S., & Richter, K.-F. (2019). The Future of Geographic Information Displays from GIScience, Cartographic, and Cognitive Science Perspectives (Vision Paper) [Application/pdf]. 11 pages. https://doi.org/10.4230/LIPICS.COSIT.2019.19
- Urry, J., & Larsen, J. (2011). The tourist gaze 3.0 (3rd ed). SAGE.
- Ventrella, F. (2015). Visual Turn. In International Encyclopedia of the Social & Behavioral Sciences (pp. 207–213). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.62152-9
- Virilio, P. (2006). Speed and politics (2006 ed.). Semiotext(e).
- Walle, E. A. (2016). Infant Social Development across the Transition from Crawling to Walking. Frontiers in Psychology, 7. https://doi.org/10.3389/fpsyg.2016.00960
- Wang, H., & Yang, Y. (2019). Neighbourhood walkability: A review and bibliometric analysis. Cities, 93, 43–61. https://doi.org/10.1016/j.cities.2019.04.015
- Wood, D. (2010). Lynch Debord: About Two Psychogeographies. Cartographica: The International Journal for Geographic Information and Geovisualization, 45(3), 185-199. https://doi.org/10.3138/carto.45.3.185
- Yang, C., & Liu, D. (2017). Motives Matter: Motives for Playing Pokémon Go and Implications for Well-Being. Cyberpsychology, Behavior, and Social Networking, 20(1), 52–57. https://doi.org/10.1089/cyber.2016.0562
- Yildirim, C., & Correia, A.-P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. Computers in Human Behavior, 49, 130–137. https://doi.org/10.1016/j.chb.2015.02.059

- Zsila, Á., Orosz, G., Bőthe, B., Tóth-Király, I., Király, O., Griffiths, M., & Demetrovics, Z. (2018). An empirical study on the motivations underlying augmented reality games: The case of Pokémon Go during and after Pokémon fever. Personality and Individual Differences, 133, 56–66. https://doi.org/10.1016/j.paid.2017.06.024
- Zukin, S. (2008). CONSUMING AUTHENTICITY: From outposts of difference to means of exclusion. Cultural Studies, 22(5), 724–748. https://doi.org/10.1080/09502380802245985

## Appendices

Due to the extensive array of materials, data, and supplementary information encompassed within this thesis, the conventional approach of integrating an appendices section within the document proved impractical. As a solution, we have curated an online compilation of appendices, which can be conveniently accessed through the following hyperlink:

https://drive.google.com/drive/folders/1987P6Zr41nmYbgJAWYoHc43I17hNn2NG?us p=sharing

This online repository contains resources relevant to the main content of the thesis. A short structure can be seen in the Table 8.

	Documents	Туре	Anonymised	Access
Landmarks	Landmarks identified in La Latina (Working Document in Spanish)	Excel Table	Not applicable	Open
Preliminary Survey	Survey Summary	PDF	Not	Open
	Software generated report	PDF	Completely	Open
Photos	Photos identified by participants	JPG	Completely	Open
	Processed Data (Working Document in English)	Excel Table	Completely	Open
Messages	Table of responses	Excel Table	Completely	Open
Maps	Original Maps (Hand Draw) Intermediate Maps (Replicated) Digitalised Maps (Final Version)	PDF	Partially	Request access to author
Focus Groups	Transcript FG (Google Maps I) Transcript FG (Google Maps II) Transcript FG (Dérive I) Transcript FG (Dérive II)	PDF	Completely	Open
Own elaboration				

#### Table 8. Structure of the online appendices