WANDER

RECONNECTING WITH SPACE

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MASTER THESIS

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Wander, Reconnecting with Space

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“What the map fails to supply, the human mind (or human yearning) sometimes has the power to conjure.”

Stephen S. Hall (Harmon, 2004)

CONTENT

This project is focused on human interaction with its surroundings and the effect of digital navigation devices in our cognitive understanding of space.

Before smartphones we moved around cities using different kinds of printed maps. We developed routes tailored to our criteria and matched landmarks and signs in the environment with the map. Today, technology has overtaken the role of navigation. We move in the most efficient route, get to our destination faster and turn right or left following the direction of the voice coming from our handheld device. GPS systems update constantly to assure efficient journeys. It would seem like a bright future for human navigation. However, the introduction of these devices has also shaped our interaction with space towards a passive overview of our surroundings. At a cognitive level, several spatial processes are been changed or completely handed over to our smart machines. We disregard and disconnect from space, affecting our performance as navigators and wayfinders. It is not surprising that many people get lost when they have to move without device assistance or when a mistake while following the route has been made. The purpose of this project is to address this problem parting from design and focussing on walking navigation. Furthermore, with this project I would also like to shift the current focus towards a navigation that takes into account spatial active interactions with the environment.

INTRODUCTION

Contrary to many species, humans do not possess any built-in orientation device, like certain birds' magnetic orientation or the sandhopper's sun compass. With evolution, we have lost our internal compass to make way for the desire to explore and to colonize. We travel, discover and conquer places (How Do Animals Find Their Way Home Without GPS?, 2016). In order to make up for that lost ability, **we generate cognitive strategies that can give us a sense of direction**. When we move, we find things that catch our eye and stand out from others and then save them in our internal space representation, called **cognitive mapping**. And we continue linking this "highlighted" points of space with each other in our brains (Golledge, 1992). Additionally, we create tools to communicate our perception of surrounding space.

Everyone moves in space, and in one way or another, explores unknown areas and finds tools and methods to locate themselves in their surroundings or reach a destination. Today our navigation tools are very broad. We can choose to move with a conventional paper map or we can purchase a GPS device or download an app in our mobile handsets.
Given our current times, it's not unusual to assume that the most common methods are the latter. They are perfectly practical. In matter of seconds, a person can know the location

of all places on our globe, can have have route to arrive the destination, estimated time of arrival, in-time information of traffic; he or she can see images of the destination and many more features. Amazingly enough, we get lost while trying to reach our desired location. **It would seem that as features in virtual maps increase,our sense of location diminishes.**

This statement has been the main interest of many researchers who suggest that due to the use and often over-use of navigation platforms, people have been losing some of the main core navigation abilities such as the development of cognitive maps (Burnett G. E. & Lee, K, 2005) and poor reconstruction and memory of the environment (Leshed et al., 2008). One way to look at it is to consider other the use of more spatial engagement tools such as printed maps. However, we can not take a step backward into navigational tool development and ignore the many advantages of the GPS systems. The introduction of GPS and online mapping service also brought a change into spatial language and different practices. This serves as an opportunity to address this problem from the very design of our orientation tools.

"Space" is more abstract than "place."
What begins as undifferentiated space becomes place **as we get to know it better** and endow it with value.

-Yi Fu Tuan

CHAPTER ONE
THE CHALLENGE

As previously stated, there is an increasing need for tools that respond to the way we understand space. This thesis is focused on creating the spatial behaviour of tomorrow through the platforms of today. Due to this, the challenge question for this project is:

How might we encourage the creation of cognitive spatial abilities in people's interaction with the environment while using digital navigation platforms?

HYPOTHESIS

Engaging interactions spaces-people are less common than ever; spatial abilities in people's minds are being disregarded or not developed. I hypothesize that by prioritizing cognitive spatial processes from the conception of digital navigation devices, we can improve people's interaction with places in walking situations.

MAIN GOAL

To encourage cognitive abilities in people's interaction with space through the development of a digital tool that considers how people process spatial information and move in their surroundings.

PERSONAL MOTIVATION

In order to study graphic design, I had to move from a small 217 km2 town — a little bigger than Dessau — to a big city almost twice as big as Berlin. For the first time, I had to learn how to move in a city. I developed habits and learned to love wandering and walking. I discovered the advantages of knowing the environment. Not long ago, I had to embark on the same journey and fly across the Atlantic to start over in a new city. Maps, one of my passions, helped me find my way through those new cities. I became interested in them during my bachelor studies. I was amazed because **they were the embodiment of human visual conveying of meaning, coding and shaping of the universe**. Maps represented the strong role that visual communication has in society. Mapmakers dedicate their lives to understand the world that surrounds them, and leave their experiences and memories imprint in a visual object. Those two things led me to notice how people survey cities. I comprehended the need for a re-engagement with our surroundings, as I saw my friends getting lost in foreign cities following the advice of an automated voice.

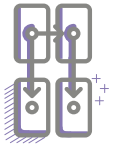
METHOD OF APPROACH

RESEARCH & DISCOVERY

The area in which the project is located and its complexity required me to carry out extensive relevant research on cognitive spatial processes research that would enlighten me into the details of the problem and its context. This research involved both reading and findings and a field experiment. This would enable me to discover and understand how people create spatial knowledge.

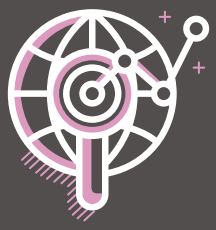
ANALYSIS & IDEATION

After having examined the current state of the problem —spatial knowledge acquisition processes and the impact of digital navigation systems on spatial knowledge processes —I started the ideation phase. In this phase. I came up with different ideas that responded to the problem.



CONCEPTUALIZATION

Subsequently, I collected those ideas, filtered them into a consistent design concept. Afterwards, I developed a mental model and conceived a set of features that were tested later. Finally, based on the mental model and the features, I created an identity for the app.



CHAPTER TWO
RESEARCH INQUIRIES

In order to recognize the problem and comprehend the aspects that entangled humans and space, it became necessary to formulate questions that directed my project. I will attempt to answer those questions taking the approach of Behavioural Geography, a discipline that pursuits to understand the interaction individual-place by analyzing data and behaviour of people (Montello, 2015)

- How do humans acquire and process knowledge of the space that surrounds them?
- What makes a landmark, a land mark?
- What is cognitive mapping?
- How can we understand Navigation and Wayfinding? And how is its differentiation is important to the project?
- What are the differences between learning spatial knowledge through digital navigation devices and conventional maps?

How do humans acquire and process knowledge on the space that surrounds them?

As said before, I will review concepts that belong to behavioural geography. One of the most known models for spatial cognition is **Route-Landmark-Survey Knowledge** — Proposed by Siegel and White in 1975. This framework explained spatial knowledge as steps in a process. From the landmark knowledge until survey knowledge stage (Labate, 2014) However, the categorization as a process with stages was later contradicted by many researchers and has remained more accepted (Newman et al., 2007 and Labate, 2014)

From early childhood, every person starts to develop spatial knowledge abilities, necessary to orient us without any natural compass. It is one of the most basic forms of survival ability (Labate, 2014). Recognizing places, distinguishing them from one another, linking place to place in our brains, putting places into order are some of the capacities that are crucial for human movement (Golledge, 1992). Many studies concerning how to obtain strong spatial knowledge have been made. In its most basic form, every humans is capable to develop knowledge of places through experience. As we grow and move from simple to more complex environments, we realize differences in objects in space. We use those differences to make hierarchies. Essentially, that is the way in which we make sense of space. When we

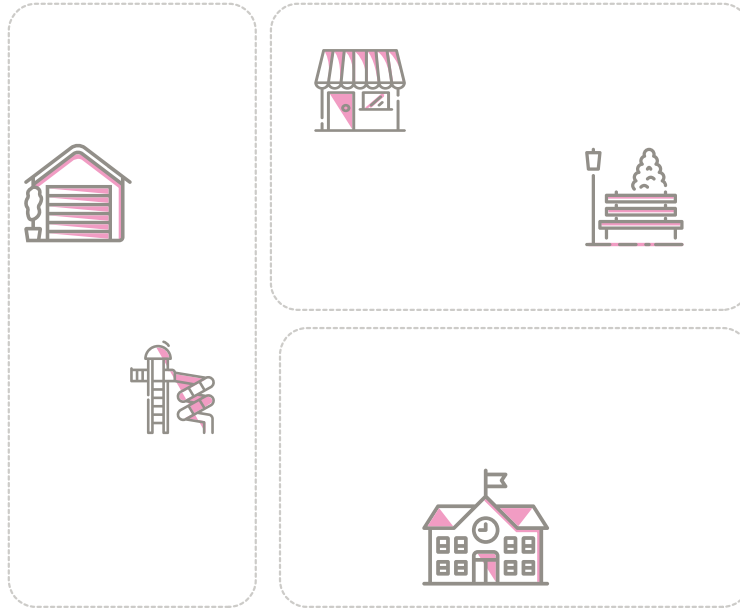


Fig 1.
Landmark knowledge

experiences places, we find things that attract our attention. For example, when arriving in a new city, we will try to find things that stand out. Perhaps we see a church, a park, the city hall or a tall and curious building. We pay attention to its location and save it in your mind. These saved locations are known as “Landmarks”. We do this so often, that if we do not find things like a church or some shop, we look for the next thing: marks on the sidewalk, a small graffiti or a curious doorbell, anything that gives us a sense of location. (Golledge, 1992). **The declarative or landmark knowledge** — also known as landmark information — is the memory of these locations, as well as, those of the boundaries and areas that belong to these landmarks such as neighborhoods and regions. (Golledge, 1992) We make use of these knowledge every time we experience again this space, or when we try to recall the data from these locations.

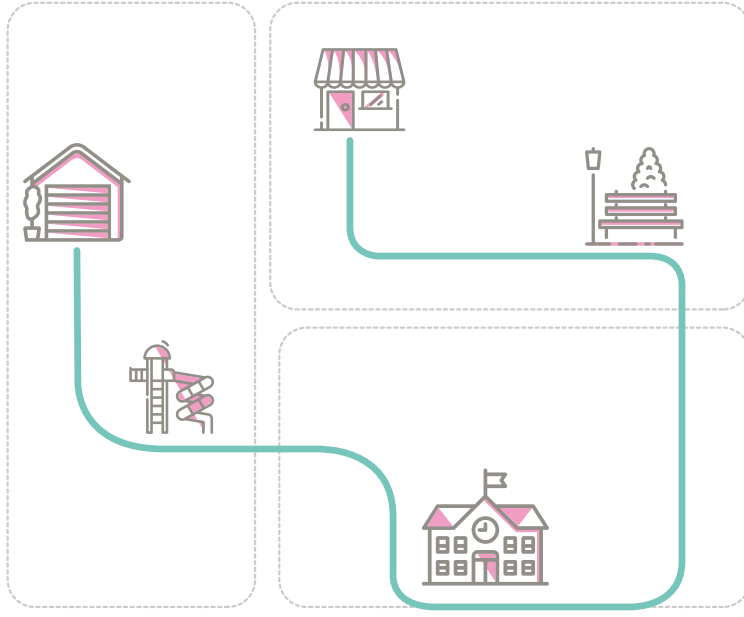


Fig 2.
Route knowledge

However, landmark knowledge is limited to knowing locations but not to relating this locations spatially one to another (Stern and Leiser, 1988). That is why additionally to this internal inventory of places, in order to make sense of space, we link landmark to landmark together. We learn the paths and direction that take us from the post office to the local church, as well as the way these points of space are associated. We also organize and give them hierarchy . **This is known as procedural or route knowledge**, an associative memory process that helps us link the places we saved in our brains into organized information strings. Such strings can be internal rules to decide which path to take or how to make coherent stops along the way to a destination. (Golledge, 1992).

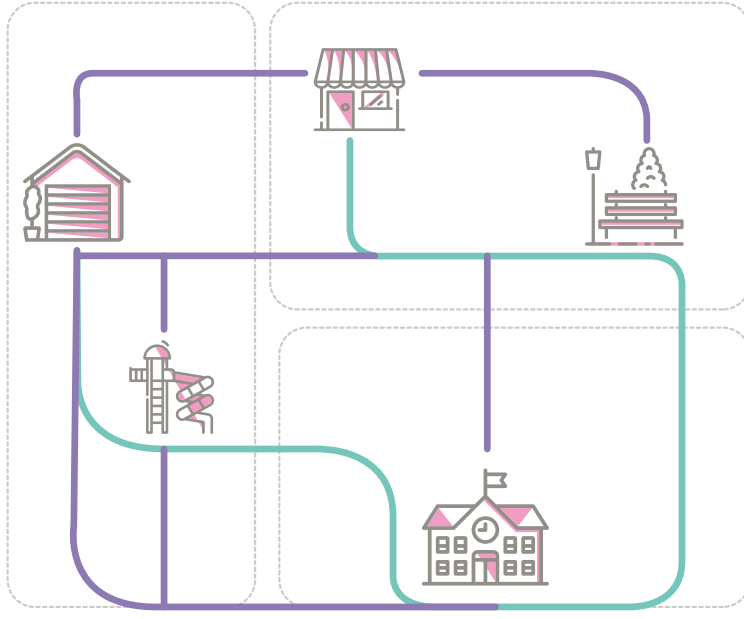


Fig 3.
Survey knowledge

"*Survey level of knowledge* means that the individual has acquired a proper spatial understanding, and comes to think of routes as links between locations, rather than as temporally ordered sequence of direction choices"

-Richard William Byrne

(Memory for Urban Geography 1979, cited in Stern and Leiser, 1988 p 142).

With this set of spatial knowledge, an individual can move along the recognized space, trace paths and achieve a successful journey to a known destination.(Golledge et al, 1993, 3) However, beyond these components lies another kind of spatial knowledge addressed as **survey or configurational knowledge** — also referred to as layout information. It refers to the acknowledgement of the properties of a space to understand the way landmarks are placed as well the consciousness to give map form to both landmark and route knowledge. (Stern and Leiser, 1988,). In other words, route knowledge represents the process in which each landmark integrates to other landmarks — and for the matter of this project — in a city grid.

Let's say we already are familiar with the downtown area of this city, we already know the church, the post office and how to get from those points fairly well. We recognized that the city is made in a circular shape, every street in the same neighborhood is named within some pattern, main street could take us to the end of the city even though we have never been there. This is survey knowledge. In order words, it consists with the integration of every piece of information we have and the inferences we can do with it. Survey knowledge is regarded as the strongest type of human spatial understanding. (Golledge et al, 1993) Planning routes between unknown places, integrating this unknown place into his/her spatial information structure and precisely estimating directions and distances are some of the abilities seen in people with high survey knowledge. (Burnett and Lee, 2005).

These forms of spatial knowledge do not correspond to stages in a process, as said before. We don't create landmark knowledge and then proceed with route to achieve survey knowledge. Instead they appear together in different levels in a quantitative and qualitative manner. How many landmarks we know or how deep our level of routes is are taken into account when evaluating spatial knowledge. As well as the means in which the information was acquired. If it's by direct exploration of the environment or if it's through indirect methods like virtual travel or studying a maps. (Burnett and Lee, 2005).

What makes a Landmark, *a Land -Mark?*

One of the main core concepts throughout this project are landmarks. Because of this, it is important that I establish what will be considered a landmark and how research led me to that understanding.

As said, Landmark Knowledge is the memory for points in space and the differentiation between them. However points can become anything when talking about space, from a shop to a tree. As this project considers city environments, the landmarks will be related to elements within this scene. But again, landmark becomes a broad participant. Kevin Lynch in The Image of the City explores the way in which we build "environmental images of the city". According to Lynch, the environment gives hints of distinction between its components and the observer process that information and creates a mental picture. This image of the place depends of each individual. However, groups of people share substantial similarities. (Lynch, 1960) Then, **a landmark is a image that represents a place of which we have experience that differs with other places in the same environment.** Furthermore, what makes it a landmark depends on the person that develops the image. But similar images can be developed in a group of people.

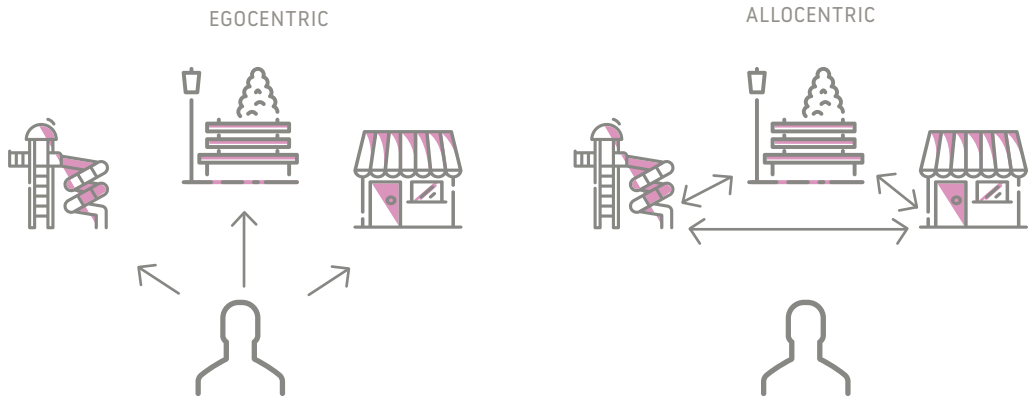


Fig 4.
Egocentric vs Allocentric representations

To understand how the spatial memory of these landmark takes place, it's necessary to examine two processes that help knowledge of spaces: Person-to-person and object-to-object relations (Golledge et al., 2000) The first imagery stored in the realm of spatial memory in individual's mind is the **egocentric representation** of a landmark. This imagery represents the relation self-to-object, or self-to-landmark. In other works, it's the recognition of the location of the landmark based on the position of oneself. The first image we have of the place when we have experience with it. The other spatial memory image is the **allocentric image**. It refers to the location of this landmarks in space, with relation to other landmarks. (Burgess, 2006 and Klatzky et al., 1998)This images aid to construct what is called a Cognitive Map.

What are Cognitive Maps?

After discussing the the several forms of spatial knowledge, the way they are acquired, and that they work simultaneously in different degree on people's mind based on their experience with space. As well as, the nature of landmarks. It becomes necessary to understand "cognitive mapping", a more known concept but equally valuable for this project.

Cognitive mapping or cognitive maps consists of "the internal representation of experienced external environments, including the spatial relations among features and objects" (G.Golledge et al., 2000) This mechanism feeds on that spatial knowledge and co directs our decisions in space. In other words, cognitive mapping is the process in which we give shape to objects in space, in order to construct a mental spatial representation — a Cognitive Map. Whether it takes map form in the mind is unclear. However, what is established is that objects and spaces are translated in place cells and allocated in the brain. (Lowry et al., 2016)

After a couple of interactions in an unknown place, people will start forming connections. Our brain begins to code parks, streets, paths we have taken, signs we have seen, and others. Landmark, route and survey knowledge are correlated

in our head. If someone asks us a location of a place in this area. Perhaps where our house is located. We would recall this information, and communicate nearby locations and connections. We could probably tell people that our house located after crossing the train tracks or right next to the local post. We would be able to draw a maplike representation, if necessary. Basically, a cognitive map is what we recall when talking about landmark-route interactions.

A cognitive map is the integration of landmark, route, survey knowledge and egocentric and allocentric imagery of the space, coded in the language of our brains.

Furthermore, cognitive maps have also being studied to analyze how it helps individual's spatial problem solving. Many researchers suggests that a good cognitive map supports its user to succeed when navigating. As said by Gary Burnett and Kathryn Lee:

> *"... a well-formed cognitive map provides a wider transport efficiency and social function, since it empowers a person to navigate for others, for example by providing verbal directions as a passenger, pedestrian, or over the phone, sketching maps to send in the post, and so on. Further issues of interest relate to how the content and accuracy of cognitive maps"* (Burnett and Lee, 2005, 1).

It is due to this, that it becomes important to look at cognitive maps when talking about spatial interactions. Cognitive maps provides us the basic knowledge to move from one to another and to communicate spatial knowledge.

“A variety of guidance instruments and materials are available for human wayfinding. Nevertheless, humans tend to use cognitively stored and recalled information more than these supplementary aids.” (G.Golledge et al., 2000, 94).

According to this, we rely on cognitive stored information more than maps. Or we used to rely on them. Advances in technology have modified drastically the way we communicate and interact with space.

How can we understand Navigation and Wayfinding? And how its differentiation is important to the project?

Navigation and Wayfinding have often been used as synonyms. Being Navigation a more known term. They are indeed related concepts. However, in this project it's necessary to address the distinctions between the two words.

Navigation can be understood as the process of choosing a course, and moving following the direction of that path using a set of tools — maps, compass and others — (Golledge, 1992, 205) Namely, this term is specifically used to meant the actions in which people find their way through a selected route — decisions of speed, choosing points to change direction among others. Navigation becomes the process that involves movement and is more on the task of reading instruments for guiding a vehicle. (Golledge, 1992, 206)

Meanwhile, **Wayfinding** refers to a cognitive process. To be more exact, it refers to an action of acquiring knowledge of a place through experience. In short, whereas Navigation considers successful travelling — moving from point A to point B — Wayfinding contemplates the knowledge acquired while navigating or just when moving in space. It signifies the individual movement of searching one's way in an environment (Golledge, 1992, 205 - 206)

Paul Symonds, David H.K. Brown and Valeria Lo Iacono take a holistic approach to Human Wayfinding, defining it as an :

> *"a socio-cultural and embodied activity, which will allow us to create connections and generate ideas that will shed new light on how people find their way."*
> (Symonds, Brown and Lo Icon, 2017)

The current document acknowledges that the process calls for an understanding of cognitive human information processing. This line of thought adheres to Golledge's argument (1992) that suggests humans do often not take into account least effort, short path or are distance minimizers. There is much richness in the processes that lead to wayfinding decisions. In fact, this project finds a solid ground into differentiating Wayfinding and Navigation. And promotes the searching of cognitive and sensorial navigation tools.

What are the differences between learning spatial knowledge through digital and conventional maps?

As the world transitioned from paper to digital navigation devices, the wave of research followed. The direction of search has been aimed to improve GPS system, automazing and developing automatic and smart aids that facilitating human navigation. (Golledge, 1992, 206) Studies focused on topics such as whether an interface should include voice or how to improve the initial experience with the machine, and other set of design guidelines that emphasizes on minimizing the navigation tasks for the user. (Burnett and Lee, 2005, 2) Crucial to improve user experience but not important in spatial knowledge acquisition.

Much in this paper has been said about how we understand space and process environmental information. Also, the impact of digital navigation devices has been briefly mentioned. To counterbalance the research emphasis discussed before. A different approach on user interaction with spaces has not long emerged. This research line considers the way in which our spatial knowledge acquisition has been affected by the introduction of digital navigation devices. Studies following those thoughts will be taken into consideration in order to answer the question :

How exactly do navigation devices affect the human spatial knowledge acquisition?

First, it's necessary to address the differences between navigation devices and conventional maps. We have all experienced navigating with printed maps. An individual matches physical landmark with the ones on the paper in order to locate oneself. This is accomplished through observation of the environment. Then, one can choose a destination and a path to follow based on a criteria that suits the individual the best. What there is left is to keep updating and matching physical and map landmarks until arriving at destination. Navigation with GPS devices is different. An individual — as soon as he accessed the device — is informed of his or her current location. Next, the individual inputs the desired location and is advised with a path to follow and direction that lead that path. The mechanisms of digital map interfaces are programmed to analyse a map through a set of logarithms and provides a route that suits a established criteria. He continues following direction until arriving at destination. As seen, landmark or survey information is not mention. In the case of navigation devices, is unnecessary. But how does that impact the way the user understands information?

In 2009, a group of researchers conducted a set of experiments comparing conventional map users, digital map users on spatial knowledge acquisition. They evaluated the spatial knowledge acquired by groups of people that had the same experience with a certain place but were given different tools (printed map or digital map) in an urban setting. Both group of participants were asked to learn a map. Later, only a group of participants review

the environment through navigation with a mobile device. The most relevant finding of this study for the matter of this thesis is that the researchers also found that digital map users had created different mental processes that relate to memory. Even though both maps were similar, the fact that the delivery of the map changed, also modified people's spatial abilities, e.g. individuals using printed map were able to relate space as a whole and locate landmarks while digital map users linked salient landmarks that were close to each other. They also found that mobile map users had worse performance in estimating distances showing poor metric knowledge and acquired simultaneously landmarks, survey and route knowledge. However, they performed similarly good as the map participants estimating orientation. (Willis et al., 2009)

Due to this, we can infer that platform changes also affect the individual's experience with space from a cognitive and sensorial level. Both of the groups achieved spatial knowledge but in different ways and in different degrees.

One of the conclusion of the experimenters was that the graphics of the platform were not a considerable factor in the results. Instead, the researchers concluded that when navigating and space there is a level of attention needed to acquire relevant location memory. So **a mobile map encourages its user to switch off and become a passive navigator**. It's because of this that the current platform does not support a significant learning experience (Willis et al., 2009)

Another similar study shown that individuals who used navigational assistants such as GPS devices or digital map interfaces showed good route knowledge but insufficient survey knowledge. Whereas individuals who moved around using maps had good survey knowledge and nearly perfect route knowledge. They argumented that navigation systems do not require users to encode and memorize information resulting in poor spatial knowledge. (Münzer et al., 2006) Cornell University took more passive environment and evaluated the way people navigate using in-car digital navigation devices. Through a series of interviews and in place observation, they examined the people's practices in relation to GPS devices. Researchers accompanied GPS user through multiple car drives. They studied their practices, experiences and habits when driving. They evidenced that the user no longer needs to know where he or she is in space, or has to pay attention to physical landmarks. With navigation assistant the user has lost the need for environmental engagement. (Leshed et al., 2008)

In brief, the way navigation devices' functionality has changed the way individuals acquire information. First, it eliminates things to pay attention to. One does not need to match environmental cues or landmark. The device has already given

the necessary information. This feature modifies and affects landmark knowledge acquisition. This also gets in the way of spatial memory. A navigation device user learns paths and routes but fails to learn landmarks and link those landmarks in a layout setting. Navigation devices do not encourage users to make spatial connections. While a navigation user has a bigger scope of information related to the environment, the device and the way that is designed fails to attach importance and meaning to the surroundings. Currently the focus is completely in origin-route-destination.

EXPERIMENT

Getting Lost in Dessau

In order to test and understand first hand the differences between exploring an area with printed maps and digital navigation tools, I developed an experiment. In this exercise, two groups of people were needed.' City newcomers' — one month in the city — and 'city familiars' — a year living in the city. The city newcomers were guided blindfolded to a place within an expected unknown area by me or a city familiar. The locations were shared before hand with the participants familiar with the city. As well, they were asked to take pictures of the events. Then, they were asked to arrive to a different places using three set of tools. A line map (mostly layout information), a city map (both layout and landmark information in a higher complexity level) and a navigation app. A week after the initial exercise, the participants will again be guided to a location within the paths taken before and asked to arrive to a destination without any guidance or tools.
(Further information in Annexes)

G O A L S

The goal of this experiment was to have in-depth information on participant's:

- Location Memory
- Time to reach a destination using different maps
- Path/Route creation
- Spatial Knowledge
- Cognitive Mapping
- Usability
- Map readability in terms of:

    Map Design (colors, shapes, signs and symbols)
    Complexity
    Interpretation
    Platform

FINDINGS

- The navigation app proved to be the mechanism that took participants faster to their destination. This could because the app will give them the path in a faster way than when the participants had to recreate it in their head.

- None of the mechanisms proved remarkably different in terms of memory creation. However, the participants accomplished an understanding the area instead of learning paths. There is not a way to evaluate to which tool this achievement can be regarded.

- None of the participants made use of the application's guidance mode. This could be attributed to the fact that the guidance mode was an extra step and that they were receiving guidance even without it.

- All participants that were familiar with the city had no previous knowledge of the area in which the experiment took place. They were pleasantly surprised with the discovered area. Some of the pictures taken were completely unrelated to the experiment, but instead to the neighborhood they visited.

In conclusion, this experiment helped me understand some of the problems that happen when using an navigation app. Furthermore, it allows me to better comprehend the user's mentality when exploring an unknown location.

All the participants were relaxed they enjoyed the view and had fun while discovering new places. They became explorers and made memories of the places.

CHAPTER THREE
IDEATION

BRIEF

Once I had comprehended the main points of human spatial knowledge acquisition and its functionality, as well after figuring out how new platforms have affected our interaction with space, I understood the direction of that my project should take.

I aimed to develop a navigation platform, directed to people arriving in a new city, who explore cities while walking that would encourage them to use their cognitive abilities to acquire spatial knowledge. That would serve as a training tool to know and locate people within this new city.

"I want to create a tool that - like the training wheels when learning to ride a bicycle - would help develop spatial knowledge acquisition habits. And after having served its purpose, it could be deleted from the user's phone, and be the first push for him or her to wander in this now known city. After all, learning how to ride a bike is not be forgotten"

CONCEPT

Current digital navigation tools are focused primarily on navigation alone. They take you from A to B, without any additional information – just guidance. The features amongst these tools vary, but they all share a similar underlying framework. You choose a destination, select a path, and follow it blindly. However, as mentioned by Reginald Golledge:

> *"This is not how humans find their way through known or unknown environments [...] wayfinders are not generally least effort, short path, or distance minimizers"*
> *(Golledge, 1992, 206)*

There is the need for an app that helps users understand and try different paths that go from A to B. They have the option as well to discover C, D and E along the way. Essentially, the user is able to comprehend the city in new ways as different paths are revealed and presented. This comprehension is achieved through the recognition of various landmarks, since they are a key component to human spatial cognition processes. In addition, it has been proven that landmarks are stronger markers in people's minds than the streets or layout of a city. (Newman, 2006)

"From a perspective of technological determinism and cultural pessimism we would interpret this observation of altered practices as manifestations of an inevitable loss of engagement with the environment. Dourish instead encourages us not to look at space as pre-given, but to recognize both space and place as "products of embodied social practice". As the introduction of new technologies generates new practices, new forms of spatiality arise, with new opportunities for engagement with the environment."

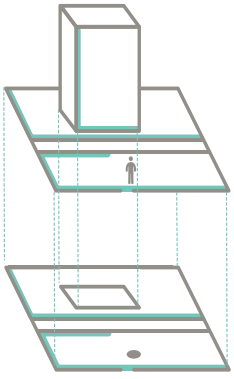
> Leshed et al. on Dorish approach to engagement with the environment and technology change.
> (Leshed et al., 2008)

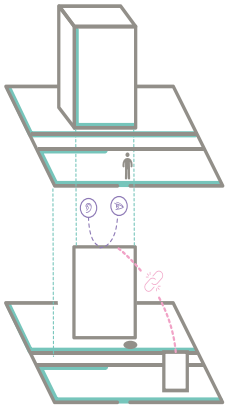
DEFINING TARGET GROUP

I decided to focus on people that have just arrived in a new city. Because, as they are newcomers and they have little to no prior knowledge of the city. They are more likely to get lost and to use navigation devices to move around. I see the opportunity in this target group for engagement and participation with the environment of this new city. Furthermore, I am also concentrating on the act of walking as the main locomotion the landscapes of the city, enhancing the chances for first hand spatial knowledge.

"When I'm walking, and hear or have an idea, the very act of walking helps me to embody it. Some of the landmarks on my walks are for ever associated in my mind with the ideas I had when being near them, and these then shape the way I see certain places. It's not only the talks I have when walking in the city that are instrumental in forming my feelings and thoughts, but the very buildings and streets that leave their impression upon me." (Taylor, Perry and Sandhu, 2017)

MENTAL MODEL



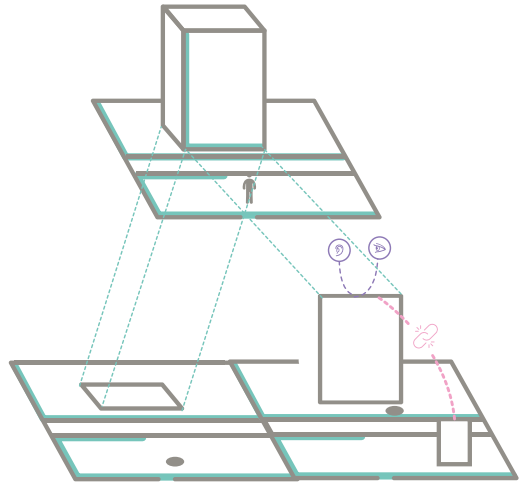


Maps of any kind are, after all, translations from a perceived space to a set of lines. They are made by a mapmaker that takes things from the environment, interprets them and draws them. In order to make its audience understand the space. This process led me to conceive this mental model inspired by Charles Pierce's Triadic Model of The sign (Klinkenberg, 2006)

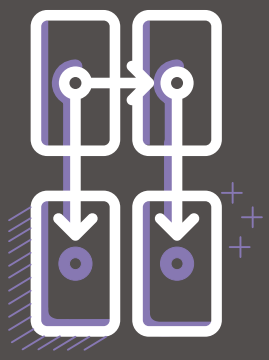
— First, we take the **Space That is Being Perceived.** This refers to the current state of the environment that happens in the now. An space that is being perceived is also the update of the translated space.

— Then there is the **Translated Space**. It to the final outcome of the interpretation of the space by the map maker. It also refers to the approach on the space that the map maker took.

— A similar process is made when an individual makes a cognitive map. He or she perceives a space and translates it into the knowledge of his or her brain. However, the individual not only translates the perceived space but also **links other type of relevant information** to this mental map. Every encounter with the space will fire an update to setting of his or her mental map.



That is why mental model of this project encompass both of processes, simulating wayfinding and navigation. As well aiming to stimulate personal translation of space, for its user to link explored landmarks and routes together in order to obtain survey knowledge.



CHAPTER FOUR
CONCEPTUALIZATION

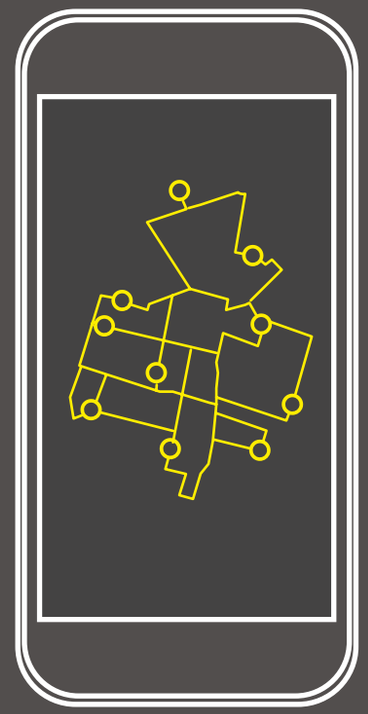
Funtionality

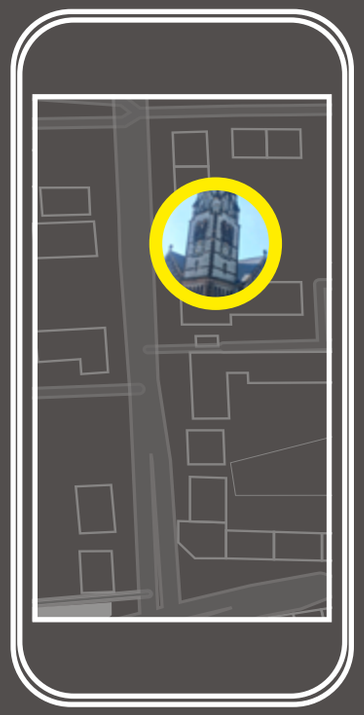
As pedestrians wandering through these different areas, they can begin to recognize landmarks. As they walk, they can refer to previously saved landmarks or paths to get a better perception of their point compared to past locations. Through exploring these different areas and recognizing landmarks, users will have a more memorable recognition of a city or place they are spending their time in as newcomers.

Wander is an app intended for people who are new to a city and wish to explore the space on foot. Its features include:

COGNITIVE MAPPING

This is a set of paths and landmarks that the user has explored and is familiar with. This will allow the user to remember and create an image of the city, through saving and tracking previous paths and landmarks. They will also understand the location of unknown areas based on what they have explored.



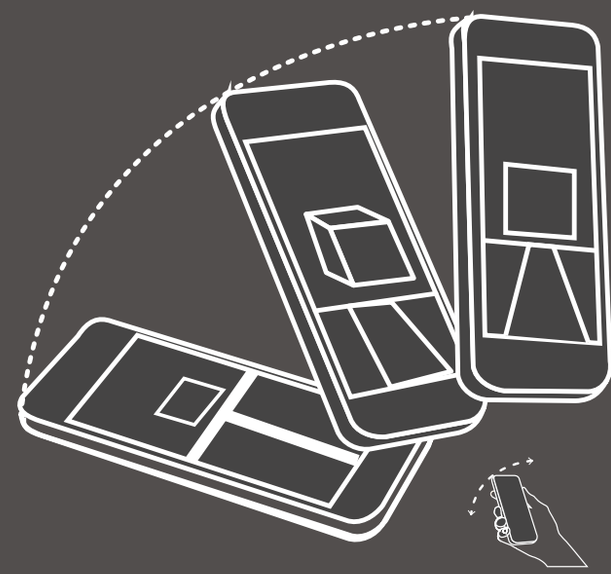


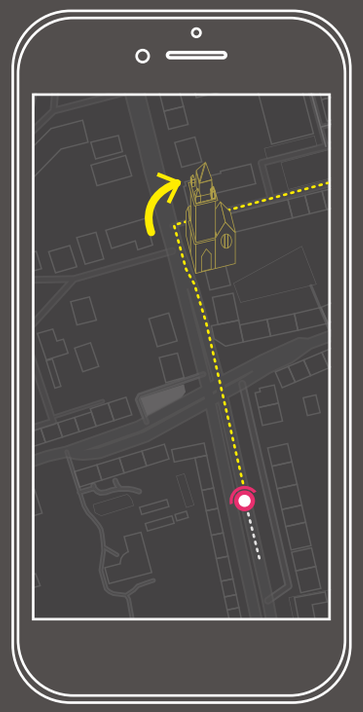
PICTURE LANDMARKS

The app processes every picture taken outdoors, and incorporates it into the cognitive map. It allows the user to have a better memory of places.

VIEW CHANGER

The perspective of the view can change based on how the mobile phone is held: relating to surroundings and improving upon place recognition.

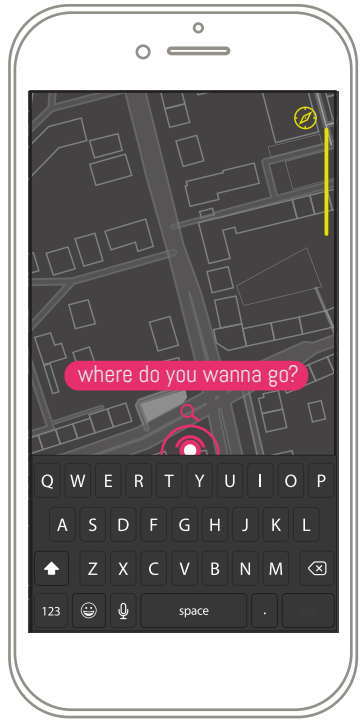




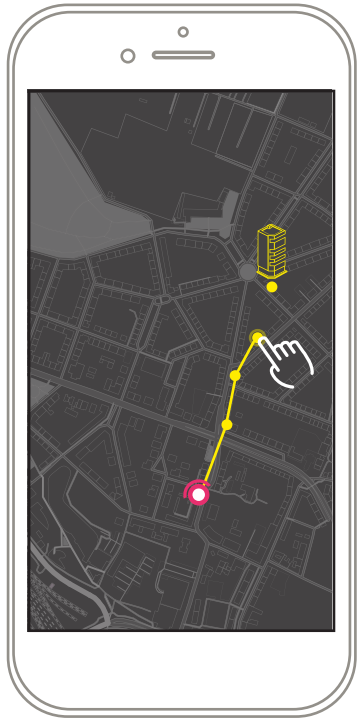
LANDMARK GUIDANCE

The app uses landmarks to guide the user through the city. This will improve the user's knowledge of landmarks, their location and relation within the city grid.

LOCATION INDICATOR



In the experiment made (see annexes), one participant had the hardest time when using the digital navigation interface because she couldn't locate the direction of herself in space. Due to this, Wander has a position indicator that unlike the usual arrow head icon does not suggest a path. But in contrast to the usual circular shape, it goes beyond being only a position indicator but as well a direction indicator.



Landmarks, as said, are the instruments in which the app is based. That is why, when setting up a route, the user will select the path based on landmarks in space. Similar to joining points together.

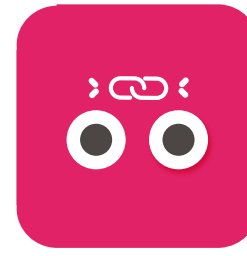
LANDMARK LINKING

COGNITIVE PROCESS

WANDER

IDENTITY

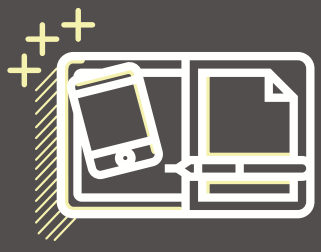
It was important for the project to receive a name that embodied the essential motivation and components communicated in this paper. The word 'Wander' shares many elements that I wanted to convey: exploration, journey, locomotion, unexpected discovery and an indifference for a destination. It was because of this, that I have chosen this word as name of the App.



visit

ankudesign.com/wander

To get more information of the project



CHAPTER 5
CONCLUSIONS & RECOMMENDATIONS.

"[...] we need to rethink the larger context of GPS use, the ways we organize our daily lives in urban and suburban environments, the role we want automobiles to play, and how we may foster alternative experiences and practices that favor unmediated contact and skilled engagement with our environment."

(Leshed et al., 2008

All the research, experiments and analysis shown that human spatial cognition processes were being disregarded due to the practicality of navigation devices and apps. Eliminating things to pay attention and making human cognition unnecessary and slow compared to a machine's logarithmic analysis. As a result, the user becomes passive when engaging with his or her surroundings altering the way humans interact with space. The focus of app development has gone into improving its features, obtaining more information about the local business and giving its user less things to worry about. Instead, the result of this project and this app present a shift in focus and are a step towards a digital interaction space-user as opposed to short term effectivity. The app, from its conception, aims to encourage human recognition of the environment through technology. The main features and functionality of the app encourage the interaction of the space-user. However, further testing to prove its effectivity is in order. To further develop and improve the app, more testing is advised. The app's main features should be programed. It would be ideal to have a possible user test the app for the term of a month and receive feedback.

ANNEXES
EXPERIMENT SUMMARY

ABOUT

The experiment called "Not Getting Lost in Dessau, I hope" was developed using the help of 6 volunteers. Three of them have not being living in Germany for more than two months. This group will be called "Participants" throughout this document. The remaining three have being familiar with Dessau and Germany for a year. Referred as "Instructors". Each member of the first group was pair with a member of the second group. All of them were given a bag whose content vary for each group. (see Table 1)

Bag Group 1 (Participants)	Bag Group 2 (Instructors)
Map Number 1	Map Number 2
Instruction Manual 1	Instruction Manual 2
Candies	Pen
	Candies

The Pairs were assigned as follow.
(Participants and Instructors)

Bárbara, Colombia and Andrea, Colombia.
Tiago, Brazil and Latika, India
Alberto, Argentina and Adrian, Colombia.

PHASES OF THE EXPERIMENT.

The experiment is divided into 2 phases called Map Phase and Memory Phase.

MAP PHASE

Duration: 2.3 h

The purpose of this phase is for the participants to get familiar with the place and to use the three different tools at their disposition. This Phase was divided into three stages divided to referring to the three maps the participants were using.
All the volunteers were asked to arrive to the Bauhaus building in the University.

PROCESSES IN EACH STAGE

Orientation. First volunteers will have to establish where they are. They will attempt to determine their locations and objects that may be nearby. For this purpose they are asked to mark their guess on their current location with a flag in the map given.
Route decision. After having themselves located in a map, they will select a course of the preference
Route monitoring. The volunteers will be recorded. As well as how will they monitor their way. How do they know they have been following the right destination.
Destination recognition. The volunteers know they have arrived the destination.

STAGE 1. Linear Map

The Instructors were asked to lead the participants to the location on the Table while being blindfolded to assure that they were unaware of their surroundings and their own location. The instructor ask the participants to use the map that was inside their bags. (Map 1) They were also asked to mark their initial location after they had figure out where they were.

Bárbara	Alberto	Tiago
Am Beckerbruch 40 06846 Dessau-Roßlau 51.851472, 12.227334	Windmühlenstraße 53 06846 Dessau-Roßlau 51.850639, 12.217227	Bodestraße 23 06846 Dessau-Roßlau 51.845586, 12.216984

Description of the Map:

All maps are used from a bird's eye view (aerial imagery). Only the walking area and areas closed by are illustrated. The rest of the city is omitted. The first map is a linear basic map. The streets names are located next to line that represent each street. Bike paths and walking paths are omitted. Street lines are simplified to straight lines. Each turn is either 90° 45° 35°. Colors used are strong flat colors. The image is simply and very little detailed. No cardinal points are put on the map.

Each map was personalized for each participant with a written name on a corner and a flag with their destination. As follows.

Bárbara	Alberto	Tiago
Windmühlenstraße 53 06846 Dessau-Roßlau 51.850639, 12.217227	Bodestraße 23 06846 Dessau-Roßlau 51.845586, 12.216984	Am Beckerbruch 40 06846 Dessau-Roßlau 51.851472, 12.227334

PRELIMINARY FINDINGS:

Two of the participants took 19 min in Stage 1. Even though both distances were different. One participant took 30 min in Stage 1. All of the participants developed a routes with the map. As Participants were unfamiliar with the destinations. All of them hesitated when arriving and recognizing the destination.

Time:

Bárbara	Alberto	Tiago
19 min	19 min	30 min
1,4 km	1,6 km	*

*The participants forgot to record their location. The distance are unknown

S T A G E 2 . Open Source Map

After having reached the destination. The instructors handed to the Participants the map that was inside their bag while taking the first linear map. The second map is very detailed. It pictures houses, streets and paths in a way in which they are closely similar to reality. Footways are displayed with detail. Stores are depicted with signs and symbols. No cardinal points are put on the map.

The Next Destinations are as follow:

Bárbara	Alberto	Tiago
Bodestraße 23 06846 Dessau-Roßlau 51.845586, 12.216984	Am Beckerbruch 40 06846 Dessau-Roßlau 51.851472, 12.227334	Windmühlenstraße 53 06846 Dessau-Roßlau 51.850639, 12.217227

P R E L I M I N A R Y F I N D I N G S :

Barbara found the transition between the first linear map and the second more complex map really difficult. It took her more time locating herself in space in this stage. However, Alberto found the second map the most useful out of the three tools.

Time:

Bárbara	Alberto	Tiago
14 min	14 min	15 min
1,6 km	1,4 km	*

*The participants forgot to record their location. The distance are unknown

S T A G E 3. Google Maps

Instructors handed their phones with a locations to the participants. They also informed them that they were allowed to use all the features availables which include:

-See your current location
-Create/trace a path to arrive destination
-Move the map

The next destination:

Bárbara	Alberto	Tiago
Gropiusallee 81 06846 Dessau-Roßlau 51.842993, 12.224034		

As all of the participants had the same destinations, it was expected that the process “Destination Recognition” was easier in this stage

PRELIMINARY FINDINGS:

Alberto refused to use his phone during the last stage. Tiago found it unnecessary since he stated that he was familiar with the place already. For Barbara, following the directions of Google Maps was hard. It took her time to locate herself on both the space and the platform.

Time:

Bárbara	Alberto	Tiago
10 min	12 min	13 min
800m	1,4 km	1,3 km

The Map Phase took place Friday, 26th of Abril,2017.

PRELIMINARY FINDINGS
OF MAP PHASE

I assumed that mobile navigation system will be the fastest tool. But in a long term will be the route the volunteers forget more easily. After having conducted the Map Phase, it was confirmed that Google Maps was the fastest tool in terms of time. However, there are some considerations to take into account. First, the participant Alberto did not use the tool. Barbara perform worse compared to the estimated time. She was the closes to the location but it took her more time than the rest. She also struggled realizing her own location in the platform. She couldn't perceive the dot as herself. Because of that, she hesitated and advanced in different directions not following the navigation device. For Tiago, he felt that he could accomplish the task without Google Maps help since he was already familiarized with the space after having completed stages 1 and 2. However, he did use it but referred to it little.

MEMORY PHASE.

Duration: 45min

The purpose of this phase is to proof the participant's memory as well as which tool remain in their memory the most. Other goals of this phase is to research the participant's strategies to move/remember/arrive to destination without any tools. Relaying only in their senses alone.
rop them just where they were.

The volunteers will drop the participants in the same place as they did in the Map Phase. The participants will be asked to arrive to the final destination as the previous phase.

LOG OF THE EXPERIMENT

Based on today's results, I can assume that the participants even though they all executed the same procedures, obtain different types of spatial knowledge. This could be regarded to the different strategies each of them had when performing in the experiment.

While Barbara chose to follow an important street in the directions she felt the most accurate, Tiago remember places. According to him, it was easy since he had developed memories on the places based on pictures taken during Map Phase.

Barbara as well mentioned that she had remember the linear map better since it was the most simple but she couldn't

remember any snapshots during the path. Which make sense since every place she walk was new to her. Results would be different if she would have been dropped some place else. The questions by the end show that TIago did a conscious path selection. He located himself in the space and have distinctive location strategies. He mentioned that he had acquired them while living in his previous city.

Both participants mentioned that the use the computer or phone to plan their journeys during cities. Tiago mentioned that he did this specially when he goes alone.

One aspect to highlight of this experiment is that all the participants were relaxed and they enjoyed the view and had fun while discovering new places. Specially in the Map Phase. They became explorers and made memories of the places. In Barbara's case, she remember the park the most of the places she visit. She did not pay attention to street names and everything looked pretty familiar and as well unfamiliar. For Tiago, while he watch the map in stage 1 and 2, he realized that all street names had something in common realize patterns and differences in streets in the neighborhood. This specially helped him trace a way in Memory Phase.

I assumed that Barbara would took the long path that she used to take in Map Phase for Memory Phase, since she would follow the familiar track. However, she chose to follow the big streets and randomly chose a direction. She arrived to the location by coincidence. When asked about her decisions, she said that she

remember the first linear map the most but was hoping to find the park where she got lost in a different place.

For Alberto, as he was told to arrive to Gropiusalle 23 without any other clue. I speculated he would have had problems remembering where this street was. However, he was able to remember the name of the last street and its location with exactitude.

All volunteers said that this experiment was curious and it became an opportunity to rediscover parts of the city.

The Memory Phase took place the 6th and 7th of May 2017.

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Gloria Andrea Cuellar Tovar
Submission Date: 22 of June 2017

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