NON-VISUAL ASPECTS OF SPATIAL KNOWLEDGE: WAYFINDING BEHAVIOR OF VISUALLY IMPAIRED PEOPLE IN COMPLEX URBAN ENVIRONMENTS

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ABSTRACT

NON-VISUAL ASPECTS OF SPATIAL KNOWLEDGE: WAYFINDING BEHAVIOR OF VISUALLY IMPAIRED PEOPLE IN COMPLEX URBAN ENVIRONMENTS

Everybody perceive space multi-dimensionally however blind people are more conscientious of the non-visual constituents of space. Although there is an extensive amount of research on mobility, perception, and way-finding of blind people, there has been fewer work to show which specific aspects of built environment they focus on and they use as cues in the way they relate to their urban environment. Therefore, this study focuses on the senses of blind individuals during their way-finding process in urban contexts. Two case studies in İzmir, Turkey and Lisbon, Portugal were conducted in large-scale urban contexts. The case study in İzmir highlights the holistic and multi-dimensional perception of space by asking 9 congenitally blind participants to mark those places that they find particularly important in Kemeralti and İzmir Fair Park by verbally describing the features in the environment they attend to. It was found that auditory information was the most used environmental cues and a feeling of enclosure is the most important environmental feature during way-finding. The second case study in Lisbon was conducted with 5 congenitally blind participants to understand the strategies of congenitally blind participants with a focus on whether sounds from the environment are of primary importance for blind individuals. The most important finding is that increased familiarity with the environment, the better way-finding strategies blind individuals have. This study highlights multi-dimensional sensory experience of urban environments and non-visual aspects of spatial perception.

Keywords: Blind; Multi-dimensional perception; Senses; Way-finding; Urban context

ÖZET

MEKANSAL BİLGİNİN GÖRSEL OLMAYAN BOYUTLARI: GÖRME ENGELLİLERİN KARMAŞIK KENTSEL ÇEVRELERDE YÖN BULMA DAVRANIŞLARI

Herkes mekanı çok boyutlu olarak algılar, ancak körler mekanın görsel olmayan boyutlarını algılamada daha titizdirler. Körlerin hareketliliği, algıları ve yön bulmalarına yönelik çok fazla çalışma bulunmasına karşın, çevreleriyle ilişki kurarken hangi ipuçlarını kullandıkları ve nelere odaklandıklarına dair çok az çalışma bulunmaktadır. Bu sebeple, bu çalışma, kör bireylerin yön bulma sürecinde kentsel mekanda kullandıkları duyulara odaklanmaktadır. İzmir, Türkiye ve Lizbon, Portekiz olmak üzere büyük ölçekli kentsel mekanlarda iki örnek çalışma yapılmıştır. İzmir'de yapılan örnek çalışma mekanın çok boyutlu ve bütüncül algılanmasını vurgulamaktadır. Bu vurgulama, doğuştan kör 9 katılımcının Kemeraltı ve İzmir Fuar bölgelerinde bulundukları ortamlarda onlar için özel öneme sahip noktaların özelliklerini sözel olarak tanımlamaları istenerek yapılmıştır. Bu çalışmada, işitsel bilginin yön bulma sürecinde en çok kullanılan çevresel ipucu ve kuşatılma duygusunun bu süreçte en önemli mekansal özellik olduğu bulunmuştur. Lizbon'da yapılan ikinci çalışma, doğuştan kör 5 katılımcının işitsel duygularının yön bulmada öncelikli öneme sahip olup olmadığına odaklanarak katılımcıların yön bulma stratejilerini anlamak için gerçekleştirilmiştir. Katılımcıların çevreye olan aşinalığı arttıkça, yön bulma stratejilerinin iyileşmesi bu çalışmanın en önemli bulgusudur. Bu çalışma, kentsel çevrenin çok boyutlu duyusal deneyimini ve mekansal algının görsel olmayan boyutlarını vurgulamaktadır.

Anahtar Kelimeler: Kör; Çok boyutlu algılama; Duyular; Yön bulma; Kentsel bağlam

To my son, Yaman

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CHAPTER 1

INTRODUCTION

According to the World Health Organization (WHO), more than a billion people, approximately 15% of the world's population, live with some form of disability (Millar, 2008; WHO, 2010). This is a significant proportion of world's population and their life in the urban environment needs to be questioned, discussed, and investigated thoroughly. WHO defines disability as "an umbrella term, covering impairments, activity limitations and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations". WHO's definition suggests a rather complex phenomenon, thus the International Classification of Functioning, Disability and Health (ICF) explains the term shortly as "of an interaction between a person (with health condition) and that person's contextual factors (environmental and personal factors)". ICF instigates discussions on reducing the experience of disability and increase everyone's experience and performance which supports Universal Design idea (ICF, 2001).

On the one hand, in 2006, Convention on the Rights of People with Disabilities (CRPD), which is signed by Turkey at the time, was officially accepted by the United Nations. According to this convention, Article 9-Accessibility, Article 19-Living independently and being included in the community, and Article 20-Personal mobility are some of the accepted articles which underlines the idea that every member of society should equally benefit from all the sources of the society (CRPD, 2006). The contents of these articles are as follow:

> Article 9-Accessibility: "To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas", Article 19-Living independently and being included in the community: "To recognize the equal right of all persons with disabilities to live in the community, with choices equal to others, and shall take effective and appropriate measures to facilitate full enjoyment by persons with disabilities of this right and their full inclusion and participation in the community",

> Article 20-Personal mobility: "To take effective measures to ensure personal mobility with the greatest possible independence for persons with disabilities" (CRPD, 2006).

Before CRPD (2006), there were some discussions and investigations on the rights of disabled people in Turkey. Turkey Disability Survey which was conducted by Turkish Statistical Institute (TURKSTAT) is an example. Turkey Disability Survey (TURKSTAT, 2002) defines disabled individuals as those who "are unable to ensure by themselves, wholly or partly, the necessities of a normal individual and/or social life, as a result of deficiency, either congenital or not in their physical capabilities" (p.10). This survey has been conducted for only one time in 2002 and presented to the public in 2004. According to it, the disability rate in Turkey is 12.29% and the rate of visually impaired people among the total population is 0.6% (TURKSTAT, 2002). Table 1 shows the distribution of seeing disability in Turkey according to age groups, place of residence and gender.

Table 1. Seeing disability rate in Turkey
(Source: TURKSTAT, 2002)

	Seeing Disability %
TURKEY	0.60
AGE GROUP	
0-9	0.33
10-19	0.36
20-29	0.45
30-39	0.46
40-49	0.62
50-59	0.91
60-69	1.56
70+	2.99
PLACE OF RESIDENCE	
Urban	0.52
Rural	0.73
GENDER	
Male	0.70
Female	0.50

Before going into details of the research it is important to define the term "blind" or "visual impairment". ICF (2006) divide the visual functions into four as normal vision, moderate visual impairment, severe visual impairment and blindness. Moderate and severe visual impairment are grouped under the term of low vision. Demir and Sen (2009) also divide the term blindness into two as totally blind people and blind people with low visions. These two categories are distinguished from each other according to certain criteria. A blind person is one whose angle of vision does not exceed 20 degree and whose vision power has only maximum ten percent of normal vision after all necessary treatments have been made. Low vision is defined as visual acuity between 20/70–20/200. These definitions are universal definitions that are used by Western countries as well (Demir & Sen, 2009).

Low vision is defined by American Foundation for the Blinds (AFB) as "a condition caused by eye disease, in which visual acuity is 20/70 or poorer in the better seeing eye and cannot be corrected with regular eyeglasses. Visual acuity is a number that indicates the sharpness or clarity of vision" (AFB, 2015). In other words, according

to AFB (2015), low vision is "not enough vision to do whatever it is you need to do which can vary from person to person". Low vision as defined by WHO has the following specific meaning: "a person with low vision is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity of less than 6/18 to light perception, or a visual field of less than 10 degree from the point of fixation, but who uses, or is potentially able to use, vision for planning and/or execution of a task" (WHO, 2010). WHO (2010) also defines total blindness as "the complete lack of light perception and form perception".

In the literature on blindness, there is debate about when a person is considered as congenitally blind (Hatwell, 2003; Millar, 1988; Rieser et al., 1986). For example, Millar (1988) has considered a person as a congenitally blind who lost the sight before 20 months old or from birth. Veraart and Wanet-Defalque (1987) and Rieser et al. (1986) have considered a person as congenitally blind if s/he has lost the sight as late as three years old, whereas Hatwell (2003) has considered it at the end of the first year old.

1.1. Problem Definition and Scope

Our architectural and urban environment is not designed to meet the needs of blind people. In fact, we -as sighted people- do not have enough knowledge about these needs and we have very little knowledge about the way-finding abilities of blind people and their limitations (Passini & Proulx, 1988). Although there is an extensive amount of research on mobility, perception, and way-finding of blind people (Dodds et al., 1982; Gaunet & Briffault, 2005; Herman et al., 1983; Leonard & Newman, 1967; Passini & Proulx, 1988; Saerberg, 2010), there has been no work to show which specific aspects of built environment they focus on and they use as cues in the way they relate to their spatial environment. In addition, these studies are generally limited to short routes and simple environments such as a room, a corridor, or a building and only focus on one advanced sense of blind people in way-finding process. Therefore, this study tries to investigate how much each sense is used by blind people during way-finding in complex urban environments and how such senses compensate each other.

Gaunet and Briffault (2005) explain simple environments as "structured urban environments (i.e., streets bordered by narrow sidewalks, walls or fences, with cross- and T-intersections, crosswalks perpendicular to sidewalks, one-step crossing, and a less than 15-m-wide road). Most blind people live and travel in such environments.

Complex environments are unstructured areas such as open areas, campuses or major roundabouts, which are usually avoided by blind pedestrians" (p.397). Gaunet and Briffault (2005) found that the more complex and unstructured an environment is the more difficult way-finding is. As also Hölscher et al. (2006) mentioned that familiarity with the environment also affects the way-finding task and influences strategy choices of blind people during the process. However, blind people desire to find their own way independently in familiar and unfamiliar environment (Golledge et al., 1998).

Thinus-Blanc and Gaunet (1997) also support this idea and they argue that strategy choice of blind people change according to the context in which they relate to and the strategy is the information gathering process to develop a set of rules. Thinus-Blanc and Gaunet (1997) define strategy as the following:

> …The term strategy has a wide meaning, depending on the context in which it is used. In our discussion, we define strategy as a set of functional rules implemented by the participant at the various phases of information processing, from the very first encounter with a new situation until the externalization of the spatial knowledge. This set of rules is assumed applicable to a wide range of situations and is allowed to reach an acceptable performance level without excessive cognitive effort…Consequently, to define strategies implies to increase the number of behavioral variables under study… (p.35).

Following Thinus-Blanc and Gaunet, this study investigates the interaction between familiarity with the environment and the strategy choices of blind participants during the way-finding process. It also discusses how strategies of blind people change according to environmental variables/urban setting during this process and which environmental cues they use most during the way-finding process and how their strategies change when one of the senses are heightened or blocked. The ultimate goal of the study is to highlight that spatial perception is not merely about vision.

1.2. Research Questions of the Study

"Our bodies and movements are in constant interaction with the environment the world and the self inform and redefine each other constantly" (Pallasmaa, 2005, p. 27). Blind people perceive space with their heightened sense of hearing, smell, and touch focusing exclusively on non-visual constituents of space (Thinus-Blanc & Gaunet, 1997). Everybody, blind and non-blind, perceive space multi-dimensionally however blind people are more conscientious of the non-visual constituents of space (Steyvers &

Kooijman, 2009) and this study investigates congenitally blind people's sense of space in an urban context. Within the scope of the study, the following research questions are developed:

Q1: while in an unfamiliar urban context, which specific aspects of the environment blind people focus on and use as cues in their way-finding process.

Q2: what type of strategies blind people use during their way-finding process in an urban context.

Q3: how different environmental variables influence blind people's strategies during way-finding process in an urban context.

Q4: how blind people's strategies change when one of the senses are heightened or blocked.

Q5: how familiarity with the environment influence the strategies choices of blind people.

These research questions are mostly open-ended and are oriented to understand how blind individuals experience the process of way-finding and identifying the steps in the process.

1.3. Methodology of the Study

I use "mixed method" as a combination of both qualitative and quantitative data collection and analysis (Saldana, 2011). Qualitative method provides data in the form of words or visual material (Strauss & Corbin, 1990) and quantitative method generetaes numerical data from the collected data. Blaikie (2007) also supports this idea and argues that researcher should be in the field while gathering data from actions, interactions and social processes of participants.

I collect data in the field where participants' experience the task. Semi-structured interview is used during their way-finding task. I keep in mind the study's general research questions, but I try to encourage people to relate experiences that are

relevant to problem. In this study, I must be a participant as an observer which means that I am a part of the research instrument and I am insider in order to understand the individuals rather than to explain. I am able to put myself in the role of participants and attempt to see the situation from their perspectives (Denzin & Lincoln, 2000).

To understand what is experienced sensually in an urban context without vision, this thesis includes two field studies, one of which is conducted in Izmir, Turkey, and the other in Lisbon, Portugal. Both case studies are exploratory studies that I try to find out how blind people find their own way in an urban context. Therefore, it can be said that the purpose of this thesis research is exploratory. In an exploratory study, the size of the sample is intentionally kept small, which is helpful in making "major decisions about the way we are going to conduct our next study" (Nargundkar, 2003, p. 41). "It can be even help in determining the research design, sampling methodology and data collection method" (Singh, 2007, p.64). Therefore, exploratory research helps to have a better understanding of the problem and to test the feasibility of a more extensive study.

After completing the case study in İzmir, the walking tour in pre-defined route in Lisbon was conducted. In the case study in İzmir, the most important result was that "sound" is the most used information during way-finding in a complex urban environment. Therefore, the study in Lisbon was conducted by controlling the sound information in the selected route to understand how blind participants' strategies change when one of the senses is heightened or blocked.

In this study, I investigate the performances of blind participants. The performances are assessed according to their route choices, landmark-obstacle or barrier recognitions and their route memorizations. For instance, some strategies of the participants can involve sensory information existing in the study field such as echo, whereas others involve systematically walking along the path (memorization) (Thinus-Blanc & Gaunet, 1997). This explains us how participants store the information from the urban context and solve the way-finding task.

1.4. Structure of the Study

The thesis is composed of six chapters. Chapter 1 is the Introduction chapter which dwells on the problem definition, purpose, methodology and contributions of the thesis. It begins with the definitions of terms such as "disability" and "blind", statistical

information about the percentage of disability and blindness all over the world, Turkey and the number of associations which took part in the research. This data will be beneficial for understanding the aim and future stages of the study.

Following the Introduction chapter, Chapter 2 gives insight into the literature on way-finding and cognitive mapping. This literature review seeks to identify what is known about blind individuals' way-finding and cognitive mapping process and examines the importance of their senses on way-finding process in an urban context.

Chapter 3 describes the methodology that was used in the study to provide an understanding of how the research was conducted. It documents the steps of the study which includes one pilot study and two field studies.

Chapter 4 details the research analysis results and the interpretation of them. Thus, this chapter is intended to provide the full documentation of the research process.

Chapter 5 includes the discussion on the results of the study supported by interviews which were conducted with "experts" on space and blindness.

Chaper 6 derives conclusions from the analysis. The research is summarized. implications and limitations of the study are discussed. Future research directions for researchers are suggested.

1.5. Contributions of the Thesis

Environmental Cues Blind People focus on during Way-finding Process

As mentioned above, there are many studies related to mobility, perception, and way-finding of blind people (Dodds et al., 1982; Gaunet & Briffault, 2005; Herman et al., 1983; Leonard & Newman, 1967; Passini & Proulx, 1988; Saerberg, 2010), however, there has been no work to show which specific aspects of built environment they focus on and they use as cues in the way they relate to their spatial environment. This study discusses the environmental cues which are used by blind people during way-finding process.

Blind People's Way-finding Process in Complex Urban Environment

In addition, these studies in the literature have not been arranged in complex urban environment and they do not try to control environmental stimuli or urban settings in complex urban environments. These studies are generally limited to short

routes and simple environments such as a room, a corridor, or a building. In addition, it is also believed that way-finding performances of people decrease in complex environments, high uniformity and lack of differentiation (Cubukcu & Nasar, 2005). Therefore, this study investigates the way-finding process of blind people in complex urban environments which have different environmental stimulus and urban settings.

Strategies of Blind People during Way-finding Process

There has been little research concerning how much each sense is used during way-finding process of blind people and these studies only focus on one sense of blind people in way-finding process. Therefore, this study tries to control environmental stimuli or urban settings to evaluate how much each sense is used during the way-finding process and highlights how blind people strategies change when one of these senses is heightened or blocked in the chosen urban settings.

Multi-sensorial Perception of Space

In addition, this study highlights the spatial perception is not merely about vision and finds ways of making blind people more independent in their daily lives and contributes to assist blind individuals in their way-finding process.

CHAPTER 2

NON-VISUAL WAY-FINDING IN URBAN CONTEXTS

The purpose of this chapter is to introduce the discussions on way-finding and cognitive mapping in the related literature and to examine the blind individuals' way-finding and cognitive mapping process. It also reviews the findings on how blind individuals use their senses, namely, hearing, touch and smell during way-finding process.

2.1. The Term "Way-finding"

The term way-finding was first used by Lynch (1960) as "a consistent use and organization of definite sensory cues from external environment" (p.3). Lynch's Image of the City (1960) could be considered as a milestone in the urban way-finding studies. It provides many starting point to understand how the urban form is perceived by the non-professional (Fendley, 2009). Since Lynch the term has been revisited by many researchers (Blades, 1991; Downs & Stea, 1973; Jansen-Osmann & Fuchs, 2006; R. Kitchin & Blades, 2002; Long & Hill, 1997; Lynch, 1960; Montello, 2005; Portugali, 1996; Rieser et al., 1982).

Lynch (1960) described maps, street numbers, and route signs as way-finding devices. Lynch's studies examined cities with regards to the legibility of the urban context and defined legible city as "the ease with which its parts can be recognized and organized into a coherent pattern" (Lynch, 1960, p. 2). He also suggested that legible surroundings are the most satisfied and well-organized environments that create effective communication frameworks during everyday experiences. Zimring (1982) mentioned that Lynch's five city elements help people organize the cities they live in and he explained these five elements as "memorable *landmarks, paths* people follow, *nodes* where paths cross, distinct *edges* of neighborhoods or physical areas, and socially or physically defined *districts"* (Zimring, 1982, p. 165). Lynch (1960) explains his approach by stating that "nothing is experienced by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences"

(p.1). It is important to consider way-finding in the external environment with Lynch's theory in mind. In addition, the definition of Lynch emphasizes the importance of the senses in the way-finding process. Lynch's definition is important for this thesis, because this study focuses on the senses during the way-finding process.

Downs and Stea (1973) and Golledge (1999) are some of the researchers who discuss way-finding. They offer to divide the term into stages. This division helps to understand the necessities and the steps of way-finding. Nori et al. (2009) explained this division as follow: Downs and Stea (1973) considers way-finding to be consistent of four stages: "a) orientation to determine self-location and estimated target location; (b) initial route choice in selecting routes from origin to target location; (c) route monitoring, that is, checking the route taken by estimates of self-location and target location as well as reassessing/confirming the route choice; and (d) recognition of the target" (p.7). Nori et al. (2009) also added that similarly, Golledge (1999) suggests five stages: "(a) identification of origin and destination, (b) determination of turn angles, (c) identification of segment lengths and directions of movement, (d) recognition of routes and distant landmarks, and (e) embedment of the routes taken in a larger frame of reference" (p.7). What is essential in this study is to determine the factors impacting people's decision making during way-finding. Although the studies above begin to give some information about the decision-making processes of navigating individuals, they fall short of explaining how individuals explore a route. Therefore, following researchers were chosen who defined way-finding in terms of exploratory strategies.

Before Golledge (1999), as also cited in Portugali (1996), Rieser et al. (1982) already suggested that the term needed to be considered in three parts as "(a) knowledge of spatial layout of destinations and landmarks along the way, (b) the ability to keep track of where one is and in which direction one is heading, and (c) comprehension of the organizing structural principles embedded in a given environment" (p.222). These components are vital during way-finding process, because as also suggested by Portugali (1996), each component is necessary for spatial orientation of people. He argued that way-finding requires spatial knowledge about destination and landmarks which is the first component. Without this spatial knowledge, people try to find their way with exploratory strategies. Without the ability to gather data about the position of their bodies and location of themselves which is the second component, people become disoriented and lost. He also added that way-finding activity is the interaction between people and the environment. If people do not understand a given environment, they will

spend more effort to memorize the components of the given environment such as grid like street system (Portugali, 1996). It can be said that Portugali (1996) separate the term way-finding and spatial orientation from each other. It seems that way-finding is an action which uses information from spatial knowledge, whereas, spatial orientation is a knowing process which contains internal representations.

Portugali (1996) suggests that we use as the following pieces of information during way-finding "reference points for identifying current location and a destination; cues to signal the spatio-temporal transition between origin and destination; information used to maintain a heading; information signaling when to turn; and a mechanism for generally determining the direction in which one must proceed or a mechanism for defining one's position with respect to a home base" (p.220). This definition gives indications about the references in the acts of exploration and route finding.

A frame of reference, following Portugali, is an important factor for defining the position of points in an environment. These environmental reference points help people relate their bodies to the environment. Portugali (1996) explains environmental frame of reference as "It can be local and relational, as with respect to landmarks or street systems, or might be related to a global and widely accepted frame of reference such as traditional geographic latitude and longitude coordinate systems and the cardinal compass directions" (p. 222).

Before completing this section, it is worth to describe recent definitions of way-finding. Kitchin and Blades (2002), Montello (2005) and Jansen-Osmann and Fuchs (2006) are some of the researchers who recently defined the term way-finding. One of these researchers defines it as "the features of encoding, processing, and retrieving information about the environment" (Kitchin & Blades, 2002). Montello (2005) preferres to define way-finding as one of the components of navigation. He proposes that "locomotion refers to navigation behavior in response to current sensory-motor input of the immediate surrounding and includes tasks such as steering, obstacle avoidance, and the approach of a visible object in vista space" (Montello, 2005). Jansen-Osmann and Fuchs (2006) summarize the term as "the orientation behavior in a new environment".

This study investigates way-finding abilities of blind people in complex urban environment, therefore, for the purpose of this study, way-finding is defined as the strategies of learning and remembering a route through the environment. Cubukcu and Nasar (2005) also support this idea and add that in large-scale environments, people

need way-finding ability to reach their goal. In addition, way-finding is necessary for one's survival and is something that most people do everyday. Way-finding is one of the problem-solving activity people undertake everyday to reach a destination and cognitive maps are the sources of information used in this seminal problem-solving process (Passini & Proulx, 1988). Therefore, in the following section, cognitive mapping is discussed.

2.2. The Term "Cognitive Mapping"

As mentioned above, Lynch (1960)'s study is very important for this study. Lynch stresses people's senses and knowledge about their surroundings. In addition, he tried to investigate the relationship between the traveler and his/her environment. In the concept of legibility, Lynch (1960) states that way-finding is based on the process of generating cognitive maps of our surroundings related to sensation and memory. Actually, the term cognitive mapping was first proposed by Tolman (1948). He states that cognitive mapping involves various measurement techniques, such as spatial priming and recall, distance and pointing judgments, mental scanning operations and map reproduction tasks. In this definition, he stresses that cognitive map is unique for each individual and emphasizes the internal spatial representations of environment that are experienced by individuals. Tolman (1948) created a base for many researchers who did research on cognitive mapping.

Downs and Stea (1973) were some of these researchers and defined cognitive mapping as "a process composed of a series of physiological transformations by which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in his everyday spatial environment" (p. 312). Golledge (1999) also supports this definition and adds that way-finder orients himself/herself according to cognitive map in his/her mind which includes the representations of environment that are learned, experienced and recorded at any one time. Therefore, way-finding and cognitive mapping cannot be separated from each other. Cognitive maps are the source of information used in way-finding process.

Passini et al. (1998) defines cognitive mapping as "the major psychological process that situates an object, a person, or an event in large scale spaces. It is also the process by which spatial layouts are retained" (p. 138). Salmi (2005) explains cognitive

mapping as recalling and applying information from previous experiences of an individual. These definitions focus on the process of generating cognitive maps. Kitchin and Blades (2002) support this idea and add that cognitive mapping is knowledge of individuals about spatial environment and cognitive mapping process is the encoding and retrieval of previous information about this spatial environment.

If individuals did not generate cognitive maps in their minds, they would need to learn a place each time they visited it and also without cognitive maps in one's mind, it is difficult to do daily activities as well. Steyvers and Kooijman (2009) propose that "gaining and using such a picture is termed cognitive mapping" (p. 223). On one hand, Kitchin et al. (1997) explained the term cognitive mapping as a process of how knowledge of spatial environment can be gained and how new environment can be learnt. These definitions provide insight into generating cognitive maps and recalling these information when visit the environment once more. Sholl (1988) also suggests that sense of direction helps people generate good cognitive maps. Because, people who have sense of direction can memorize landmarks of the environment and can use this information to orient themselves and form cognitive maps. Therefore, according to Sholl (1988), sense of direction stresses the ability of gathering egocentric information and environmental frame of references.

Thinus-Blanc and Gaunet (1997) suggest that cognitive mapping "includes encoding information, such as the integration of body rotations, length of traveled paths (on the basis of speed and duration of travel), selection of particular landmarks and also constitute a set of rules to get acquainted with the environment" (p. 36). In addition, this definition gives indication to egocentric encoding. Therefore, we should give detailed information about egocentric and allocentric frame of references in this section.

First, frame of reference is defined by Klatzky (1998) as representations of entities' location in space. He added that these entities can be objects such as chairs, buildings, etc. and also they can be fixed features such as corners, slopes, etc. Later, Meilinger (2008) gave more detailed definitions of egocentric and allocentric frame of references. Meilinger (2008) defined these definitions as follow:

> …In an egocentric reference frame, object-to-self relations or location-to-self relations are represented. A location in an egocentric reference frame is defined by the direction and distance to one's position. In allocentric reference frame object-to-object relations or locations-to-locations relations are represented… (p.61).

> …Egocentric reference frame is changed as we move around. The locations of the objects surrounding us have to be updated either by vision/by internal cues. Contrary to this, allocentric representations do not change as we move around. In addition to this, conception of an egocentric reference frame which is updated during movement, these other conceptions also assume an enduring egocentric representation, e.g., views stored in long-term memory. In our conception such views are allocentric representations as they store locations in relation to a point of view they were experienced at a specific point in time … (p.62).

Klatzky (1998) also state that "exceptions notwithstanding, there is general understanding that in an egocentric reference frame, locations are represented with respect to the particular perspective of a perceiver, whereas an allocentric reference frame locates points within a framework external to the holder of the representation and independent of his or her position" (p. 2). In this study, both egocentric and allocentric reference frame of blind individuals are inquired.

As also seen above, most of the definitions emphasize the necessity of visual perception. However, blind individuals' cognitive maps can provide insight into the role of other sensory references and show which environmental cues they use during way-finding process as different from sighted ones. Therefore, it is worth to discuss way-finding and cognitive mapping process of blind individuals.

2.3. Blind Individuals' Way-finding Process

According to CRPD (2006), one of the most important rights of persons with disabilities is "accessibility" which is located as Article-9 in this convention. In this article, it is written that persons with disabilities should have rights to move independently in a new environment and participate in all aspects of life as any other person. However, to move independently in a new environment, in other words accessibility, poses a special challenge for any person regardless of whether they are disabled or not. Passini and Proulx (1988) also state that "to move freely in the large scale architectural and urban environment can be a difficult task for any person; but it can be an exasperating one for the visually impaired" (p.228). Blind people require extensive storage of information regarding their environment because they cannot use visual sensory inputs to understand the spatial organization of their environment.

In this study, one of the main hypotheses is that spatial perception is not merely about vision. Strelow (1985) suggests that generating cognitive map is not based on vision. The information about external space may be provided by vision as the fastest.

In the absence of vision, other senses collect spatial information about external frames of references. In this point of view, Ungar (2000) suggests that blind people use coding strategies to provide and organize spatial information. Strelow (1985) explains these way-finding strategies as path selection processes and path following strategies. He argues that blind people collect spatial information which is initially available or can be provided along the way (Strelow, 1985). Accordingly, it is thought that sighted people have advantages compared to blind individuals in way-finding. Because vision provides ready and fastest information about the external frame of references and this information is accessible by vision. Other senses cannot provide information about the structure of external space as fast as and as reliable as vision can do (Ungar, 2000).

Freksa (1999) suggests that blind people gain this specific spatial knowledge by exploring the environment and memorizing landmarks. However, as sighted individuals we have very little knowledge how blind people perceive a large-scale urban environment and how they can achieve spatial information of this complex urban environment. Because the studies in the literature have concentrated on small-scale spaces as mentioned above (Dodds et al., 1982; Gaunet & Briffault, 2005; Herman et al., 1983; Leonard & Newman, 1967; Passini & Proulx, 1988; Saerberg, 2010). In this study, I focus on how blind people provide this spatial information during way-finding process in a complex urban environment.

Gaunet and Briffault (2005) divide way-finding process of blind people into three and explain it in reference to three concepts: Body concepts, Spatial concepts, Environmental concepts. Gaunet and Briffault (2005) propose that "Body concepts concern the ability to identify parts of the body and knowing their locations, movements, relationships, and functions. Spatial concepts refer to spatial positions and relations (front, back, left, right, in-between, parallel, etc.), shapes (circle, rectangle, square, etc.), and measurements (distance, amount, weight, volume, width, length, size, etc.). Environmental concepts refer to features that can be found in a given environment (e.g., streets, traffic lights, safety island, crossroads, intersections, etc., as well as hills, ramps, stairs, slopes, etc. in a city). Other concepts include textures, temperature, and others" (p.273). These concepts can be related with "route" and "map" explanations which are defined by Thinus-Blanc and Gaunet (1997). They propose that routes are classified on the basis of egocentric frame of references, whereas maps are the encoding of direction and maps which also define the relationship between person’s position and distance of place. They are organized on the basis of allocentric frame of references

(Thinus-Blanc & Gaunet, 1997). Therefore, it can be said that routes can be related with body concepts and spatial judgments and maps can be related with the spatial concepts and environmental concepts.

As seen above, way-finding in complex and unfamiliar environment is a very difficult task for blind people. Although they use special devices or agents with them such as dogs or long canes, to follow the route along the way in such environments is a very difficult task for blind individuals (Loomis et al., 2001). The use of long cane or dog affect way-finding abilities of blind individuals. For example, Gaunet and Briffault (2005) explain the advantages and disadvantages of these assistance devices. They suggest that dogs are trained to identify environmental features such as doors or stairs and also they can perceive the environmental obstacles. Therefore, dog using blind individuals can walk faster than long cane users. They also mention that long cane provides information about the obstacles around with the help of echo. It can scan the environment in a large angle, therefore, it provides information about location of landmarks and obstacles (Gaunet & Briffault, 2005).

These researchers propose that dog users are more advantageous than long cane users. However, in this study, it is believed that blind people perceive space multi-dimensionally. Each sense for blind individuals is very significant in perceiving the environment. However, they do not use only one sensory modality when perceiving environment. In the absence of vision, spatial information is constructed by using all other senses. Therefore, the assistant device is very important for blind individuals. Long cane can connect link between the blind individuals and spatial environment. It allows blind individuals to use all their senses. Millar (1994) made significant contributions in the way other senses are used in perceiving environment and claims that each of the different senses is specialized, however, these senses are complementary and overlapping. Therefore, providing information from spatial environment is not based on only one sensory modality.

Actually, these assistance devices are not enough to make way-finding task easier for blind individuals. In an unfamiliar environment, a blind person has many difficulties to collect spatial information and to locate landmarks which make their way-finding process easier (Coughlan & Manduchi, 2009). Gaunet (2006) showed that blind individuals' difficulties in accessing information in unfamiliar environments consist of not knowing "which way to walk to the destination, keeping track of the direction to the destination, knowing which way is faced, which street corner the pedestrian is on, when

and where to turn, finding a new store or office destination, learning about new bus stop locations, and learning about new locations the pedestrian is passing" (p. 341). In this study, the results are discussed according to Gaunet's insights on these difficulties.

During way-finding, blind individuals should develop some strategies to reach the target. "Pre-travel route planning, path selection, destination choice, travel mode selection, landmark recognition, choice point identification and obstacle or barrier avoidance" are used as instruments to develop strategies during this process (Portugali, 1996, p. 216). For example, some blind travelers follow linear features of an environment such as sidewalks or walls of the building which is defined by Portugali (1996) as "shore lining". Portugali (1996) also mentioned that some blind individuals use sun and wind direction, others use count steps, street corners or obstacles. Others use feelings which are based on indicators about environmental cues, choice point or a destination. In this study, it is believed that counting steps, street corners or obstacles is only used as a strategy if blind person cannot provide any spatial information from the environment features during way-finding process.

As cited in Portugali (1996), Passini et al. (1986) found that blind individuals have the most difficulties in places such as "shopping complexes, department stores, hotel lobbies, train and bus stations, airports, parking lots, open spaces and park land areas and other places which were either crowded or which lacked distinctive auditory reference points to assist with way-finding" (p. 230). It means that auditory cues is one of the most environmental features as reference points during way-finding process which is further investigated in this study. Portugali (1996) also discuss the importance of understanding the layout of the environment during way-finding process. He proposes that "when layouts are ambiguous, such as where specific patterns are repeated multiple times (e.g., repetitively landscaped blocks, segments of stores arranged exactly the same way, and so on), they have difficulties to find their way. But, on the other hand the repetitive example of a rectangular street system with uniform size blocks are often given as an example of a simple but highly commended organizing principle" (p. 230). This information is used as a base in selection criteria of routes in this study.

As also cited in Portugali (1996), Passini et al. (1986) define the selection criteria of participants as "their profiles and history, independent way-finding abilities, the variety of technical and human aids used in their way-finding behavior and also the information they used during actual way-finding, their strategies for different physical obstacles and dangers likely to be encountered during way-finding and their cognitive

mapping ability" (p. 230). They also examined blind individuals' skills based on spatial orientation, understanding environmental cues and features of large-scale environments (Passini et al., 1986). This information is also used as a base in selection criteria of participants in this study.

As discussed above, vision allows a person the fastest and the most reliable information about the layout of the environment and spatial relationship during the way-finding process of blind individuals. Portugali (1996) thought that the spatial information which is used by blind individuals is second hand. It can be explained as: in blind conditions, verbal descriptions of sighted people are also used to understand the surroundings during way-finding process and this information belongs to sighted one's perception of space. Therefore, it is called second hand information for blinds. According to this argument, in this study, it is questioned whether and how blind people generate cognitive maps with collected spatial information during way-finding process. He also asks "how much information about spatial layout is necessary before a blind individual can travel confidently and independently" (Portugali, 1996, p. 218). This is another important question which is discussed in this thesis study. This question is also significant to understand the composition of cognitive maps of blind individuals during way-finding process. Therefore, next section discusses the cognitive mapping process of blind individuals.

2.4. Blind Individuals' Cognitive Mapping Process

As mentioned in section 2.2., cognitive maps are generated from the interaction between people and their environment via sight, hearing, touch, smell and language (Tversky, 2003). Tversky (2003) adds that these mental representations include elements which are specific to people's environment. As Kitchin et al. (1997) mentions blind people's mental representations are similar to those of the sighted ones. This study investigates the claim by Kitchin et al. (1997) and in this section what is discussed is how blind people construct their cognitive maps.

Kitchin et al. (1997) argue that blind people use same strategies and same types of spatial knowledge during way-finding process. It is logical because choices of strategies affect generating cognitive maps. They are related to each other. Kitchin et al. (1997) wondered about "how blinds plan a journey, what the role of non-visual spatial

perception is in formation of cognitive map knowledge and active spatial behavior by blind" (p. 238). These questions are also significant for this study.

Steyvers and Kooijman (2009) also tried to find an answer to these questions and they argue that blind individuals have to rely on other environmental information other than vision such as vestibular, haptic and auditory information. In order to reach the target, they should understand the spatial relations. Therefore, blind individuals are able to construct a cognitive map from non-visual cues of their surroundings (Steyvers & Kooijman, 2009). Steyvers and Kooijman's study contributes to our understanding of what spatial and environmental information blind individuals acquire, how this informations is learnt, and how it is processed and stored. In their study, they found that blind people rely on more auditory information to generate their cognitive maps.

Many studies investigated how blind people "see" the world. The study of Portugali (1996) is one of these studies. He thought that cognitive maps are internal representations of environments in which people live. Any person who moves independently and freely has such kind of representations in his/her mind (Portugali, 1996). As also accepted in CRPD (2006), the ability to move independently and freely is an essential right of any person. Thinus-Blanc and Gaunet (1997) explain the advantages of vision on generating cognitive maps and sighted people also learn easier the route that they should follow. Thinus-Blanc and Gaunet (1997) claim that blind people should spend more cognitive effort to construct their cognitive maps.

As mentioned above, travelers need cognitive maps to learn and memorize the environmental information. In addition, cognitive mapping task allows people to be a part of their surroundings. Giudice et al. (2007) claim that verbal descriptions have an important role during this process and they believe that it is possible to construct cognitive maps from verbal descriptions and to solve way-finding problems. Gaunet and Briffault (2005) also add that verbal descriptions are the best way to orient blind people. Foulke (1982) mentions that blind individuals' mental space includes the descriptions of space features, not objects like trees, buildings and their names, cars, etc. Therefore, verbal descriptions which are available to blind individuals should include information about space features such as crosswalks, slopes of a street, the sound of the traffic, walls and intersections, in other words, solid-voids of surroundings. In this study, it is believed that verbal descriptions are important for blind individuals to construct cognitive maps, because verbal descriptions help them generate the image of what they

cannot see. In addition, the verbal descriptions of blind individuals are also important to understand their mental world in this study.

As mentioned by Portugali (1996), blind individuals need different types of information about their surroundings during way-finding process to construct their cognitive maps. These are explained as follows:

> … First, there is information about the proximal environment which provides spatial information about local cues and identifies obstacles such as the number of telephone poles or doors bypassed, the location of building entrances, the identification of curbs and street intersections, and local effects such as noises, smells, wind direction, sun angle, and so on. Second, information is needed about larger scale geographic space and this information includes knowledge of the location of near and more distant buildings, information about changing terrain, and the definition of and differentiation among path segments. This type of information is generally gained via exploratory search or repetitive travel behavior in a local environment. The information is coded and stored as part of the traveler's cognitive map. (p. 235)

This study focus on way-finding behavior and cognitive mapping processes of blind individuals in complex urban environments through repetitive travel behavior. The second type of information which is defined by Portugali (1996) is important for this study which is why the repetitive travel behavior was an important aspect of the study.

Portugali (1996) also mentions the importance of blind individuals' senses to construct their cognitive maps. He thinks that auditory information plays an important role for the long distance information and he adds that "the ability to unpack the information contained in verbal descriptions are the major tools of the blind traveler" (p. 236). In the next section, senses of blind individuals during way-finding process are analyzed and also how such senses compensate each other is discussed. These senses are divided into three: sense of hearing, sense of touch and sense of smell.

2.5. Senses of Blind Individuals during Way-finding Process

All people perceive space multi-dimensionally. Jacobson (1998) claims that all people have spatial awareness. However, in the absence of vision, senses such as hearing, smell and touch provide spatial information from environment and engage them in a complete perception (Jacobson, 1998). According to Millar (2008), in blind individuals' world each one of the senses has great significance and is specialized, but also complementary and overlapping. Therefore, spatial perception of blind individuals

is not based on the exclusive domain of one sensory modality. This study aims at giving insights into multi-sensorial space perception of blind individuals.

In contemporary world, vision is seen as a primary sense to perceive architecture. Pallasmaa (2005) criticizes this type of knowledge and adds that architectural forms and spaces are analyzed and produced according to their visual characteristics instead of their multi sensorial characteristics. He also emphasizes that a person who has spatial awareness understands that the eye is not the only one which creates spatial experiences (Pallasmaa, 2005).

Blind individuals rely on their senses other than vision and develop them to higher than normal levels because of the lack of visual information (Gougoux et al., 2005) such as "the localization of sound, the discrimination of pitch, memory and selective attention involving words, and the discrimination of texture" (Cuevas et al., 2010, p. 369). Senses of blind individuals are very important during way-finding, however, memory also has very significant role during way-finding process, especially in familiar environment. For example, Thinus-Blanc and Gaunet (1997) suggest that reaching the target, distance and direction information are related to the information in the memory of individuals.

Blind individuals should know how to use the knowledge which exists in the environment. As stated by Steyvers and Kooijman (2009), there are two types of knowledge that can be learned. First one is "moving around in an environment (route) and second is looking down on it (assisted by a map or a high position; survey)" (p. 223). These researchers also add that blind individuals use their senses such as hearing, smell and touch to gain the sequential information from the environment, because they do not have chance to look around and provide information at glance. Therefore, they think that blind individuals' experiences in the environment are route-based information more than survey-based information (Steyvers & Kooijman, 2009). One of the main goals of this study, following, is to investigate in more detail the use of blind individuals' senses to gain route-based information during way-finding process.

In absence of vision, other sensory modalities such as audition, touch and olfaction in the environment are heightened during way-finding process of blind individuals. However, do all these modalities have the same significance during way-finding process of blinds? Next sections will try to inquire this question.

2.5.1. Sense of Hearing

> Vision and hearing are now the privileged sociable senses, whereas the other three are considered archaic sensory remnants with a merely private function, and they are usually suppressed by the code of culture. (Pallasmaa, 2005, p. 18)

The advantages of vision over other sensory modalities were underlined above. Moreover, Foulke (1982) compared audition and vision and mentioned that every object has visible features, but every object cannot emit sounds. Contrary to audition, vision gives information about distance and the shape of the objects (Foulke, 1982). However, in absence of vision or in the case of blind individuals, the use of auditory information is very important during way-finding process. According to Wiener and Lawson (1997), sense of hearing provides information to the blind individuals about depth and distance of an object and help them understand the environmental features. Koutsoklenis and Papadopoulos (2011) also mention the importance of auditory information for blinds and claim that auditory cues are vital for way-finding behavior of blind individuals. Also Pick et al. (1969) had worked on the importance of auditory information. They found that:

> in sighted participants, vision strongly biased both proprioceptive and auditory localization judgments, whereas audition did not bias visual localization. Congenitally blind participants produced pointing responses toward targets that were strongly influenced by proprioceptive information, whereas the reverse was not observed. In addition, control participants pointed at sounds more accurately in the presence of a visual environment than in its absence (eyes closed or in the dark), even though vision did not actually provide information as to the location of the sound. (Pick et al., 1969, p. 204)

Moreover, the study of Iverson (1999) illustrates a comparison of visual and auditory cues and Iverson (1999) states that:

> in comparison to vision, audition is not as reliable in specifying the locus of movement through space, nor is it as available for updating the relative spatial position of the body or as precise in indicating relative positions of external surfaces. Unless continuous sound sources are available at relevant locations along a path to be traversed, it is extremely difficult for blind navigators to evaluate their current position by simultaneously referring back to the starting point and forward to the goal. This type of analysis suggests that the path representations of blind navigators, based as they are on proprioceptive, tactile, and acoustic rather than visual cues, may differ from the representations of those who are sighted. (Iverson, 1999, p. 1132)

Some (Holl et al., 2006; Pallasmaa, 2005; Rasmussen, 1964) have studied the relationship between architecture and sense of hearing. Rasmussen (1964) wrote that

sound can be reflected by buildings like light and people can feel this reflection. Therefore, he argued that different type of spaces and materials can create different type of sound reflections (Rasmussen, 1964). Pallasmaa (2005) also states that the sense of hearing provides three-dimensional perception to people and adds that "we are not aware of the significance of hearing in spatial experience, although sound often provides the temporal continuum in which visual impressions are embedded" (Pallasmaa, 2005, p. 49). Holl et al. (2006) also emphasize the effects of sound in relation to materials. They claim that if people see space beyond vision, they can redefine space and add that the acoustic of an environment, surface or an object assists vision and replaces vision in case of blindness (Holl et al., 2006).

Auditory cues are essential during way-finding process of blind individuals. As also mentioned in this thesis, blind people use information about landmarks, and source of information by using auditory cues. They also orient themselves within the environment according to this auditory information. Ashmead and Wall (1999) also support this idea because they think that the echo of the environment help blinds to navigate within space. They found that the echolocation features of an environment are essential. Blind individuals can orient themselves according to the walls of a given space and they can easily walk parallel to a wall with the help of the echo of sound that the wall creates (Ashmead & Wall, 1999).

The echo of an environment also provide information about the size, shape and location of an object or obstacle (Rice, 1967). However, if there are no obstacles which create echo for the blinds, they have difficulties to navigate within space. Blind individuals need a closure delineated by walls, barriers or obstacles to use the echo of the environment. It is also written in AFB (2015) that open spaces are a double edge sword for blind individuals. Because blind people think that these spaces provide freedom to them, yet, open spaces are too noisy to navigate in. Open spaces are difficult to navigate inside because there are no obstacles which could create echo.

On the contrary to above explanations, Portugali (1996) thinks that auditory information which is gained from external sources are not reliable, because the sources of sound are moving objects. He claims that only when the auditory information has continuity, it becomes a reliable cue for the blind individuals during their way-finding process. Millar (2008) also claims that external sounds are beneficial cues for blinds' navigation, however, unfamiliar sounds are not reliable during this process and adds that bodily experiences are more reliable than external cues for blind individuals. This

idea is important for this study, because it is related with the location of a participant and the source of sound. Therefore, it is related with the egocentric and allocentric frame of references.

In some studies (Ashmead & Wall, 1999; Thinus-Blanc & Gaunet, 1997), the advantages of dynamic auditory information is emphasized. For example, Ashmead and Wall (1999) claim that travelers who walk toward stationary sound estimate their location better than stationary travelers. Thinus-Blanc and Gaunet (1997) also claim that such studies have been done by sighted ones and suggest conducting such experiments with blind participants. One of the main goals of this study, therefore, is to conduct exploratory studies with blind individuals to investigate the role of senses during way-finding process. In the next sections, other important senses of blind individuals such as sense of touch and smell are discussed.

2.5.2. Sense of Touch

In sighted conditions, people have a chance to observe and investigate the environment. Vision can collaborate with other senses. In blind conditions, qualities of space are measured by other senses such as hearing, touch and smell. Blind individuals have to spend more energy to collect information from the environment and their world differs from sighted ones not only through senses, but also through the structure of the whole. As Thinus-Blanc and Gaunet (1997) mention vision provides a simultaneous perception of the environment. Therefore, haptic perception of a space by blind individuals requires more cognitive energy than sighted ones' perception of a space. However, they also mention that blind individuals' performances in spatial cognition can be as skillful as sighted ones. Herssens and Heylighen (2010) studied the relationship between blindness and haptic perception of an environment. Their results show that Lynch's five city elements such as landmark, path, edge, node and districts are also applicable in haptic experiences.

For example, the path identity, texture and also planting is very important for blinds during way-finding. As mentioned by Lynch (1960), "it is important to sense the path kinesthetically. This is the only citations of a bodily sense of curving motion. People can sense the turning because the close building walls heightened the visual perception of curvature" (p. 55). To feel the path kinesthetically is essential for blinds to

acquire information about the entire space image. Edges are the continuous elements and like boundaries between areas (Lynch, 1960). Continuity is also very important for blind individuals' navigation. Edges can direct blind individuals during way-finding process. Districts are large city areas which have some common character that people can go inside (Lynch, 1960). Because of its' components such as texture, form, details, activity, this city element is significant for blinds to find their own way. Nodes are either junctions of paths or break in transportation (Lynch, 1960). Break points in the city have great importance for blind travelers. Because they can give decisions according to these break points into space (Lynch, 1960).

Actually, Lynch also explains landmarks as externally considered objects by the observer. Therefore, blind individuals and sighted ones' landmark choices are different than each other as also mentioned in Herssens and Heylighen (2010). They claim that a tower can be a visual landmark for sighted travelers, changes in ground texture can be a landmark for blinds. Also they add that a line in ground or material characteristics of a floor has great significance for blinds to remember the meeting points of two surfaces in the floor (Herssens & Heylighen, 2010). Touching a space creates a conscious experience about the space and increases spatial cognition of blind individuals.

van Beers et al. (2002) list haptic experiences as hot, cold, rough or soft and they believe that seeing does not provide more information than touching and add that spatial experiences can also be provided by touching as well as seeing. Pallasmaa (2005) supports this idea and emphasizes that "skin reads the texture, density and temperature of the matter and reinforces sight" (p. 56). He also adds that:

> the sense of touch is the unconscious of vision that also provides three-dimensional information of material bodies. For the blind people, touch can provide solid information comparing to sound, which is very abstract. For that reason, the study of tactile and information is important, along with the tactile perception of Braille. We can feel if a room is brightly lid or if it is dim. In the same way as we can feel the sunlight on our skin. So light is a good method to address touch in architecture. But the skin can sense more things. (Pallasmaa, 2005, p. 81)

As mentioned above, haptic information which is perceived by skin has great importance in way-finding process of blind individuals. Feeling the sun, appearance and disappearance of sunshine, wind direction give information to blind individuals about the time of the day and provide information about environmental cues such as crossroads, end-start points of obstacles and geographical direction (Foulke, 1982; Gaunet & Briffault, 2005; Guth & Rieser, 1997). The skin can provide information

about the temperature and feet can feel the texture of the ground. This information which is experienced in space can create memories about the environment for blind individuals.

In the study of Thinus-Blanc and Gaunet (1997), it is mentioned that congenitally blind participants can generate cognitive maps by touching and hearing and they define this process as "seeing in the mind's eye". On the other hand, Moore and Bloomer (1977) compare the senses and claim that a person can see a place or hear a sound, but touch is the sense of nearness and reality. They think that only sense of touch can provide solid information comparing to sense of hearing which is the sense of distance.

Although there are many studies on the meaning of sense of hearing and touch for the blinds, knowledge of the sense of smell play a less significant role in this population. Compared to vision and hearing, sense of smell seems to be minor (Hummel & Nordin, 2005). In the next section, the knowledge of sense of smell and its' significance for blind people during way-finding is discussed.

2.5.3. Sense of Smell

Blind individuals use mainly sense of hearing and touch to gather information about the environment (Hatwell, 2003). However, in the absence of vision, if the information cannot be gained by hearing or touch, blind individuals can rely on olfactory information. Because it allows to access environmental cues which is used in way-finding process (Hatwell, 2003; Saerberg, 2010). In addition, Hatwell (2003) adds that blind people use olfactory information, in addition to touch and hearing, to recognize the objects and other individuals. In blind individuals, perceived environmental information is not based solely on one sensory modality. The senses of blind people are complementary and overlapping as sighted ones' senses. Therefore, people can perceive the space multi-sensorially.

Koutsoklenis and Papadopoulos (2011) conducted a study in outdoor environment and found that olfactory cues of an environment help blind individuals understand their locations according to the object and to find a place that they try to find. They also claim that blind individuals use olfactory information as a reference point or kind of a landmark. In other words, they can orient themselves in an

environment and determine their position within the environment (Koutsoklenis & Papadopoulos, 2011). On the other hand, they believe that olfactory cues are not very reliable during way-finding because of the direction of the wind, the presence of other smells and consistency of particular odors. These are the factors that affect the way-finding process of blind participants. Consistency of odors has very important role for blind individuals. Because some smells are not present all the time in the environment. Therefore, the olfactory cues cannot be taken easily as a landmark during way-finding process.

Koutsoklenis and Papadopoulos (2011) listed the olfactory cues as "from buildings, such as shops (like a fruit and vegetable store or a flower shop) or structures that have another use (like a church). Smells also come from natural elements (the ground, sea, and trees, for example), from animals (such as horses), and from other objects or attributes that produce distinctive smells (like a garbage can or a sewer)" (p. 698). According to this list, it can be said that blind individuals pay more attention to olfactory cues that come from stationary buildings or shops, in other words, they use olfactory cues which have consistency.

In addition, Porteous (1985) argues that each smell has its own reference and it is related to its source. Therefore, smell can define the distance and direction of a source. Furthermore, he believes that if blind individuals focus on olfactory cues, it may be useful for their mobility in an environment. Ferdenzi et al. (2010) support this idea and think that the sense of smell increases ecological value of an environment and it is beneficial in the absence of vision. There is an important relationship between architecture and sense of smell as Boyle and Frascari (2010) and Pallasmaa (2005) claim.

Boyle and Frascari (2010) argue that people can experience space through sense of smell. If all materials have their own odors, the role of olfactory experiences should be re-discovered. The scent of a space is related to the material, function and lighting, etc… of a space and provides information about the spatial features of an environment. For example, rose has a spiritual effect on Islam and mosques' walls and surfaces are constructed by rose-scented mortar to increase the spatial pleasantness of a participant and spiritual experiences of a space (Boyle & Frascari, 2010). Pallasmaa (2005) also believes that each space has its own characteristic scent. Consciously or unconsciously, travelers experience the smell of any space. Therefore, they can find easily a bakery, hospital or a coffee shop by following their characteristic scent (Pallasmaa, 2005). In

this study, it is believed that the characteristic scent of a place is very important in goal-oriented life of blind individuals. The sense of smell plays an important role to reach the target which has its own odor such as bakery, pharmacy or hospital.

For blind people, the sense of smell can help awareness of one's location and distance to an object. Olfactory cues are also important to understand the spatial features of an environment which are very important in way-finding process of blind individuals. Smell of an environment can direct and guide blind individuals within the space. In addition, as cited in the study of Boyle and Frascari (2010), the smell of an environment can be collected in the memory and this information can be recalled and transformed people back to an experience of a space. Pallasmaa (2005) also mentions that "the most persistent memory of any space is its smell" (p.58). As seen, memory of a traveler is very important to experience the space and it has also great significance in blinds' world. Blind individuals can collect every environmental cue and recall them from memory to experience the space once more.

As mentioned above, each sense has importance and has a special role in way-finding process of blind individuals and sighted ones as well. However, we cannot investigate the importance of each sense in blind individuals' world separately, because senses work with each other in complementary and overlapping manner. In this study, therefore, it is believed that space is perceived multi-dimensionally and multi-sensorially by blind individuals during way-finding process.

In absence of vision, other sensory modalities such as audition, touch and olfaction in the environment are heightened during way-finding process of blind individuals. However, do all these modalities have the same significance during way-finding process of blinds? This study will also try to answer this question and hypothesize that spatial perception is not merely about vision.

One of the main goals of this study, therefore, is to conduct exploratory studies with blind individuals to investigate the role of senses during way-finding process and to investigate in more detail the use of blind individuals' senses to gain route-based information during way-finding process. Therefore, I focus on how blind people provide this spatial information during way-finding process in a complex urban environment.

As also mentioned above, in this study, way-finding is defined as the strategies of learning and remembering a route through the environment. Therefore, it is believed that counting steps, street corners or obstacles is only used as a strategy if blind person

cannot provide any spatial information from the environment features during way-finding process.

As also seen above, most of the definitions emphasize the necessity of visual perception. However, blind individuals' cognitive maps can provide insight into the role of other sensory references and show which environmental cues they use during way-finding process as different from sighted ones. Therefore, I believe that it is worth to discuss way-finding and cognitive mapping process of blind individuals and it is questioned whether and how blind people generate cognitive maps with collected spatial information during way-finding process.

This question is also significant to understand the composition of cognitive maps of blind individuals and the role of verbal descriptions during way-finding process. It is believed that verbal descriptions are important for blind individuals to construct cognitive maps, because verbal descriptions help them generate the image of what they cannot see. In addition, the verbal descriptions of blind individuals are also important to understand their mental world in this study.

CHAPTER 3

METHODOLOGY

The research questions of this study shape the choice of methodology. An interpretative, constructivist and mixed method approach is suitable for this study. This study focuses on the way-finding experiences of blind individuals in an urban context and tries to understand their experiences from their perspectives. My role as the researcher in this process is to experience the process with them and listen to their experiences at the same time. As researcher, I aim to understand the meanings of their own lived experiences during this process. Therefore, I think that the mixed method strategy provides a suitable framework for this study. Mixed method approach includes "either quantitative or qualitative strategies that involve collecting and analyzing both forms of data in a single study" (Creswell, 2003, p. 15). Creswell (2013) states "this approach associate with field methods such as observations and interviews (qualitative data) were combined with traditional surveys (quantitative data)" (p. 15). This strategy allows the exploration of lived experiences of blind individuals. The detailed information about data collection, data analysis and data interpretation are given below.

As Blaikie (2007) mentions a researcher should be in the field observing and participating into especially the actions, interactions and social processes of people while generating a theory. Mixed method approach helps the researcher use the results from one method and develop the other method. This methodology is appropriate for this study, because it attempts at offering a series of explanations based on data collection to have a better understanding of wayfinding of people with disabilities. As Mertens (2003) states "mixed method can serve a larger, transformative purpose to change and advocate for marginalized groups, such as women, ethnic/racial minorities, members of gay and lesbian communities, people with disabilities, and those who are poor" (Mertens, 2003, p. 16). We can discuss mixed method study with data collection, data analysis, data interpretation and additionally with research questions.

The research questions in this study focus on how individuals experience the process. Therefore, both case studies are exploratory studies. An exploratory approach helps explore the research topic and does not provide the final answers as mentioned by

Saunders et al. (2007). They state "when conducting exploratory research, the researcher ought to be willing to change his/her direction as a result of revelation of new data and new insights" (Saunders et al., 2007, p. 134). In this study, I try to understand which environmental aspects blind participants focus on and use as cues during way-finding process. There is a developing literature on mobility, perception and way-finding process of blind individuals. However, none of the studies focus on individuals' experiences during way-finding process which is the key point of this study. Therefore, exploratory research is suitable for this study as "it tends to tackle new problems on which little or no previous research has been done" (Brown, 2006, p.43).

Data collection for an exploratory research is based on a variety of methods such as trial studies, interviews, group discussions, experiments for the purpose of gaining information (Saunders et al., 2007). Denzin and Lincoln (2000) think that unstructured interviews provide a better understanding of the participants. The researcher collects data where the observed individuals experience the task. I am the insider to understand blind individuals' experiences in a complex urban environment as Denzin and Lincoln (2000) suggested. Denzin and Lincoln (2000) suggest that the researchers should put themselves in the role of participants and understand the situation from their perspectives. Therefore, I participated into all way-finding trials with blind individuals one by one to gain insights and familiarity as a part of exploratory research However, I use structured interviews during the process. I used the same explanations to all of the participants not to affect their way-finding performances. I focus on the data collection process and generate new research questions. I encouraged blind participants to relate their experiences that are relevant to my research problem.

Another data collection method is participant observation. I was actively present in all the trials in this study, therefore, I was a participant observant which means that I was part of the research instrument and interacted closely with the participants. This helped me understand individuals and seems to be important in empathizing with them. As a sighted researcher, I should be a participant observant of the study to see the situation from blind participants' perspectives. This gives chance to a researcher to become more involved in the research groups (Denzin & Lincoln, 2000). In addition, in-depth interviews were conducted with the experts to be sustained the findings of the study as a part of exploratory research.

Exploratory research generally handles small sample size and findings are not generalizable to the population. As Nargundkar (2003) proposes "Sample size may be

smaller. But it helps to the exploratory study as methodically as possible, if it is going to be used for major decisions about the way we are going to conduct our next study" (p. 41). In this study, as a researcher, I also worked with a small sample size.

Data analysis starts with the coding of the verbal data. I developed categories to code the verbal data. Verbal descriptions of the participants were recorded during the way-finding process in both case studies. The transcripts of the recordings were coded according to the environmental sensory inputs such as auditory information, tactile information and olfactory information. In addition, their role of the memory was also evaluated through the transcripts of the recordings. Whenever the decision-making was based purely on memory retrieval before there is any environmental input or in the absence of environmental input, this was coded as a memory-based action. The categorization was made according to space features such as sound, texture, air movement, temperature and smell and their respective frequencies was measured in their verbal reports. The nouns, adjectives and the descriptions of feelings used by the participants were also included under these three categories. For example, when the participant used the noun "patios", the adjectives like "hot, soft, sloppy, etc." or "the feeling of crowding", these are added under tactile information. They do not need to use directly the words such as "sound, touch and smell". The detailed information was given in "Measures" sections in the case studies.

In data interpretation process, I wrote down ideas from the results of codings which is close to a specific problem of participants (Groat & Wang, 2002). As also stated in Creswell (2007), the conclusion of the study is suggestive and includes the voices of participants.

This chapter discusses how the study was conducted step by step. There are three preliminary studies before the pilot study was conducted. As a sighted researcher, I wanted to familiarize myself with the blind participants. That is the reason for conducting preliminary studies. After discussing how preliminary studies contribute to design pilot study, I will explain the procedures of case studies which were conducted in İzmir/Turkey and Lisbon/Portugal.

3.1. Preliminary Studies

In the first preliminary study, I tried to understand how sighted people construct cognitive maps and how they represent space in their mind. There were 37 sighted participants and they were asked to draw freehand sketches to understand how Kemeralti is perceived by the participants. Data collection was based on cognitive mapping technique (Figure 1). In this stage, there was a research question in my mind which was related to differences between sighted and blind participants' cognitive maps and I wondered about how they were different. The first preliminary study helped to design the second preliminary study which compares the verbal descriptions of blind participants to sighted subjects' representations of an urban environment.

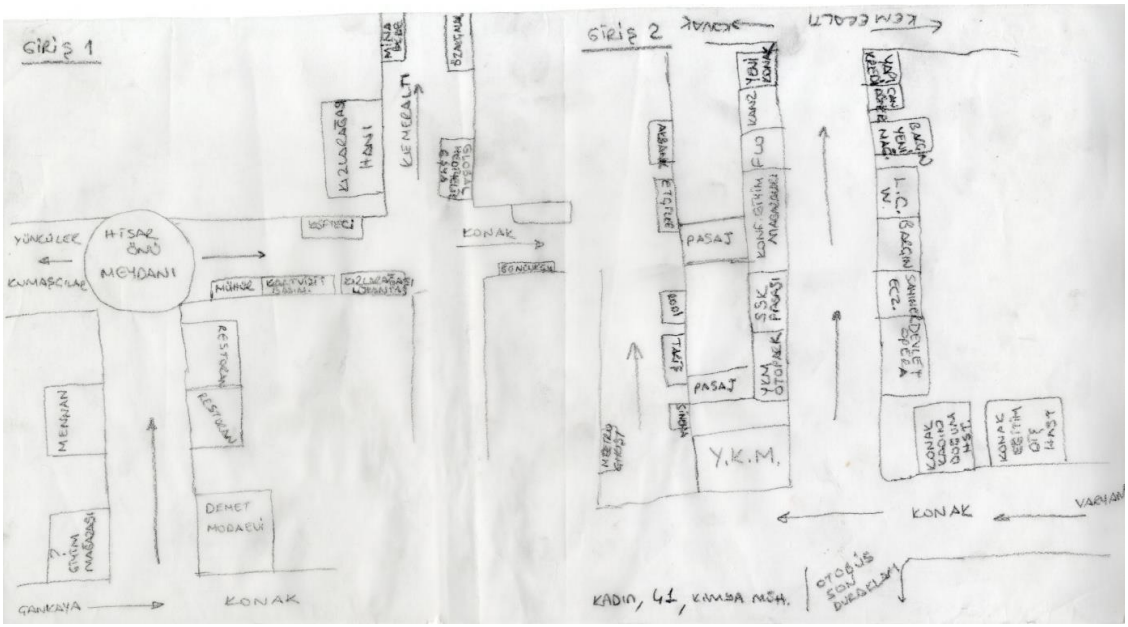

Figure 1. The example of cognitive map of a sighted participant

In the second preliminary study, verbal descriptions were used as a technique to determine the cognitive maps of the participants. This aimed to discuss the information used by blind participants during way-finding and to show to what extent the information used is different from the sighted people. In the first preliminary study, I tried to understand sighted subjects' mental representations and in the second preliminary study, I tried to give insights into understanding the differences between sighted and blind participants' mental representations. There were ten blind participants

and ten sighted participants. Sighted and blind participants were individually asked about their way-finding strategies in Kemeralti, which is an old, busy shopping district in Izmir, Turkey. Therefore, collected data consists of verbal descriptions of blind, of sighted and cognitive maps of sighted participants. This study helped in understanding the verbal description technique as a data collection technique for a study on blind individuals and the differences between their verbal descriptions and the sighted ones. This study helped in designing the third preliminary study which was the walking tour in Konak Square in downtown Izmir with a congenitally blind participant.

In the third preliminary study, I walked with a congenitally blind participant in İzmir Konak Square to understand deeply how his decision-making process functions during walking in relation to way-finding. Data consists of all his comments during walking tour which were recorded. I observed and photographed him finding his way around in this complex urban environment and tried to notice his strategies. With this walking tour, I had a close exposure to see how a blind person's strategies are different from the sighted ones. However, as a researcher, I had to be in the field with a group of blind participants and not just one participant and conduct the walking tour with them individually in a complex urban environment to gain insights into the perspectives of blind participants. Therefore, it was decided to conduct a pilot study with a group of blind participants. In the following, the pilot study is explained in detail.

3.2. Pilot Study in İzmir/Turkey

The aim of this pilot study was to understand how blind participants use their senses and which environmental cues they use during way-finding process in two different urban contexts. It discusses how different urban contexts and environmental cues affect their way-finding process. This study shows that an urban context is determinative in way-finding process of blind participants. Therefore, it highlights the relationship between different environmental variables and urban setting and way-finding process of blind participants.

This study took place in two different urban environments. One of them is in a complex urban fabric, namely in the Kemeralti District in İzmir and the other is an urban park, namely the İzmir Fair Park. The initial visit to the area was made by the researcher alone to determine the route which would provide the environmental sensory

information, such as sound, touch or smell, for the way-finding process of blind participants in both urban environments. Kemeralti provides rich sensory information for blind people in the form of non-visual sensory inputs such as sound, smell, and touch (Figure 2-Figure 3-Figure 4).

Figure 2. Sense of Hearing – sound of birds
(taken by author)

Figure 3. Sense of Smell – smell of boiled corn
(taken by author)

Figure 4. Sense of Touch – change the amount of air movement
(taken by author)

On the other hand, there are distractions and complications resulting from the presence of obstacles, other people, and unexpected diversions and barriers that might occur (Figure 5-Figure 6). Therefore, way-finding is a difficult task not only for the blind participants but also sighted ones in Kemeralti.

Figure 5. Crowd in Kemeralti District
(Source: wowturkey.com)

Figure 6. Barriers (people and benches of stores) in Kemeralti District
(Source: www.kultur.gov.tr)

The İzmir Fair Park is an urban park selected as the site of the second phase of the study. The park does not provide as much sensory information as Kemeralti. It does not have streets of different lengths and there is a clearly intelligible street pattern in this urban park (Figure 7). On the other hand, İzmir Fair District does not have buildings, walls or obstacles which create a feeling of enclosure for blind participants.

Figure 7. Street pattern in İzmir Fair District
(Taken by author)

In Kemeralti, selected route started with the Clock Tower and ended at Hisar Mosque as seen in Figure 8. The travelled route is around 700 m. and includes four turning points. As a sighted subject, the time travelled is around 10 minutes. However, for blind participants, this might change according to the participant's way-finding ability. The selection criterion of the route was to define streets which have different features from each other.

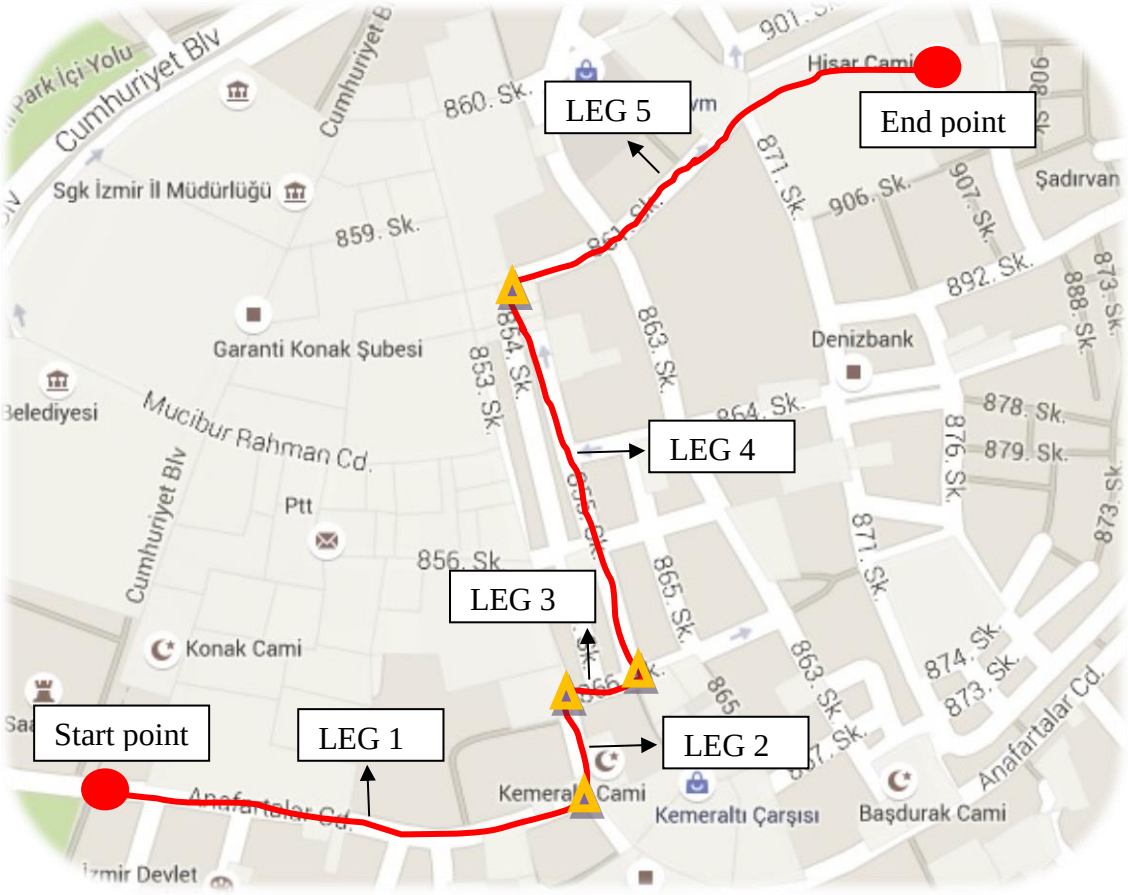

Figure 8. The selected route in Kemeralti in Pilot Study
●*Start and end point ▲*Turning point

In urban park, the selected route started with the Lozan Gate and ended at the open-air theatre (Figure 9). The travelled route is around 550 m. and includes two turning points. As a sighted subject, the time travelled is around six minutes. However, for blind individuals, it changes according to the participant's way-finding ability. The selection criterion of the route in the İzmir Fair District was the same as in the Kemeralti district. It was based on identifying different type of streets according to environmental features. However, the length of routes and also the number of turning points in two different urban contexts were not equal.

Figure 9. The selected route in İzmir Fair District in Pilot Study

3.2.1. The Participants

There were seven participants in the study (four men and three women). The ages of the participants ranged from 25 years to 34 years. At the time of the study, three of them were employed and four of them were university students. In this pilot study, it was not considered to select all the participants from the congenitally or late blinds. Three of them were congenitally blind, and the rest were late blind. Four of the participants had no perception of light and shadow. The participants had a self-sustaining life and were good travelers. They could easily get on and off public buses, go around familiar and unfamiliar environments. All participants were told to use a long cane at the time of the study. The participants were familiar with the environment and at least once in a month they walk alone in the environment for their needs. However, they were not familiar with the specific route proposed (Table 2).

Table 2. Information about the participants in the pilot study in İzmir/Turkey

	Age	Sex	Occupation	Congenitally Blind	Light-Shadow Perception	Independent walking ability	Device	Familiarity to the environment	Walk alone in the environment in a week
P1	*30*	*M*	*University Student*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice a week*
P2	*32*	*M*	*Public Employee*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice a week*
P3	*34*	*M*	*Teacher*	*NO*	*YES*	*YES*	*Long Cane*	*YES*	*Once in a month*
P4	*25*	*M*	*University Student*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Rarely*
P5	30	*F*	*University Student*	*NO*	*YES*	*YES*	*Long Cane*	*YES*	*Once in a month*
P6	27	*F*	*University Student*	*NO*	*YES*	*YES*	*Long Cane*	*YES*	*Rarely*
P7	32	*F*	*Employee*	*NO*	*NO*	*YES*	*Long Cane*	*YES*	*Once in a month*

3.2.2. Design of the Study

All the participants were informed about the study's scope and were tested individually on a different week day between 12.00 p.m. to 16.00 p.m. The research was conducted first in Kemeralti and second at the Fair Park on a pre-scheduled day. The way-finding trials were not conducted on the same time of the day for each participant. In addition, the walking tour was conducted on weekends and weekdays without considering different crowding level of the urban environments. The research took place around one and half hours in total (including walking tour and unstructured interview) in Kemeralti and an hour in the Fair because of less density compared to Kemeralti District. An unstructured pre-trial interview lasted for about half an hour in both environments.

3.2.3. Materials (Experimental Settings)

The participants signed a consent form which was prepared by the researcher. The form includes information about the researcher, the content of the study and how the collected information will be used after the study.

A video recorder was used to record the participants' experiences and their verbal reports during the walking tour. It also recorded their answers to the unstructured interview which was conducted before the walking tour. The videos were later used to analyze the verbal reports of the participants.

3.2.4. Procedure

PREPARATION PHASE

In this phase, the consent form was read and signed by the participant. The researcher gave the participants initial instructions about the area and the duration of the research. The participants also gave information to the researcher about their demographic information and their familiarity to the environment through the unstructured interview.

LEARNING PHASE

During this phase, which is the learning phase, a first trial along the selected routes is conducted for each one of the participant with the researcher. This learning phase is done to introduce the routes in two different urban environments to the participant and the researcher gave information to the participants about the area. However, the explanations to the participants were not standardized in the pilot study. During this phase, the researcher walked near the participant holding their arms and also each participant used a long cane.

TEST PHASE

This phase is the trial phase. In this phase, the participants were asked to talk simultaneously about their experiences in two different urban contexts and the differences between these environments considering environmental cues which help them during way-finding. In this phase, each one of the participant walked the route

while occasionally requesting help from the researcher. I also experienced the two routes with the participants. The participants' verbal reports were recorded during the way-finding process with the video recorder.

POST-TEST PHASE

In this phase, the participants were asked questions about their experiences in two different urban environments and which environmental cues they focused on during way-finding. In addition, they were asked to explain the differences between these two different urban contexts and the related reasons for these differences. It was also asked how different urban environments affected their way-finding process. At the end of the study, their feedbacks were taken and they were helpful to prepare the next study.

3.2.5. Measures

Verbal descriptions of the participants which were recorded during the way-finding process were evaluated. The transcripts of the recordings were coded according to the environmental sensory inputs such as auditory information, tactile information and olfactory information. The frequency of each type of information reported in their verbal reports was measured. Sensory inputs from the environment included sound, air movement, texture, kinesthetic, temperature, and smell.

In addition, their memory was also evaluated through the transcripts of the recordings. In this pilot study, I did not look into specifically when participants were lost during the way-finding task.

Based on this pilot study I decided to design two case studies, one mostly observational and one experimental. My observations during the pilot study helped me fine-tune the design of the case studies. First, for drawing comparisons among participants, all the participants needed to be either congenitally blind or late blind. For this study, it was decided that they should be all congenitally blind, because it was found that congenitally blind participants rely on more sensory information than the late blind participants. In addition, the participants' selection criteria have to be determined according to age, state of job, independent mobility and familiarity with the chosen environments.

In the case study, initial visit to the chosen urban contexts should be done by the researcher to assess the richness of the sensory information and identify the turning points along the route which would include environmental sensory information such as sound, touch or smell. The length of selected routes and the number of the turning points in the selected routes needed to be comparable in the two urban contexts as well. Each turning point should include sensory information for blind participants. Therefore, the selected routes in two different urban contexts needed to be reconsidered and route selection criteria had to be determined.

In the case studies, the time of the day needed to be the same for each participant's test and also the weather condition needed be similar for each one. In addition, weekdays should be chosen for conducting the way-finding task, because especially Kemeralti District has higher crowding level in weekends than weekdays. The density level affects the way-finding ability of blind participants and the test should be conducted in the same crowding level for each one of the participant in order to assess their way-finding ability.

In the case studies, it was decided that preparation phase should include structured interview instead of unstructured one. Each participant should give answer to the same questions; therefore, the researcher could assess their demographic information, way-finding abilities and familiarity with the environment. Learning phase needed to include the same explanation for each one of the participants. The same words were going to be used to introduce the selected route to each participant. Therefore, each of them can get the same and standard instructions about the area. In addition, in the case study, in learning phase, the researcher should walk near the participant without holding their arms, therefore, the researcher could assess the way-finding ability of participant without any help.

After conducting this pilot study, above criteria were set and the case study in İzmir was conducted in the two different urban contexts that were chosen for the pilot studies.

3.3. The Case Study in İzmir/Turkey

The aim of this case study was to question if different urban environments have different impact on way-finding strategies of blind participants and what these impacts

are. It also investigates how the participants use their senses in two different urban environments and how the priority of senses changes according to the urban context. As the pilot study, this case study also inquires which environmental cues the blind participants use during way-finding in two different urban contexts. Therefore, it highlights the relationship between different environmental variables and urban settings and their way-finding strategies.

In the İzmir case study, I contacted eight organizations for blind people. The first two organizations rejected to participate in my research. The other organizations tried to find volunteers to participate in my research. Ufuk Özen, the president of Çağdaş Görmeyenler Derneği supported the research project and contacted 15 congenitally blind participants for way-finding task in an urban environment. However, nine of them were voluunteer to participate in my research project in İzmir/Turkey.

This study took place in two different urban environments which were used in the pilot study as well. One of them is in a complex urban fabric, namely Kemeralti District in İzmir and the other is an urban park, namely the İzmir Fair Park. The chosen urban environments are the same with the pilot study, however, selected routes are different. In the case study, the initial visit to the area was made by the researcher alone to identify the turning points which include strong reference points with regards to the sensory information they provide in two urban environments. In addition, the route determined in these two urban environments are similar to each other considering length and number of turning points. The selected route length in Kemeralti is 700 meters and in Fair Park 710 meters. Three turning points which have different sensory cues for the participants are defined in each route. The time travelled in each route is around 7 minutes as a sighted subject. However, it changes according to the participants' speed of walking.

Kemeralti is a historic commercial district near downtown İzmir which has typical characteritics of an old Ottoman City with its mosques, khans, synagogues, covered bazaars, shops, and streets. İzmir became a port city during Ionion collonization. Later it remained to be an important trading center. Kemeralti is the historic commercial center of the city which is located right behind the historic port (Benzergil, 2006). As an urban environment, Kemeralti has a complex urban fabric with streets of different lengths, orientation, and lacks a clearly intelligible street pattern. It is separate from the rest of the city with clear borders and is linked to the rest of the city with specific entry points. Therefore, altogether these urban characteristics of the area

make wayfinding a complex task not only for blind people but also for sighted people. It is thought that urban space of Kemeralti is well worth studying the wayfinding ability of blind people and their spatial knowledge of Kemeralti (Figure 10).

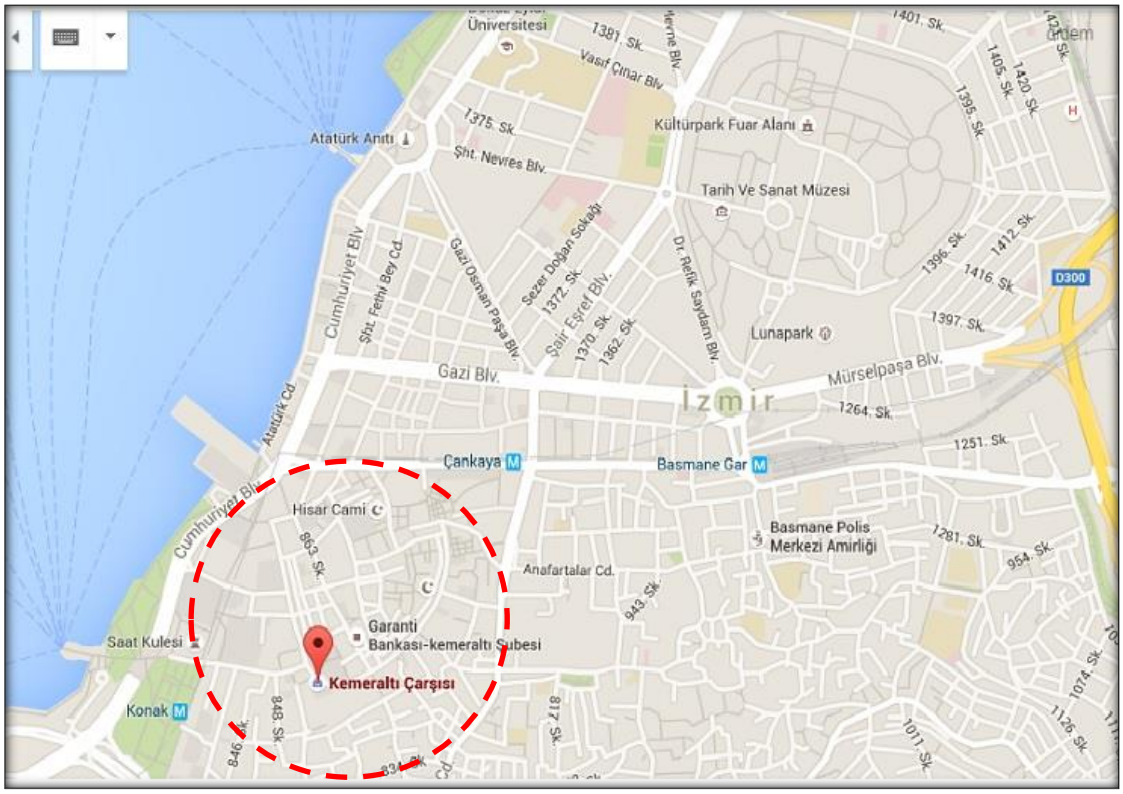

Figure 10. Kemeralti as a commercial district in İzmir
(Source: https://www.google.com.tr/maps?source=tldsi&hl=tr)

The selected route in Kemeralti begins with the Clock Tower and finishes under the cover coat of a coffee shop in Kızlar Agası Khan. The important criteria to determine the route were to include turning points which have strong reference points for the blind participants. The start and end points are important to identify the length of the route. They should be determinative and also have meaningful references for the participants as the turning points along the route. I thought that selected route in Kemeralti District provides different and rich sensory information to the participants along the way (Figure 11).

Figure 11. The schema of the selected route in Kemeralti
(Prepared by author)

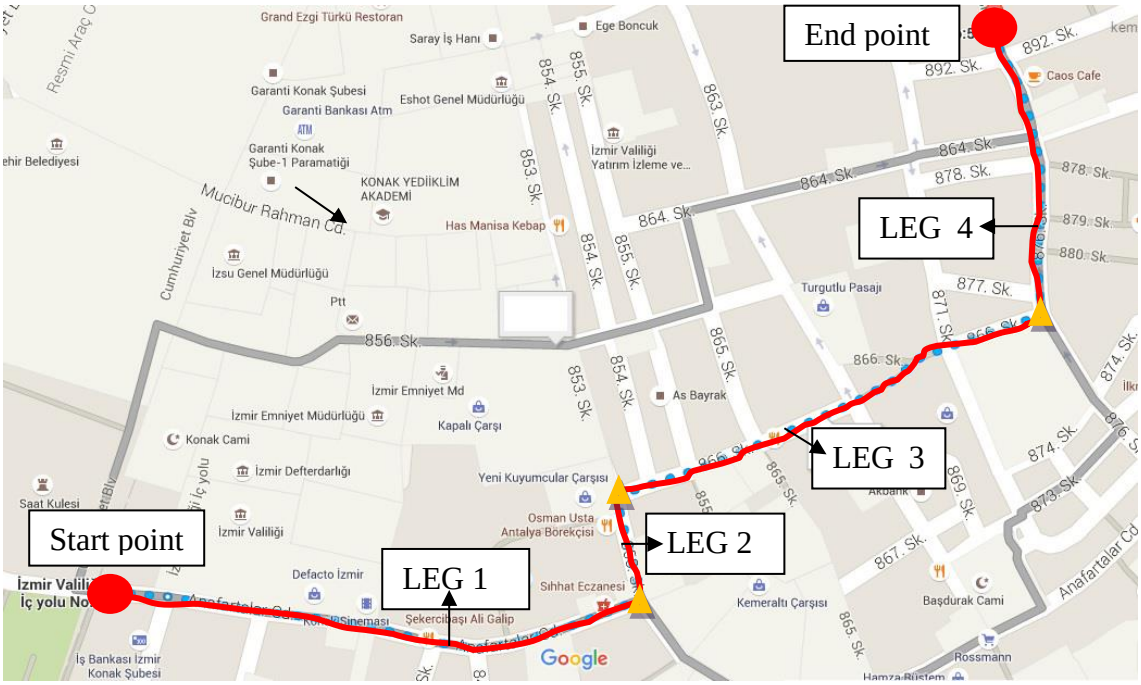

Figure 12. The selected route in Kemeralti in the case study

As seen in Figure 12, the entrance of Kemeralti Bazaar is chosen as a starting point. Barriers in the entrance help participants to identify from where they should enter the bazaar (Figure 13). From the starting point until the first turning point (LEG 1), the leg includes one wider street at the right side of the participant which is closer to the starting point. This street can easily be identified by a change in the amount of wind on the right side and also by a change in the ground texture at the beginning of this street (Figure 14). It is the longest part of the route which includes high buildings on both sides and many narrow streets in between. This solid-void organization provides echo for participants during walking (Figure 15). When a participant arrives at the first turning point, it is expected from the participant to recognize the olfactory information because of the most famous coffee shop in Kemeralti and also auditory information which is created by the high wall at the end of the street (Figure 16).

Figure 13. Start point – entrance of Kemeralti bazaar
(Taken by author)

Figure 14. A wide street close to the start point
(Taken by author)

Figure 15. Solid-void organization
(Taken by author)

Figure 16. First turning point
(Taken by author)

From the first turning point to the second one (LEG 2), which is the shortest leg along the route, there are walls on both sides blocking direct sunlight and creating an echo for the participants like LEG 1. The continuous wall of Kemeralti Mosque is on the right side of the street (Figure 17). The second turning point is the end of this wall (Figure 18). When the participant arrives at the second turning point, it is expected from the participant to turn right where the third leg begins.

Figure 17. The wall of Kemeralti Mosque
(Taken by author)

Figure 18. Second turning point
(Taken by author)

From the second turning point until the entrance of Ali Paşa Square (LEG 3), there are buildings and narrow streets on both sides like LEG 1 (Figure 19). This street is covered with a fabric canopy which creates echoes and shadow for participants. The canopy is a strong reference point for the participant until the entrance of Ali Paşa Square (Figure 20). When the participant arrives at the entrance of Ali Paşa Square, it is expected from the participant to recognize the change in the ground texture and the change in the amount of wind because of the voids on both sides (Figure 21).

Figure 19. View from LEG 3
(Taken by author)

Figure 20. A fabric canopy along the street
(Taken by author)

Figure 21. An entrance of Ali Paşa Square
(Taken by author)

Ali Paşa Square is a transition space for participants which is shaded with a fabric canopy and restaurants' patios on both sides (Figure 22). Therefore, participants can perceive this space as a narrow street. This is the only space which has a larger ground texture. Therefore, it is expected from participants to recognize the auditory, tactile information and olfactory information from the restaurants on both sides. Ali Paşa Square ends with asphalt pavement which allows participants to understand that they reached the finish and also recognize the wind from both sides of the street (Figure 23).

Figure 22. Restaurants' patios and cover coat
(Taken by author)

Figure 23. Transition to asphalt ground texture
(Taken by author)

LEG 4 lies between the exit of Ali Paşa Square and the corner of Old Fish Store construction site (Figure 24). LEG 4 and LEG 5 are the only ones along the route which are open to traffic. On the right side of LEG 4, there is the construction site protection wall and continuous high wall on the left side. When the walls on both sides end, the participant reaches the third turning point where one should turn to left (Figure 25).

Figure 24. Construction site protection wall
(Taken by author)

Figure 25. Third turning point
(Taken by author)

From the third turning point until the finish point (LEG 5), the street features are the same as in LEG 3, except the ground texture. Stores are located on both sides of the street. This leg has a fabric canopy above the street as in LEG 3 which creates an echo for the participant (Figure 26). It has also narrow streets on both sides of the street which creates a change in the amount of wind and voids in this urban context. To reach the target, the participant should cross a street with vehicular traffic (Figure 27). When a participant reaches the finish point, it is expected from the participant to recognize the material change in the roofing above the street which creates a different type of echo and gives the feeling of interior (Figure 28).

Figure 26. View from LEG 5
(Taken by author)

Figure 27. A street has to be crossed
(Taken by author)

Figure 28. Finish point
(Taken by author)

Another selected route is in the most important recreation area of the city called İzmir Fair Park with many giant trees considered to be the lungs of İzmir. It does not include many buildings, except few such as the Parachute Tower, Open Air Theatre and culture and art centers. The park was selected for the way-finding task of blind individuals, because it does not provide as much sensory information as Kemeralti. It has a clearly different urban identity with an intelligible street pattern within an urban park. As a sighted researcher, I expected that the way-finding task in this urban context would be easier than the way-finding task in Kemeralti district (Figure 29).

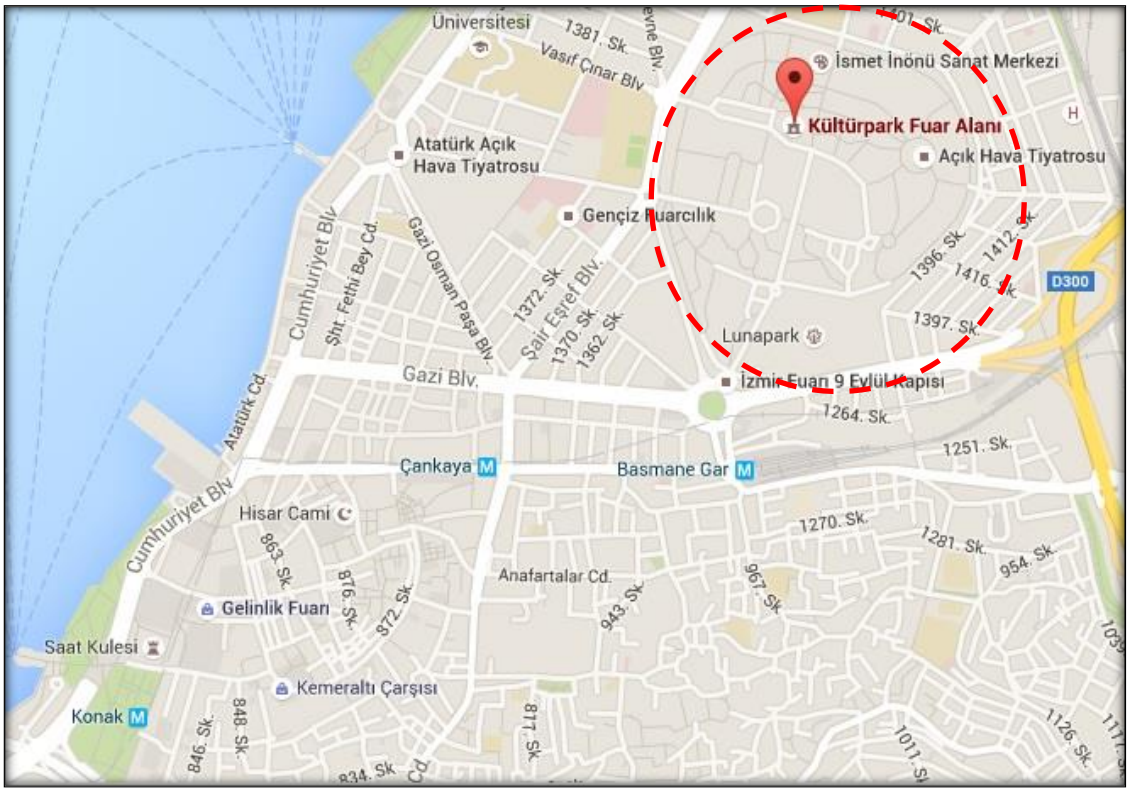

Figure 29. İzmir Fair District as lungs of İzmir
(Source: https://www.google.com.tr/maps?source=tldsi&hl=tr)

In the İzmir Fair Park, the selected route starts with the Lozan Gate and ends at the Parachute Tower. This urban park has different features when compared to Kemeralti. As mentioned above, the Fair Park does not have buildings, walls and obstacles which create a feeling of enclosure for the blind participants. Therefore, the selection criterion of route is based on the idea that to identify legs which include buildings (Figure 30).

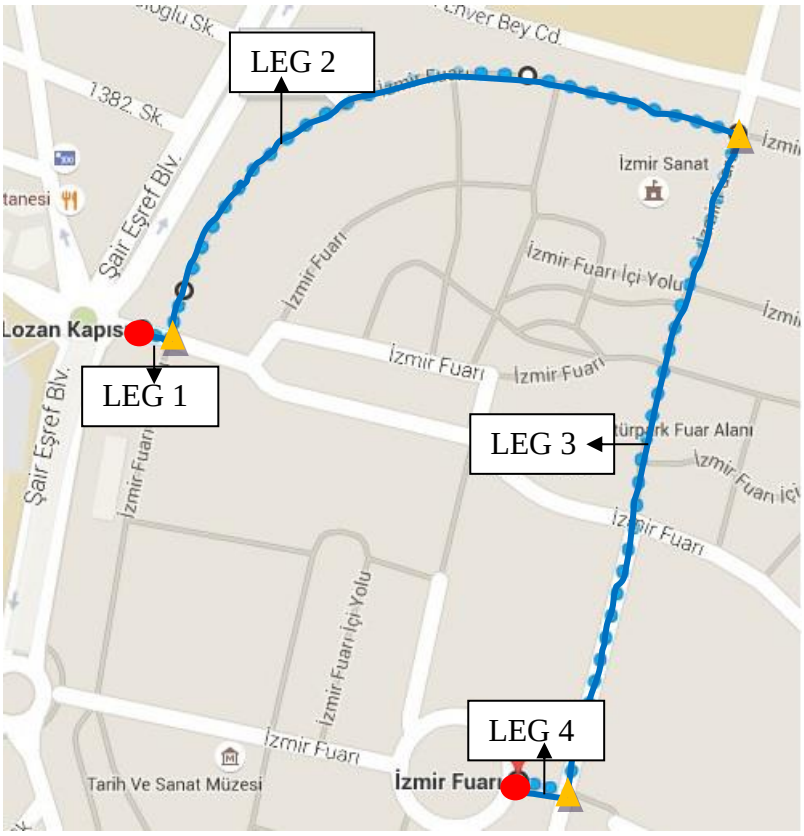

Figure 30. The selected route in İzmir Fair Park in the case study

As seen in Figure 30, Lozan Gate is chosen as the starting point in İzmir Fair Park (Figure 31). LEG 1 lies between Lozan Gate and the first turning point which is the first left turn when the participant enters in the Fair Park from the Lozan Gate. Along LEG 1, the only reference point for the participant is the height of the side curb on the left side. LEG 1 is the shortest leg along the route. It is expected from the participant to recognize this height change and follow it until the first turning point. The end point of the pavement is the corner of the first turning point (Figure 32).

Figure 31. Start point
(Taken by author)

Figure 32. First turning point
(Taken by author)

From the first turning point until the second turning point (LEG 2), the street has only one building on the left side which creates an echo for the participant. On the right side, there are two sports fields which can also be reference points for the participant. This leg is narrower than the entrance. The height of the side curbs on both sides allows the participant to follow the leg. There are barriers which are 50 cm. in length standing at the border of the street which also allow the participant to recognize the end point of the street. It is expected from the participant to recognize these barriers and turn right (Figure 33).

Figure 33. The barriers at the end of the street
(Taken by author)

LEG 3 is the longest leg along the route which includes different type of ground texture and also two main buildings in the park which block direct sunlight and the wind. The participant should also cross a street and a runway which is the first time along this route. It is expected from the participant to recognize one of the main buildings on the right side and follow the pavement (Figure 34). End of the pavement is

the corner of the third turning point. The participant should turn right from third turning point to reach the Parachute Tower which is the end point.

Figure 34: The main building on the right side
(Taken by author)

LEG 4 lies between third turning point and Parachute Tower. It is the second shortest leg along the route after LEG 1 (Figure 35). When the participant turns from third turning point, it is expected from the participant to recognize Parachute Tower because of its height. It creates an echo which allows the participant to understand that they reached the target.

Figure 35. LEG 4
(Taken by author)

3.3.1. The Participants

This study consists of 9 congenitally blind participants (7 men, 2 women). Mean age of the participants is 33. At the time of the study, all participants were employed or were university students. Half of them had no perception of light and shadow, the rest had a negligible perception of light. All participants could walk alone in the city and used long canes during their way-finding process. All participants were familiar with the study environment and at least once in a month they walked alone in Kemeralti and İzmir Fair District for shopping, meeting their friends, eating and drinking. As seen in Table 3, in this case study, the participants' selection criteria were set according to degree of blindness, state of job, independent mobility ability and familiarity with the environment.

Table 3. Information about the participants in the case study in İzmir/Turkey

	Age	Gender	Occupation	Congenitally Blind	Perception of Light&Shadow	Independent walking ability	Device	Familiarity to an environment	They walk alone in the environment in a week
P.1	*70*	*Male*	*Retired teacher*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Everyday*
P.2	*33*	*Male*	*Public employee*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Once in a month*
P.3	*25*	*Male*	*Public employee*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice in a week*
P.4	*30*	*Male*	*Public employee*	*YES*	*VERY LITTLE*	*YES*	*Long Cane*	*YES*	*Once in a month*
P.5	34	*Female*	*Teacher*	*YES*	*VERY LITTLE*	*YES*	*Long Cane*	*YES*	*Long time ago*
P.6	*29*	*Male*	*Teacher*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice in a month*
P.7	*19*	*Male*	*Student*	*YES*	*VERY LITTLE*	*YES*	*Long Cane*	*YES*	*Three times in a week*
P.8	*28*	*Male*	*Employee*	*YES*	*VERY LITTLE*	*YES*	*Long Cane*	*YES*	*Three times in a week*
P.9	*32*	*Female*	*Psychologist*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice in a week*

3.3.2. Design of the Study

All the participants were informed about the study's scope and were tested individually at the same time of a different week day between 13.00 p.m. to 16.00 p.m. and in similar weather conditions. The research was conducted first in Kemeralti District and second in the park in a pre-scheduled day. The trials took around two hours including the structured interview in both urban environments. Weekdays were chosen to conduct the study, especially in Kemeralti, because this place has a different identity and crowding level during the weekends.

3.3.3. Materials (Experimental Settings)

The participants signed the consent form which was prepared by the researcher. The form includes information about the researcher, the content of the study and where the collected information will be used after the study.

A structured interview with 36 questions was conducted before each trial. The first 11 questions are about demographic information, the following 17 questions are about independent way-finding ability and the rest are about familiarity with the environment.

A video recorder was used to record the participants' experiences and their verbal reports during the walking tour. It also recorded their answers to the structured interview which was conducted before the walking tour. The videos were later used to analyze the verbal reports of the participants.

3.3.4. Procedure

PREPARATION PHASE

In this phase, each participant's consent was taken prior to the study. The consent form, which states their consent to attend this exploratory study, was signed by each participant. The researcher gave the participants initial instructions about each urban environment before the walking tour and the duration of the research. In addition,

structured interview was conducted with each participant to assess their independent way-finding abilities and understand their familiarity with the study environment

LEARNING PHASE

This step is the trial phase. This phase is done to introduce the routes to the participant who were expected to learn the length of the route, main features along the route, the end point, and the turning points. In this phase, a first trial along the selected routes is done for each one of the participant together with the researcher and the researcher gave information to the participants about the area such as the turning points and the functions of the places around. The researcher gave the same information with the same words to each participant and told the participants to memorize the environmental cues which would help them in the test phase. This learning phase also check participants' ability to walk alone without holding their arms and each participant used a long cane during this phase.

TEST PHASE

This phase is the actual test phase. This phase is also conducted in two different urban environments. In this phase, the participants were requested to re-walk the route and to talk about their experiences. In addition, they were asked to talk about the differences between these environments considering environmental cues which help them during way-finding. In this phase, the researcher didn't provide help to reach the target. In addition, the researcher did not talk with the participant during the way-finding process. However, if participants felt lost or they were confused, they could request help from the researcher. In such a situation, the researcher waited 10 seconds and helped them find the right direction. If the participant cannot recognize where he/she is and makes an error again, the researcher will not help the participant and wait until he/she realizes the error. If the participant cannot recognize, the researcher lets them go and it means that they are lost. The participants' verbal reports were recorded during the way-finding process with the video recorder.

POST-TEST PHASE

The test phase was followed by a post-test. In this phase, the participants were requested to evaluate the walking tour in two different urban environments and describe the routes once more after the study. The participants talked about environmental cues

that they focus on during way-finding in two different urban environments and were requested to explain how different urban environments affected their way-finding process. The results of post-test phase were used to have better understanding of blinds' way-finding process.

3.3.5. Measures

Verbal descriptions of the participants which were recorded during the way-finding process in two different urban environments were evaluated. The transcripts of the recordings were coded according to the environmental sensory inputs such as auditory information, tactile information and olfactory information. In addition, their short-term memory was also evaluated through the transcripts of the recordings. Memory is based the decision-making on purely memory retrieval before there is any environmental input or in the absence of environmental input. The categorization was made according to space features such as sound, texture, air movement, temperature and smell and it was measured how many times they use this information in their verbal reports (Table 4-Table 5-Table 6).

Table 4. Coding system for auditory information in case study in İzmir

	SPACE FEATURES	**THE CASE STUDY IN İZMİR**	
1	***SOUND***	**Definition**	Auditory information giving by **Adjective**
		Sample (P.8.)	*"There is a high wall in front of me. My words hit the wall and come back. There is a big gap in the right side of me. When I turn to right, my voice spread out in the air. It doesn't hit any obstacles".*
		Definition	Auditory information giving by **Noun**
		Sample (P.1.)	*"I feel the person carrying the bag in his left hand".*
		Definition	Auditory information giving by **Feeling**
		Sample (P.3.)	*"We are walking in a crowded street. In both sides, there are lots of people standing in the middle creates crowding".*

Table 5. Coding system for tactile information in case study in İzmir

	SPACE FEATURES	**THE CASE STUDY IN İZMİR**	
2	***TEXTURE***	**Definition**	Tactile information giving by **Adjective**
		Sample (P.1.) (P.5.)	*"The ground is smooth in the Fair Park. However, I need to find an edge as a reference. Without following anything in the ground, I cannot go straight".* *"I cannot walk easily in wide areas. Because, in wide areas, it is difficult to find references to narrow my path. I cannot control myself in reference to the environment in such wide areas".*
		Definition	Tactile information giving by **Noun**
		Sample (P.1.) (P.4.) (P.3.)	*"Now, the sun hits the back of my neck. It is following me. I can recognize the row of trees while the sun appears and disappears. Therefore, I can follow the shadow of the trees along the route".* *"In the İzmir Fair Park, the most important reference for us is the curbs. They are always stable there".* "*We came across the race track and there is a low obstacle on the right side of me".*
		Definition	Tactile information giving by **Feeling**
		Sample (P.2.) (P.4.)	*"This is an empty space. There is no one to ask the way. It is the difficult part of this way-finding process".* *"There is too much light on my right hand side and a high wall on my left hand side. It means that at the end of this wall, I need to turn left and it is the last turning point"*

Table 6. Coding system for olfactory information in case study in İzmir

	SPACE FEATURES	**THE CASE STUDY IN İZMİR**	
3	***SMELL***	**Definition**	Olfactory information giving by **Adjective**
		Sample (P.8.)	*"When I take the smell of double roasted coffee, I feel relax. Because I know that I am in the right way".*
		Definition	Olfactory information giving by **Noun**
		Sample (P.3.)	*"When I need extra information for way-finding in such a crowded environment, I follow the olfactory sensory inputs such as coffee, corn and new cloths".*
		Definition	Olfactory information giving by **Feeling**
		Sample (P.9.)	*"Olfactory cues are distributed homogeneously. In addition, there are no obstacles around to cut the air. Therefore, it is difficult to recognize them in such a wide area".*

In this case study, different urban environments' impacts on the strategies of the blind participants and how these two different urban environments' features affect the priority of the sense usage were investigated. In the Lisbon case study, only one urban environment was chosen and the study was conducted under two different conditions to assess the performance of each participant. The most important sense for blind individuals, which is sense of hearing as it is determined in the literature and found in the first case study, was blocked to understand how their strategies change when one of the senses is blocked. While the first case study is an exploratory study designed to find out which sensory inputs are of utmost importance in different urban contexts, the second study is mostly exploratory and also an experimental study which tests the role of audition in blind individuals' navigation in the city. Therefore, additional measurement techniques such as digital applications which measure the performance of the users during way-finding process were introduced in the second case study.

3.4. The Case Study in Lisbon/Portugal

In the Lisbon case study, the participants were asked to reach a pre-determined target and accomplish predefined tasks along the way. The aim of the case study conducted in Lisbon is to understand the strategies of congenitally blind participants during way-finding process with a focus on whether sounds from the environment are of primary importance for blind individuals. This particular part of the study discusses what happens and how their strategies change when one of their other senses, namely hearing, is heightened or blocked. The study shows that blind participants are able to perceive the environment through senses such as hearing, smell, and touch rather than vision. Therefore, this study also highlights the non-visual aspects of spatial perception.

In the case study which was conducted in Lisbon/Portugal, I contacted Mr. Peter Colwell who is the president of Técnico de Acessibilidade da **ACAPO.** He could reach 12 congenitally blind participants and five of them participated in my research project in Lisbon/Portugal.

Lisbon is one of the world's oldest cities. The city was rebuilt after the earthquake of 1755 by the Manques de Pombal who also designed the street, Rua Augusta, was I conducted my study (Portugal History, 2016). The street is a commercial area filled with many touristic attractions. The street is designed on a north-south axis with side streets running in the east-west direction. I was in Lisbon for a period of time and the reason why I chose this district as a case study is that it has a multi-sensorial richness like in Kemeralti (Figure 36).

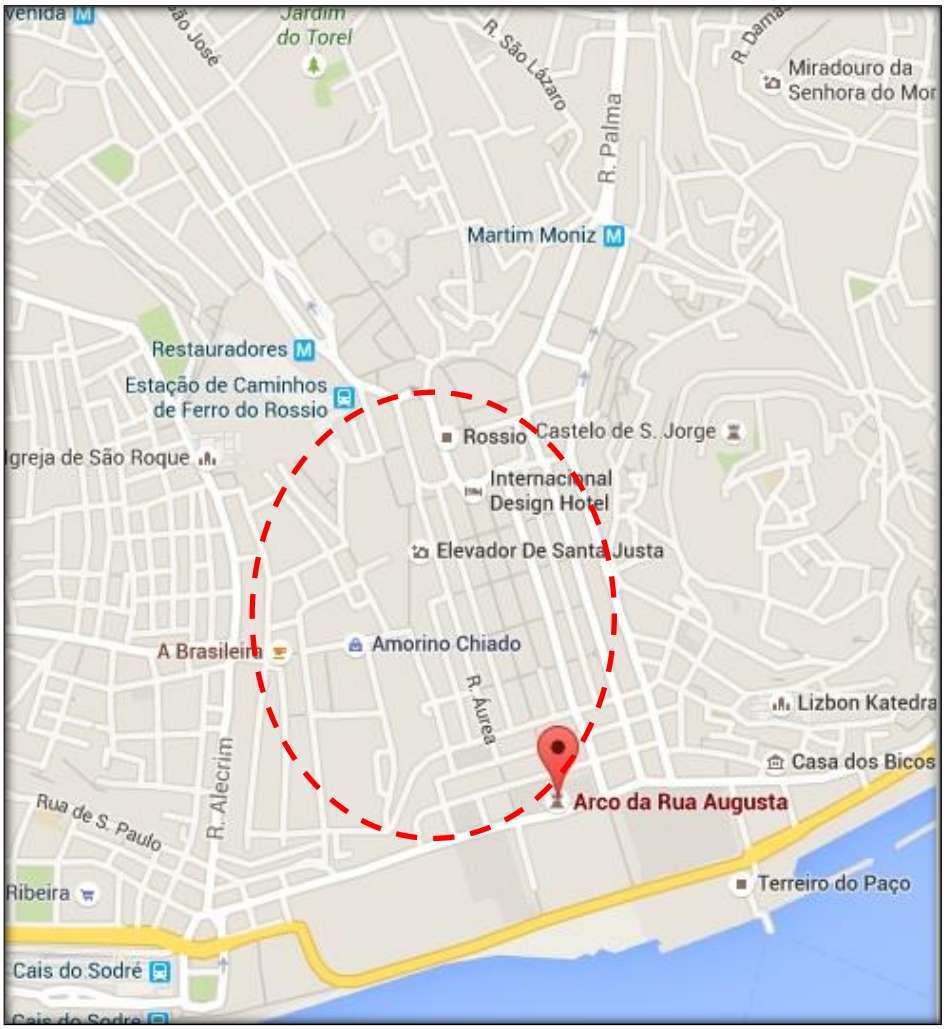

Figure 36. The touristic region in Lisbon
(Source: https://www.google.com.tr/maps?source=tldsi&hl=tr)

This study takes place in Rua Augusta (Augusta Street) between Praça do Comércio and Praça D. Pedro IV (Rossio) in a complex urban environment in Lisbon's city center. This pedestrianised street includes many stores and street artists. The streets in this area of the city are arranged in a squared grid. The initial visit to the area was made by the researcher alone to determine the route and identify the turning points along the route which would include environmental sensory information such as sound, touch or smell. There is some research regarding the choice of the elements that would be needed to be part of a spatial layout for an independent walking. Following the related research, it was decided that turning points with strong reference points were needed for blind participants to notice the differences (e.g. patios). Portugali (1996) was one of the researchers who investigated how much information about the spatial layout

is necessary before a blind individual can travel confidently and independently in an urban environment. In addition, Golledge et al. (1996) described the difficulties of blind travelers in an urban environment to choose the way to walk to the destination, when and where to turn, learning about new locations and knowing which way is faced.

The selected route begins under Rua Augusta Arc and finishes under another arc which has the same features as the starting point. Determining the route, the important criteria were to define streets which have different features from each other and locate turning points which provide different sensory information from each other. Six turning points were identified which have strong reference points for the blind participants. In addition, with the average walking speed, the sighted subject reached the target in 18 minutes and the distance is around 0, 65 km. The grid fabric of the urban context does not allow to define a specialized route for participants because of its' similar streets, however, I thought that the selected route provided special experience for blind participants (Figure 37-Figure 38).

The selected route in Lisbon City Center:

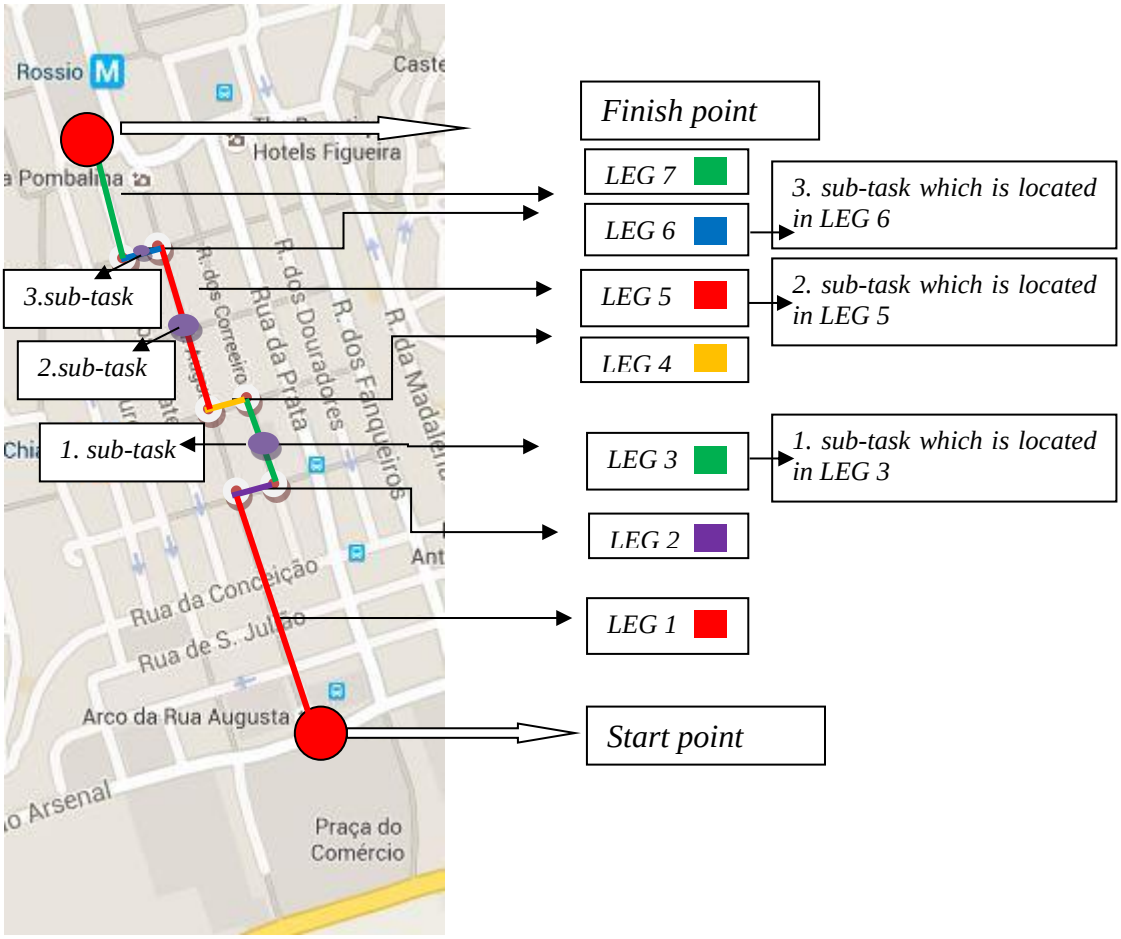

Figure 37. The selected route in Lisbon city center

Figure 38. The schema of the selected route in Lisbon in the case study

Figure 37 shows the selected route. Arco da Rua Augusta is identified as the starting point. This arc opens to the Comércio Square and can easily be identified by a change in the amount of wind when passing under (Figure 39). From the start point until the first turning point (LEG 1), the leg includes three streets that have to be crossed (Figure 40-Figure 41-Figure 42). It is the longest stretch of the street without turning when compared to the other parts along the route. This section of the street has high buildings on both sides blocking the sun at particular spots and creates a sort of echo for the participants. After passing three streets with traffic, there are restaurants' patios which are located in the middle of the street dividing it in two. When the participant arrives at the first turning point, it is expected from the participant to recognize the auditory and olfactory information because of the most famous bakery of this touristic region.

Figure 39. Start point - Arco da Rua Augusta
(Taken by author)

Figure 40. First street which has to be crossed
(Taken by author)

Figure 41. Second street to be crossed
(Taken by author)

Figure 42. Third street to be crossed
(Taken by author)

From the first turning point to the second one (LEG 2) (Figure 43), although this leg is the narrowest one that the participants walk along the route, the restaurants' patios are located in the middle of the street which makes it feel even more crowded (Figure 44). Therefore, this leg seems to be the most crowded space as compared with the other ones. This street also has high buildings on both sides blocking the direct sunlight like along LEG 1. When the participant arrives at the second turning point, the participant is expected to turn left where the third leg begins. In the corner of the second turning point, there is a soap store which has a strong smell and also the restaurants' patios end at this point because of the crossroads (Figure 45).

Figure 43. First turning point
(Taken by author)

Figure 44. Restaurants' patios in the middle of the street
(Taken by author)

Figure 45. Second turning point
(Taken by author)

The street that goes from the second to the third turning point (LEG 3) can be identified by a row of restaurants on both sides of the street leaving an open, empty space in the middle which is different from LEG 1 and LEG 2 (Figure 46). When the participant reaches the third turning point, it is expected from the participant to recognize the changes in the ground texture compared to the previous streets (Figure 47). During the complete route, this is the first point where a ground texture change can be observed.

Figure 46. View from LEG 3
(Taken by author)

Figure 47. Third turning point
(Taken by author)

From the third turning point to the forth turning point (LEG 4), the restaurants' patios are located in the middle of the street and it has the same length as LEG 2. However, this leg is wider than LEG 2. LEG 4 is the only stretch which has a different ground texture compared to the other streets. It is covered by marble which has a smooth surface (Figure 48). There are barriers which are 80 cm. in length standing at the border of the street at the third and fourth turning point which draw the line to the beginning and end point of LEG 4 (Figure 49).

Figure 48. Marble in LEG 4
(Taken by author)

Figure 49. Fourth turning point
(Taken by author)

From the fourth to the fifth turning point (LEG 5), the street's features are the same as in LEG 1 (except for the streets with traffic) since we enter again Rua Augusta. Stores and restaurants are located on the both sides of the street (Figure 50). Along this leg, several street artists (e.g. statue men, musicians, jugglers) can be seen (Figure 51). These performances create groups of people standing in the middle of the street which can hinder the mobility of the participant, but also be used as a reference point. When the participant arrives at the fifth turning point, it is expected to recognize the flower stand which has a strong smell and also this stand is located on the right side of LEG 5 which can be identified by touching with a long cane (Figure 52).

Figure 50. View from LEG 5
(Taken by author)

Figure 51. Street artist's performance
(Taken by author)

Figure 52. Flower stand as a reference point for the fifth turning point
(Taken by author)

Between the fifth and sixth turning point (LEG 6), there is a kiosk in the middle of the street which is expected to be recognized by blind participants (Figure 53). This street has roughly the same length as LEG 2 and LEG 4. However, it is the only street which has a structure in the middle (a kiosk). In the sixth turning point, there is a barrier which delimits LEG 6 and creates an obstacle for the participants (Figure 54).

Figure 53. The kiosk in LEG 6
(Taken by author)

Figure 54. Barrier in the sixth turning point
(Taken by author)

LEG 7 lies between the sixth turning point and the finish. This leg is the only one along the route which is open to traffic (Figure 55). In addition, this is the only one which has sidewalks on both sides and the traffic travels in the opposite direction to the participants. There are many obstacles for the participants in this leg such as dustbins, parked cars and people walking on the sidewalks, among others. This leg ends with the Pombalina Arc which opens to the Rossio Square. A strong wind can be felt under the Arc which allows participants to understand that they reached the finish (Figure 56).

Figure 55. View from LEG 7
(Taken by author)

Figure 56. The finish point – Pombalina Arc
(Taken by author)

3.4.1. The Participants

This study consists of five congenitally blind participants (three men, two women). The ages of the participants ranged from 23 years to 59 years old. At the time of the study, all participants were employed. The participants had no perception of light and shadow, except the third one. The participants had a self-sustaining life and were good travelers. It means that they had independent walking ability, could easily get on and off public transportation, and go around in familiar and unfamiliar environments. All participants were told to use a long cane, however, the third participant preferred to use guide-dog during the way-finding process which was precluded in the findings and discussion part. The participants were familiar with the environment and at least once in a month they walk alone in the environment for their needs. However, they were not familiar with the specific route proposed (Table 7).

Table 7. Information about participants in the case study in Lisbon/Portugal

	Age	Sex	Occupation	Congenitally Blind	Light-Shadow Perception	Independent walking ability	Device	Familiarity to the environment	Walk alone in the environment in a week
P1	*48*	*M*	*Lawyer*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Twice a week*
P2	*59*	*M*	*Lawyer*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Once in a month*
P3	*29*	*F*	*Quality Manager*	*YES*	*YES*	*YES*	*Dog*	*YES*	*Rarely*
P4	*23*	*F*	*Dancer*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Rarely*
P5	59	*M*	*Psychologist*	*YES*	*NO*	*YES*	*Long Cane*	*YES*	*Once in a month*

3.4.2. Design of the Study

Sound is within-subject variable, that is, each subject is requested to perform the same way-finding process with and with-headphone conditions. The conditions' order is counter-balanced, that is, half of the sample performs first the way-finding process without-headphone and then with-headphone and the other half would perform in the reverse order (Figure 57). Participants were randomly assigned to one of the conditions. In order to eliminate auditory information, all participants in the no-sound condition were requested to listen to the same music from an mp3 player (mobile phone) while they walked along the route. In addition, utmost precautions were taken by the researcher to prevent any accidents in the with-headphone condition.

All the participants were informed about the study's scope and were tested individually at the same time of a different week day and in similar weather conditions between 13.30 p.m. to 16.30 p.m. Weekdays were chosen for conducting the study, because the chosen environment is a touristic region of Lisbon. Therefore, this place has a different identity and crowding level during the weekends. The research took place around three hours in total (including walking tour and interview). The interview lasted for about half an hour and walking tour took about two and a half hour.

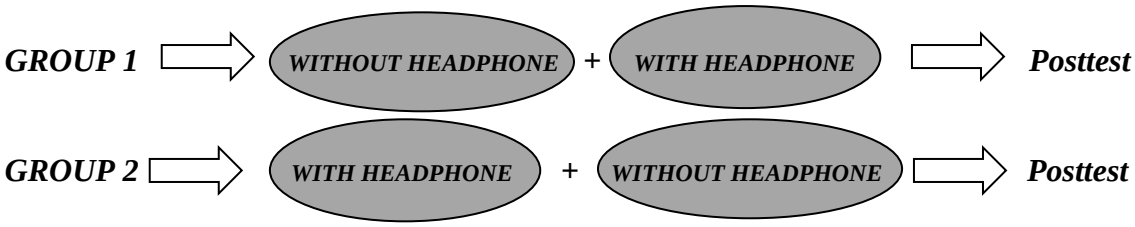

Figure 57. Counter-balanced order

3.4.3. Materials

The participants were asked to sign a consent form before walking the tour. The form includes information about the researcher, the content of the study and where the collected information will be used after the study.

A pre-test interview with 19 questions were administered before each trial. The first part is about demographic information, e.g., age, gender, and the rest is about participants' independent way-finding abilities and familiarity with the area.

"Runtastic" and "Runkeeper" applications were uploaded to a mobile phone, which was carried by the participants during their walk. These helped calculating how many meters participants walked and recorded the precise route that the participant walked on the map.

A mobile phone was worn by the participants on their chest during the walking tour in order to record video of the route travelled and the audio of their verbalizations. The videos were later used to analyze the errors and successes during the process. More details regarding this process are described in Part 4.5.

A headphone was worn by the participants in the no-sound condition to listen to music from an mp3 player (a mobile phone) while they walked the route.

3.4.4. Procedure

The study includes preparation phase, learning phase, test phase and post-test phase. It is believed that multi-trail learning tasks help blind participants to solve the way-finding task better. Some of the researchers also suggested that "spatial abilities of blind individuals should be studied in contexts where they have opportunity to develop the best strategy by solving the task. In this respect, multi-trial learning tasks would seem to be more adequate than single trail task to study the spatial abilities of blind people" (Corazzini et al., 2010, p. 328).

The main task of this study is to reach the target. And also, there are three sub-tasks, which they needed to complete before reaching the target. First sub-task was "to ask the dinner price to a specific restaurant" located on LEG 3. Second one was "to place a coin in the statue man coin box" which was on LEG 5 and the last sub-task was "to ask the price of a magnet in the kiosk" which was located on LEG 6.

PREPARATION PHASE

In this phase, the consent form was read and signed by the participant. The researcher gave the participants initial instructions about the area and the duration of the research. In addition, an interview was conducted with each participant to assess their independent way-finding abilities and understand their familiarity with the study area.

LEARNING PHASE

During the learning phase, a first trial along the selected route is conducted for each one of the participant together with the researcher. This learning phase aims to check each participant’s ability to walk and to introduce the route to the participant. Each one of them tried the route only once before each trial. During this phase, the researcher walked near the participant without holding their arms. Each participant walks as they would in their daily lives. In this phase, the researcher gave information to the participants about the area. In other words, the researcher told the features of the legs and the turning points. The researcher also told them when the walking tour begins, they should try to get to the target as fast as possible. In this learning step, the participants were also informed about the three sub-tasks that have to be completed by

the participants along the route and the locations where these sub-tasks should be performed.

TEST PHASE

This phase is the trial phase. In this phase, the participants were requested to re-walk the leg and to talk about their experiences. The participants were also expected to complete all the sub-tasks along the route. This phase is conducted under two different conditions. The first condition is with the sound, the second condition is with-headphone input. Half of the participants performed the way-finding process first without-headphone and second with-headphone and the other half in the reverse order. The sound input is controlled by wearing headphones during the process. After blocking the sound, the participant was asked to focus on the sense of smell, touch or other information that they use to find the route. In the with-headphone condition, the participants were not requested to talk about their experiences. The only times when they removed their headphones and talked were when they were supposed to complete the specific tasks. In addition, if they felt lost or they were confused, they could take off their headphones and requested help from the researcher.

In this phase, the researcher walks near the participants without holding their arms and assesses what happens and how the participant's way-finding strategies change when the sense of hearing is heightened or blocked. Time and distance walked by the participant in this phase under two different conditions (without-headphone and with-headphone) and their errors and successes are measured without-headphone and with-headphone. In addition, the performance of the task accomplishment is measured during this phase. Their verbal reports were recorded during the way-finding process by the mobile phone.

POST-TEST PHASE

The test phase is followed by a post-test. The participants were asked questions about their experiences and strategies during way-finding process under two different conditions. They were requested to tell about where they felt lost and why. In addition, they were asked to explain the most difficult part of the experience for them. At the end of the study, the feedbacks were taken and research suggestions were proposed in order to help them in their way-finding strategies in large-scale urban environments.

3.4.5. Measures

I evaluated "accuracy" and "task accomplishment performance" in the way-finding process. Accuracy is operationalized by measuring the following variables.

Time spent to reach the target, which indicates the duration between the starting point and the finishing point, is the first variable. The second is distance travelled from the start point to the finish point, which is measured in meters. The third measured variable is the number of additional turns.

Accuracy includes errors and successes in it. Errors, which means the number of getting lost during the process, and successes which mean reaching the target or not, were measured. The measured errors and successes of each trial provided an accuracy rating for each participant.

Strategies of the participants were evaluated in this study. The accuracy of the chosen strategies can be evaluated. Strategies include the plan of the participants which is created in their minds to show how they walk the route. This plan also includes errors and successes in it. As mentioned above, errors and successes define the accuracy of the way-finding process of the participants. Therefore, it is possible to evaluate the accuracy of the chosen strategies of the participant during their way-finding process.

Task accomplishment performances of the participants were also evaluated according to the number of tasks that they complete during the route.

In the following circumstances a participant was considered to be lost. The participant had one chance to make an error at each turning point. If the participant made an error, the researcher helped the participant after counting 10 steps and take him/her 10 steps backward, basically, taking the participant to the turning point again. When the participant walked more than one time in the same spot and he/she made an error again, this time, the researcher will not help the participant and wait until he/she realizes the error. If they realized they repeated the error and asked for help, the researcher would help them find the right direction and way. If they did not recognize the right leg, the researcher let them go. If they cannot find the right way and make more than three errors, that is when they were considered to be lost.

Verbal descriptions of the participants which were recorded during the way-finding process were also evaluated. The transcripts of the recordings were coded according to the allocentric and egocentric frameworks. Allocentric framework includes

the environmental sensory inputs that they mention during the way-finding process and egocentric framework relates to the memory of the participants. In the transcripts, environmental sensory information was divided into three as auditory information, tactile information and olfactory information. The categorization was made by space features such as adjectives like hot, soft, narrow, etc… or nouns like chairs-tables, obstacles, etc… The nouns, adjectives and the description of feelings used by the participants were also included under these three categories. For example, when the participant used the noun "patios", the adjectives like "hot, soft, sloppy, etc." or "the feeling of crowding", these are added under tactile information (Table 8-Table 9-Table 10). They do not need to use directly the words such as "sound, touch and smell". As also cited in Foulke (1982), a blind individual's world can be described with space features rather than with objects such as trees, buildings, cars, etc...

Table 8. Coding system for auditory information in case study in Lisbon

	SPACE FEATURES	**THE CASE STUDY IN LISBON**	
1	***SOUND***	**Definition**	Auditory information giving by **Adjective**
		Sample (P.4.)	*When the sound of the second street performer, I knew the first one had the music louder and I knew that I had to turn in a wider place.*
		Definition	Auditory information giving by **Noun**
		Sample (P.3.)	*"What is said about the congenital blindness, that we use echo-localization to orient is true. Hearing allows me to identify the sounds of streets to know when to cross and its proximity or the proximity of the street performers which I used as a reference".*
		Definition	Auditory information giving by **Feeling**
		Sample (P.5.)	*"If I'm between buildings and I keep walking, as soon as I reach a street I feel the openness of the space and then listening to a sound and the brain being conditioned to the sound that comes from the headphones, closing completely the environmental noise which is very important".*

Table 9. Coding system for tactile information in case study in Lisbon

	SPACE FEATURES	**THE CASE STUDY IN LISBON**	
2	***TEXTURE***	**Definition**	Tactile information giving by **Adjective**
		Sample (P.1.) (P.2.)	*"At this point we are here in a flat surface and the sidewalk starts to become more... more... where the paving stones are more spread away from each other. There's a slight slope on our right in the direction we are walking". "Now the surface is much smoother here".*
		Definition	Tactile information giving by **Noun**
		Sample (P.5.)	*"I started feeling the wind but I knew I was going to stop before the Arc, but when I stopped feeling all the wind... I knew I was near the Arc".*
		Definition	Tactile information giving by **Feeling**
		Sample (P.4.)	*"There are more people here. I am trying to overtake some people. I passed them".*

Table 10. Coding system for olfactory information in case study in Lisbon

	SPACE FEATURES	**THE CASE STUDY IN LISBON**	
3	***SMELL***	**Definition**	Olfactory information giving by **Adjective**
		Sample (P.1.)	*"It's a street with a smell that's very.... let's say, unpleasant".*
		Definition	Olfactory information giving by **Noun**
		Sample (P.4.)	*"I mentioned smell, because they were characteristic smells for the areas I was passing, but I couldn't for instance link the smell of curry with the fact that I would have to turn left. For me this time it wasn't a reference. Maybe, if I were for instance looking for a restaurant or a café. Maybe it could work as a reference.*
		Definition	Olfactory information giving by **Feeling**
		Sample (P.1.)	*"The smell here... it's from perfumes, most likely from people nearby".*

CHAPTER 4

RESULTS AND DISCUSSION

This chapter consists of two main sections which includes the results and discussions on the case studies in İzmir, Turkey and in Lisbon, Portugal. A general discussion follows the case studies.

4.1. Results and Discussion on the Case Study in İzmir, Turkey

As mentioned above, the case study in İzmir, Turkey was conducted in two urban environments, namely in the Kemeralti District and in the İzmir Fair Park. The results are reported separately for each of the urban environments. The discussion includes the analysis of the participants' verbal descriptions according to allocentric and egocentric reference framework.

4.1.1. Findings in the Kemeralti District

In Table 11, the categorization of verbal descriptions uttered by the participants is presented. The categorization is done according to information derived from environmental sensory inputs such as sound, texture, air movement, temperature and smell. In addition to information from the environmental inputs, information retrieved from personal memory is also evaluated and the results are shown in Table 11.

Table 11. Findings of the participants in Kemeralti District

Congenitally Blind Participants	**URBAN FABRIC Kemeralti**					
Number	***Sound***	***Texture***	***Air Movement***	***Temperature***	***Smell***	***Memory***
1	18 **(35%)**	9 **(18%)**	4 **(8%)**	13 **(25%)**	1 **(2%)**	6 **(12%)**
2	9 **(29%)**	6 **(20%)**	2 **(6%)**	0	5 **(16%)**	9 **(29%)**
3	14 **(32%)**	11 **(25%)**	6 **(13%)**	3 **(7%)**	3 **(7%)**	7 **(16%)**
4	12 **(35%)**	8 **(23%)**	4 **(12%)**	3 **(9%)**	0	7 **(21%)**
5	18 **(47%)**	7 **(18%)**	2 **(5%)**	0	4 **(12%)**	7 **(18%)**
6	19 **(48%)**	12 **(30%)**	3 **(7%)**	0	2 **(5%)**	4 **(10%)**
7	12 **(50%)**	5 **(21%)**	1 **(4%)**	0	1 **(4%)**	5 **(21%)**
8	28 **(58%)**	5 **(10%)**	5 **(10%)**	5 **(10%)**	2 **(4%)**	4 **(8%)**
9	15 **(53%)**	3 **(11%)**	2 **(7%)**	0	1 **(4%)**	7 **(25%)**
TOTAL	145 **(42%)**	66 **(20%)**	29 **(9%)**	24 **(7%)**	19 **(6%)**	53 **(16%)**

Finding 1: All the participants reached the target without getting lost at the end of the study. As shown in Table 5, sound (42%) is the most used environmental sensory input among other environmental inputs during way-finding in Kemeralti. The auditory cues are vital for the congenitally blind participants' way-finding process, because they use the auditory cues to estimate their distance to the obstacles, to understand where they are and what the surroundings are as also cited in Portugali (1996). Portugali (1996) also mentions that blind people's navigation in outdoor environments is performed by assessing the distance of sound source, the estimation of landmarks' location and reference points that help them to orient themselves. For example, some of the participants mentioned that the stationary sound sources such as air-conditioner or non-stationary sound sources such as high wheels help them orient themselves in Kemeralti. They explained this situation as follow:

P.1. *"Woman wearing high-heeled shoes is passing by me. The sound of heels helps me understand the place of the wall around me. And also I feel the person carrying the bag in his left hand. The sound of heels and the sound of the bag help us orient ourselves in such a crowded environment"*[1].

Some of the participants also thought that their way-finding process in Kemeralti rely on echoes primarily which help them estimate the shape and the size of the obstacles which is also supported by Kellogg (1962) and Rice (1967). These researchers discussed that echo helps blind individuals determine the type of outdoor environment in which they are located and also determine the size and the shape of obstacles that they come across during way-finding (Kellogg, 1962; Rice, 1967). Below, there is statement of one of the participants who relied most on echoes:

P.8. *"There is a high wall in front of me. My words hit the wall and come back".*

P.8. *"There is a big gap in the right side of me. When I turn to right, my voice spread out in the air. It doesn't hit any obstacles".*

As he told, blind people walk with the echo in the surroundings in their daily lives and they can not put even one step without echo. In addition, he gave a strange example from his childhood:

P.9. *"I was ashamed of using cane in my childhood when I went out. However, I needed to hear the echo in order to walk. Therefore, I always carried a key chain in my pocket or my hand to create the echo".*

Finding 2: As seen in Table 5, smell (6%) is the least used environmental cue among the other ones by the participants in Kemeralti. This is probably related to the non-stationary sources of smell. The participants cannot rely on olfactory information because the olfactory information can easily change according to other environmental features such as wind as also mentioned by one of the participants:

P.4. *"To take olfactory cues as a reference can't be always correct. They can easily change according to the direction of the wind or the store can be closed at that particular time. Olfactory cues aren't reliable for me".*

Ferdenzi et al. (2010) also state that there have been many research on auditory and tactile information in environments, however, there are not many studies on sense of smell. In blind conditions, if there is no access to environmental information such as

[1] All verbal descriptions of the Turkish participants were translated into English by the author.

hearing and touch, olfaction may be particularly important for the participants. For example, Kemeralti is an urban environment which has a high level of crowding. If the participants cannot reach the other environmental cues, they need olfactory cues to orient themselves. One of the participants also explained this as follows:

P.3. *"When I need extra information for way-finding in such a crowded environment, I follow the olfactory sensory inputs such as coffee, corn and new cloths".*

Finding 3: The participants reported that LEG 1 in Kemeralti contained the most auditory cues (50%) among the other environmental cues (Figure 58).

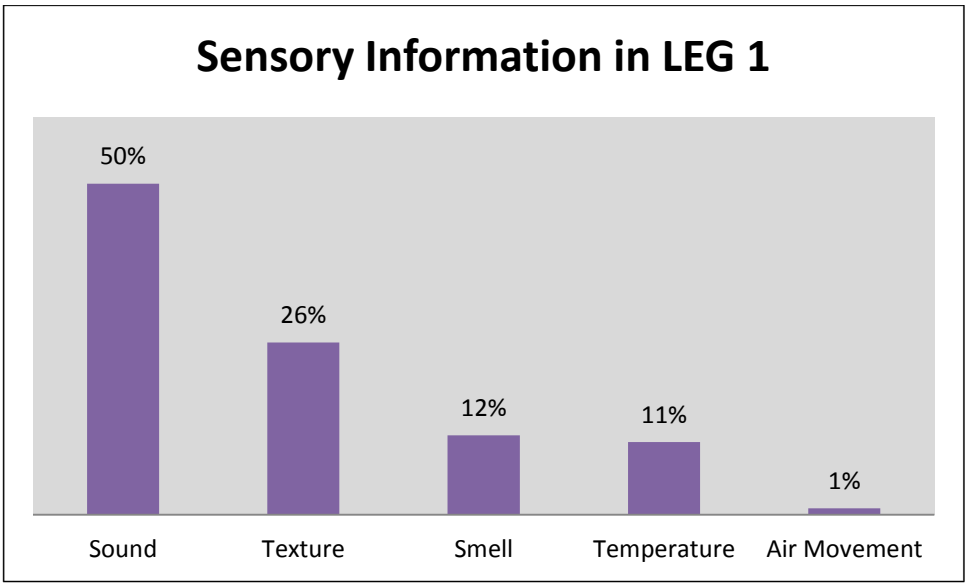

Figure 58. Sensory information in LEG 1

This is probably related to the physical features of this leg which supports participants' echolocation. There are shops on both sides of LEG 1 and the row of shops is rarely interrupted by narrow streets. Therefore, the participants can use the echo of the sound to interpret their distance to the obstacles. The walls on both sides help them in their independent way-finding experience. As also cited in Ashmead and Wall (1999), the echo of the city helps blind people walk parallel to a wall or an obstacle, because the wall creates a wall of sound on the sides of a participant. Some of the participants mentioned the importance of solid-void organization of an environment and how this organization helps them in their way-finding process:

P.5. *"I cannot walk easily in wide areas. Because, in wide areas, it is difficult to find references to narrow my path. I cannot control myself in reference to the environment in such wide areas. However, in this route (LEG 1) I can take the buildings as references to control myself during way-finding. My cane's sound hit the walls of the buildings and comes back to me".*

P.6. *"The perception of wall and gap are related to our sense of hearing. If we are wearing headphones during way-finding process, it will be difficult for us to even take one step".*

Continuity of sound and texture provides reliable information about the environment and it helps the learning and remembering process. As Portugali (1996) discussed, the layout of the environment during way-finding process is important. The continuity of solid-void organization of a city help blind travelers collect spatial information from the environment. Freska (1999) suggests that blind people gain this specific spatial knowledge by exploring the environment and memorizing landmarks. The continuity of solid-void organization leads them to plan how to walk as a strategy of learning and remembering a route. Steyvers and Kooijman (2009) report that blind individuals' experiences in the environment are route-based information. They orient themselves according to the walls of a given space. Therefore, solids can create barriers and a feeling of enclosure and voids create break points which can be references for blinds' way-finding process.

Finding 4: When the participants arrived to first turning point, it was expected from them to recognize the olfactory references because of the most famous coffee shop and also auditory information which is created by the high wall at the end of the street.

It was found that most of the participants (P.2., P.3, P.5, P.6 and P.7) recognized the coffee shop in the corner and the rest (P.1., P.4 and P.9) relied on the auditory information which was present only at the end of the leg.

During the way-finding process, the olfactory information was the least used environmental information along the route. However, in the first turning point, the sense of smell was very dominant when compared to the other environmental sensory information. In this case study, it was found that participants have their own strategies which are different from each other in order to reach the target. We could not evaluate these strategies in this case study, however, it should be investigated in the next case study. Strelow (1985) also argues that blind participants have strategies in their mind

and they use the environmental information which is collected during way-finding process for the path selection processes and path following strategies.

In the following, there are statements from one of the participants who relied on more auditory cues and one of the participants who couldn't recognize the coffee shop in the corner:

P.4. *"I heard the voice of coffee machine. It means that we reached our first turning point. There is also the smell of the coffee in the air, however, the sound is more dominant for me than the smell of it".*

P.1. *"We faced the high wall in front of us. This is the end of the street; therefore, we will turn left from here".*

Finding 5: The participants reported that the tactile information was the most used environmental information (44%) among the other ones in LEG 2 (Figure 59).

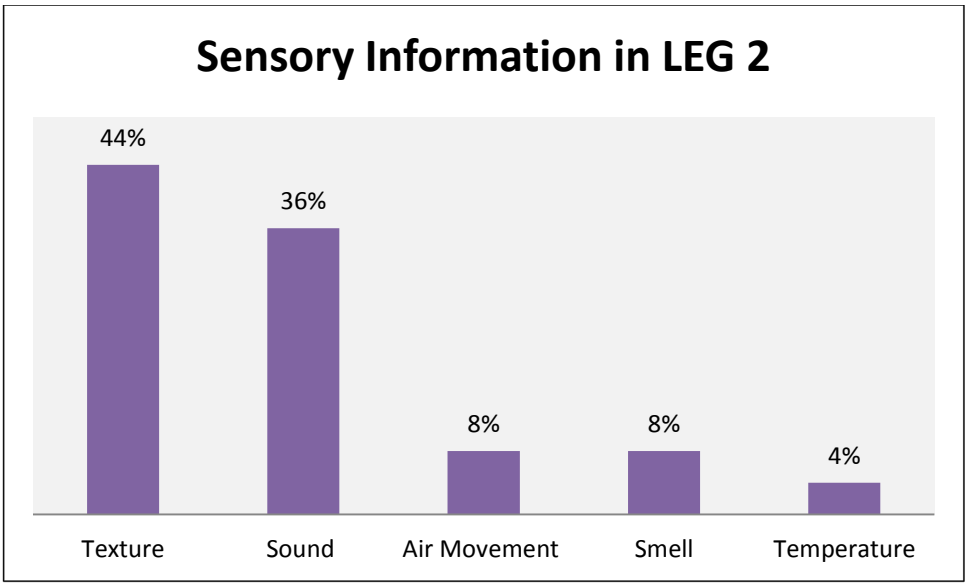

Figure 59. Sensory information in LEG 2

This is again probably related to the physical features of LEG 2. As mentioned above, the right side of this leg is covered by the wall of a mosque. The second turning point is the end of this wall. Therefore, all the participants followed the right side not to miss the turning point. The blind participants were not interested in the names of a space, the definition and the function of a space are the most important thing for them

especially in way-finding process. As also mentioned in Portugali (1996), a blind traveler uses the knowledge of the definition and differentiation among the path segments instead of memorizing the names of a space. This case study showed that the blind traveler focused on this knowledge in LEG 2 not to miss the second turning point during way-finding and one of the participants mentioned:

P.5. "*I don't care about the name of the place that I follow. This wall is the wall of the mosque for you and this is just a wall for me which helps me find my way. The functionality is the most important thing for us".*

Finding 6: The participants reported that they used their memory the most in LEG 2 which is the shortest leg along the route (Figure 60).

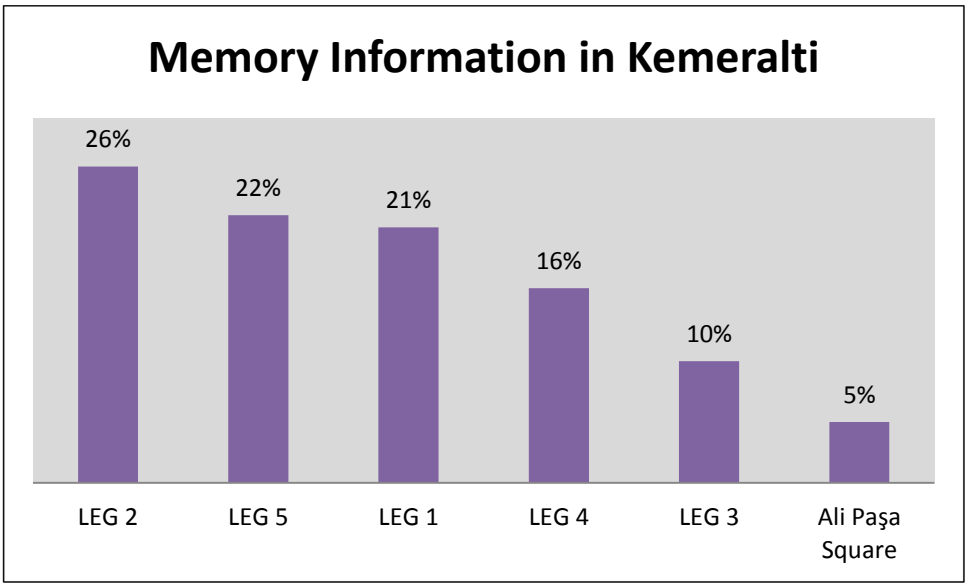

Figure 60: Memory information

As mentioned above, the right side of the leg was covered by the wall of the mosque which was a strong reference point for the participants. As the participants followed this continuous wall, the tactile information was the most used information in this leg which was also emphasized above. Therefore, the participants can easily memorize this reference point in LEG 2. In addition, in the learning phase of the study, they were also told the features of the legs and it helped them to store the environmental cues in their minds as they also mentioned in their verbal reports.

Millar (1988) also hypothesized that blind individuals reach a target by previously memorized movements and they code this information as part of their cognitive maps. In addition, Portugali (1996) argues that this type of information is generally gained via exploratory search or repetitive travel behavior in a local environment as it was done in this case study. One of the participant explained about how she stored and used the information which was gained in the learning phase of the case study as follows:

P.4. *"At the end of the wall, there is a second turning point. I cannot remember the names and the function of the places. I create a cognitive map in my mind and I have my own references to remember the places. In order to remember the second turning point, I don't need to memorize the mosque on my right hand side. The important thing is when the wall finishes on the right side; there is a turning point there".*

In addition, the way how blind people generate cognitive maps in their mind is different than in the case of sighted ones. Blind people store primarily non-visual information to construct cognitive maps. However, as a sighted researcher one of my main questions was "how blinds use this non-visual information to generate cognitive maps". Some of the participants gave detailed information about this and reported as follows:

P.5. *"We construct cognitive maps in our minds different than you. For example, you generate it based on visual information, however, we construct it based on the information such as the voice of coffee machine or the smell of coffee".*

P.7. *"I constructed cognitive map of this space in my mind. For example, the rough floor texture with restaurants' patios on both side is one of the references for me. When I passed these patios, the floor texture changed from rough to smooth. Another reference to construct cognitive map is the smell of coffee. This place is always located at the same corner. Or at the third turning point, there was an air-conditioner sound. I coded this place in my mind as the third turning point. Therefore, our cognitive maps are based on sound, smell and texture".*

The auditory, tactile and olfactory cues from an environment give information to blind individuals about their surroundings. They collect references based on these non-visual aspects and construct their cognitive maps in their minds.

Finding 7: It was expected from the participants to recognize Ali Paşa Square when they reached the area. Most of the participants (P.3, P.4, P.6, P.7, P.8 and P.9) recognize Ali Paşa Square as it has many sensory information such as auditory, olfactory and tactile (Figure 61).

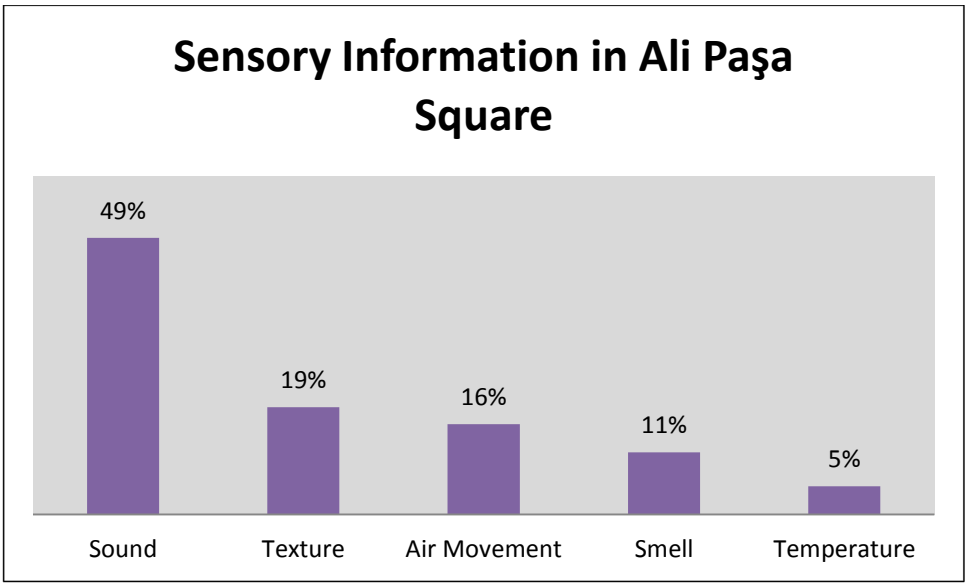

Figure 61: Sensory information in Ali Paşa Square

This Square has many restaurants and their patios around. Therefore, these restaurants are the source of sound and smell for the participants. In addition, Ali Paşa Square is the only space which has a bigger ground texture. Therefore, it also includes the tactile information. However, the participants reported that they mostly used auditory information (49%) in this square to orient themselves. Millar (2008) claimed that external sounds help indicate location and have reference cues about the environment and the participants reported that without vision, auditory information is more reliable than other sensory modalities as also mentioned in Millar (2008). In the following, there is the statement of a participant who emphasized the importance of auditory information which can provide by the voids of an environment:

P.9. *"I recognized Ali Paşa Square. Because before arriving Ali Paşa Square, we need to pass a street. After passing the square, there is another street which has the same character with another street. I created the cognitive map of this place as like being surrounded by the narrow streets".*

In addition, these participants called this area as a narrow street instead of a square because the surrounding restaurants' patios are located on both sides which make the space feel even narrower. It shows how the blind participants' sense of enclosure is different than sighted individuals' sense of enclosure. Below, I include one of the statements from the participant which emphasized the reason why they do not call it as a square and the differentiation between the senses of enclosure:

P.8. *"We reached the point that you called Ali Paşa Square. However, for congenitally blind people, the square means "totally empty space". There are many tables-chairs on the both sides and other obstacles at the Ali Paşa Square. Therefore, it is not a square for us, just a narrow street which is limited by the restaurants on both sides".*

Finding 8: When the participants arrived to the LEG 4, it was expected from them to recognize the construction site at the old fish market on the right side which was surrounded by vertical panels. It was estimated that these panels create different type of echo when compared with the walls and the participants could recognize it during way-finding process. However, only one of the participants recognized these panels on the right side of the leg and added:

P.8. "*There is a type of wall which has a different material on the right side of me. And the sound of the air-conditioning can be heard behind this wall. I am walking with the echo in every second of my life. The echo of machine, footsteps, walls, music, etc. Every type of sound hits the obstacles and turns back to me".*

In the learning phase of the case study, I had given information about the area. However, it was understood that the participants focused on the continuous high wall on the left side where the third turning point was located not to miss the third turning point. In addition, the participants concentrated on their left side because the third turning point was located on their left hand side. In the following, there are some statements about how they recognized the third turning point:

P.4. *"There is too much light on my right hand side and a high wall on my left hand side. It means that at the end of this wall, I need to turn left and it is the last turning point".*

P.6. *"There is a high wall in front of me. It is the end of the street. The last turning point should be on the left side".*

P.7. *"There is an obstacle in front of me. When I hit my cane on the ground, the sound of it turns back to me. This is the last turning point. Then, I turned left".*

P.9. *"Now, we are walking inside the street which is surrounded by low wall on the right side and high wall on the left side. I am following on the left side, because at the end of the high wall, there is a third turning point".*

4.1.2. Findings of the Participants in İzmir Fair Park

Table 12 presents a summary of all the results from the park.

Table 12. Findings of the participants in İzmir Fair District

Congenitally Blind Participants	**URBAN PARK İzmir Fair Park**					
Number	***Sound***	***Texture***	***Temperature***	***Air Movement***	***Smell***	***Memory***
1	7 **(30%)**	10 **(44%)**	2 **(9%)**	0	0	4 **(17%)**
2	0	5 **(42%)**	0	0	0	7 **(58%)**
3	14 **(25%)**	29 **(50%)**	1 **(2%)**	0	0	13 **(23%)**
4	3 **(10%)**	17 **(59%)**	0	0	0	9 **(31%)**
8	17 **(46%)**	13 **(35%)**	0	0	0	7 **(19%)**
9	9 **(35%)**	11 **(42%)**	0	0	0	6 **(23%)**
TOTAL	50 **(27%)**	85 **(46%)**	3 **(2%)**	0	0	46 **(25%)**

Finding 1: All the participants reached the target without getting lost in the park like in Kemeralti. However, the park offers different types of sensory information than Kemeralti. Therefore, the priority of the chosen senses is different from the situation in Kemeralti District. As seen in Table 12, tactile information (46%) is the most used cues among the other environmental cues during way-finding process in the Fair Park. One possible reason for this could be related to the environment. In the park, there are not many sources of sound and the existing ones are far away from the route. Therefore, it

is possible that participants used sense of touch more than sense of hearing during way-finding. One of the participant explained why they use tactile information in this urban space as follows:

P.8. *"In this space, there are not many elements that can be taken as references. However, the floor takes and directs us where we want. There is no chance to go in another direction out of your way".*

As cited in Moore and Bloomer (1977), the sense of touch provides the real information to the participants when compared to hearing, smelling and even seeing. Moore and Bloomer suggested that these senses are more abstract senses in terms of bodily experience. They also added that the spatial experiences could be gained from touching (Moore & Bloomer, 1977). The blind participants reported that İzmir Fair Park is an open environment whereas they did not use the same term for Kemeralti District. I thought that it is one of the main points of this case study. They called İzmir Fair Park as an open environment because there are not buildings, walls or barriers to create a feeling of enclosure for the participants. They told that they should follow something not to get lost in such an open environment and added:

P.1. *"The ground is smooth in the Fair Park. However, I need to find an edge as a reference. Without following anything in the ground, I cannot go straight".*

P.4. *"In the İzmir Fair Park, the most important reference for us is the curbs. They are always stable there".*

P.9. *"The ground takes us where we want to go. The ground directs us".*

It is also written in AFB (2015) that open spaces are a double edge sword for blind individuals. Because blind people may think that these spaces provide freedom to them, on the other hand, they are often too noisy to navigate in. On the contrary, I believe that open spaces are difficult to navigate because there are no obstacles which create echo for blinds to make navigation easier. The Fair Park is an example of such an open and difficult environment to navigate. The information provided by touching seems to be the primary sensory information which is used by the participants during way-finding process.

As also cited in Gaunet and Briffault (2005), sunshine appearing and disappearing, gusts of wind can be felt by the skin and provide information about crossroads. The skin can detect the temperature, and the foot can measure the gravity with the density and texture of the ground (Gaunet & Briffault, 2005). Below, I include

the statement of one of the participants who felt the sunshine better than the other participants and used this information along the walking tour:

P.1. *"Now, the sun hits the back of my neck. It is following me. I can recognize the row of trees while the sun appears and disappears. Therefore, I can follow the shadow of the trees along the route".*

This participant also claimed that blind participants can see the space with their skin as Pallasmaa (2005) proposed and the participant added:

P.1. *"Our face works as the eye. We can see with our faces, because our faces always in the process of collecting information from the surroundings".*

Finding 2: It was found that air movement and smell are not used by the participants at all during way-finding process in the park. This is probably related to the physical features of the environment, because this environment offers a homogeneous smell of a green environment and there has not been any other source of smell. In addition, the environment does not have any obstacles, walls, or buildings which might cause a change in the amount of wind.

As cited in Koutsoklenis and Papadopoulos (2011), the direction of the wind, the presence of other smells, and the consistency of particular odors are factors that affect the use of olfactory cues for way-finding. They state that "smells also come from natural elements (the ground, sea, and trees, for example), from animals (such as horses), and from other objects or attributes that produce distinctive smells (like a garbage can or a sewer)" (Koutsoklenis & Papadopoulos, 2011, p. 699). On the contrary, the Fair Park cannot provide any of these factors to the participants in terms of smell and air movement and the participants told:

P.9. *"Olfactory cues are distributed homogeneously. In addition, there are no obstacles around to cut the air. Therefore, it is difficult to recognize them in such a wide area".*

Finding 3: The participants reported more tactile cues on LEG 3 than others (65%) (Figure 62).

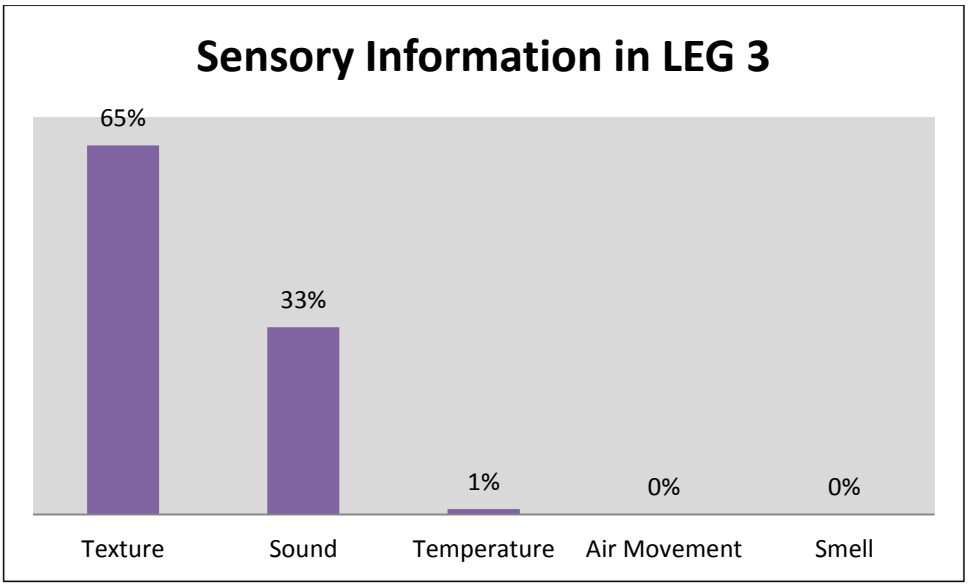

Figure 62. Sensory information in LEG 3

This leg is the longest stretch along the route. In addition, there are intersections and crossroads on the path that can be references for participants during way-finding. In this leg, the participants create the representation of a space based on the tactile information rather than visual information. Because the features of this leg allow the participants to follow the tactile information. As Iverson (1999) suggests "unless continuous sound sources are available at relevant locations along a path, it is extremely difficult for blind navigators to evaluate their current position by simultaneously referring back to the starting point and forward to the goal" (p.1132). Below, I include some statements from the participants who relied on more tactile information in LEG 3 and also follow the tactile information along the route:

P.3. *"I am following the pavement. There are trees on the both sides in rows. The texture under my feet changed. I think we are passing into racetrack".*

P.3. *"Now, I am following the intersection of the grass and the floor. It helps me to walk straight in such a wide environment".*

P.4. *"I am descending from the sidewalk and as I remember, I should find the sidewalk that is against this one".*

Finding 4: In addition, the participants reported more auditory cues on LEG 3 than on others (33%) (Figure 62). This is probably related to the obstacles on both sides of the leg. Only this leg has these obstacles which can be references for the participants.

Therefore, the participants can use the echo of an environment during way-finding in this leg. Other legs are covered by trees in rows; there is not much obstacles to limit or orient the participants. For example, one of the participants used the echo of the objects to estimate the length of the wall on his right side. Below, I include his statement. He told:

P.8. *"There is a wall on my right side. The sound of my cane and even my coin in my pocket tell me that the wall is still continuing".*

Pallasmaa (2005) also supports the idea that a building returns the sound of a person walking in it and creates a three-dimensional atmosphere for the blinds. Rasmussen (1964) and Holl et al. (2006) also added that a building reflects the sound like light and the human body can feel this reflection. They told that blinds use the acoustic features of an environment to orient themselves. For example, participants can also estimate their distance to an obstacle and accordingly they can locate themselves in the space and one of the participants told:

P.8. *"There is another building on my left side. However, this building is farther than the building on the right".*

Finding 5: It was found that the participants used their memory more along LEG 3 (Figure 63).

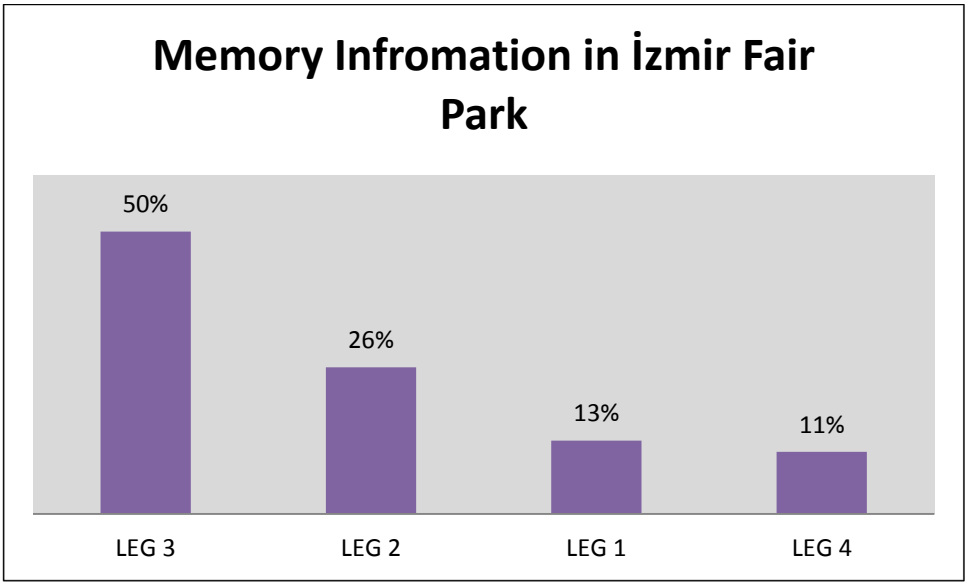

Figure 63: Memory information

As I mentioned above, this path includes more obstacles than the other paths. Therefore, there are many references for the participants that can be memorized. In the open environments without any obstacles, the blind participants can easily feel lost as also written in AFB (2015). The obstacles help them estimate their distance to an object, understand their location and direction as also hypothesized in Millar (1988). Millar (1988) claimed that reaching the target, distance and direction are determined by previously memorized movements. The learning phase of the process helps them to memorize the reference points for them and understand the features of the environment. One of the participants stated the following:

P.3. "*We came across the race track and there is a low obstacle on the right side of me. Now, I understand that I am on the correct path because of this stable obstacle here. This is one of the references for me along this path. In addition, sometimes there will be crossroads on my way; however, I will go straight until I find the building on the right side which is another reference for me".*

Finding 6: It was found that LEG 4 provided no sensory information. It is the shortest path along the route.All of the participants memorized the last turning point because of the wall of a building just before it. And this is the only building that the participants can come closer along the route. After the wall of the building finishes, there is a slope in the sidewalk. These references helped the participants to remember the last turning point. When they turned from the last turning point, they walked until the end (LEG 4). Therefore, they didn't need to use any other sensory information from the environment. Below, I include some of the statements of the participants which were mentioned how the participants recognized the last turning point:

P.3. *"Now, I found the slope. This is the third turning point".*

P.9. *"The sidewalk finished. I need to turn right from here".*

Finding 7: As it is seen in Table 13 and Figure 64, the participants used more sensory information in Kemeralti than the Fair Park.

Table 13. Comparison of two different urban context

	Congenitally Blind Participants (9 participants)	
	Sensory	***Memory***
Urban Fabric (Kemeralti District)	283 **(84%)**	53 **(16%)**
Urban Park (İzmir Fair Park)	138 **(75%)**	46 **(25%)**

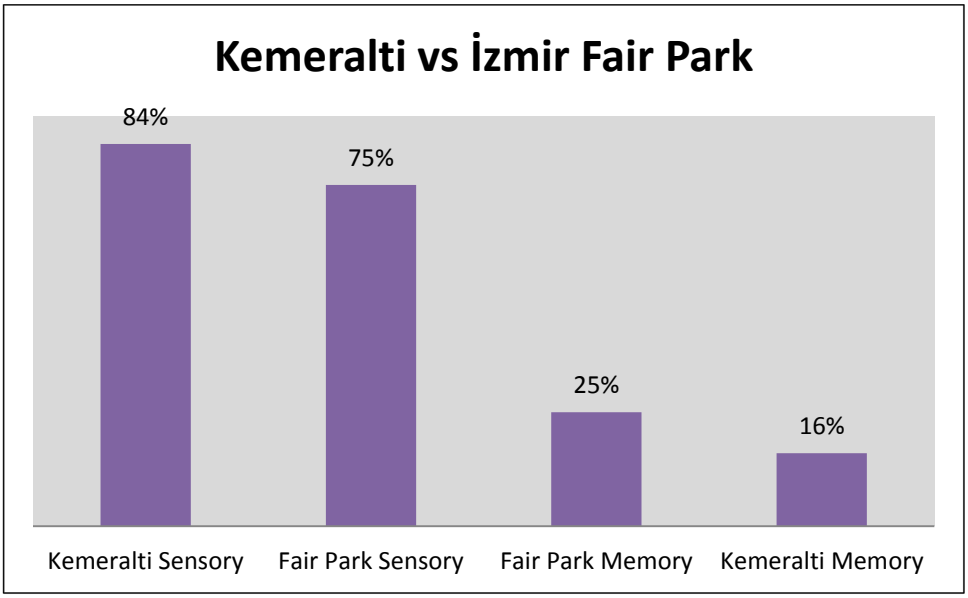

Figure 64: Comparison of two different urban environments

The chosen routes in the two urban environments have the same length and the same number of turning points. Each turning point in two urban contexts provides strong sensory information. However, Kemeralti provides different types of sensory information for the participants than the Fair Park in the form of non-visual sensory inputs such as sound, touch, and smell. Therefore, the memory of blind participants has a better significance in İzmir Fair District than Kemeralti District. In order to create a cognitive map of an environment and reach the target, it is important to memorize the obstacles and reference points.

4.1.3. General Discussion

In this study, there are two different urban contexts which offer different environmental features. The results show that when the urban context was changed, the participants' way-finding strategies according to the features of an environment changed as well. Therefore, we can say that the context is determinative. For example, as also mentioned in the results, sense of hearing is the most used sense in Kemeralti by the participants. In the park, there isn't much source of sound as a reference for them. Therefore, the participants mostly used tactile information instead of auditory in this urban environment. Sense of touch is the most used sense in the park by the participants. Sense of smell isn't as significant as sense of hearing and sense of touch for the participants in both urban environments. Therefore, their way-finding strategies are related to the features of the environment they navigate in.

Before the study was conducted, it was expected that participants can reach the target easier in the park than in Kemeralti because of fewer number of obstacles. However, the participants reported that they felt lost in İzmir Fair District because of its environmental features. The results show that the participants used less sensory information during way-finding process in the park. When the participants have obstacles which help them orient themselves in an environment, (even the crowd can be a reference for them during way-finding), these obstacles create a feeling of enclosure for the participants. However, in the park, the sense of enclosure is almost impossible because of the features of the environment.

In this case study, it was learnt that the sound of the city and the echo of the environment is the most important factor for blind participants in a dense urban environment as mentioned in the literature. Therefore, another case study was designed in Lisbon, Portugal to understand how blind participants' way-finding strategies change when one of the environmental variables such as sound is blocked or heightened in a complex urban environment. In the next section, the results and discussion on the case study in Lisbon, Portugal is detailed.

4.2. Results and Discussion on the Case Study in Lisbon, Portugal

The results are discussed with regard to two issues. The first one is the performance assessments of the participants' performances at the end of the way-finding process. The performance assessment consists of errors-successes, time spent and distance travelled to reach the target, and the performance of the task accomplishments during the way-finding process. This part also reviews the data from their verbal descriptions with relation to their errors and the maps. The second issue is the analysis of their verbal descriptions which is categorized according to the allocentric and egocentric frame of references in the without-headphone condition.

4.2.1. Assessments of the Participants at the end of Way-finding Task

In Table 14, the results of time spent and distance travelled to reach the target, the types of errors made and the percentages of task accomplishment during the way-finding process are presented.

Table 14. Assessments of the participants in the case study in Lisbon, Portugal

	REACH THE TARGET		***TIME***		***DISTANCE***		***TYPES OF ERRORS***								***TASK ACCOMPLISHMENT***	
	without-headphone	with-headphone	without-headphone	with-headphone	without-headphone	with-headphone	without-headphone				with-headphone				without-headphone	with-headphone
			minute	minute	m	m	NT	MT	TWD	RT	NT	MT	TWD	RT	out of 3	out of 3
P.1	✓	✓	23.25	19.03	0,71	0,62	-	-	-	-	-	-	1	-	3/3	1/3
P.2	✓	✓	32.35	28.33	0,69	0,61	-	-	-	1	-	-	-	1	3/3	2/3
P.4	✓	✓	22.59	30.37	0,83	0,70	-	1	1	2	-	1	-	2	2/3	1/3
P.5	✓	✓	23.13	28.07	0,61	0,60	-	1	1	-	-	2	-	1	2/3	1/3

*NT: no turning *MT: miss turning *TWD: turn wrong direction *RT: reverse turning

FIRST GROUP	SECOND GROUP

There were two groups of participants in this study. The first group which consists of Participant 1 and Participant 2 performed the way-finding task first without headphone and second with headphone. In the without-headphone condition, the participants got more familiar with the area after the learning phase and it is possible to assess the potential learning effect. When these participants walked again with headphone, they made fewer errors than in the with-headphone condition first. This could be related to a better test phase in the first stage without headphone or with a learning effect. The conditions' order was counter-balanced, therefore, the second group which consists of Participant 4 and Participant 5 performed the way-finding task first with headphone and second without headphone. They made more errors when compared to the first group. Since the test phase was performed first with headphone, they could not get the auditory environmental information and got less familiar with the environment. In addition, all the participants completed the main task of the study which was to reach the target. The detailed information on the success of the participants can be found below.

All the participants reached the target without getting lost at the end of the way-finding process task the conditions of without-headphone and with-headphone. The first two participants (first group) made fewer errors than the last two participants did (second group) to reach the target under two different conditions. The fourth participant had the most difficulties among the other participants to reach the target in both conditions. She missed turning points, turned in the wrong direction and made reverse turning. However, at the end, she also reached the target without getting lost. In the following, the detailed information on this participant can be found.

The first group and the second group completed the way-finding task walking less distance under the condition with-headphone than the condition without-headphone. The first group performed the test first without headphone and second with headphone and the second group performed it first with headphone and second without headphone. So, it cannot be said that this is because of conditions' order. We might say that this is because of familiarity with the environment. Because the learning phase of the procedure increase the familiarity with the environment. The time they spent during way-finding process is as important as the distance they walked when way-finding process of the participants were assessed.

The first group spent less time to reach the target under the condition with-headphone than without-headphone. Because, they got familiar with the study area after

the learning phase under the condition without-headphone and also they shortened the route because of the errors they made. The second group also spent less time to reach the target under the condition with-headphone than the condition without-headphone. Since this group performed first the way-finding task with-headphone, they did not have the chance to get fully familiar with the environment as the first group. We might also say that task accomplishment percentage of the participant is also related to the familiarity with the environment. In the following, the relationship between the familiarity to the environment and the task accomplishment percentages are discussed.

The first group accomplished all the sub-tasks under the condition without-headphone. However, the first participant which turned in the wrong direction under the condition with-headphone missed the two sub-tasks along the route. The second participant could not recognize the street artist because of the headphones; therefore, he could not complete all the sub-tasks under the condition with-headphone. The second group could not complete the sub-tasks under both conditions. Their task accomplishment percentages are lower than the first group. This could be because of not being able to store too much sensory information in their mind because they performed first the way-finding task in the with-headphone condition.

In the following, each participant was assessed under the condition without-headphone and with-headphone discussing with the maps and their verbal transcriptions.

FIRST GROUP (Participant 1 and Participant 2)

As I mentioned above, the first group performed the way-finding process first without-headphone and second with-headphone. According to this order, their verbal transcriptions were matched with their errors and I tried to go into details about where they made errors and why.

PARTICIPANT 1 (P.1), age 48, Male

The map below (Figure 65) shows the participant's path under two different conditions. In all maps, green color represents the selected route, blue one shows the process under the condition with-headphone and red color shows the process under the condition without-headphone. In these maps, the errors during way-finding process under two conditions are easily seen.

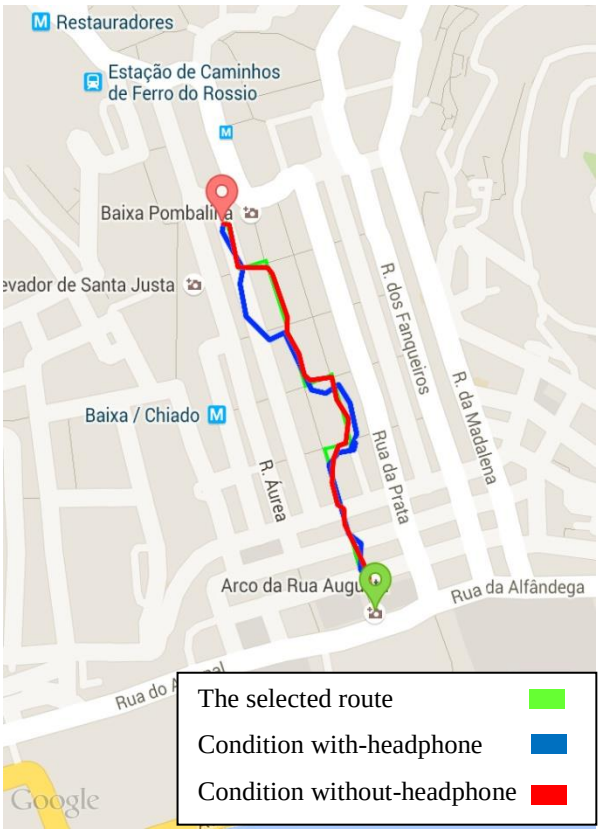

Figure 65. Way-finding process of PARTICIPANT 1 under two conditions

Without-headphone Condition

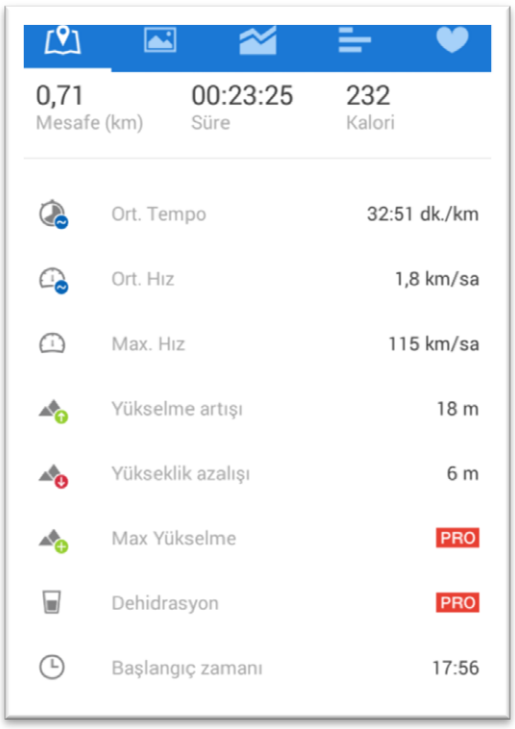

Figure 66. Measures from Participant 1's way-finding task

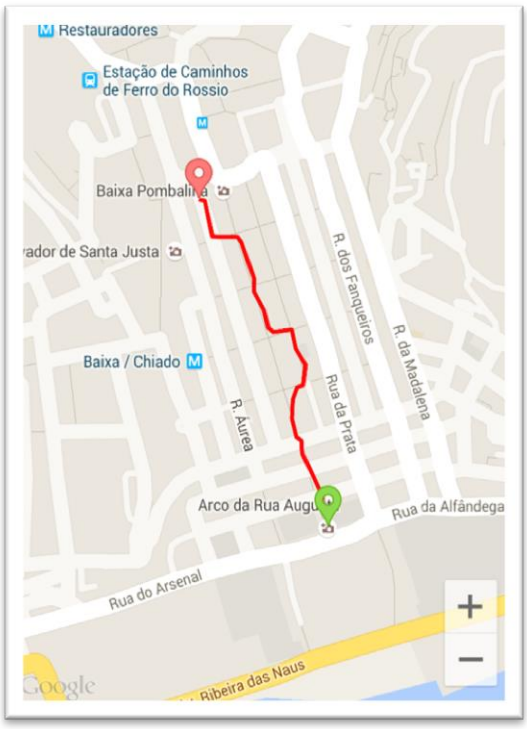

Figure 67. Participant 1's path in the without-headphone

The participant reached the target without any errors in the without-headphone condition (Figure 66-Figure 67). As mentioned above, the first condition might have created a potential learning effect for the participants and they might have gotten more familiar with the environment. The participant also supported this finding as follows:

P.1.: *"In the first trial, more or less I tried to be attentive to the route itself, the second time I already knew it better. Obviously, as we are walking on the route, we are knowing better the study area, the highs and lows, the type of floor we are walking…I only had a difficulty detecting the place where the statue man stands"*[2].

[2] All verbal descriptions of the Portuguese participants were translated into English by Luis Teixeira.

With-headphone Condition

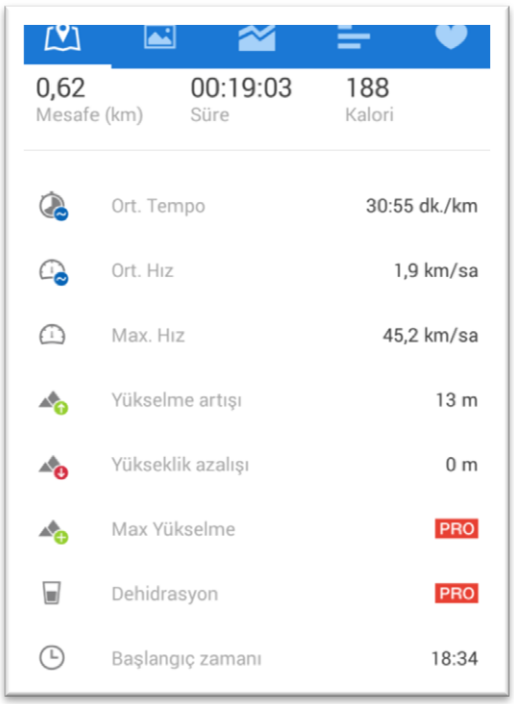

Figure 68. Measures from Participant 1's way-finding task

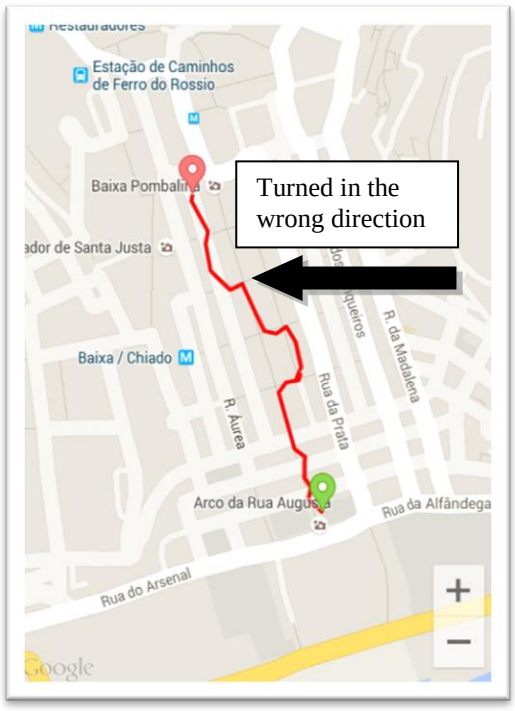

Figure 69. Participant 1's path in the with-headphone

As it is possible to see in Figure 68-Figure 69, the participant turned on the previous street instead of turning from the fifth turning point. He made an error during his way-finding task in the with-headphone condition, because he could not perceive the openings around him and couldn't pay attention to the echo of the environment because of the headphones on his ears. The headphones blocked the sound of the environment. The tactile information became more vital for the participant when the sense of hearing was blocked. In the following, he explained the reason why he turned in the wrong direction.

P.1. *"This (headphones) is much more complicated. I think I already made a mistake. I turned on the previous street. What hindered me the most was having my ears covered. Since I had my ears covered I was paying more attention to the type of surface. When a person has the sound available, through the sound, a person knows more or less if it is getting close to the end or not. And here I had to use other instruments that was not hearing, like the cane and the surface and that is why I turned in the previous street".*

PARTICIPANT 2 (P.2), age 59, Male

The map (Figure 70) shows the way-finding tracks of Participant 2 under two different conditions and the errors can easily be seen .

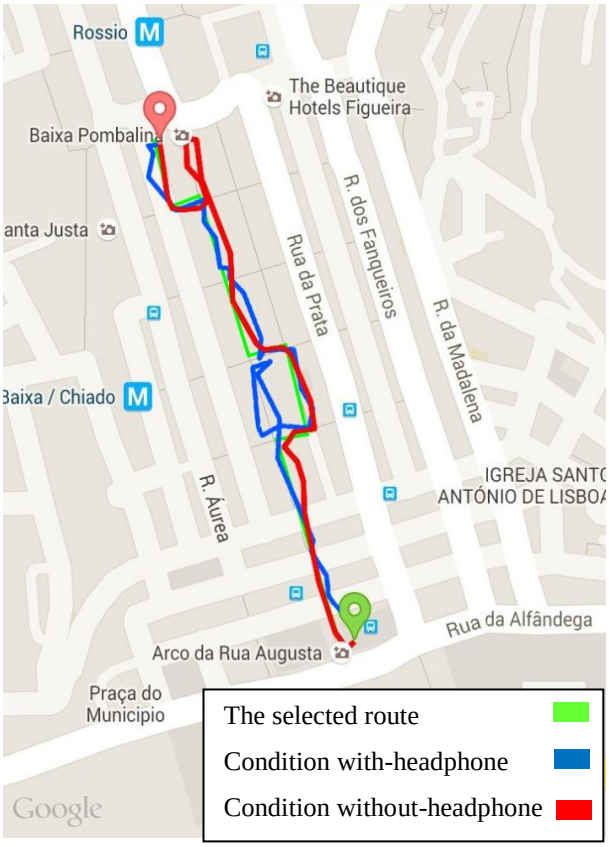

Figure 70. Way-finding process of PARTICIPANT 2

Without-headphone Condition

The participant had to do reverse turning because he reached the main traffic axis which he had not been during the learning step (Figure 71-Figure 72). Therefore, he realized that it was an error and wanted to turn back to find the right leg to reach the target. At the end of the experiment, he reached the target; however, the crowd affected his way-finding ability. We might say that the sound was a strong reference point for him during the way-finding process, however, he could not catch the reference points which would help him orient in the environment because of the crowd.

Figure 71. Measures from Participant 2's way-finding task

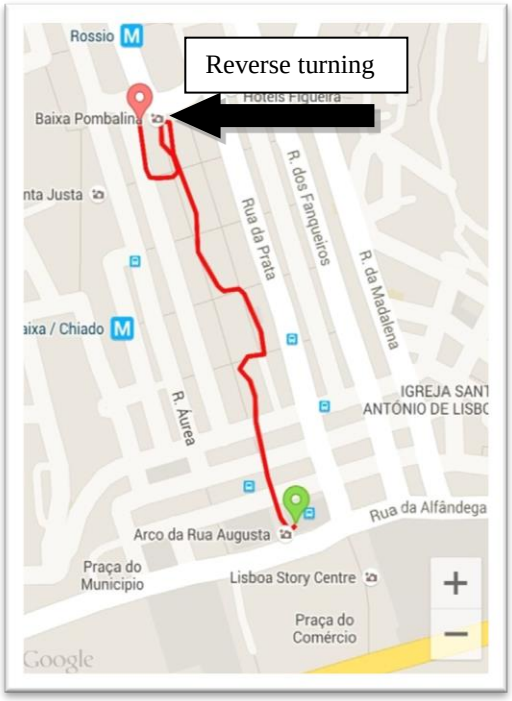

Figure 72. Participant 2's path in the without-headphone

He also mentioned why he made an error during way-finding task in the without-headphone condition:

P.2. *"This is Rua de Santa Justa. Let's see if we already passed…we already passed, we are near Rossio. We should go back to go ask the price of the magnet. Now you want to know how I know to get to the edge/limit. Because I have information that there was a bus passing by and also I know that only in Rossio there are buses. From Terreiro do Paço until here there aren't buses passing in the transverse direction. Only*

vertically in Rua do Ouro and Rua da Prata or in Rua dos Fanqueiros. So that is a fundamental element. I know that I arrived at Rossio. There is a place here that has music from Amalia. It is a very specialized house of Fado. And as such, in terms of sound, I have that place as a strong reference point. When I am coming in the reverse direction I know that I passed Rua de Santa Justa. Here what happens is that there are a lot of foreign people and sometimes, I don't know where the stores are, or the reference points to find them".

With-headphone Condition

The participant made an error in the with-headphone condition during the way-finding process (Figure 73-Figure 74). When the sense of hearing was blocked, the participant concentrated on the tactile information and missed the openings around him like the first participant.

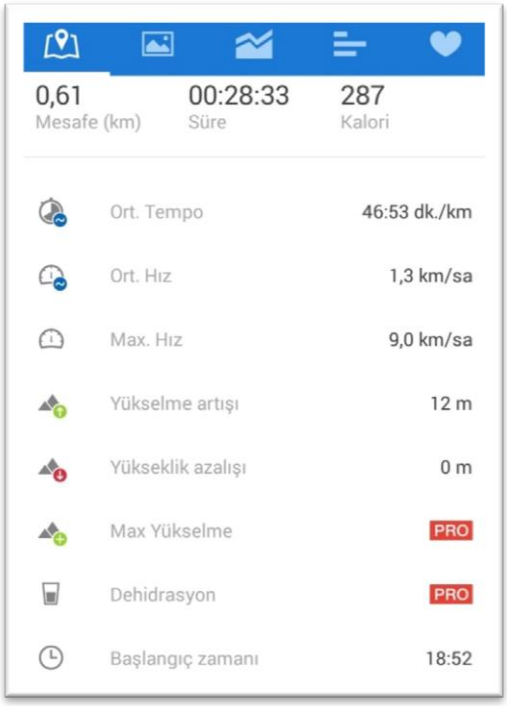

Figure 73. Measures from participant 2's way-finding task

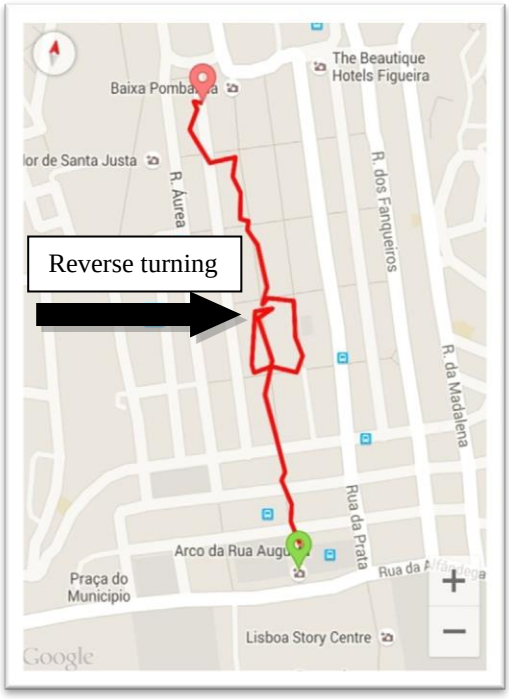

Figure 74. Participant 2's path in the with-headphone

In the following, he explained why he had difficulties under this condition:

P.2. *"I would have much more difficulty or it would be almost impossible to do this route. Because it is the same as if you would close your eyes. I was with my ears completely closed or blocked. For completely blind people, it is completely impossible to orient themselves. Moreover with music at the volume that it was! It wasn't very loud but it was loud enough to distance me from everything. It blocked, abstracting the environment. Therefore, the change of surface and also sidewalk line are fundamental for me to orient. I didn't have any more elements to guide me, therefore, I missed the first turning point".*

He also added that the kinesthetic information was very important under the with-headphone condition. The kinesthetic sensations oriented him to the end of the route. Below, I include the statement of the participant which explains the importance of the kinesthetic information during this condition:

P.2. *"Let's say, a good part of the orientation of blind people is related to something that is connected with kinesthetic sensations. The kinesthetic sensations help us when we don't exactly know the route and we don't have physical reference points such as the floor/surface, walls, and some sounds that are always difficult. On the other hand, the kinesthetic sensations are also helpful when we are going in a specific leg. It gives a different physiological sensation if you try to close your eyes in a corner. If you continue to walk with your eyes closed, you will feel that there is something opened which is fundamental for the orientation".*

SECOND GROUP (Participant 4 and Participant 5)

The second group performed the way-finding task in a reversed order: first with headphone and second without headphone. The second group also consists of two participants like the first group. In the following, their verbal descriptions are matched with their errors and I tried to understand why they made errors during way-finding task under two different conditions.

PARTICIPANT 4 (P.4), age 23, Female

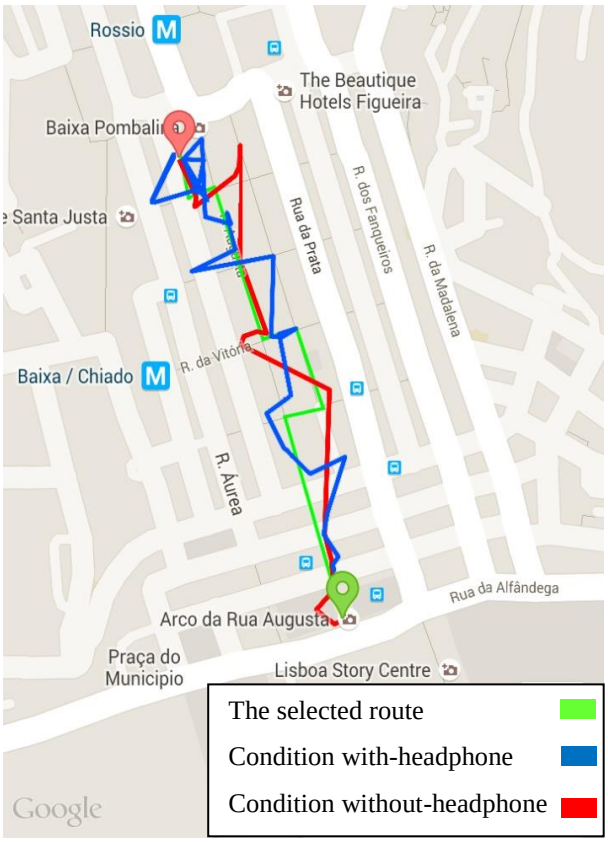

Figure 75. Way-finding process of PARTICIPANT 4

With-headphone Condition

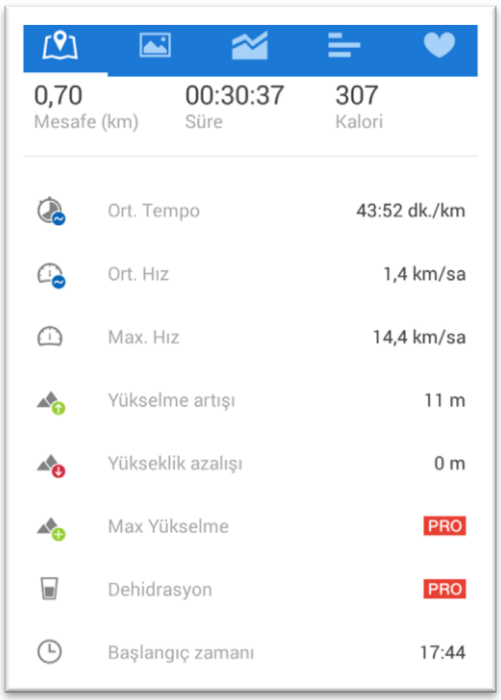

Figure 76. Measures from participant 4's way-finding task

Figure 77. Participant 4's path in the with-headphone

This participant had the most difficulty when compared to the other participants to reach the target in both conditions (Figure 75). She missed the turning points and made a reverse turn (Figure 76-Figure 77). However, at the end, she managed to reach the target without getting lost. She had difficulties to remember the references for the turning points. As hypothesized the participant who performed the study in a reversed order had more difficulties to get familiar to the study area and collect the references for the turning points. Below, I include the statements of the participant about her experience during the way-finding task in the with-headphone condition:

P.4. *"This is the first time I did it with the headphones. The route seemed much longer and I constantly felt to get more and more lost. I think for me the main difficulty was to go with music in both ears. I completely lose the references that I use daily which is my hearing. That is to say, I go there and it seems that I am in an entirely separate world in which all the rest are puppets that get out of the way. It is very weird.*

I felt lost but I didn't remember if I had passed there or not. I can't understand the reference points, contrary when I go alone".

Without-headphone Condition

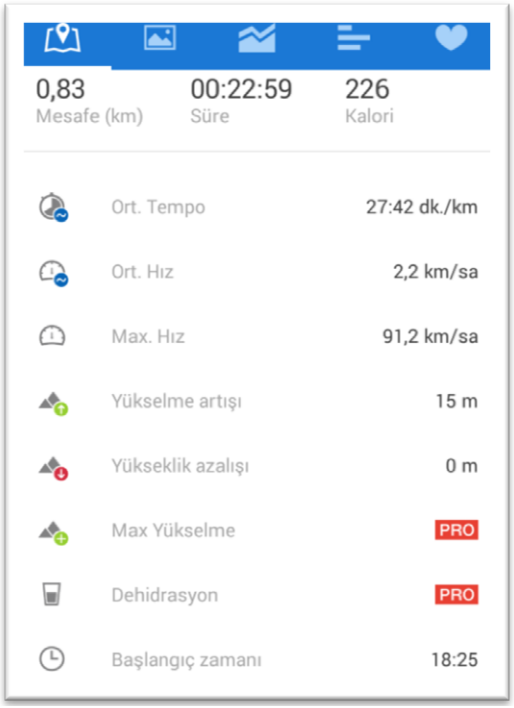

Figure 78. Measures from participant 4's way-finding task

Figure 79. Participant 4's path in the without-headphone

This participant made the highest number of errors among the participants under the without-headphone condition (Figure 78-Figure 79). She turned from the wrong direction, did reverse turns, and missed a turning point. Her mind was confused too much because she performed the test first with-headphone. After the test was completed under the condition without-headphone, she stated that:

P.4. *"Here will be the flower stand, I already hear the plastic of the packages. And now it was to the left…This area is always the most confusing. We are now in the wrong place and we need to turn back. I don't know why it happened. There is a car in front of me. I made an error again. I think where I hit the car, I should have turned immediately right. I want to go back. It was here to the left. But, as the car stopped, I thought it was some parking space. That car wasn't there last time. Now, I am going to that side of the street to go to the usual spot. So I do not make a mistake."*

She also mentioned the olfactory information during the walking tour, however, she did not use this information to reach the target. In the following, she explained her experience as follows:

P.4. *"Without doubt for me the hearing is really important and this time it seemed to me much simpler, because I could hear. For instance I knew that I was close to a road I had to cross or I could understand where areas with cafés with patios were. I knew after we went the first time. I knew when there were patios I might have to turn left or right. I used mostly hearing for my reference points. I mentioned smell, because they were characteristic smells for the areas I was passing, but I couldn't for instance link the smell of curry with the fact that I would have to turn left. For me this time it wasn't a reference. Maybe, if I were for instance looking for a restaurant or a café. Maybe it could work as a reference. For instance if I want to go to a pharmacy. I know there's a pharmacy somewhere in this street and normally it has a characteristic smell and in that case I use it as a reference point, but essentially it's sound".*

PARTICIPANT 5 (P.5), age 59, Male

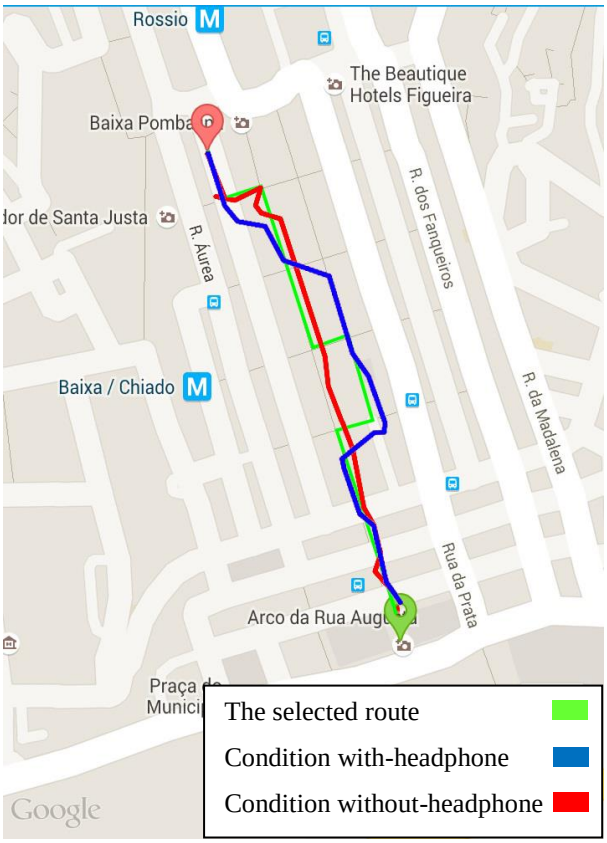

Figure 80. Way-finding process of PARTICIPANT 5

With-headphone Condition

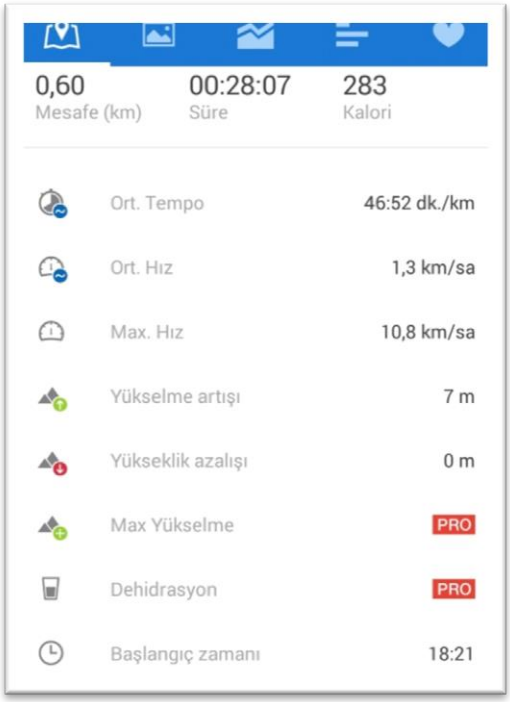

Figure 81. Measures from participant 5's way-finding task

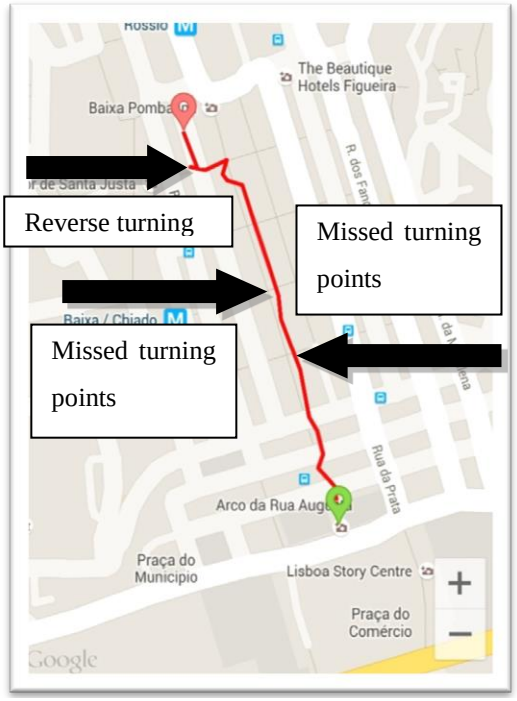

Figure 82. Participant 5's path in the with-headphone

Like the previous participant, this participant made many errors such as missing the turning points and reverse turn (Figure 80). It is possible that the second group had difficulties to collect the environmental sensory inputs and create a cognitive map in their minds. This participant lost his references during the way-finding test and relied on the tactile information under the with-headphone condition (Figure 81-Figure 82). Below, there are statements which state difficulties that he experienced:

P.5. *"So I already passed the first one…Oh no…This headphones disorients a lot. I had a feeling that was this beat, but I wasn't sure if it was the right sound for the statue man that I was looking for. The headphones really hinder me. I have never tried to walk on the street with headphones. The flower stand…The kiosk…I am not sure if it was around here…I passed it a bit I guess. I have to turn back. I need some time to reorganize myself".*

He also added his experience about how his strategies changed when the sense of hearing was blocked:

P.5. *"I have the feeling that I should have turned right in a specific street that I didn't. And why? Because I didn't know the street. If I already passed there several times and I know that street, my mental organization would be tuned to that knowledge. Since it is a street that I don't usually go, probably it was the first or second time, I was completely disoriented, without knowing where it was. I knew that after the third street I needed to turn and I could have used a strategy which I didn't, that sometimes it works sometimes not really, that I needed to know that after the third street crossing, I had to walk for example 30m, almost 30 steps, but I really didn't know where the street was. Therefore, I passed the street without even noticing. I was thinking that I needed to turn right somewhere but I couldn't identify where."*

When the sense of hearing was blocked from the participant, he used the tactile information instead of the auditory information. In the following, he stated that:

P.5. *"The headphones with the music closed me completely from the outside world. I lose all the references except the ones given by my feet. If I'm between buildings and I keep walking, as soon as I reach a street I feel the openness of the space and then listening to a sound and the brain being conditioned to the sound that comes from the headphones, closing completely the environmental noise which is very important".*

Without-headphone Condition

Figure 83. Measures from participant 5's way-finding task

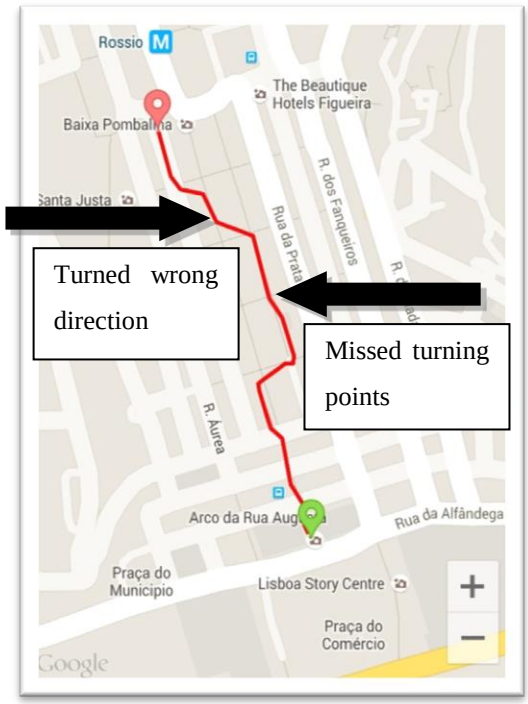

Figure 84. Participant 5's path in the without-headphone

This participant turned into the wrong direction and also missed some turning points under the without-headphone condition (Figure 83-Figure 84). He made these errors because he could not memorize the route well as he mentioned in the post-interview. He could not create the reference points to identify the study area. The verbal descriptions of him which was recorded during the without-headphone condition also support this:

P.5. "*The flower stand, no, it is not here yet…this surface tricked me. Since the surface changed and since I didn't memorize the route well and it is an area that I don't know well and I am learning now. In a very short time-frame to create reference points to identify the context and that's the reason I passed the turning point".*

The study was conducted in the reverse order for the second group. Therefore, he could not create any mental map in his mind and additionally, he got very confused as it can be seen below:

Researcher: *Are you looking for the flower stand? The flower stand is in Rua Augusta.*

P.5. *"So I have to turn here to the left. Around here we should have the kiosk.*

Researcher: *Not yet. There is a kiosk but it is not the right one".*

P.5. *"I got an idea that the kiosk would be on this street. We are in Rua Augusta".*

Researcher: *The kiosk was not in Rua Augusta.*

P.5. *"It is too much information and I think I should have turned at the previous street. I didn't have many references so I passed it".*

Researcher: *For the statue man, what was the biggest confusion?*

P.5. *"I passed twice there with the same type of music. But, it was a different thing than what I was listening to earlier. I got the sensation that it would be there, but the reference point I created didn't showed me that".*

Researcher: *But in terms of distance you got it correctly.*

P.5. *"Yes, I was getting the feeling it was in that location. But the music was not. All these environmental contexts are very important. And then, the entry in Rua Augusta... and then go to Rua dos Sapateiros didn't present any problems. And I stopped because I started feeling the wind but I knew I was going to stop before the Arc, but when I stopped feeling all the wind... I knew I was near the Arc".*

The third participant cannot be included in any group. Because she didn't use a long cane which was the selection criteria of the participants and preferred to do the test with her dog who was educated for blinds. She performed the way-finding test first with-headphone and second without-headphone like the second group. However, she completed the test without any errors under both conditions. In addition, she was the fastest one who completed the way-finding task in around 15 to 16 minutes under both conditions and the distance travelled by her was the shortest one. She also accomplished all the tasks under the without-headphone condition, however, she missed the second task which was placing the coin in the street artist's coin box under the with-headphone condition. Because she had difficulty to orient herself with the sound information. The reasons why she was the most successful one were mentioned by her as follows:

P.3. *"I was trained to be alone and be autonomous in moving, not everyone is prepared like that because I had training for two years. I had four years of classes and during two years I didn't had a cane. I was trained to move without using anything. And that gave me an incredible preparation. It was already expected for me to have a guide-dog someday and with the dog all the references we have are the texture of the surface.*

For the rest, we have to orient ourselves with the echo-location and the dog and trust and go forward".

In the following, the information about the way-finding test and the map which shows how the participant completed the test under the with-headphone condition and without-headphone were included (Figure 85). As it is seen in these maps, the participant walked the route without any errors the fastest under the two conditions (Figure 86-87-88-89).

PARTICIPANT 3 (P.3), age 29, Female

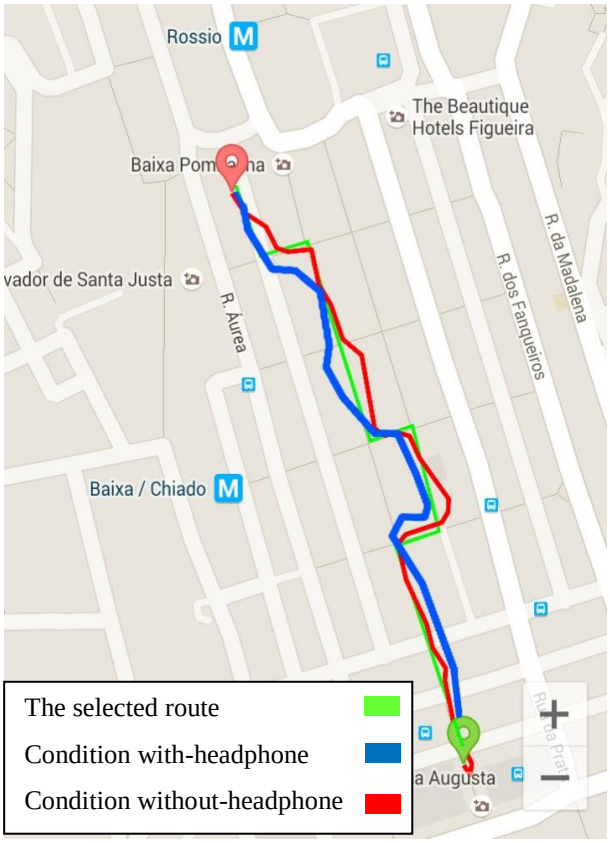

Figure 85. Way-finding process of PARTICIPANT 3

With-headphone Condition

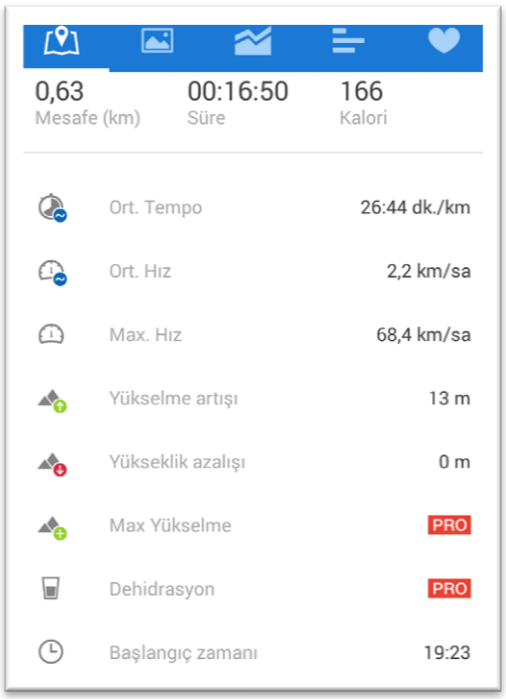

Figure 86. Measures from participant 3's way-finding task

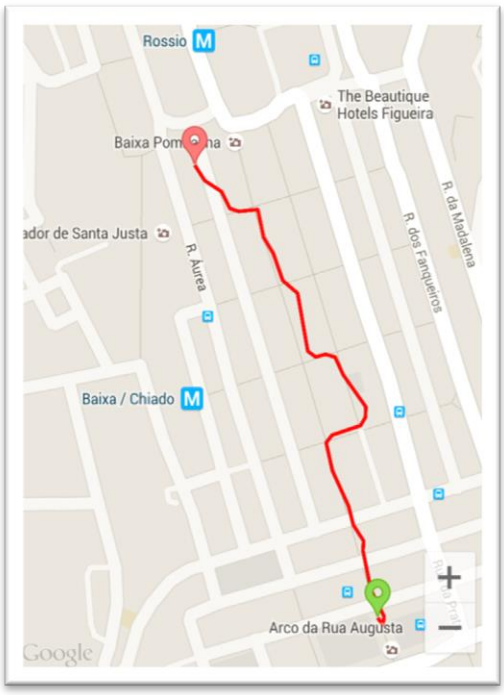

Figure 87. Participant 3's in the with-headphone

The participant thought that the previous knowledge about the route which she learnt in the learning phase helped her a lot during this test phase. Below, I include the statement of the participant about her experience in the with-headphone condition.

P.3. *"This experience was different and it is a route complicated with a lot of obstacles but it is a nice experience because it really shows that we have a lot of autonomy if we know the route. It shows that we have a possibility to orient ourselves, if you have a previous idea of the route".*

In her experience in the with-headphone condition, the participant mostly used tactile information to recognize the turning points. In the following, she told about how her strategies changed when the sense of hearing was blocked and also this was the only participant who could perceive shadows which is mentioned below:

P.3. *"Honestly, the turning points... there was one that it wasn't me that recognized, it was the dog. The first right turn, the dog was the one that knew. I was giving the instruction to turn. In the first turn, I didn't know exactly where to turn, but I knew she had to turn right because I counted the streets, I knew there were three*

crossings and then turn right, not sure where. I knew that I had to walk a little further, but it was complicated to know exactly where because I cannot use the reference point of the table or some obstacles. But after that it was all a succession of anticipations and since I created a mental map of the route, I knew it was right and then the first left which was easy because it's when there's no more shadows on the left and then when the surface changes I needed to change left and in the next surface change I had to turn right. In the end, I knew that there was a street artist near the left turn and then I also knew the street artists and I was looking more or less at the distance between the reference points".

Without-headphone Condition

Figure 88. Measures from participant 3's way-finding task

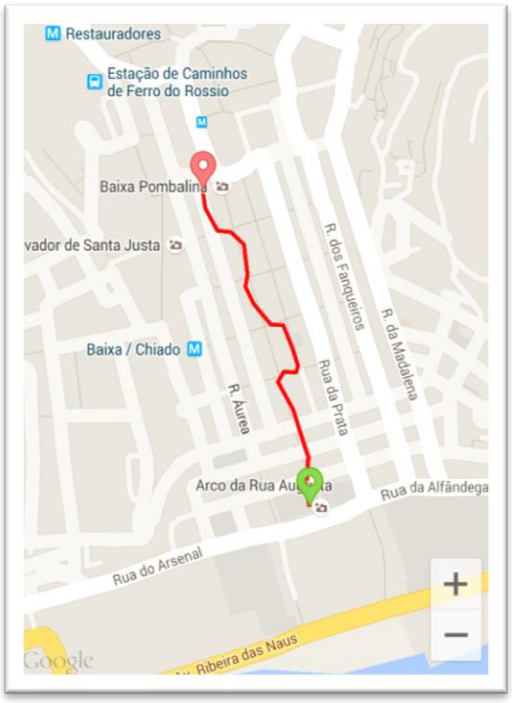

Figure 89. Participant 3's in the without-headphone

The auditory information was used by the participant more than the other environmental sensory inputs during the way-finding task in the without-headphone condition. Because the route included many auditory information and also all the legs

were aligned with high buildings which created echo for the participants. In the following, she told about how she used her sense of hearing during the process:

P.3. *"Now without the headphones was easier without a doubt because I was able to use my hearing. My hearing is trained; it is prepared to make the localization by hearing. What is said about the congenital blindness, that we use echo-localization to orient is true. The hearing allows me to know if I'm on a wider or narrower street. It allows me to identify the sounds of streets to know when to cross and its proximity or the proximity of the street performers which I used as a reference. When the sound of the second street performer, I knew the first one had the music louder and I knew that I had to turn in a wider place. My echo- localization told me that I was in that wider space and I had to turn left. The localization of the third test, the kiosk, was also by resorting to the shadows. But mostly due to echo-location because earlier I wasn't able to locate it and now I did. And then regarding turning left or right, it was precisely that. End of walls, wind, other sensations, near restaurants the silverware noises and the smell of food. Here in the Arc was the characteristic noise that we hear under it".*

4.2.2. Findings of the Participants' Verbal Descriptions under without-headphone Condition

Table 15 presents the results of the video transcripts which were coded according to allocentric and egocentric framework of the study. As mentioned before, allocentric framework includes the environmental sensory inputs which were divided into three as auditory information, tactile information and olfactory information. Egocentric framework relates to information retrieved from participants' memory.

Table 15. Findings of the Participants' Verbal Descriptions in Lisbon, Portugal

URBAN FABRIC in LISBON						
	ALLOCENTRIC FRAMEWORK					**EGOCENTRIC FRAMEWORK**
	Auditory Information	**Tactile Information**			**Olfactory Information**	
NO	***Sound***	***Texture***	***Air Movement***	***Temperature***	***Smell***	***Memory***
P.1	27 **(37%)**	20 **(27%)**	0	2 **(3%)**	10 **(14%)**	14 **(19%)**
P.2	13 **(36%)**	6 **(17%)**	0	0	0	17 **(47%)**
First group Total	40 **(37%)**	26 **(23%)**	0	2 **(2%)**	10 **(9%)**	31 **(29%)**
P.4	9 **(26%)**	13 **(38%)**	0	2 **(6%)**	4 **(12%)**	6 **(18%)**
P.5	16 **(45%)**	5 **(14%)**	2 **(6%)**	0	2 **(6%)**	10 **(29%)**
Second group Total	25 **(36%)**	18 **(26%)**	2 **(3%)**	2 **(3%)**	6 **(9%)**	16 **(23%)**
TOTAL	65 **(37%)**	44 **(25%)**	2 **(1%)**	4 **(2%)**	16 **(9%)**	47 **(26%)**

Result 1: It was found that auditory information (37%) is the most used input compared to the other environmental sensory inputs by all the participants (the first group and the second group) in the way-finding task. The first group, who performed the way-finding test first without headphone and second with headphone, used the auditory information more than the second group, who performed the test in the reverse order. As it was mentioned above, the first group got more familiar with the study area after the first task being performed. Therefore, they used all the environmental sensory information such as auditory, tactile and the olfactory information more than the second group under the without-headphone condition.

Result 2: It was found that egocentric information was used more by the first group than by the second group. As mentioned in the previous result, the first group and the second group performed the test in a reverse order. When the participant performed the test first without headphone and second with headphone, it is easier to collect the environmental sensory inputs and create a mental map. Because this order creates the potential learning effect and help the participants memorize the reference points in the way-finding process.

Result 3: It was found that tactile information (25%) is the second most used input by the participants. The participants used mostly auditory information however when the sense of hearing was blocked during way-finding process, the participants used the tactile information instead of auditory information to collect the environmental sensory inputs. Therefore, we can say that the secondary important one is tactile information for the participants.

Result 4: It was found that the second group (third and fourth participants) had more difficulties in way-finding than the other participants did. As it is seen above, these two participants made the highest number of errors during the way-finding process under two conditions. These two participants also used their memories at a minimum level compared to other participants, because they performed the test first with headphone and second without headphone. Therefore, they had difficulties to memorize the reference points of the study area. In addition, the forth participant was the only one who relied on more tactile information than auditory information during way-finding in the without-headphone condition.

4.3. General Discussion

The main findings of this study are explained below with regard to performances of two groups who performed the way-finding process under two different conditions.

All the participants reached the target without getting lost at the end of the way-finding task. However, the first group and the second group had different way-finding performances to reach the target. In the first group, since the test phase was performed first without headphone and second with headphone, there is a potential learning effect for the first group. Since they got more familiar with the environment, they spent less time and made less error to reach the target during with-headphone condition. In addition, task accomplishment percentage was higher than the second group because of the potential learning effect in both conditions.

In this study, it was found that the auditory information was the most used environmental sensory inputs for the participants as it was expected. Sound was expected to be the primary environmental cue because all legs of the selected route were aligned with buildings which heightened the echoes for the participants. Passini et al. (1986) also found that all of their blind subjects used auditory cues as reference points when they tried to define their location and position with respect to their environments. Since the auditory information is the most important sense for blind participants, the main research question was defined in this study as what happens when the sense of hearing of the participants is heightened or blocked. And it was found that when the sense of hearing is blocked during the way-finding task, the participants used the haptic information instead of auditory information to memorize the environmental sensory cues.

I believe that the spatial perception is not merely about vision. As also cited in Portugali (1996), the process of cognitive mapping or generating mental representations of environments is not solely based on vision. In addition, the perception of space is multi-dimensional for blind individuals. They do not use only one sense to perceive the environment, when one of the senses is blocked, they substitute the blocked one with another sense, which in this case was haptic. This finding also supports the results of the study of Thinus-Blanc and Gaunet (1997). They found that congenitally blind participants use auditory or tactile senses to generate their mental maps and that blind individuals can perceive the spatial environment as skillfully as sighted ones. As also

was mentioned in van Beers et al. (2002) spatial experiences could also be gained from touching as well as seeing.

While the participants told about their spatial experiences during way-finding process, they mentioned primarily space features rather than objects in the space. Therefore, the verbal descriptions were coded according to the allocentric and egocentric framework and categorized by space features such as adjectives like hot, soft, narrow, etc. or nouns like chairs-tables, obstacles, etc. As Foulke (1982) said blind individual's mental space does not include the objects categorized by the sighted people such as trees, buildings, roads, etc., blind individuals describe their spatial environment with space features as it is seen in this case study.

In this case study, multi-trial learning tasks which consist of a learning phase, test phase and post-test were used in order to help blind participants to solve the way-finding task better as also suggested by Corazzini et al. (2010). A learning phase in the procedure makes the route more familiar for the participant. In the literature, the difficulties that blind individuals come across during their walking tours in unfamiliar environments are explained by Gaunet (2006). Gaunet (2006) states that the difficulties of blind individuals to gain information about unfamiliar environments consisted of not knowing "which way to walk to the destination, keeping track of the direction to the destination, knowing which way is faced, which street corner the pedestrian is on, when and where to turn, finding a new store or office destination, learning about new bus stop locations, and learning about new locations the pedestrian is passing" (p.341). What was aimed was to decrease these difficulties during the way-finding process. Therefore, the learning phase helped the participants gain more environmental sensory information about the area.

The learning phase of this study taught the participants in which direction to walk to the target, when and where to turn, which type of obstacles the legs have and what type of cues the turning points have for the participants. The question posed by Portugali (1996, p. 218) which is about "how much information about spatial layout is necessary before a blind individual can travel confidently and independently," was also revisited in this study.

As it can be understood from the methodology part, this study is more an experienced-based research as suggested in Cattaneo et al. (2008) and Thinus-Blanc and Gaunet (1997). These researchers thought that blind individuals had difficulties to

develop good exploratory strategies, therefore, they mentioned that the studies about blind individuals can be designed more egocentric. Therefore, in the post-test phase, the participants were requested to tell about their strategies and how they created their cognitive maps during the process. It can be said that the first group (participant 1 and participant 2) could generate cognitive maps better than the second group (participant 4 and participant 5) according to the post-test results. In addition, as seen in the section above where the maps and the verbal descriptions of the participants were matched, the first group's strategies were more successful than the second group's one. Therefore, we might say that better performances can be achieved by determining better strategies to reach the target. Better strategies can be achieved by generating better cognitive maps in their minds. These strategies include the plan of the participants which is created in their minds to show how they walk the route. This plan also includes the errors and successes in it. Therefore, the chosen strategy can affect the cognitive map of a participant. They are related to each other.

In conclusion, it can be said that everybody has a goal-oriented life. However, the absence of vision takes the freedom of random decision-making from blinds. All environmental sensory information is collected according to these chosen goals and blind individuals collect dynamic references which are task determined as one of the participant mentioned:

P.4. "…… *For instance if I want to go to a pharmacy. I know there's a pharmacy somewhere in this street and normally it has a characteristic smell and in that case I use it as a reference point……".*

Everybody has goals in their minds and generate cognitive maps to reach the chosen goal. However, in blind condition, it is difficult to change the mind suddenly and give a new decision. As I mentioned above, if they generate better cognitive maps, they can develop better strategies. They should find the best strategy to solve the way-finding task during their daily activities. They should also live without making plans and should go wherever they want freely as sighted ones. In addition, as sighted ones, they should also have a chance to experience the randomness of life. However, the cities are not well-designed for them and also there are many hazards which prevent them from walking and living freely in their daily lives.

CHAPTER 5

EXPERT OPINION

In this study, I conducted in-depth interviews with the experts Chris Downey, Carlos Mourao Pereira, Madalena Riberio and Ufuk Özen, because I thought that the findings of the study need to be further investigated to be substantiated.

Chris Downey and Carlos Mourao Pereira are the only two practicing architects without sight in the world and they are pioneer in the field of architectural design for blinds. They use their skills and expertise to develop environments for the blinds (Figure 90). Therefore, they are chosen as experts for this thesis study.

Figure 90. Chris Downey, Carlos Mourao Pereira
(Source: www.daisy.org)

Chris Downey is an architect who lost his sight in 2008 during a brain tumor surgery (Figure 91). He lives in San Francisco and within six months after the surgery, he returned to his work again. He relates his heightened non-visual senses to his architecture and his vision for architecture is about making connections with people and making people come together more than designing beautiful buildings. He also believes that vision is to see what more than just your eyes see.

Figure 91. The blind architect Chris Downey
(Source: www.dailycal.org)

Carlos Mourao Pereira is an architect who lost his sight in 2006 and works on developing multi-sensory aspects of architecture (Figure 92). After he lost his sight, he realized that the architectural experience is much more than just the aesthetics of it and became interested in space perception with all our senses and the whole body. Therefore, this Portuguese architect was chosen because of his expertise on multi-sensory perception.

Figure 92. The blind architect Carlos Mourao Pereira
(Source: hg.hu/cikkek)

Madalena Riberio is a Portuguese woman who is a quality manager and has a master degree in translation of English and German. She was also third participant (P.3) in the Lisbon case study. She had four years of classes and during two years she was trained to move without using anything and that gave her an incredible preparation to live alone. She is the only one that I met during this thesis process who can walk without any assistance. Therefore, she was chosen as an expert because of her incredible independent way-finding ability.

Ufuk Özen is a lawyer who lost his sight in 1987 and is the president of "Çağdaş Görmeyenler Derneği" in İzmir, Turkey. He gives importance to independent way-finding ability and encourages the members of his association to develop their independent way-finding abilities. In addition, he got special education on generating cognitive maps as a blind individual. Therefore, he was consulted because of his expertise on the creation of cognitive maps during the way-finding process in an urban environment.

The interview with Chris Downey was conducted via e-mail. The interview questions were sent to him and he sent all the answers back via e-mail. There were 16 questions in total which are presented in Appendix G. The first six questions were about demographic information. The rest were about way-finding in urban environments. The main purpose of the questions was to find which specific aspects of built environment he focuses on and uses as a cue during his way-finding process. In addition, questions were asked on how he generates cognitive maps and what his strategies are to solve the way-finding task. He was also asked how he can perceive the solid-void configuration of a city as an architect and the role of sound during this process.

The interview with Carlos Mourao Pereira was conducted in Instituto Superior Technico, University of Lisboa in Lisbon. He did not give permission for any kind of video or audio recording. Therefore, the answers were noted down by hand during the interview. There were 26 questions in total which are presented in Appendix H. The first six questions were about demographic information. The rest were about way-finding and decision-making process in urban environments like the interview questions of Chris Downey.

The interview with Madalena Riberio was conducted via e-mail. The interview questions were sent to her and she sent all the answers back via e-mail. There were 26 questions in total which are presented in Appendix I. The first six questions were about demographic information and the rest mostly focus on the use of senses during way-

finding process in an urban environment. In addition, the questions were asked on how she finds her way without using any assistant devices and how she can develop strategies during this process.

The interview with Ufuk Ozen was conducted in his office in İzmir and he gave permission to record the interview. There were 16 questions in total which are presented in Appendix J. The content of the interview was similar with Madalena Riberio. It included demographic questions in the first part and the second part was about how he can find his way in an urban environment and what aspects of multi-sensorial perception of a space should be considered.

Before going into the details of the interviews with these experts, some additional information needs be provided. Both of the architects and the lawyer are late blind and had an extensive career in their professional lives before they lost their sight. Therefore, they immediately tried to get the best training as quickly as they could and got on to continue with their lives. Furthermore, they have fully fledged experience of space both as a sighted and a blind individual; therefore, they can tell about their experiences on how to trust their other senses and how to learn a new sensory world. On the other hand, Madalena Ribeiro is a congenitally blind and has no visual information in her mind. Her life experience is based on senses from birth, therefore, she does not have to learn a new world like the other experts. In the following, the main findings of the case studies were discussed through the feedback from these experts.

Blind individuals more so than sighted individuals perceive space through the use of multiple senses and collect environmental cues to reach a target. According to the chosen goal, some of the senses have priority to reach a successful outcome. We could suggest that way-finding and the use of particular sensory information is task specific which is the first major finding. For example, if blind individuals try to find a bakery, the sense of smell is the most important one. If they choose to reach the train station as a goal, the sense of hearing has priority. In their daily lives, they choose meaningful and vital goals for them.

As observed, sometimes, blind people can feel contrasting textures in the floor below, and over time, they can feel the pattern of the floor to understand where they are and where they are going. In addition, for blind individuals, the sun which is felt on the face or wind which is felt on the neck give environmental cues about the location, time of the day and the movement in the street. They also mentioned some olfactory information and believe that some cities or districts have their own smell. As well as

other blind individuals, the perception of the experts is naturally centered on the other modalities beyond vision. In the following, there are some statements on how they use their senses in perceiving the environment:

CARLOS MOURAO PEREIRA: *"The smell of the city is very important at the first impression. When you arrive, you experience the smell of the city before anything. But after, the olfactory space can be less important because the perception of the smell is temporary. The most important for me is the haptic quality of a city, as for example, flat sidewalks without stairs are for me an urban spatial quality. Also, cities have characteristic sounds that can be very stimulating, for example, I remember in your country a street that I liked very much, the Istiklal Avenue in Istanbul, where it is possible to perceive the sound of people talking and walking combined with the sound of birds. For me the haptic sensory integration of the kinesthetic systems are extremely important for the blind as well for all other people. For example, the hearing perception can be very vulnerable. A temporary noise can create an absence of hearing perception and is completely different from the haptic perception that is possible to perceive using a cane and feet with much more trust than through other senses"*[3].

UFUK OZEN: *"For example, if I try to find the restaurant that I know, I try to focus on olfactory information, not the auditory information. At this time, I do not need any auditory information as cue. Olfactory information is dominant for searching the restaurant. As I said before, the senses change their places according to the target and environmental condition. Another example, if I try to find a delicatessen, I try to find a cue on cool airflow which can be recognized from the entrance of the shop. These information return to me as environmental cues to reach the target"*[4].

In addition, some of the experts explained what they perceive most and first when they visit a new city. They tried to perceive space with all their senses to understand the atmosphere of an environment, however, sound has a significance role for the first impression of the city. They told:

[3] The interview with Carlos Mouro Pereira was originally conducted in English. Verbal descriptions were directly quoted from the interview.

[4] The interview with Ufuk Özen was originally conducted in Turkish. Verbal descriptions were translated into English by the author.

CHRIS DOWNEY: *"My first curiosity is of sound as that gives the best orientation and understanding of space. I then rely on the sense of touch which gives me a strong impression of the care and quality of the design and construction"*[5].

MADALENA RIBERIO: *"I went to Madrid, a totally unknown city and I tried to perceive the sounds, the tactile indications in the soil and the possible help of voices and smells"*[6].

The second finding is that auditory information and echo of the urban environment were the most used cues during the way-finding process of the participants in the chosen routes. The participants tried to reach the target by mainly using auditory information around them, including the echo of the environment. According to the experts, the environmental sound, which gives them cues on how they should act and where they need to go, impressed them with how beneficial it is when they lost their sight. Chris Downey also mentioned that the symphony of sound in the environment fascinated him because the sound of the city helps him how and where to move.

CHRIS DOWNEY: *"I rely significantly on sound to anticipate things in motion around me and to plot a straight and relative trajectory. Some sounds can be incredibly easy to target and work with while others can be distracting or confusing. In some cases, sounds can be incredibly hard to target and find but difficult to leave. It's easy to walk directly to the sound of a fountain in a plaza or square as it can be located in space whereas it cannot be spatialized when walking away from it as it sounds further away regardless of the direction of travel. At other times, noise can be deafening such as loud construction noise, loud street musicians or trucks that may overwhelm and cover up other useful sounds. As useful as sound can be, it can be elusive as it is a variable in that it changes from moment to moment, day to day or throughout the year. Like sight, however, it is very helpful for finding things remotely or across distance as touch requires immediacy and some form of immediate contact"*.

[5] The interview with Chris Downey was originally conducted in English. Verbal descriptions were directly quoted from the interview.

[6] The interview with Madalena Riberio was originally conducted in English. Verbal descriptions were directly quoted from the interview.

Instead of giving up his career, today, he uses his skills and expertise to develop environments for the blinds. Therefore, he has lots of ongoing projects for the blind users such as headquarters for blinds, rehabilitation center for blinds, school for blinds and museums for blinds. He added:

CHRIS DOWNEY: *"Architects do not know anything about how blinds use space and move through the building. However, I know the blindness and know how the space feels, even how it smells. It is a different operation. I know that sound can be an active element of a design".*

However, in some cases, loud sound cannot help blind people during way-finding process as also mentioned above. Madalena Riberio also supported this idea and added that:

MADALENA RIBERIO: *"A very loud sound is not good for my way-finding, because in this case I feel lost. Sounds which identify certain types of shops, for example coffees can help my orientation".*

The experts also added that they give importance to the continuity of environmental sound, because, it is more difficult to find the source of sound with discontinuous sound. The experts think that auditory information has priority among other senses if it is continuous. If sound has no continuity, the auditory information can be confusing for the participants during the way-finding process. In the following, some statements about the significance of sound continuity are included:

CARLOS MOURAO PEREIRA: *"The hearing space is complex and illusory regarding urban way finding. The location of a street can be easily perceived with continuous car traffic. It is more difficult without headphone discontinuity. Also the acoustic reflection of a sound can introduce illusion of the sound source location".*

UFUK OZEN: *"The sense of hearing has priority. However, this situation is valid only for completely blind individuals who have successful independent way-finding ability. On the other hand, according to the environment and environmental conditions, the priority of the senses can change. If sound is not continuous, sometimes,*

haptic information, sometimes olfactory information can be important for the way-finding process".

One of the experts called Chris Downey also gave importance to the environmental sound which is fixed to the environment and added that:

CHRIS DOWNEY: *"With no sense of sight, I rely on acoustics including ambient sounds fixed in space and those in motion as well as echo location to rely on the interaction of the sounds from the tip of my cane interacting with the form and materials below and around me".*

Since the auditory information is the most important sense for blind participants, the main research question was defined in this study as what happens when the sense of hearing of the participants is heightened or blocked. And it was found that when the sense of hearing is blocked during the way-finding task, the participants used the haptic information instead of auditory information to memorize the environmental sensory cues as also supported by the experts:

MADALENA RIBERIO: *"It is difficult to walk with headphone and I need to be more concentrated to the ground and my feet".*

CHRIS DOWNEY: *"If there are no auditory cues around, I rely on the sense of touch through the grip of my cane as well as the sense of touch through the soles of my shoes to understand and recognize paving textures as I walk. In some rare cases, I rely upon the sense of touch as I grip handrails, doorknobs and other similar things to confirm that I'm on the right path or at the right place. I rely heavily on the sense of propriaception to recognize changes in grade and the sense of my body in space".*

In addition, as mentioned above, it is believed that blind people perceive space in a multi-sensorial way. They perceive the environment with all their senses, however, when one of the senses is blocked, they use another sense instead of the blocked one which in this case was haptic. The third finding of the study suggests that senses compensate for each other. This is in line with what experts mentioned, as for example:

CARLOS MOURAO PEREIRA: *"The tactile spatial components that are possible to perceive with an orientation cane, as the walls of buildings in the sidewalks help me to orient myself in no sound condition".*

UFUK OZEN: *"If sense of hearing is blocked, first I have difficulties to walk, because the body cannot be programmed like this. The body decides which sense is going to be used where and when according to the environmental conditions. Then, I decide to use sense of touch which is integrated with the cane. I start to pay attention to my body movement".*

MADALENA RIBERIO: *"If the sound of the city is blocked, the characteristics of curves of an environment, the directions, the need of crossing a certain number of times, etc… help me to orient myself in that path".*

The fourth finding of this study was that solids and voids of an urban environment have significance for the blind individuals' way-finding process. These environmental solids and voids create a feeling of enclosure for them. This feeling helps them feel safe, keeps them in the correct path and decreases the feeling of being lost. Buildings, obstacles and walls around are the elements which create this feeling for the participants. These solid elements provide a border for the participants to follow and define the voids of an environment and help them to gather references about the start and finish points of borders.

I believe that the strong solid barriers create a sense of constancy in the middle of all the noise of the rest of all the environmental cues and this constancy help them orient themselves in an urban environment. In addition, experts also think that solids and voids of an urban environment can be perceived in a multi-sensorial manner as it is mentioned below:

CARLOS MOURAO PEREIRA: *"Each space has an intrinsic sensory character, for example a courtyard provides acoustic shadow and wind protection. So an urban void can be perceived in a multisensory way".*

UFUK OZEN: *"Solids and voids of an urban environment are significant and positive elements which help us orient ourselves. They help to recognize the start and finish point of buildings and streets. For example if you try to find an entrance of any passage, you need to approach the building as well to recognize the void of an*

environment. Furthermore, every blind individual does not have a skill to recognize the voids of an urban environment. In addition, the presence of buildings on our right and left help us follow the route. The buildings create a wall effect around us, therefore, they limit and keep us in the route. For example, the square without any restrictive elements inside is a very difficult space for us to find the target and generate a cognitive map in our mind".

In addition, the experts also think that echo of the city is useful to identify the solid-void organization of the space. Therefore, an acoustic feature of a space is very important to understand this organization and they claimed:

CHRIS DOWNEY: *"Most typically, I rely on acoustics to understand form and space through echo location. That works well in acoustically live environments but not so well in highly acoustically dampened space (with carpets and other absorptive materials). Echo location can also be incredibly useful for identifying solids and voids within architecture. At times, it is possible to feel the compression of space when walking through a thick portal or transition".*

As mentioned above, blind people have a goal-oriented life. They also prefer to live without any plans in their mind and prefer to walk freely as sighted ones. However, the cities are not well-designed for them and also there are many hazards which prevent them from walking and living freely in their daily lives. Therefore, they cannot change their mind easily and do not have chance to live spontaneously. They need environmental cues and from them they collect environmental references which are task determined to reach the chosen goal. In addition, with these environmental cues, they generate their own cognitive maps and strategies. It is seen that these strategies can change according to the environmental conditions and their specific goal.

Better performances can be achieved by determining better strategies to reach the target. Better strategies can be achieved by generating better cognitive maps in their minds. Therefore, if blind individuals have a better understanding of the features of the environment and collect environmental cues according to the chosen goal, they can generate better cognitive maps. The experts also have their own strategies during their way-finding process in an urban environment. They generate strategies sometimes for the environmental hazards and sometimes for their goals. The strategies they generate

change the type of information they collect. Below, there are some statements about how they can develop strategies during their way-finding process in an urban environment:

CARLOS MOURAO PEREIRA: *"I prefer to have the previous knowledge of the environment. It is possible to perceive the urban morphology through tactile maps or models that can give a useful orientation for the blind. Another strategy is, do not be alone avoiding streets with fewer users. Unfortunately the urban environment is full of temporary hazards, as holes in the sidewalk not protected with fencing. Many times, urban spaces with people are strategically safer because the users can alert and help in avoiding the mentioned risks. In addition, a consolidated urban morphology mainly through blocks with backyards with large trees, can give sensory stimulus and also it is important to consider the sidewalk as an inclusive pathway. The circulations far from the car traffic and near the building walls increase the mobility reference. You can notice the sound and smell intrinsic to different shops, as the sound of the coffee being grinded on cafeterias or the flower shops perfume. Another important point is the presence of fixed references that allow a precise spatial orientation".*

CHRIS DOWNEY: *"Where they occur, I rely on audible pedestrian signals that help to locate crosswalks, the angle of trajectory and the identification of streets at the intersections. In addition, I'm constantly scanning the various sensory modes to capture relevant information and couple that with the cognitive map that I either "know" through experience or through advanced scoping through some form of GPS, trip planner or advice".*

Another issue which needs to be discussed is how blind people define strategies and collect environmental information in an unfamiliar environment. Familiarity is very important during way-finding process. If blind subjects walk in a familiar environment, they can construct better cognitive maps, better strategies and develop better performances. They feel themselves more free and comfortable in a familiar environment as shown in the finding and discussion part. Ufuk Özen mentioned how he develops his strategies in an unfamiliar environment and considers that he does not need to develop strategies for familiar environment. However, in an unfamiliar environment, he tries to develop better strategies to solve the way-finding task and he explained this process as follows:

UFUK OZEN: *"Each blind individual develop their own strategies according to their independent way-finding ability. In an unfamiliar environment, first, we should have the process of data gathering. We should learn where we are. The location of the beginning point is very important. We should check whether our beginning point is in the right place or whether you get off the bus at the right stop or not. We should collect information about what is around. If you get off the bus earlier or later, it can affect your cognitive map which is developed according to the bus stop. Therefore, the start point is very important for the cognitive maps in our minds which are generated according to the environmental variables. Here, we should trust our senses which help us assess the environmental cues".*

Furthermore, as mentioned above, the chosen strategies are related to their cognitive maps. For example, late blinds have the visual memory in their minds and they can relate the environmental references to the cognitive maps. In congenitally blind condition, the environmental lines are the only references to construct their cognitive maps. I believe that their strategies about constructing cognitive maps have similarities and differences. In the following, Chris Downey explained how he generates cognitive map in his mind during way-finding process as a late blind and Madalena Riberio explained her experience as a congenially blind expert:

CHRIS DOWNEY: *"In places that I know, I rely on a pattern of sequential multi-sensory landmarks and queues as well as a cartographic understanding of where I am in space and time. As I live in the same area that I did while sighted, at times, I combine a visual memory of the city or area which can, even after years without sight, be incredibly vivid and useful. At times, I hear things through echo location that immediately triggers a visual memory of the building and the form that would create the acoustic behavior".*

MADALENA RIBERIO: *"I try to imagine the parallel and perpendicular lines that are roads and I try to follow these lines in order to know when I have to cross, to turn left or right, etc…".*

We also should talk about the main assistant device of way-finding process of blind people which is the cane. Blind people and the cane have a strong relationship in the environment. The cane creates a connection between the ground and the blind

subject's finger, therefore, body. Just holding the cane, they can feel texture differentiation in the ground and understand where they are and where they are going. The cane behaves as part of their bodies. With using cane, they can develop their spatial knowledge and understand what is around. One of the experts explained this experience as follow:

CHRIS DOWNEY: *"Using the cane is incredibly environmental, in sense of learning environment around you. While people ask why you do not have a dog, it is because with the cane you actively engage the environment, you learn about the environment and you learn what is on the ground. You can hear the sounds of the buildings and the gaps with hitting the cane to the ground. It starts to organize all these things. It is actually something like extension of a finger all way down the ground".*

The experts who are blind architects made me question the relationship between the architects and the visuality. Beforehand, I believed that architecture is primarily visual. If they lose their sight, what remains to be a successful architect? How can the aesthetic of a space be defined? Another question can be asked as what is the role of sight in design? These blind architects offer, perhaps, a more complete understanding of design and architecture.

The only congenitally blind expert who is Madalena Riberio also made me question the necessities of sight in our daily lives. She had training on walking without any assisting devices, therefore, she has capability to walk like a sighted subject in an urban environment and is able to perceive the space with all the environmental references except vision. She shows me that a congenitally blind subject can also experience the spontaneity of life as sighted ones if they have a chance to get training. So, what is the role of sight in perceiving environment? In addition, in sighted condition, the dominancy of vision causes to miss the other environmental cues. Vision has a potential to dominate other senses. Therefore, she made me understand how space can be perceived multi-dimensionally and multi-sensorially.

The lawyer who is another expert is a great example to understand how the previous knowledge which was learnt while sighted can be converted into new information in a blind condition.

The expert opinion study shows me that the blind condition makes somehow remove the ethnic, social, racial and economical prejudices of people. Therefore,

blindness creates an equality of opportunity as also mentioned by one of the experts called Chris Downey.

CHAPTER 6

CONCLUSION

6.1. Summary of the Thesis

This thesis has focused on the questions of:

Q1: "while in an unfamiliar urban context, which specific aspects of the environment blind people focus on and use as cues in their way-finding process".

Q2: "what type of strategies blind people use during their way-finding process in an urban context".

Q3: "how different environmental variables/urban setting influence blind people's strategies during way-finding process in an urban context".

Q4: "how blind people's strategies change when one of the senses are heightened or blocked"

Q5: "how familiarity with the environment influence the strategies choices of blind people"

The results of the study show that urban environment is perceived as multi-dimensionally and multi-sensorially. To explore the multi-dimensional and multi-sensorial perception of space by blind participants is the main objective of this thesis.

As observed, the priority of sense usage changes according to the chosen goal. If blind individuals try to find a bakery, the sense of smell is the most important one. If they choose to reach the train station as a goal, the sense of hearing has priority. Sometimes, blind people can feel contrasting textures in the floor below and over time. In addition, for blind individuals, the sun which is felt on the face or wind which is felt on the neck give environmental cues about the location, time of the day and the

movement in the street. They also highlighted the significance of some olfactory information and believe that some cities or districts have their own odor. We could suggest that way-finding and the use of particular sensory information is task specific in legible environments which is the first major finding. As suggested by Lynch (1960), legible surroundings are the most satisfied and well-organized environments that create effective communication frameworks during everyday experiences of people. Daily experience and the senses in the way-finding process have a great significance in Lynch's Image of the City (1960). He explains his approach to this subject by stating that "nothing is experienced by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences" (Lynch, 1960, p.1). He stresses the significance of people's senses and knowledge about their surroundings. In addition, he tried to investigate the relationship between the traveler and his/her environment. Therefore, he could be considered as a milestone in the urban way-finding studies.

However, he described maps, street numbers, and route signs as way-finding devices and explained five city elements which are based on visual knowledge. Therefore, the main question is this: how blind people can identify the legible surroundings according to Lynch's framework and how they can read the cities with using his five city elements.

Zimring (1982) mentioned that Lynch's five city elements help people organize the cities they live in and he explained these five city elements as "memorable *landmarks*, *paths* people follow, *nodes* where paths cross, distinct *edges* of neighborhoods or physical areas, and socially or physically defined *districts*" (Zimring, 1982, p.165). In this study, it is believed that these definitions should be defined according to all people who live in the cities. Lynch's (1960) study puts emphasis on paths, edges and nodes which are also recognized by blind people. However, how about landmarks and districts?

For example, the path identity, texture and also planting are very important for blind people's way-finding. As mentioned by Lynch (1960), "it is important to sense the path kinesthetically. This is the only citations of a bodily sense of curving motion. People can sense the turning because the close building walls heightened the visual perception of curvature" (p.55). To feel the path kinesthetically is essential for blind people to acquire information about the entire space. He also explained nodes as junctions of paths or break in transportation (Lynch, 1960). Break points in the city

have great importance for blind travelers. Because, they can make decisions according to these break points into space (Lynch, 1960).

Lynch's elements such as paths, edges and nodes are applicable in haptic experiences. However, Lynch (1960) explains landmarks as externally considered objects by the observer. Therefore, blind individuals and sighted ones' landmark choices are different from each other. A clock tower can be a visual landmark for sighted travelers, changes in ground texture can be a landmark for blind people. The information of blind people is not based on visual memory. In addition, Lynch (1960) explains districts as large city areas which have some common character that people can go inside because of its' components such as texture, form and activity. However, for blind individuals, touching a space creates a conscious experience about the space. Blind people can not recognize districts because there is no spatial information for them which is based on touching. In this study, I suggest that these five city elements should be reconsidered for all city users.

Lynch (1960) also explains edges as the continuous elements of a city. Continuity is also very important for blind individuals' navigation. Continuity of sound and texture creates reliable information about their surroundings and it helps their learning and remembering process. As Portugali (1996) discussed, the layout of the environment during way-finding process has a significant role. The continuity of solid-void organization of a city help blind travelers collect spatial information from the environment. Freska (1999) suggests that blind people gain this specific spatial knowledge by exploring the environment and memorizing landmarks. The continuity of solid-void organization leads them to plan how to walk as a strategy of learning and remember a route through the environment. As also Steyvers and Kooijman (2009) suggests blind individuals' experiences in the environment are route-based information. They orient themselves according to the walls of a given space. Therefore, solids can create barriers and a feeling of enclosure and voids of an organization also create break points which can be references for blinds' way-finding process.

Auditory information and echo of the urban environment were the most used cues during the way-finding process of the participants in the chosen routes. The participants tried to reach the target by mainly using auditory information around them, including the echo from the environment. Buildings, obstacles and walls around create the echo of the city and also the feeling of enclosure for the participants. I believe that the strong solid barriers create a sense of constancy in the middle of all the noise of the

rest of all the environmental cues and this constancy help them orient themselves in an urban environment. As the sense of hearing was the most important sense during way-finding process, it was decided to block the sense of hearing to explore how blind people's strategies change when one of the senses are heightened or blocked. Another important finding of this study is that when one of the senses is blocked, i.e., hearing, they substitute the blocked one with another sense, which in this case was haptic.

Every subject has a goal-oriented life. However, blind individuals cannot change their mind easily and do not have experience the spontaneity of life. They also prefer to live without any plans in their mind and to walk freely as sighted ones. However, they always need non-visual environmental cues and they collect environmental references which are task determined to reach the chosen goal. In addition, with these environmental cues, they generate their own cognitive maps and strategies. It is seen that these strategies can change according to the environmental conditions and the goal and these strategies include the plan of the participants which is created in their minds to show how they walk the route which is the second finding.

Strelow (1985) explains these way-finding strategies as path selection processes and path following strategies. Accordingly, it is thought that sighted people have advantages compared to blind individuals in way-finding. Because vision provides ready and fastest information about the external frame of references and this information is accessible by vision. Ungar (2000) proposes that other senses can not provide information about the structure of external space as fast as and as reliable as vision can do. Therefore, familiarity becomes one of the main issues in way-finding process of blind individuals. To create a familiarity with an environment, the procedure of this study includes multi-trial learning tasks which consist of a learning phase, test phase and post-test. A learning phase in the procedure makes the route more familiar for the participant. It was found that the learning phase helped the participants gain more environmental sensory information about the area and they could develop better strategies to reach the target. Familiarity provides them when and where to turn, which way to walk to the destination, knowing which way is faced and so on.

Familiarity is very important in the navigation of all people. Urban heritage is a key element in the familiarity with our surroundings. These elements create urban identity and strong reference points in the city. As mentioned above, blind individuals and sighted ones' landmark choices are different from each other. A clock tower can be a visual landmark for sighted travelers, changes in ground texture can be a landmark for

blinds. However, the coffee shop which is located at the same corner for many years can become a strong reference point and the main landmark of the city for all people. It can be a visual landmark for sighted ones and olfactory landmark for blind individuals. The places which are located at the same place and preserved for many years carry on the identity and culture of cities. As long as such places can exist, we do not need to create a new design for making way-finding easier. Such places are of utmost importance for all people. A clock tower or an iconic building can be a visual landmark, however, a coffee shop located at the same place for many years can be a landmark for all people as well.

This study brings a new approach to the definition of landmark and questions the term landmark which is defined by Lynch (1960). If urban heritage is preserved, we will make sure that there are clear reference points and landmarks in the city. These reference points help blind people orient themselves in an urban environment and these elements create familiarity for all people.

In contemporary world, it is believed that vision is the primary sense to read the city as a traveler. Pallasmaa (2005) criticizes this type of knowledge and adds that architectural spaces are analyzed according to their visual characteristics instead of their multi-sensorial characteristics. He also emphasizes that a person who has spatial awareness understands that the eye is not the only one which creates spatial experiences (Pallasmaa, 2005). Holl et al. (2006) claim that if people see space beyond vision, they can redefine space and add the acoustics of an environment. In this study, I tried to explain different ways of seeing and reading the environment.

6.2. Limitations of the Study

Based on the research process, the following items are listed as limitations of the study.

First, both case studies, which were conducted in İzmir and Lisbon, had a small size sample groups. The participants' selection criteria did not allow enlarging the sample size in İzmir in a limited time period. In Lisbon, it was hard to find larger number of participants according to the participants' selection criteria because of the limited period of stay.

Another limitation of this study is to conduct the study in a limited time period in fall semester in İzmir and spring semester in Lisbon. Therefore, the effect of weather conditions on way-finding ability of blind participants could not be investigated and measured in summer and winter.

In addition, the topic of this study is limited to urban spaces. Therefore, I had difficulties to control the urban variables during the way-finding task.

In their daily lives, blind participants choose meaningful and vital goals during way-finding process. In this study, it was not possible to set such meaningful tasks for the participants. Instead, the study was conducted with artificial tasks and this is another limitation of this study.

6.3. Future Research Suggestions

This section makes some suggestions for what could be some future studies. Based on the research process and an understanding of the limitations of the study, the following recommendations are listed as future research directions.

First, the research can be conducted on a larger number of participants including different groups of blind who have different level of low vision. This would provide a large data set and the researcher can get more varied results according to participants' gender and age differences. Characteristics such as gender and age could be further dwelled on in detail which were not the focus of this study. The analysis could be conducted more statistically. Each leg walked by the participant can be measured seperately and statistical analysis can be used to inquire how lenght and feature of the leg affect the way-finding behaviour of blind participants.

The research can be conducted for a longer time frame to include winter and summer time and different time period of the day. The participants' way-finding abilities can be examined in different seasons and time of the day.

In this thesis study, the effects of non-visual space experiences on different types of environment with different variables are open for exploration in further studies. The research can be conducted in different urban environments with controllling different urban variables during way-finding task. For example, Kemeralti and a recently built outdoor shopping district such as Forum Bornova, Izmir, can be compared to understand how this study transfers into design. The same approach can be applied in

İzmir Fair District and Ege University Campus. In these examples, the chosen spaces have similar spatial layout, however, life is different insides. Further studies can explore spatial knowledge of different kinds of places, environmental variables, populations and cultures. In other words, future research studies can clarify the relationships between different kinds of spatial knowledge and way-finding behavior.

As mentioned in previous chapters, there are many studies about mobility, perception and way-finding behavior of blind individuals. However, these studies are generally limited to short routes or simple environments such as corridors, buildings or rooms. This study looked into way-finding in large-scale urban environments. Therefore, some design suggestions are provided for large-scale urban environments. For example, continuous well-designed pathways should be designed. Accessibility in urban environment should be the main issue. Solid-void organization of a city should have significance for better spatial experience. The urban heritage should be preserved in the cities. In this study, it is believed that these places become non-visual landmarks for blind travelers. If we can preserve such spaces which are located at the same place for years, designers do not need to propose new solutions in order to make way-finding easier.

6.4. Significance of the Study

This study has great significance for designers, city planners and blind people as well.

The significance of this study for designers is to create a better understanding to perceive the space multi-dimensional and multi-sensorial. I expect from designers to think of these as the criteria of aesthetics of an environment. I believe that if spaces are designed for blinds, the walls will act as an acoustic barrier in a space and exterior/interior spaces will create solid-void configuration. If spaces are designed for blinds, identifiable spaces can be created which have different spatial and structural relationship and these spaces can be experienced by five senses. I hope that this study will create awareness for designers to understand the needs of blind people in a space. This study also suggests a new method in order to understand the city. Designers gain new and different type of power with this study for seeing the space in a new light.

I believe that if cities are designed just for blinds, it will be a well-designed city for all. I mean that if cities are designed for blinds, there will be well-designed pathways which have continuity in the city, solid-void configuration which help to hear the sound of the city and have the feeling of enclosure which will improve the quality of life for the general public as well. If cities are designed for blinds, you can reach places wherever you want. Accessibility will become the main issue. Therefore, this study has significance for all designers and city planners.

As one of the experts called Carlos Mourao Pereira mentioned: "we have more multi-sensorial life as a blind person than a life when we were sighted". If cities are designed for blinds, all people have the chance to experience multi-sensorial cities. It does not matter whether you are blind or physically disabled or have not meet your disability, if the cities are designed for all, people can experience the space in a multi-sensorial and multi-dimensional manner.

The significance of this study for blind people is to encourage them in their daily activities of way-finding. I expect that my thesis research will spread awareness in the society and help blind people better integrate their activities within society in an active and independent manner. It is possible to improve the living conditions of blind people throughout the country and create the needs of blind people. In addition, it is possible to defend the rights of blind people in different social, academic and politic platforms with the organizations. The organizations will include blind people in every level of decision-making. In this way, the active participation of blind people in different activities shows their capabilities and helps to promote their acceptance in the society.

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APPENDIX A

INFORMATION FORM USED IN CASE STUDY IN İZMİR

Adınız/Soyadınız:

Yaşınız:

Doğum yeriniz:

Doğum tarihiniz:

Mesleğiniz:

Doğuştan görme engelli misiniz?

Doğuştan görme engelli olma sebebiniz nedir?

Eğer değilseniz kaç yaşında görme engelli oldunuz?

Sonradan görme engelli olma sebebiniz nedir?

Herhangi bir ışık veya gölge görebiliyor musunuz?

Görme engellilere özel herhangi bir eğitim aldınız mı?

1- İzmir'de nerede yaşıyorsunuz?

2- İzmir'de kiminle yaşıyorsunuz?

3- Ev hayatında hayatınızı kolaylaştıran hikâyelerinizi bizimle paylaşır mısınız?

4- Çalışıyorsanız iş yeriniz nerede?

5- İş yerine kendiniz mi gidiyorsunuz?

6- İş yerinize nasıl gidiyorsunuz? Araç/yürüyerek

7- Derneğe kayıtlı mısınız?

8- Dernek yeriniz nerede?

9- Derneğe kendiniz mi gidiyorsunuz?

10- Gidiyorsanız haftada kaç kez?

11- Şehirde kendi başınıza gezebiliyor musunuz?

12- Şehirde kendi başınıza haftada kaç kez iniyorsunuz?

13- Şehirde yürürken kullandığınız araçlar nelerdir?

Baston/köpek/navigasyon/hiçbirşey

14- Şehirde yürürken nelere dikkat ediyorsunuz?

15- Aşina olduğunuz yerde nasıl hareket ediyorsunuz?

16- Aşina olmadığınız yerde nasıl hareket ediyorsunuz?

17- Günlük hayatta şehirde yürürken size yardımcı olan tüyolar nelerdir?

18- Kemeraltını daha önceden biliyor musunuz?

19- Kemeraltında bildiğiniz yerleri söyler misiniz?

20- Kemeraltını kendi başınıza geziyor musunuz?

21- Geziyorsanız haftada kaç kez?

22- Kemeraltında gezerken kullandığınız araçlar nelerdir?

23- Kemeraltına genelde ne için iniyorsunuz?

24- Kemeraltında yürürken karşılaştığınız zorluklar nelerdir?

25- Kemeraltında yürürken size yardımcı olan unsurlar nelerdir?

APPENDIX B

CONSENT FORM USED IN CASE STUDY IN İZMİR

Ben, İzmir Ekonomi Üniversitesi Güzel Sanatlar ve Tasarım Fakültesi İçmimarlık ve Çevre Tasarımı Bölümü Öğretim Görevlisi Didem Kan Kılıç. 'Görsel Mekanın Görsel Olmayan Boyutları' başlıklı doktora tezimin son aşamasında sizinle çalışmak istemekteyim. Bu çalışmayı yapma amacım, doğuştan görme engelli olan katılımcının gelişmiş duyuları sayesinde mekanın aslında ne kadar çok boyutu olduğunu deneyimlemektir.

Yapılacak olan çalışmanın kapsamı:

1- Saha çalışması öncesinde katılımcıya kendisiyle ilgili ön sorular sormak
2- Belirlemiş olduğum rotayı katılımcı ile birlikte yürümek ve tanıtmak
3- Başlangıç noktasına geri dönmek, video çekimi yaparak katılımcıdan aynı rotayı hangi ipuçlarını kullanarak yürüdüğünü bitiş noktasına kadar anlatması talep etmek
4- Çalışma bittikten sonra katılımcıya çalışmanın nasıl geçtiğini sormak, değerlendirme yapmak

Bu çalışmada toplanan veriler doktora tez çalışması kapsamında sadece bilimsel amaç için kullanılacaktır. Ayrıca katılımcı tarafından verilen bilgiler ve yapılan çekimler herhangi bir özel amaç için kullanılmayacaktır.

TARİH İMZA

APPENDIX C

INFORMATION FORM USED IN CASE STUDY IN LISBON

Congenitally Blind ☐	***Late Blind*** ☐

Name/Surname:

Age:

Place of Birth:

Date of Birth:

Occupation:

The reason why you are congenitally blind

If you are late blind, the age you become blind

The reason why you are late blind

Do you perceive light or shadow?

YES ☐ *NO* ☐ *Extra Notes:*

Did you take any special education for independent walking?

YES ☐ *NO* ☐ *Extra Notes:*

Where do you live in Lisbon?

Who do you live with?

If you are working, where is your working place in Lisbon?

Do you go to your work alone?

YES ☐ *NO* ☐ *Extra Notes:*

How do you go to work?

By Foot ☐ *By car/bus/taxi* ☐

Can you walk in the city alone?

YES ☐ *NO* ☐

Which of them do you use when walking in the city?

Long Cane ☐ *Dog* ☐ *Navigation Device* ☐ *Other:*

What do you pay attention when you are walking in the city?

How do you walk in a familiar environment?

How do you walk in an unfamiliar environment?

Do you familiar to the study field?

YES ☐ *NO* ☐

Can you mention the places that you know in the study field?

Can you walk the study field alone? If yes, how many times in a week?

YES ☐ *NO* ☐

Which of them do you use when walking in the study field?

Long Cane ☐ *Dog* ☐ *Navigation Device* ☐ *Other:*

What are the difficulties that you come cross when you are walking in the study field?

What are the beneficial elements when you are walking in the study field?

APPENDIX D

CONSENT FORM (ENGLISH) IN CASE STUDY IN LISBON

CREATIVE UNIVERSITY
LAUREATE INTERNATIONAL UNIVERSITIES

Av. Dom Carlos I, nº4, 1200-649 Lisboa, Portugal

Informed Consent Form

This Informed Consent Form for volunteer blind participants and who we are inviting to participate in PhD research, titled "Non-visual Aspects of Spatial Knowledge: Way-finding Behavior of Blind People in an Urban Environment".

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you choose to participate)**

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

I am Didem Kan Kilic and PhD student in İzmir/Turkey, studying as a visitor researcher in IADE/Lisbon - *Institute of Art, Design and Enterprise.* I am doing research on way-finding ability of blind participant in an urban environment. I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me.

Purpose of the research

We believe that you can help us by telling us the places that you find particularly important during way-finding process in a chosen urban environment. We want to learn which specific aspects of urban environment that blind people focus on and use as cues during their way-finding process. We want to know more about way-finding strategies of blind people during this walking tour.

Type of Research Intervention

This research involves an interview and a walking tour which takes place around 3 hours in a scheduled day. An interview will last for about half an hour and walking tour will take about two and a half hour.

Participant Selection

You are being invited to take part in this research because we feel that your experience as a blind person who has an independent way-finding ability can contribute much to our understanding and knowledge of way-finding behavior of blind subject in an urban environment.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

Procedures

A- We are asking you to help us learn more about way-finding ability of blind subject in an urban environment. We are inviting you to take part in this research project. If you accept:

1- This study will take place in a complex urban environment in Lisbon city center between the Praça do Comércio and Praça D. Pedro IV (Rossio). In the chosen environment, the route will be pre-defined. The researcher will give you initial instructions about the terrain.In addition, the interview will be conducted with you to assess your independent way-finding abilities and understand your familiarity to the

terrain.

2- An exploratory travel along the route will be done with you (training step). You will experience the route only once before each trial.

3- This phase is the trial. In this phase, you are asked to re-walk the path and to talk about your experience. The study will be done under two different conditions. The first condition is with the sound, the second condition is without sound input. The sound input will be controlled by inserting headphones to you during the process. After controlling the sound, you will be asked to focus on sense of smell, touch or other information.

B- Participate in an interview with Didem Kan Kilic

During the interview, I will sit down with you in a comfortable place at the city center. If you do not wish to answer any of the questions during the interview, you may say so and the interviewer will move on to the next question. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except Prof. Emilia Duarte will access to the information documented during your interview. The entire interview will be tape-recorded, but no-one will be identified by name on the tape. The information recorded is confidential, and no one else except Prof. Emilia Duarte will have access to the tapes. The tapes will be destroyed after 8 weeks.

Duration

The research takes place around 3 hours in total (including walking tour and interview) in a scheduled day. An interview will last for about half an hour and walking tour will take about two and a half hour. It takes place in Lisbon city center between the Praça do Comércio and Praça D. Pedro IV (Rossio).

Risks

There is a risk that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. You do not have to answer any question or take part in the discussion/interview if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

Benefits

There will be no direct benefit to you, but your participation is likely to help us find out more about which specific aspects of the urban environment blind people focus on and use as cues in their way-finding process.

Reimbursements

You will not be provided any incentive to take part in the research.

Confidentiality

The research being done in the community may draw attention and if you participate you may be asked questions by other people in the community. We will not be sharing information about you to anyone outside of the research team. The information that we collect from this research project will be kept private. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except Prof. Emilia Duarte.

Sharing the Results

Nothing that you tell us today will be shared with anybody outside the research team, and nothing will be attributed to you by name. The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. Each participant will receive a summary of the results. There will also be small meetings in the community and these will be announced. Following the meetings, we will publish the results so that other interested people may learn from the research. In addition, the research findings will be shared more broadly, for example, through an international conferences and publications.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so, and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the [discussion/interview] at any time that you wish without your job being affected. I will give you an opportunity at the end of the interview/discussion

to review your remarks, and you can ask to modify or remove portions of those, if you do not agree with my notes or if I did not understand you correctly.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact any of the following:

Prof. Emilia Duarte / IADE / Av. Dom Carlos I, nº4, 1200-649 Lisbon, Portugal /
T: +351 213 939 600 / emilia.duarte@iade.pt
Didem Kan Kilic /IADE / Av. Dom Carlos I, nº4, 1200-649 Lisbon, Portugal / didem.kan@ieu.edu.tr

Part II: Certificate of Consent
I have been invited to participate in research about way-finding ability of blind participant in an urban environment.
(This section is mandatory)

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

If illiterate [7]

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

[7] A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb print as well.

Print name of witness_____ **Thumb print of participant**

Signature of witness _____

Date _____

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:

1.

2.

3.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

APPENDIX E

CONSENT FORM (PORTUGUESE) IN CASE STUDY IN LISBON

Av. Dom Carlos I, nº4, 1200-649 Lisboa, Portugal

Consentimento Livre e Informado

Este formulário de Consentimento Livre e Informado foi-lhe enviado porque se voluntariou para participar num estudo de doutoramento intitulado "Aspectos não visuais do conhecimento espacial: Comportamento de "wayfinding" em pessoas cegas no meio urbano.

O formulário está dividido em duas partes:

- **Folha informativa (para partilha de informação relativa ao estudo)**
- **Formulário de Consentimento (para assinatura no caso de decidir participar)**

Ser-lhe-á entregue uma cópia deste Formulário.

Parte I: Folha Informativa

Introdução

O meu nome é Didem Kan Kilic, sou estudante de doutoramento em İzmir, na Turquia, e estou atualmente a fazer um estágio de investigação no IADE–U – Creative University, em Lisboa, sob supervisão da Professora Doutora Emília Duarte. O meu estudo aborda questões de orientação e navegação (wayfinding) com pessoas cegas, em ambiente urbano. Neste documento vão-lhe ser dadas informações sobre o estudo e será convidado(a) a participar no mesmo. Não terá de decidir, de imediato, se pretende ou não participar. Antes de decidir poderá aconselhar-se e pedir qualquer esclarecimento adicional que considere necessário, até se sentir confortável quanto à sua eventual participação no estudo. Se alguma parte do texto, termo ou expressão não forem claros

para si, por favor solicite o seu esclarecimento e teremos toda a disponibilidade para o(a) esclarecer.

Objectivo do estudo

Estamos particularmente interessados em perceber quais os aspectos do meio urbano nos quais as pessoas cegas se focam e usam como pistas para as suas tarefas de navegação e orientação. Neste contexto, nós consideramos que nos pode ajudar nesta investigação dando-nos informações, durante uma tarefa real de navegação, sobre como se orienta no meio urbano para chegar a um ponto de destino.

Metodologia

Este estudo implica uma entrevista inicial e deslocações a pé, sempre acompanhadas, numa área pré-defina na Baixa de Lisboa para encontrar um ponto de destino. Ser-lhe-á pedido que verbalize alto a sua tarefa de orientação e navegação, falando sobre que informações está a recolher para executar a tarefa, as dificuldades, hesitações, medos, entre outros aspectos.

Seleção dos participantes

Foi convidado(a) a participar porque é cego total, sendo a cegueira congénita ou adquirida, com capacidade de navegação e orientação independente no meio urbano.

Participação voluntária

A sua participação neste estudo é voluntária e a decisão final é inteiramente sua. A decisão de participar ou não no estudo não terá qualquer tipo de consequência adicional e poderá alterá-la em qualquer momento, mesmo se tiver concordado participar anteriormente.

Procedimento

C- Se aceitar participar:

4- O estudo será realizado num ambiente urbano complexo, na Baixa da Cidade de Lisboa, entre a Praça do Comércio e a Praça D. Pedro IV (Rossio), onde foi definida uma rota prévia. No início ser-lhe-á feita uma entrevista com o objectivo de saber um pouco sobre as suas capacidades de navegação e orientação, bem como a avaliação do

seu grau de familiaridade com o local onde decorrerá o estudo.

5- No momento seguinte será feita uma passagem exploratória pela rota pré-definida (fase de treino). Nesta fase ser-lhe-ão dadas instruções iniciais sobre a tarefa que lhe vai ser pedida. Apenas poderá realizar esta rota uma vez antes de iniciar a fase experimental.

6- A fase seguinte corresponde à parte experimental do estudo. Ser-lhe-á pedido que volte a percorrer a rota inicial enquanto verbaliza alto a sua experiência. Esta tarefa de "wayfinding" será feita por duas vezes, em duas condições diferentes: com e sem informação auditiva. A informação sonora do ambiente será controlada através da audição de música com auscultadores.

7- Tanto a entrevista inicial como as verbalizações ao longo da rota serão gravadas em áudio. Os dados serão mantidos anónimos e confidenciais.

8- Todo o processo será acompanhado pelo investigador. Poderá ser acompanhado por uma terceira pessoas, se desejar, mas terá que garantir que esta não interferirá no procedimento do estudo.

9- Se concordar, serão captadas imagens suas durante a tarefa de "wayfinding".

D- Se recusar participar:

1. Por favor responda ao e-mail em que recebeu este documento, dizendo que não pretende participar neste estudo.

Duração

A duração total prevista para a sua participação é de três horas, sendo cerca de 30 minutos para a entrevista e cerca de 2,5 horas para as deslocações, incluindo pausas para descanso e refrescamento. O dia e horário para esta atividade serão combinados de acordo com as condições do estudo e a sua conveniência.

Riscos

Existe o risco de poder partilhar, sem querer, alguma informação pessoal, ou que se possa sentir desconfortável em falar de algum dos tópicos abordados. Contudo, não desejamos que isto aconteça e tentaremos evitá-lo ao máximo. Não queremos que se sinta obrigado(a) a responder ou a falar se assim não o desejar. Bastará que nos comunique essa vontade e interrompemos o estudo imediatamente. Como em qualquer deslocação do quotidiano, existe o risco de poder tropeçar ou embater em algum

obstáculo durante a deslocação. Para evitar que isto aconteça, será sempre acompanhado(a) pelo investigador, que o(a) alertará de qualquer perigo nas proximidades. Existe, ainda, o riso de ser perder durante o percurso. Porém, estando acompanhado(a), quando desejar interromper o processo será logo auxiliado(a) e acompanhado(a) até ao ponto de início do estudo.

Benefícios

Não existirão benefícios diretos para si, mas a sua participação contribuirá para a evolução do conhecimento sobre a navegação e orientação de pessoas cegas, o que poderá resultar em importantes contributos para o design ambientes urbanos mais inclusivos.

Pagamentos

Não haverá lugar a qualquer pagamento pela sua participação no estudo.

Confidencialidade

A informação recolhida, bem como som e imagens, serão mantidas anónimas, sendo usada apenas para fins académicos. Não haverá nenhum registo de informação que possa expor a identidade do participante, que será identificado(a) por um número de registo. As únicas pessoas que terão acesso aos dados pessoais dos participantes são os investigadores, Didem Kilic e Emília Duarte.

Partilha dos resultados

Os resultados que obtivermos com este estudo serão partilhados com os participantes do estudo, em primeira mão, e só depois com a comunidade, através de publicações e/ou apresentações em eventos académicos e científicos nacionais ou internacionais. Todos os participantes receberão uma cópia dos relatórios ou artigos produzidos. Se ocorrerem apresentações públicas em Portugal, os participantes serão convidados a assistir e/ou participar, consoante cada caso.

Direito de recusar a participação ou de desistência a qualquer momento

Poderá recusar-se a participar ou desistir a qualquer momento, sem qualquer penalização ou consequência. No que diz respeito ás declarações efectuadas durante a entrevista, estas ser-lhe-ão enviadas para aprovação prévia. Poderá, caso considere que

não foi corretamente entendido(a), pedir que sejam feitas modificações à transcrição das suas palavras.

Quem contactar

Se tiver questões adicionais ou pretender mais informação, mesmo após ter participado, poderá contactar-nos para:

- Professora Emília Duarte, IADE-U, Av. Dom Carlos I, nº 4, 1200-649 Lisboa, Portugal

Telf: 213 939 600 / e-mail: emilia.duarte@iade.pt

- Didem Kan Kilic, IADE-U, Av. Dom Carlos I, nº 4, 1200-649 Lisboa, Portugal e-mail: didem.kan@ieu.edu.tr

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Parte II: Formulário de Consentimento

Foi convidado(a) para participar num estudo sobre questões de orientação e navegação (wayfinding) com pessoas cegas, em ambiente urbano.

(Esta secção é de preenchimento obrigatório)

Nome

_____

Assinatura

_____

Se for analfabeto ou não puder assinar

Eu testemunhei uma leitura rigorosa deste documento ao potencial participante e declaro que este teve a oportunidade de ver esclarecidas as suas dúvidas, tendo consentido em participar voluntariamente neste estudo.

Assinatura da testemunha

_____

Data _____/ 06 / 2015 **Impressão digital do participante**

Assinatura do investigador

_____

APPENDIX F

TRANSCRIPTION OF VERBAL DESCRIPTIONS IN CASE STUDY IN İZMİR

KEMERALTI ROTASI SES-KAYIT DÖKÜMÜ

P.1. (14.01.2015 – 11.30)

Günlük güneşlik yola düştük kalabalıkta. Şu anda hükümet konağını solumuza aldık. Güneş binalar yüzünden geride kaldı. Gölgeye girdik. Kalabalık bir günde ilerliyoruz. İki yanımız da şu anda dolu. Sağ tarafımızda bir genişleme var. Sanırım bir sokağa geldik. Çünkü sağ tarafta uzaktan sesler gelmeye başladı. Seslerle beraber güneş de geliyor. Gölge bitti, sokak sayesinde güneşi hissettik. Yollar çok girintili-çıkıntılı. Kemeraltı'na hiç yakışmıyor. Üsküp'te bir geziye gittim, Kemeraltı gibi bir çarşıya götürdüler. Ama kesinlikle buraya benzemiyor. Dükkanların önüne kesinlikle hiçbir şey koymuyorlardı. Zeminde girinti-çıkıntı yoktu. Dümdüz bir zeminde yürüdük. Güya Avrupa'nın en geri kalmış ülkesiymiş. Şu anda yolun ortasından yürüyorum. Sağda bir sokak geçiyoruz (Sağdaki mağazayı sokak zannetti. Çünkü mağaza girişi diğer mağaza sıralarına göre çok derindeydi). Zemin başlangıca göre biraz daha düzleşti. Girinti-çıkıntı azaldı. Bir sokak daha geçtik. Çünkü güneş bize göründü ve geri kaçtı. Demek ki dar bir sokakmış yanından geçtiğimiz. Şu anda hafif bir esinti var. Düz devam ediyoruz yolumuza. Henüz dönüşe gelmedik. Öğle arasına denk gelince iyice kalabalıklaştı yolumuz. Sol tarafta bir ses var. Bu ne böyle? Bir dakika.

Tam karşımıza bir duvar geldi. O zaman buradan sola dönüyoruz. O zaman sol tarafımızda kahveci kalmış olmalı. Sağ tarafımızda da cami. (Kahvecinin bulunduğu yeri ne kahve kokusundan ne de kahve dövme makinesi sesinden anlayabildi. Yolun sonuna gelip karşısına duvar çıkınca döneceğini hatırladı. Sol ve sağ tarafında hangi mekanların olduğunu da döndükten sonra hatırladı). Tekrar güneşe çıktık. Burası ilk dönüşümüzdü. Yavaş yavaş ikinciye geliyoruz.

Sağ tarafımızdaki cami duvarı bitiyor. Ve buradan sağa dönüyoruz. Uzaktan sesler geliyor. Demek ki uzun bir sokak var önümüzde. Şimdi güneş binanın arkasında kaldı. Devam ediyoruz. Güneşi tekrar hissettik. Demek ki sağ tarafımızda bir sokak var. Sağda ve soldaki sokakları geçtik. Düz devam ediyoruz. Yol biraz daha düzeldi. Zemin engebeli olunca baston sekme yapıyor. Bu sokakları herkese göre yapsalar bizim için uygun olur zaten. Bunun da bir güzelliği var diyorlar ve eskiyi koruyorlar. Fakat bunun bizlere bir faydası yok. Şu anda sağımız ve solumuz daraldı. Vatandaşlar birbirlerine daha yakın yürümeye başladılar. Şu anda ne güneş ne de tam gölge. Üzerimizde bir şey var sanki. (Sokak üzeri branda ile örtülmüş). Sağ tarafımızda bir sokak geçiyoruz. Uzaklardan ses geldiği zaman bil ki orada bir açıklık var. Ben sokak olduğunu oradan anlıyorum. Şimdi daha dar bir alana girdik. Yemek kokuları var (onlar için daha dar hissedilen yer, bizim için Ali Paşa Meydanı). Solumuzda bir derinlik oluştu. Çok kalabalık. Üzerimiz yer yer kapalı. Çünkü ara ara güneşe çıkıyoruz, sonra gölge oluyor. Nefis yemek kokuları eşliğinde devam ediyoruz (Ali Paşa Meydanı'ndan geçtiğimizi fark etmedi. Sokaktan geçtiğimizi zannetti). Şimdi bir sokakta yürüyoruz ve dört yol ağzına geldik. Sesler geliyor derinlerden. Günlük güneşlik bir sokak. Zemin çok daha düzgün. Kalabalık azaldı. Karşımızda ne var?.

(3. dönüşün olduğu yeri anlayamadı. Yolun sonuna kadar yürüdü, dükkanla karşılaşınca yolun bittiğini anladı ve dönüş yapmamız gerektiğini hatırladı). Şimdi burada sola dönüyorduk sanırım. Burası daha düzgünce bir yol. Kalabalık git gide azalıyor. Zemin hafif bozuldu, tekrar düzeldi (Bir çukur vardı, onu geçtik). Evimin olduğu yer bir sokağın orta yerindeydi Evi bulmak için ayaklarımı kullanırdım. Tam evin önünde hafif bir eğim-çukur gibi bir şey vardı. Çukuru ezberledim. Hissedince eve geldiğimi biliyordum. Oldu da çukuru doldurdular diyelim, yine doldurdukları zemin diğer taraftan farklı olur. Bu sokak Kemeraltı'nın girişine göre baya düzgün. Topuk seslerini hiç kaçırmam. Yanımızdan bir bayan geçti. Sol tarafta bir sokak geçiyoruz. Biraz dar bir sokaktan yürüyoruz. Sağdaki ve soldaki binalar öyle diyor bize. Sıkışık bir yolda ilerliyoruz (Kavis yapamadık, düz devam etti ve bir dükkana girdi). Üzeri kapalı bir mekana girdik. Baya dar bir alan burası. Bitiş noktasına geliyoruz. Ve geldik sanırım şu anda.

POST-TEST:

Eskiden bildiğim bir yeri gezdik ama bu güzergahı hiç yürümemişim. Yer döşemesi, binaların sıkışık olması, dükkanların önünün dolu olması ve kalabalık yüzünden çok sağlıklı yürüyemedim. Hükümet binasının oradan ilerledik. Kahveciden sola döndük. Cami'den sağa dönük ve Eski Balık Hali'nin oradan da son dönüşümüzü yaptık. Eskiden balık halinin orası balık kokusundan geçilmezdi. Tabi şimdi bizim için bir anlamı yok orasının. (Çalışma bittikten sonra dönüşlerin hepsinin tek tek hatırladı).

Rota tamamlama süresi: 21.30 dakika

P.2. (16.01.2015 – 11.30)

Saat Kulesi'ni arkamıza aldık. Yürümeye başladık. Şu anda dükkan yok etrafımızda. Boş bir alandayız. Girişe geldik şimdi. Pütürlü taşları geride bırakıyoruz ve mazgalı buluyoruz öncelikle. Sağımda bir giyim mağazası var. Bastonla mazgalı takip ediyorum. Sağımız tekrar boşaldı. Bastonu vurunca boş alanda yankı yapıyor. Oradan anlıyorum ki sağ tarafımızda sokak var. Şimdi vuruyorum mesela, yankı kesildi. Demek ki sağımız ve solumuz tekrar doldu. Mazgalı takip ediyorum. Dönerciye yaklaştık. Dükkanlar sıklaştı. Sağ tarafta bir sokak var yine. Bastonla kenar takibi yapınca sokağa geldiğinizde o kenar kesiliyor. O yüzden kenarları takip etmek sokak girişlerini anlamak için çok önemli. Özellikle böyle bir yerde. Düz devam ediyoruz. Baharat kokusu alıyorum. Önünden geçiyoruz hatta tam şu anda. Uzaktan kahve kokusu da gelmeye başladı.

Sola dönmem gerekiyor sanırım, çünkü kahve kokusu çok keskinleşti. Sola döndüm ve sağ tarafımda cami duvarı kaldı. Kenarı takip ediyorum.

Cami duvarı bittikten sonra sağa dönüyorum. Sağımız ve solumuz boş ya da çok uzakta bir şeyler var. Devam ediyoruz. Daha dar bir sokağa girdik şimdi. Sağda-solda dükkanlar var (Dönüyoruz-dönmüyoruz kafası karıştı, 4 adım sonra hatırladı). Cami dönüşünden sonra Balık Hali'ne kadar düz gidecektik. Karıştırdım. Şu anda bir kestanecinin önünden mi geçiyoruz? Kokusu geldi. Balık haline gelmeden dönerciyi bulmam lazım öncelikle. Öyle hatırlıyorum. Burada dükkanlar sıklaştı, hem ayaklarımı hem bastonumu yere vuruyorum, yankı çok çoğaldı. Ses dağılmıyor, ses bir yerde toplanıyor böyle dar yollarda. Dediğim dönerciye geldik. Demek ki Balık Hali'ne yaklaştık. Düz devam ediyoruz.

(Balık Hali'ni bilemedi. Yolun sonuna gelince ve bir dükkanla karşılaşınca dönmemiz gerektiğini hatırladı). Şimdi buradan sola dönecektik. Balık Hali arkamızda kaldı o zaman. Fark edemedim. Düz devam ediyoruz. Kemeraltı'nda arada sırada şöyle yardımlar alıyorum. Bazen tam dönüş yapacağım yere esnaf malzeme koyuyor. O zaman döneceğim yeri karıştırabiliyorum. O zaman yardım alıyorum işte. Az önce geçtiğimizde bu tadilat sesi yoktu. Henüz gelmedik son noktaya. Geldiğimizi şöyle

anlayacağım: Şu anda üzerimiz boş, orada üzerimiz kapanacak. Şimdi geldik işte. Üzerimiz kapandı, dükkanlar sıklaştı, ses dağılmıyor ve dar bir alana girdik.

POST-TEST: Yön bulmak için kullandığım en önemli şey bastonla mazgal takibi yapmaktı ve ses yankısının olup olmadığını dinlemekti. Böylece çevredeki doluluğu anlayabildim. Yankı yapıyorsa bina yoktur. Kokuya göre bazı yerler belirledim. Onlara göre belli bir noktaya gelip gelmediğimi anlıyorum. Bir yöne dönmek için geldiğimiz sokağın sonunda ne varsa onu işaret olarak alıyorum. Örneğin, ilk dönüş noktamız kahveciydi. Kalabalık bazen dezavantaj oldu. Tam dönmem gereken yerde insan yığını olunca dönüşü kaçırdım. Kenar takibini çok kullandım. İlk dönüş kahveciydi, sonra cami duvarı bitince sağa döndük ve en son balık halinden sonra sola dönüp düz yürüdük.

Rota tamamlama süresi: 14.10 dakika

P.3. (21.01.2015 – 11.30)

Burası İzmir Konak Meydanı. Arkamızda Saat Kulesi, sağ çaprazımızda simitçi, sol çaprazımızda Hükümet Konağı var. Bu güzergahtan Kemeraltı girişine doğru gidiyoruz. Kaldırım kenarları, yağmur olukları bana genelde çok yardımcı oluyor. Fakat burada böyle bir şansım olamayacak. Şimdi girişteyim. Burada hafif bir rampa var. Girişe geldiğimizi buradan anlayabiliyorum. Sağımız solumuz kapalı. Sağımızda bir sokak var. Şimdi bu sokağı şuradan anladım. Birincisi güneş geliyor o taraftan. İkincisi yolda hafif bir eğim var o tarafa doğru. Bu da o yöne doğru bir dönüş var anlamına geliyor. Ben düz devam ediyorum. Kıyafet ve ayakkabı satan dükkanlar var sağ tarafımızda. Kaldırım takip edemiyorum. Kalabalık çok engel oluyor bana. Yürümemi zorlaştırıyorlar. Sağ tarafımızda bir dönerciyi geçiyoruz. Sağ tarafta aynı zamanda sokak var. Yine eğimden hissettim bunu. Devam ediyoruz. Burada kuş satan bir yer mi var? Kuş sesi geliyor. (Kuyumcu dükkanının girişinde bir kuş kafesi var. Onu duydu). Kahve kokuları gelmeye başladı. Biraz daha keskinleşince sola dönmemiz gerekiyor.

Döndük ve sağ tarafımızda cami duvarı var. Duvarı takip ediyorum. Bastonla bu duvara dokunarak devam etmek istiyorum. Bu duvar bitiminden sağa dönüyoruz.

Sağa döndük ve buranın zemininin girişe göre daha düzgün olduğunu düşünüyorum. Sağda bir sokak var. Güneş çıktı ve kayboldu. Şu anda Ali Paşa Meydanı'na doğru yürüyoruz. Sol tarafta bir sokak var. Dönercilere varınca anlayacağım meydana geldiğimi. Burada üzerimiz kapalı. Bastonu vurunca yankı yapıyor. Kalabalıkta ayak seslerini dinleyenlerden değilim. Benim kafamı karıştırıyor. Ben daha çok kaldırımı ve yerdeki izleri takip ediyorum. Çünkü insanların ne yapacağı çok belli olmuyor. Sabit şeyler daha güvenilir. Sağımızda ve solumuzda sokak var. Ve dönerciye ulaştık. Üzerimiz kapalı, yine yukarıya çarpan bir ses var ve yukarıdan gelen hava akımı kesildi. Buradan anlıyorum üzerimizin kapalı olduğunu. Şu anda meydanın içersinden geçiyoruz. Zemin bozuluyor meydana vardığımızda. Buradan düz devam ediyoruz. Üzerimiz hala kapalı ve hala dar bir yolda devam ediyoruz. Şimdi sağımız açıldı. (Eski Balık Hali'nin önünden geçiyoruz, ama burayı hatırlayamadı). Soldaki duvarı takip ediyorum. Çünkü sağ taraf boşaldı.

Soldaki duvar bitince sola döndük. Sağda ve solda mağazalar var şimdi. Sağ tarafımızda bir yol ayrımı var. Araç sesi geliyor çünkü. Buradaki zemin çok daha düz. Sokakları geçiyoruz, hava akımlarından anlıyorum. Üzerimiz ara ara açılıyor, ara ara kapanıyor. Toptancılar vardı galiba burada. Ama belirli bir kokusu yok bunların. Burası son durak artık. Üzerimiz tamamen kapandı ve sokak çok daraldı. Ses yankı yapıyor çok fazla ve güneş ışınları kesildi.

POST-TEST: 3 kere dönüş yaptık. Birincisi kahveci, ikinci dönüş cami duvarı bitinceydi. Meydanda dönercileri geçtik. Eski Balık Hali yıkıntılarının yanından geçtik. Ama ben sol taraftaki duvarı takip ettim. Duvar bitince sola döndük. Genel olarak bu çalışmada en çok yerdeki izlere dikkat ettim. Bozuk ve düzgün zeminler benim için en belirleyici izlerdi. Duvar takibi çok önemliydi. Yerdeki eğimler sokak boşluklarını anlamamda yardımcı oldu.

Rota tamamlama süresi: 15.36 dakika

P.4. (26.01.2015 – 11.30)

Kemeraltı'nın girişindeyiz. Geniş bir alandayız şu anda. Bu rota üzerindeki dönüşler çok önemli. Ben sağdan gitmeyi tercih ediyorum. Sağ tarafımızda dükkanlar var. Ben dükkanları referans olarak almıyorum. Çünkü günün birinde orada olmayabilirler. O zaman oradan gelen ses veya koku da ortada kalmayabilir. Bu benim için dezavantaj olur. Ben daha çok zemine dikkat ediyorum. Belli bir adrese gideceksem şimdiki gibi dönüş yerlerindeki referanslar çok önemli. Yolun ortasına bir tezgah koyuyorlar, o zaman takip ettiğiniz yoldan ayrılmanız gerekiyor. Şu anda sağ taraftan bir sokak geçiyoruz. Işık miktarı arttı o tarafımda. Takip ettiğim duvar bitti. Yol sağa dönüyor. Yol bitimi çok önemli. Şu anda sağımızda solumuzda yol var.

Tam karşımızda da yüksek bir bina var. Bu noktadan sola dönüş yapacağız. (Kahve kokusundan değil karşısına çıkan binadan dolayı dönüşü hatırladı). Devam ediyoruz. Tekrar sağı takip ediyorum. Sürekli gittiğim bir yerse gittiğim yeri kafamda şekillendiriyorum. Burayı da bir kez yürüdük sizinle. Kafamda dönüşleri ve nereden döndüğümüzü oturtmaya çalıştım. Biraz dönüş yapacağız takip ettiğimiz duvar bitince).

Şimdi sağa dönüyoruz. (Cami olduğunu unuttu, duvarın bitiminden dönüşü hatırladı). Genel olarak isim ve mekanlar aklımda kalmıyor. Benim kendime göre referanslarım var. Onları aklımda tutmaya çalışıyorum. Sağımızda solumuzda sokak var. Bunları geçiyoruz. Günlük hayatta evime giderken ya da babamın iş yerine giderken, yani sürekli kullandığım bir güzergah ise zaten kafamda bir yön haritası oluyor. Sağ ve sol tarafta sokak geçiyoruz yine. Çok kuvvetli bir ışık geldi oradan anladım. Burayı da geçtik. Dar alanlarda masa-sandalye koyuyorlar. Bunlar bizim için dezavantaj. Çünkü duvar takibi yapamıyoruz böyle olursa. Yol burada baya daraldı. Bunu şuradan anlıyorum. Yankı değişti, hava akımı değişti. Yol ayrımı var. Burayı da geçicez. Üzeri kapalı olan alana ulaştık. (Ali Paşa Meydanından bahsediyor. Ama adını hatırlamadı). Sağımızda ve solumuzda masalar var burada. Yol baya dar. Köşeler çok kalabalık. Sağ tarafımızda kitap yığınları mı var, pasaj girişi mi anlamadım. (Kitapçı vardı). Düz devam ediyoruz. Zemin biraz bozuldu. Tırtıklı yolu bitirdik, düz asfalt bir yola başladık. Bu noktadan sonra ışık miktarı çok arttı. Üzerimiz de açıldı. Aklımda kaldığı kadarıyla bu ışık miktarı artan yer Eski Balık Hali'ydi. Tırtıklı yolun bittiği, asfalt yolun başladığı, mekanın ferahlaştığı yer burası. Eski Balık Hali yani. Kokulara çok

takılmıyorum ben. Sese ise şu noktada önem veriyorum. Tehlike olduğunu hissedersem o zaman sese dikkat kesilirim. Yoksa mağazalardan gelen ses benim yön bulmamda önemli değildir.

Bu yolun bitimden sola dönüyoruz. Fark ettiyseniz dönüşleri hiç saymadım. Kendi referanslarıma göre döneceğim yerleri aklımda tuttum sadece. Buradan düz devam edeceğiz. Ses ile ilgili yalnız şöyle bir detay vermek isterim. Mesela özel yerler var. Derneğimizin girişi, trafik ışıkları, metro asansörü gibi. Buradaki sesli uyarıları tabi ki dikkate almamız gerekiyor. Fakat bu ses kavramını her yer için düşünmek benim için çok zor. Koku da ses gibi geçici bir şey benim için. (Kafasının karıştığı noktaya geldik). Buradan mı sağa dönüyorduk. Bir Dakka kafam karıştı. Dönüş yoktu sanki bir kez daha. Son varacağımız nokta pasaj. Üzeri kapalı olmalıydı. Yok, düz devam etmemiz gerekiyor. Devam ediyorum. Evet, şu anda vardım sanırım. Üzeri kapalı olan bu alana varmadan önce dikkat ettiğim bir şey vardı. Asfalt yol bitiyor ve tekrar pütürlü zemin başlıyor. Yol daralıyor ve üzeri kapanıyor. Böylece geldiğimizi anladım.

POST-TEST: Çalışmayı yaptığımız saat gereği kalabalık olmaması benim için bir avantajdı. Üç dönüşümüz vardı. Gerçi kafanızda bir rota belirledikten sonra onun kaç dönüşlü olduğunun da bir önemi yok. Çünkü kafanızdaki rotayı ve referansları takip ediyorsunuz. Ses ve koku çok önemli değildi. Dediğim gibi, bugün olan ses ve koku, yarın burada olmayabilir. O yüzden bu rotayı sizinle ilk yürüdüğümüzde de bunlara hiç dikkat etmedim. Beraber yürüdüğümüzde dikkat ettiğim şeyler, dönüş yapacağım yerdeki işaretlerdi. Duvar bitimleri, yerdeki zemin değişiklikleri, zemindeki inişler-çıkışlar bu rotayı oturturken kullandığım referanslardı.

Rota tamamlama süresi: 14.50 dakika

P.5. (26.01.2015 – 11.30)

Şimdi burası Konak Meydanı. Açık bir alan. Açık alanı size şöyle tarif edebilirim. Sağdan soldan sesleri çok iyi alıyoruz. Bir de yankı diye bir şey var bizim kullandığımız. Açık alanda bastonun yankı olayı olmuyor. Herhangi bir duvara veya engele ses çarpmadığı için. Ama kapalı alanda ses bir engele çarpıyor. Şu anda sağ tarafım kapandı. Kıyafet dükkanı sanırım. Kumaş kokusu geldi içeriden. Kalabalığı hiç sevmiyorum. Sesin geçişini engelliyor. Sağ tarafımızda şu anda boş bir alan var. Baya genişledi o taraf. Zemin değişikliği oldu bir de. Ama malzeme olarak değil de, döşenme yönü değişti. Sağ tarafta açılan yol yüzünden herhalde. Sağdan yürümeyi tercih ediyorum. Sağımız ve solumuz şu anda kapalı. Geniş alanlarda çok rahat hareket edemiyorum ben. Çünkü oraların sınırları yok. Geniş alanlarda kendini kontrol etme olasılığın, sınıra göre kendini uyarlama olasılığın olmuyor. Ama dar yerlerde az-çok nerede olduğumu anlayabiliyorum. Bir şeyleri referans olarak alabiliyorum. Olduğum yere göre kullandığım referanslar değişiyor. Zamana göre bile değişiyor aslında. Bazı yerler bazı zamanlarda daha kalabalık. O zaman mekanla ilgili algın direk değişir. Zemin değiştiği anda yürüdüğün mekanın da farklılaştığını anlarsın. Burada zemin değişikliği henüz yok. Burada zeminde hafif bir eğim var. Sağa dönüş olduğu için herhalde. Bir yeri belirlerken sokak saymak faydalı olabiliyor. Mesela soldan ikinci sokağa girmem gerekiyor gibi. Ama tabi ki tek başımayken kullanıyorum bunu. Duruma göre önceliklerim değişiyor yanlı ve bulunduğum yere göre de. Bazen de zemin en önemli olabiliyor. Bir kuş sesi mi geçtik. Kalabalık beni gerçekten çok etkiliyor. Hiçbir şey duyamıyorum, algılayamıyorum. Parfüm kokusu alıyorum. Parfüm satan yer kahveciye yaklaştığımızı gösteriyor. Sol taraftaki kahveciye geldik. Kahvenin çekilme sesini duydum. Kokusu da var ama şu anda bu ses daha baskın. Bir yere yaklaşırken bizim için önemli şey kıyaslarsak kokudan çok sestir.

Kahveciden sola dönüyoruz. Dönünce kahve kokusu baya belirginleşti. Ben genelde yürürken sağı takip ediyorum. Şimdide sağ taraftaki duvarı takip edicem. Belki de bu görme engelliler okulunda bize söylenen: merdivenlerden inerken ve çıkarken sağı takip edin koşullaması yüzündendir.

Duvar bitti, sağa dönüyoruz. Aslında duvarını takip ettiğim yerin ne mekanı olduğu benim için çok önemli değil. Yani o sizin için bir cami, ama benim için yönümü

bulmamı sağlayan bir duvar. İşlevsellik çok önemli bizim için. Yol takibi için o duvar bana lazım. Rotayı birlikte bir kez yürüdük. Kafamda oluşan şey, aslında sizin kafanızda oluşturduğunuz şeyle benzerlik gösteriyor. Aynı şeylere dayanarak oluşturuyoruz belki de. Siz görsel olarak oluşturuyorsunuz, ama biz de görsel bilgiye göre değil, örneğin orada duvar vardı, kahve makinesi sesi vardı, ses geliyordu, koku geliyordu diyerek oluşturuyoruz. Daha geniş bir alana geldik. Sağda ve solda sokak var. Üzerimiz yer yer kapalı. Sesin yankısı değişiyor. Sağ tarafta bir kuş sesi var. Pet-shop var sanırım. Bize eğitim alırken direk bağımsız hareket eğitimi ya da algılarımızı geliştirmek için bir eğitim vermiyorlar. Ama bunu doğuştan itibaren geliştirebilirsiniz. Ben başka bir dünya, başka bir yaşam tarzı bilmiyorum. Benim açımdan farklı bir şey yok. Sizin için farklı olanı ben bilmiyorum bile. Bildiğim şey görmemek. Görmek nedir bilmiyorum. Sağda ve solda sokak geçiyoruz yine. Dar bir yola girdik. Sağda ve solda çatal-bıçak sesleri var. Devam ediyoruz. Bir balık kokusu alıyorum içlerden. Balık kokusu keskinleşti. Yemek alanını geçtikten sonra sağda ve solda sokak var. Bu sokakları geçtikten sonra sağda Eski Balık Hali kalıyor diye hatırlıyorum. Benim için Eski Balık Hali bir referans değil., ondan önceki sokak ayrımı benim için belirleyici olan.

Şimdi sola dönüyorum. Çünkü sol tarafta takip ettiğim duvar bitti. Şimdi düz devam ediyorum. Bir klima var sağ taraftaki sokağın içinde. Dar bir sokakta yürüyoruz. Yankı değişti. Son nokta dar ve üzerimiz kapalı bir alandı. Henüz varmadık. Evet, şimdi son duraktayız. Üzerimiz kapandı, sağda ve solda masalar var ve yankı değişti.

POST-TEST: Aslında sizin için referans olan benim için değil. Mesela caminin duvar, sizin için cami olan benim için sadece bir duvar, ya da Eski Balık Hali. Oraya varmadan önce dikkat ettiğim şey yeme-içme yerinden geçtikten sonraki ilk sokak ayrımı. Çünkü ilk yürüyüşümüzden hatırladığım eğer o sokak ayrımını bulursam sağımda kalacak Balık Hali. Yani Balık Hali de benim için bir referans değil. Kahvecideki kahve makinesi sesi olmasa o da benim için bir referans olmayacaktı, belki de dönüş yapacağımı belirlediğim başka bir şeyden anlayacaktım. Sonuçta benim haritamla sizinki aynı ama referansları farklı.

Rota tamamlama süresi: 16.35 dakika

P.6. (28.01.2015 – 11.00)

Şu anda meydandan girişe doğru yönlendik. Yerde tırtılı taşlar var. Yani yer algısı olarak farklılıklar yaratabiliriz. İlk yürüyüşümüzde fark ettiğim şey yerdeki taş yapısının değişiyor olması. Benim için bu ayırt edici özellik. Şu anda sağ tarafımda duvar etkisi oluşmaya başladı. Meydandaki taş yapısına göre Kemeraltı'nın bu bölgesindeki taş yapısı farklı. Burada koku algısıyla alakalı olarak bir restaurant olduğunu söyleyebilirim. Eğer rüzgar bizi yanıltmadıysa şu anda bir pastaneye yaklaşıyoruz. Sağımızda bir boşluk oluştu. Duvarları ya da boşlukları algılamak kulak ile alakalı bir olay. Yankıdır herhalde bunu anlamamızın sebebi. Eğer kulaklık takarak yürürse bir görme engelli bildiği yolda bile rahat yürüyemez mesela. Çünkü dünya hissi ortadan kalkıyor. Yani yürürken algı açısından kulağın önemli olduğunu düşünüyorum. Şu anda etrafımızda mağazalar var. Adım sayma olayı görme engellilerde mevcut olmayan bir şey. Hiçbir görme engellinin adım saydığını düşünmüyorum. Belki sonradan görme engelliler kullanıyordur. Biz de yolların yapısı, dönüşler, yoldaki eğimler bizim için çok daha önemli. Sağımızda bir yol açıldı. Boşluğu geçtik. Sağımız tekrar kapandı. Sağa daha yakın gittiğim için bu tarafı daha çok algılayabiliyorum. Sağ tarafta bir boşluk daha oluştu. Kuşçular mı var burada? Bu mesela bizim için bir referans olabilir. Dediniz ki bir kuyumcunun kapısında asılı olan bir kuş kafesi. Ben eğer bir kuyumcu arıyorsam bu kuş sesi benim için referans olabilir. Şu anda kahveciye yaklaşıyoruz.

Dönüşe geldik. Önümüzde caminin duvarı var. Solumuzda kahveci var. Dönüyoruz. Yerdeki taş yapısı değişti. Kahveciden döndükten sonra değişen bu taş yapısı benim için belirleyici bir unsur. Daha düzgün bir taş yapısı var. Solumuzda restaurantlar var. Sağımızda bir duvar var.

Sağımız genişledi ve açıldı. Bunu hissettiğimizde dönüyoruz. Düz devam ediyoruz. Belirgin fark ettiğim bir şey yok. Sağa sola bir boşluk oluştu. Burayı geçicez ve düz devam edicez. Burada yerde hafif bir yokuş oluştu. İlk yürüyüşümüzde de fark etmiştim bunu. Böylece yeni bir yere başladığımızı da anlayabiliyoruz. Daha da daraldı sağımız solumuz. En mantıklı referans alınacak şey yerdeki taşların yapısı ve dönüşler. Mesela kokular rüzgara göre, günün belli vakitlerine göre değişkenlik gösterir. Sesi de kontrol edemezsiniz, bir vardır bir yoktur. Ama zemin hep buradadır. Koku, ses kısmen işime yarıyor. Ama sürekli değil. Şu anda sağda solda yol ayrımı var. Yerdeki taş yapısı da

değişti. Bu değişiklik yine yeni bir yere geldiğimizi gösteriyor. Masalarla dolu bir yere geldik. Restaurantlar var (Ali Paşa Meydanı). Taş yapısı baya değişti bu bölgede. Kemeraltı'nda yer yapısının önemli bir unsur olduğunu görüyorsunuz. Dönüşlerde, yeni mekanlarda hep değişiyor. Sağımız-solumuz şu anda dolu. Sağa-sola bir boşluk açıldı. Biraz ilerde duvar var bizi bekleyen. Masaların olduğu yeri bitirdikten sonra sağlı sollu boşluğa geliyoruz. Ve yer yapısı yine değişiyor. Çok daha düz bir yola girdik. Karşımızda bir duvar var ilerde. Sağımızda ve solumuzda boşluk oluştu. Sola dönüyoruz buradan. (Eski Balık Hali'ni hatırlayamadı). Bir yanlış algı daha var görme engellilerle ilgili. Merdiven sayısı değil önemli olan. Bastonla ne hissettiğimizle ilgileniriz biz. Baston boşluğa gelirse merdiven biter. Bu kadar basit. Burası yine farklı bir yer. Çok daha sakin. Devam ediyoruz. Son noktaya varıyoruz şimdi. Üzerimiz kapandı. Dar bir alana girdik. Sağlı sollu masalar var. Burada bitiriyoruz.

POST-TEST: Epey düz şekilde yürüdük. Sağlı sollu dükkanlar vardı. Sonra caminin duvarı çıktı önümüze. Sağda ve solda boşluk vardı. Sanırım sol tarafta da kahveci vardı. Ama benim için karşıma çıkan duvar daha önemli. Döndükten sonra yerdeki taş yapısının farklılaştığını gözlemledim. Doğru yerden döndüğümü anlamama yardımcı oldu. Çok fazla yürümeden sağa döndük. Sağa dönüşten sonra yerdeki taş yapısı değişmişti yine. Baya sıkıntılı bir zemin oluşmuştu. Birinci yürüdüğümüz yol kadar yürüdük. Restaurantların olduğu bölüme geldiğimizde yerdeki taşların daha da büyüdüğünü gözlemledik. Burayı da geçip sola döndük. Düz yürüdük ve son noktaya geldik.

Rota tamamlama süresi: 14.25 dakika

P.7. (28.01.2015 – 13.00)

Ben mazgalı takip etmek istiyorum. Genelde böyle yerlerde mazgalı takip ederim. Çünkü mazgal ya yolun kenarından gider ya da yolun tam ortasından geçer. Diyelim ben soldan mazgalı takip ederek gidiyorum. Bir araba var burada park etmiş olan. Bir püf noktası söyleyeyim size. Araba hiçbir zaman mazgalın üzerine durmaz. Bu arabanın arkasında kalarak ve mazgalı takip ederek aslında paralelimdeki kalabalıktan kurtulmuş oluyorum. Bu abralara dokunmasam bile konuşurken sesim onlara çarpıyor. Arabaya ne kadar mesafede olduğumu ya bastonun sesinden ya da kendi sesimden anlayabiliyorum. Araba bitti, yoluma devam ediyorum. Bastonu vurarak yürüdüğümden yol nerede genişliyor anlayabiliyorum. Genişleyen yerden yankı alamazsın. Ne tarafta yankı kesiliyorsa o tarafta dönüş vardır. Aslında gören insanda da kulak var. Arkasından gelen tık tık sesine bakmalı. Ama görenler görmeye o kadar odaklılar ki aslında duysalar da farkında değiller. Şimdi bakın bastonumu kullanmıyorum. Önümde giden insanların ayak seslerini dinleyerek aramdaki mesafeyi bozmadan onları takip ediyorum. Çok kalabalık yerlerde bu yöntem çok işime yarıyor. Bildiğimi düşündüğüm yere kadar onları takip edip bildiğim yere geldiğimde takibi bırakıyorum. Şimdi kahveciye geldik ve buradan sola döndük. Sağda caminin duvarını takip ediyorum. Şimdi şu yanmış kahve kokusunu duyunca doğru yere geldiğimi anlıyorum, içim rahatlıyor. Sonra cami duvarının yanında yürürken bastonu güçlü vururum yere, ki dönüşün nerede olduğunu anlayayım.

Şimdi sağa dönüş yapıcaz. Yankı kesildi, cami duvarı bitti. Şimdi yürüdüğümüz güzel düz bir yol. Yoldan çıkan motorlar bana bir fikir veriyorlar aslında ben yolun başındayken. İlerde kullanmayacağım ama dönüşün olduğunu bildiğim bir sokak var. Ben düz devam edicem. İster istemez koku almada hem de duymada bir hassasiyet kazanıyoruz. Etrafta şu anda garip bir tiner kokusu var mesela. Böyle sessiz olan ortamlarda işime yarayan bir şey var. Yürüyüşler, ayak sesleri daha ön plana çıkıyor. İnsanların ayak seslerinden nereye döndüklerini, ne tarafa yürüdüklerini anlayabiliyorum. Dükkan derinliklerini içeride konuşan insan seslerinden anlayabiliyorum. Şimdi benim sevmediğim şu yere geldik. Etrafta masa-sandalyeler var. Ortası boş. Bu yolun sonunda zemin düzgünleşiyordu diye hatırlıyorum. Yolun sonuna geldiğimi hissettiğimde bastonu yere vururum. Mesela şimdi karşıdan bir yankı geliyor. Demek ki bir engel var. Bu engel karşıma çıktığında sola dönüş yapacaktım.

Sola dönüyorum. Bir engele takılmamanın yolu o engeli izlemektir. İlerde duyduğum bir ses var benim. Birincisi motor sesi, bir de yukarda yankılanan klima sesi. Bir önceki yürüyüşümüzde de bu klima sesini duymuştum. Demek ki doğru yoldayım. Ve sona doğru varmak üzereyim. Görenlerde özellikle gözlerini sürekli kullandıkları dolayı bir duyu eksikliği var bence. Bu yüzden birçok şeyden haz alamamalarına sebep oluyor. Mesela ben yolda yürüyorum, bir taraftan çevredeki müzikleri duyuyorum, bir taraftan da hiçbir şeyi kaçırmamak istiyorum. Ama görenlerin görme için harcadıkları enerji inanılmaz. Normalde iki gün gözleriniz kapalı gezseniz üçüncü gün farkı mutlaka anlayacaksınız diye düşünüyorum. Mesela, evde bir sinek var, gören biri bunu fark ettiğinde bir görme engelli kişi onu çoktan sesinden fark etmiştir. Şu anda son noktaya ulaştık. Bir mekana girdiğimin hissini uyandırdı. Çünkü üzerimiz kapalı, ileride bir açıklık var. Bastonu vurduğumda her tarafım kapalı, ses bana geri dönüyor. Demek ki son noktadayım.

POST-TEST: Kafamdaki haritayı size anlatayım. Pütürlü zemini olan etrafta masa-sandalye olan sokak birinci dipnottur benim için. İkincisi bu pütürlü yeri geçer geçmez zemin düzleşiyor. Bir de en çok dikkat ettiğim şey kötü kokan kahve Bunlar hep Kemeraltı'nda var olacaktır. Kahve döven ayı da hep orada olacaktır. Burası birinci dönüşümüzdü. Cami duvarı bitimi ikinci dönüştü. Benim için durağan şeyden çok hareketli, sesli şeyler daha önemli. Mesela, son dönüşten sonraki sokakta bulunan klima sesi. Onun orada olması doğru yolda olduğumu ve sona ulaştığımın bir göstergesiydi. Görenler olarak çok şey kaçırıyorsunuz. Bunu lise deneyimimde anladım. Görenlerle birlikte okudum ve yaşadım. Yatılı okudum. Adaptasyonum bir hafta sürdü. Bastonla bütün okulu gezdim, öğrendim. Sonra baston kullanmama gerek kalmadı. Ama okulda gezip dolaşmadığım yer kalmadı. Aslında bir görme engelli tek başına bırakıldığında bir binayı en fazla 15 dakikada tanıyabilir. Ben düşünün 2 hafta gezdim. Diyelim bir mekana girdim. Ama öncelikle kapıyı kapatmanız gerekir. Çünkü açık bir yer varsa sesi dağıtır. Ve hemen yürürüm enine ve boyuna. Görenler işte her şeyi görme odaklı yaşıyorlar. Karmaşık tasarlanmış bir mekana bir göreni ve görme engelliyi aynı anda sok. Görenin gözünü kapattığın an bir telaşa kapılır. Her yere çarpar. Ve çarptığı yeri bir bilgi olarak düşünmez. Halbuki bir görme engelli buradaki herhangi bir şeye çarptığında hiçbir şekilde dönüp aynı şeye çarpmaz. Bilir ki orada bir engel var. Ve görenden çok daha rahat hareket eder. Ben şimdi buraya oturdum ya. Hemen kafamda bembeyaz bir

sayfa oluşturuyorum. Girişin sağ tarafındaki ve girişe yakın olan 2. Masaya oturduk. Hemen onu oraya yerleştiriyorum. Aynı masalardan kaç sıra olduğunu az çok tahmin edebilirim. Buraya gelirken aynı masadan karşıda da olduğunu fark ettim. Demek ki arada bir yol var. Bunu hemen kafama çizerim. Aslında yollar bizim için çok büyük bir yardım. Yerdeki bozukluklar, çukurlar bizim için çok önemli. Adım saymak diye bir şey yok. Sokak ve dönüş sayabiliriz, ama adım saymak çok zor. Hiç kullanmıyoruz. Mesela ben otobüslerde şöyle bir yöntem kullanıyorum. Yolda girilen çukurları, eğimleri ve dönüşleri takip ederim. Köprüdür, çukurdur bunlar çok önemli benim için. Otobüste bu sayede son ses müzik dinleyip yol takibi yapabiliyorum.

Rota tamamlama süresi: 12.15 dakika

P.8. (17.02.2015 – 11.00)

Şu an Kemeraltı Meydanı'ndayız. Mazgalın üzerindeyiz. Bunu takip etmek istiyorum. Valiliğin üzerinde kuş sesleri var. O sesler binaya olan mesafemi ölçmemde bana yardımcı oluyor. Uzaklaşıp yakınlaştığımı anlayabiliyorum. Mesela sağda üst tarafta bir klima sesi geliyor. Sağ tarafımızda bir boşluk oluştu. Ve tam burada sayısal loto makinesinin sesi geldi. Rüzgarın getirdiği basınç ve yankının kesilmesiyle bunu anlıyorum. Düz devam ediyorum. Sağ tarafı takip etmek istiyorum. Mazgalı referans alarak devam ediyorum. Yürüdüğümüz yolda insanların bulunmaması benim için çok önemli. Sol tarafta büyük bir yankı var. Sanırım ok yüksek ve uzun bir duvar var sol tarafımızda. (Hükümet Konağı'nın duvarı). Şimdi sağ tarafımızda güneş ışığı var. Bir boşluk oluştu. Şimdi sağ tarafımız gölge oldu. Bina geldi, güneş ısısı gitti ve sokak bitti. Kemeraltı'nda geçtiğimiz sokaklardan birine gideceksem onlara dikkat ederim. Ama şu anda bu sokakların benim için çok da bir önemi yok. Düz devam ediyorum. Sağ tarafımızda bir kuyumcu var sanırım. Bozuk para sesi gibi, altın sesi gibi bir şey geldi içeriden. Yürüdüğümüz güzergah üzerinde sol tarafta mağazaların olduğunu ve özellikle bayanlara yönelik mağazaların olduğunu düşünüyorum. Çünkü sol taraftaki topuk sesi oranı çok fazla. Kadın sirkülasyonu daha fazla. Sağ tarafta yine bir sokak var. Çaycı çay bardaklarını toplamış gidiyor sağ tarafımızda. Yavaş yavaş kahvenin kokusu gelmeye başladı. Kahve kokusu keskinleşti.

Artık benim sola dönmem lazım. Solumda kahveci kaldı. Sağımda yüksek bir duvar var. Bu duvarı nasıl anladığımı şimdi anlatıcam. Solumdaki kahve dükkanlarının içinde çalışan makinelerin karşı tarafta yapmış olduğu yankıdan anlıyorum. O ses buradaki duvara çarpıyor. Böylece duvarın ne kadar alçak veya yüksek olduğunu anlayabiliyorum. Daha alçak bir duvar olsaydı o ses o duvara çarpamayacaktı. Ama bu duvar yüksek olduğu için o ses duvarı çarpıyor, dönüyor ve tekrar çarpıyor. Sağdaki duvar hala devam ediyor. Konuşma sesim hala bu duvara çarpıyor. Yani bir görme engelli yürürken hayatında yankı hiç kesilmiyor. Kendi ayak sesimiz, yanımızdan geçen insanların ayak sesleri, kadınların topuk sesleri, müzik sesi… Bu sesler engellere çarpıp bize geri geliyor. Ve ben bu yankılar sayesinde etrafımı anlayabiliyorum. Çünkü özellikle kulaklarımı kullanıyorum yön bulurken. Bu şekilde yönümü tayin ettiğim için, yankıyı sürekli kullanıyorum. Sağımızda bir boşluk oluştu. Mesela bir tepsiyi alın kendi yüzünüze doğru tutun. Bütün konuştuklarınız tepsiye çarpıp size geri dönecektir. Bir

süzgeç alın konuşun yankının daha az olduğunu hissedeceksiniz. Ben de bunu uyguluyorum aslında. Yankı hep var.

Şimdi sağa döneceğiz. Sol taraftan ortası cam olan demir bir kapı kapandı. O kapı tahta bir kapı olsaydı, kapanırkenki tonu daha farklı olacaktı. Önümüzde iki bayan bir erkek yürüyorlar. Bir görme engelli insanların ne yöne doğru konuştuklarını hissedebilir. Şimdi bir çerezcinin önünden geçiyoruz. Doldurduğu kese kağıdını poşetin içine yerleştiriyor satıcı. Solda ve sağda bir boşluk oluştu. Yürüdüğümüz güzergahta yankıyı takip etmek bizim için yeterli bence. Rüzgar verdi coşkuyu demek ki sağlı sollu bir boşluk var. Sol tarafta bir dükkan var, önünde de tezgahı var. Üzerimizde branda var. Tepemizde bir basınç var. Sol tarafımızda dükkanın girişi var. İçeride konuşan bir adam var. Sağ tarafımızda bir duvar var ama tam kapalı bir duvar gibi değil. Boşluklu bir yapısı var. (Alüminyum levha gibi bir duvar). Üzerimizde sokağı komple kapatan bir branda var. Solda ve sağda bir boşluk oluştu. Sizin Ali Paşa Meydanı dediğiniz yere geldik. Ama bir görme engellinin meydan algılaması oranın boş olmasıyla alakalıdır. Meydan dediğin boş bir arazidir. Ama burası masa-sandalye ile sınırlandırılmış restaurantların olduğu bir yol-sokak benim için. Çünkü başka bir şey algılayamıyorum. Burası sizin için meydanken benim için bir sokak. Sol tarafa doğru biraz genişliyor alanımız. Ortada bir şey mi var? (Çeşme var). Üzeri yine kapalı bir yerdeyiz. Sol tarafımızdaki restaurant çok daha kalabalık. Üzerimizdeki brandaların arasından güneş geliyor. Güneşin geldiğini de ısıdan anlayabiliyorum. Önceki brandalar daha yüksekteydi, buradaki biraz daha aşağıda. Sağ tarafımızda tarihi bir bina var. Garip bir kokusu var, taş galiba. Verdiği yankı çok dalgalı. Brandalardan kurtulduk. Aydınlık, sıcak bir yere geldik. Hatırladığım kadarıyla burası Eski Balık Hali'nin olduğu yer. Sağ tarafımızda bir duvar yine ama cami duvarından çok daha alçak ve hafif bir malzemeden yapılmış. Bu engelin arkasında uzaklarda çalışan bir makine sesi duyuyorum. Klima da olabilir o ses. Bilmiyorum. Onun yankısı direk bana geliyor, duvara çarpmıyor. Burası sizin için Eski Balık Hali yıkıntısı, benim için arkasında klima çalışan alçak bir duvar. Benim için önemli olan yürüdüğüm yoldaki yankı bana ne gibi işaretler getiriyor.

Buradan sola dönüşümüz var. Artık zemin asfalt, düz bir yol. Bu yolda herhangi bir tezgahtar sesi falan gelmiyor. İnsan kalabalığı çok az. Demek ki Kemeraltı girişindeki mağazaların depoları burada olabilir. Sola dönüş yapacağımızı da karşıda duran

engelden anladım. Sol tarafta bir sokak var. Buradaki yol biraz girintili-çıkıntılı. Sağ tarafımızda güzel bir sokak var. Neden güzel? Kalabalık değil, güzel kahve kokusu var, cezve sesleri geliyor. Şimdi düz devam ediyorum. Burada dükkandan çok depolar var. İnsan kalabalığı çok az. Sol tarafta yine bir sokak geçiyoruz. Ama bu sokakların benim için bir önemi yok. Bir de her sokakta hava akımı hissedicem diye bir şey yok. Önemli olan yankıya odaklanmak. Bir yerlerde talaş, ahşap kokusu geliyor. Bir dükkan var galiba ahşap satan. Yolun sonuna doğru yaklaştık. Üzerimiz kapandı. Yol daraldı. Son noktaya vardık demek ki. Sanki burada ışık tepeden dar bir yerden giriyor. Sanki bina çatıları birbirine çok yakın.

POST-TEST: Konak Meydanından yürümeye başladık. Bu güzergah üzerinde valilik duvarı çok büyük ve yüksek bir duvar var. Çok özellikli. Sokaklar çok önemli değildi benim için. Döneceğim yeri yankıya göre ve kokuya göre tayin ettim. Ama en önemlisi yankı benim için.

Rota tamamlama süresi: 34.20 dakika

P.9. (19.02.2015 – 11.00)

Bu geniş alan (İzmir Konak Meydanı) sıkıntı aslında benim için. Etrafta uyaran olmadığı için, referans alacağım çok şey olmadığı için bu gibi yerlerde düz gidemeyebiliyoruz. Şimdi burada sol tarafta hükümet konağının duvarı var. Sağımızda sokak var. Bastonu yere vurduğumda ses bana geri dönmüyor. Daha doğrusu çok geç dönüyor. Dolayısıyla sağ tarafımda bir açıklık olduğunu anlayabiliyorum. Sol tarafta bir işportacı geçtik. Simitçi olabilir. Sağ ve sol tarafım şimdi kapalı. Sesler bana geri dönüyor. Burada yemek yapan bir yer var. Ama ben yön bulurken koku algısını çok kullanan biri değilim. Geçici bir referans çünkü benim için. Yemek yapan bu yer geçici süre kapalı olursa ne olacak? Bunu kullanamam o yüzden. Etraftaki sesler ve zemin özellikleri benim için daha öncelikli. Bir AVM' ye gittiğimde mesela bir dükkanı arıyorsam ve o dükkan restauranttan sonraysa o zaman koku algısını kullanırım. AM böyle bir yerde güvenemiyorum. Buralarda sokaklar geçiyoruz. Ama çok geniş olmadığı için ve bu sokakları herhangi bir şey için referans olarak kullanmadığımdan dolayı fark edemiyorum. Bir de o tarafa yakın da yürümediğimden çok önemsemiyorum. Sağ tarafta bir yere gidecek olsaydım ve belirtecim sağ tarafta olsaydı orayı takip ederdim. Ama şu anda sola dönüş yapacağım için sağı takip etmeme gerek yok. Sokak sayma işini bir tek şu durumda yapıyorum. Eğer benim için belirteç başka hiçbir şey yoksa o zaman sokak sayarım. Mesela evimin olduğu yerde çok fazla duyulara dair bir şey yok. Ana cadde ve sokaklar var. O yüzden orada sokak sayıyorum.

Kahveciye yaklaştık ve yolun sonuna geldik. (Yolun sonundaki duvarı hissedince döneceğimizi hatırladı). Kokuyu biraz duydum. Ama dönüşü kokuya göre yapmadım. Karşıma çıkan duvar sayesinde yaptım. Sağ tarafımda caminin duvarı var. İznin olursa sağ tarafı takip etmek gerekiyor. Çünkü duvar bittikten sonra dönüş yapıcam sağa. Rüzgar var mesela şu anda. Bu çok önemli bir sorun bizim için. Çünkü rüzgarın kendi uğultusu olduğu için etraftaki sesleri ayırt etmemiz daha da zorlaşıyor. Sağda ve solda sokaklar var şu anda. Bir yol ayrımı var. Onu geçiyoruz. Burası çok daha dar bir yer. (Ali Paşa Meydanı). Üzerimiz kapalı. Masalar var etrafta. Sağlı sollu sokaklar var yine. Bu sizin meydan dediğiniz yere varmadan ve meydanı geçtikten sonra bu sokaklardan var. Meydanı çevreliyor. Şu anda sağ tarafımızda alçak duvarın olduğu, sol tarafımızda ise yüksek bir duvarın olduğu sokakta yürüyoruz. Bu sokak bitiminden sağa döneceğiz diye hatırlıyorum.

Sokak bitti, sağda ve solda yol ayrımı var. Biz sağa dönüş yapacağız. Ben güneş ısısını falan kullanmıyorum. Çok körcül bir belirteç olmasına rağmen hiç kullanmadım. Güneş sadece ışık yaymadığı için bizim de algılayabileceğimiz bir şey ama öğretilen veya öğrenilen bir şey galiba. Ben öğrenmedim. Böyle şeyleri bize beden eğitimi derslerinde öğretirler ki bunlar çok yetersiz bilgilerdir. Bu sokak daha sakin bir yer insanlar açısından. Gerçi araç geliş-gidişi var. Bu yol biraz daraldı mı, binalar mı çok yükseldi çok algılayamadım. Binalar çok yakın ve üzerimizde brandalar var. O yüzden sanki pasaja girmişiz gibi hissediyoruz. Bu hissi hatırlıyorum ilk yürüyüşümüzden. Burası varış noktamız.

POST-TEST: Çalışma esnasında yaptığımız ilk dönüşte kullandığım şey kahvenin kokusu değildi, yol bittiği için ve karşıma duvar çıktığı için döndüm. İkinci dönüşü, sağ taraftaki duvarı takip ettiğim için kaçırmadım. Duvar bittikten sonra sağa dönüleceğini hatırlıyordum çünkü. Zemini çok kullanmam gerekmedi. Genelde benzer taşlarla döşeli olduğu için, ona dair bir bilgi kullanmam gerekmedi. Eski Balık Hali'nin oradaki açıklığı kullanamadım. Çünkü orada benim için bir açıklık değil alçak bir duvar vardı. Mesela sizin Ali Paşa Meydanı dediğiniz yer, benim için sadece bir koridordu. Sonuna doğru sola doğru bir açılma oldu o meydanda. Bir kör olarak oranın Ali Paşa Meydanı olduğunu bilmeme rağmen oraya meydan demem. Meydana varmadan ve geçtikten sonra benzer genişlikte sağa ve sola açılan sokaklar vardı. Son dönüşten sonra düz devam ettik. Fakat bu son noktaya gelebilmemiz için hafif bir eğim yaptık. Yolun sonundan gelseydik belki de bunu yapmamız gerekmezdi. İlk yürüyüşümüzde bu rotayı kafamda oluşturdum. Girişler-çıkışlar-koridorlar gibi bir şey oluşmuştu kafamda. Geniş bir yer her ne kadar benim için güzel olsa da yön bulmada sıkıntı yaşıyorum. O yüzden Kemeraltı'ndaki bu sokaklar her ne kadar karmaşık olsa da yön bulmam için içersinde referans barındıran yerler.

Görenlerin gözünü bağlasanız dışarıda olma ve içerde olma farkını anlayabileceklerini düşünüyorum. Yani halı kaplı bir yer ile taş döşeme bir yeri ayırt edebileceklerini düşünüyorum. Hali kaplı koridorla taş kaplı bir koridor sesi birbirinden çok farklıdır. Bunu aslında siz de farkındasınız ama görme duyusu çok kısa zamanda çok fazla bilgiyi toplamanızı sağlıyor. Bu ses farkını duysanız bile kullanmanıza gerek yok aslında. Neden ekstra binanın sesini dinlemeniz gerekli ki? Zaten binanın orada olduğunu görüyorsunuz. Benim için güzel bir yerin tanımı şöyle: Çok karmaşık bir yer değilse, düz yürüyerek bir yere ulaşabiliyorsam orası benim için güzeldir. Geniş yerleri

seviyorum. Ama dış mekanda dediğim gibi geniş yerlerde yön bulma durumu çok sıkıntılı. Referans alacağınız hiç bir şey kalmadığı için her yer toprak, her yer açıklık. Kaybolmak daha mümkün.

Görme engelliler için lise olmasını öneriyoruz biz. Ya yardım ilişkisi oluyor lisede ya da başka bir görme engelli varsa hemen benzerlik ilişkisi kuruluyor. Normal iki arkadaş arasındaki ilişkilerin gelişmesi zaman alıyor. Görme engelli okulunda model alabileceğin biri yok. Herkes senin gibi. Kendin gibi insanlarla birlikte olunca konuşurken nasıl davranman gerektiğini bilmiyorsun. Mesela iki kör yüz yüze bakmadan sırtları birbirine dönük de konuşabilirler. Siz bizim farklı olduğumuzu düşünüyorsunuz. Ve farklı olana farklı davranmanız gerektiğini düşünüyorsunuz. Mesela sizin için konuşalım. Görmemek hiç bilmediğiniz bir şey. Bizim için de görmek öyle işte. Ama şundan sıyrılmamız lazım. İnsan körse sadece önünü göremiyordur. O kadar. Başka bir kusuru yoktur. Yani sağır değildir, IQ' su düşük değildir. İşte bizim dezavantajımız her yeni tanıştığımız kişiyle öncelikle bunları aşmak zorundayız tekrar tekrar. Önce herhangi biri olduğumuza inandırıp sadece göremediğimizi, aslında bunun haricinde her şeyi yapabileceğimizi anlatmamız gerekiyor.

Rota tamamlama süresi: 11.53 dakika

İZMİR FUAR ROTASI SES-KAYIT DÖKÜMÜ

P.1. (03.02.2015 – 11.30)

Şimdi Lozan kapısı arkamızda kaldı. Böylesi büyük bir yerde benim yapacağım ilk iş kaldırım kenarı bulmak.

Bildiğim kadarıyla Lozan kapısını arkamıza alınca solumuzdaki ilk sokaktan giriş yapıcaz. Evet, yolumuzu bulduk. Zaman içinde yüz hatlarımız o kadar gelişiyor ki yüz göz görevini görüyor. Mesela güneş ensemize vuruyor. Böyle bir alan benim için çok daha rahat yürüme konusunda. Bir kere zemini Kemeraltı gibi değil. Çok daha düzenli ve düzgün. Zemin hep aynı. Böyle bir yerde izleyecek bir kenar lazım bana. Kapı çıkışlarına kadar bu kaldırım kenarları beni götürür. Şimdi de bu rota üzerinde onları kullanıyorum. Bu kaldırım kenarı bitine kadar yürüyeceğim. Geçen gün yağmur yağarken yanıma biri yaklaştı. Niye giymiyorsun montunun şapkasını dedi. Kızım ben o şapkayı bir giysem gözüm görmüyor zaten, kulaklarımı da duymaz hale getirir, adım atamam. Buradan şuna gelicem. Bir: Yağmur, İki: Rüzgar, Üç: Aşırı gürültü. Bunlar bizim hayatımızı olağanüstü zorlaştıran şeyler. Bir görenin rüzgar umurunda değildir yön bulurken. Şu anda bu üçü de yok. O yüzden çok rahat hareket edebiliyorum. Bu üçünden herhangi biri olduğunda adım atamazsın, ne yöne gideceğini kestiremezsin, nasıl bir tehlikeyle karşılaşacağını kestiremezsin. Kaldırım kenarında bir cisim var. Bunu geçtik. Gelinceye kadar onun orda olduğunu da hissedersin. Bir körün yüzü çok önemlidir. Gözün görevini sanki yüz sinirleri üstleniyor. Mesela bunun ayırtına nerede varırsın? Gözünü sonradan yitirende. Gören biri kör olduğunda bir adım atamaz. Neden, çünkü yüz hatları gelişmemiştir. Nelere dikkat edecek ki uyum sağlayabilsin. Doğuştan görme engelli geldiysen dünyaya görenden bir farkın yok ki. Öyle bir dünyaya doğuyorsun, başka bildiğin bir şey yok ki. Kıyı takibi yapmaya devam ediyorum.

Kaldırım bitti, şimdi sağa dönüyoruz. Düz devam ediyoruz. Şimdi ağaç kesme makinesi çalışıyor. Bu benim için tehlike. Nereden ne geleceğini bu baskın ses yüzünden kestiremiyorum. Zemin en başından beri aynı. Bu bizim için çok önemli. Sağ tarafımızda baya geniş bir boşluk var. Şimdi ağaç sırası altında çalılılık karaltısı var. Aşağı taraf dolu. Sen gördüğün için bu çalıların senin için bir önemi yok. Ama benim için bir belirteç. Sağ tarafımız yine boşaldı. Ensemizden gelen güneş karşıdan gelmeye

başladı. Sağ tarafımızda bir bina var. Sol tarafta da bir bina var ya da engel. Daraldığını hissediyorum bulunduğumuz yerin. Bu engelleri geçtikten sonra tekrar sağ tarafımızdaki çalılık sırasını takip ediyoruz.

Çalı sırası bittikten hemen sonra sağa dönüş yapıyorum ve bitiriyoruz. Karşımızda kule var sanırım. Hissetmiyorum ama ilk yürüyüşten hatırlıyorum.

Rota tamamlama süresi: 25.16 dakika

P.2. (19.02.2015 – 13.00)

Fuar içersindeyiz.

İlk sola dönüyoruz. Burada takip edecek bir kenar bulamadım henüz. Bir dakika su oluğu var. Bunu referans alıp yürüyorum. Kemeraltı'nda yön bulmak buraya göre hem zor hem kolay. Çok fazla tezgah olduğu için yol üzerinde yürürken bizi engelliyor, Kolay şöyle: İnsanlardan faydalanabilirim orada. Ama burada öyle bir şansım yok. Bir taraftan da beni engelleyen bir şey yok. Dolayısıyla insana da ihtiyacım yok. Burası bomboş bir alan. (Evlendirme Dairesi'ni fark etmedi). Baston kullanmama bile gerek yok burada. Güvende hissediyorum. Herhangi bir engel yok önümde. (Bu yüzden kenar takibini de bıraktı. Yolun ortasından yürüyor).

Şimdi sağa dönüyoruz. Çünkü güvenlik bariyerine çarptık. Yol bitti. Şimdi düz devam ediyoruz. Haritalandırma yapmıyorum ama belli işaretlerim aklımda yürürken. Mesela dönüşten önceki bariyerler. Ona denk gelince biliyorum ki döneceğim. Burası o kadar boş ki biraz zorlanıyorum. Sanki her yer aynı. Evet şimdi indiğimiz yere geldik kaldırımdan. Sonra diğer kaldırımı bulacağım. Buldum, düz yürüyorum. (Binanın önünden geçtiğimizi de anlamadı). Şimdi son dönüşe yaklaşıyoruz sanırım. Ama emin değilim. Yürüdüğümüz yolun mesafesi az-çok yaklaştığımızı söylüyor. Hafif bir rampa indik. (Dönüşü bulamadı. Yardımcı oldum).

Şimdi burası son dönüş noktası, karşımızdaki de Kule değil mi?.

Rota tamamlama süresi: 13.53 dakika

P.3. (03.02.2015 – 13.30)

Arkamızda Lozan kapısı, buradan içeri girdik.

Meydana girdikten sonra solumuzdaki ilk sokağa giriş yapıyoruz. Bu sokaktan direk devam ediyorum. Ama burada neleri baz alabiliriz onu kontrol etmem lazım. Düz bir yolda yürüyoruz. Sağ ve solda ağaç sıraları var sanırım. Sol tarafta bir kaldırım bulmayı tercih ediyorum şu anda. Kaldırım kenarını takip ederek yürüyorum. Kemeraltı'nda yürümek benim için çok sıkıntılıydı. Çünkü kalabalık çok fazla. Bu yüzden bir çok şeyi algılayamıyorum. Burada ipucu olarak alabileceğim ilk şey kaldırım kenarları. Ve paralelimizde uzanan araç yolundaki araç sesleri olabilir. Kaldırım bitti, sanırım burada sola doğru bir genişleme vardı yolda. Ama ağaç sırası devam ediyor. Onu da takip edebilirim. Aynı düzende devam ediyorlar çünkü. Kaldırım kenarı yerine oluk var burada. Onu da takip edebilirim. Arkamızda güneş var. Ensemize vuruyor. Güneşli havada ağaç sırasını takip etmem daha da kolaylaşıyor. Su oluğunu takip etmeye devam ediyorum. Bu oluk bittiğinde veya kaldırım bittiğinde sağa dönüş yapıcam. Sol tarafta bir bina var. Evlendirme Dairesi burası. Bastonu vurduğumdaki yankı değişti. Binanın önünden geçiyoruz. Henüz bitmedi bu bina. Kaldırım yine başladı. Takibe devam ediyorum. Sağ tarafımızda da bir bina var. Yankı yine değişti. Sanat Merkezi miydi neydi burası? Yani benim için bir bina işte. Ağaç sırası devam ediyor sağ ve sol tarafımızda. Bu binalar haricinde yankı çok da değişmiyor. Ara ara kaldırım bitiyor, su olukları onların yerini alıyor. Sağ tarafta bir sokak var sanırım. Ama biz bu sokağa değil, kaldırım bittikten sonraki sokağa dönücez. Kemeraltı'nda çok fazla referans var ama kullanabilmek için daha az insan olması lazım. Burada da bir tek kaldırım kenarı var referans aldığım ama kendimi daha güvende hissediyorum. Az olsun faydalı olsun. Yolumuz burada bitiyor.

Sağa doğru dönmemiz gerekiyor. Nasıl anladım? Burada araç girişi var. Sol taraftan araçların girdiğini duyuyorum. Yani yolun sonuna geldik. Sağa dönüyoruz. Yine kaldırımı takip ediyorum. Yine ağaç sıraları var. Ama zemin farklılaştı. Yürüyüş yolu geçtik sanırım. Alçak bir şey var sağ tarafımızda. Sabit olduğu için benim açımdan önemli. Bu alçak sabit şey sayesinde doğru yoldan döndüğümü anlıyorum. Burada da ara ara kaldırım kesilecek. Ama ben düz yürümeye devam edicem. Burada zeminle çimen birleşimini takip ediyorum. Kaldırım yok şimdi. Sağ tarafımda duvar gibi bir şey

var. Otopark girişi miydi? O kadar büyük bir boşlukta yürüyoruz ki bu sabitler çok önemli. Ara ara karşımıza çıkan sabit engeller bizim için belirleyici. Rüzgarlı havalar çok engelleyici benim için. Hele yağmurlu havalarda bir de şemsiye verirseniz çok zor oluyor benim için yürümek. Üst tarafım kapanıyor çünkü. Yön bulma hissim kayboluyor. Burada sağa dönüş var. Ama biz buradan dönmüyoruz. Sağ tarafımızda yine bir engel var. Alçak duvar gibi bir şey. Bu neydi? Havalandırma gibi bir şey. Yine bir sağa dönüş var. Bunu da geçeceğiz. Devam ediyoruz. Bazen zemin-çimen birleşimini bazen kaldırımı takip ediyoruz. Şimdi kaldırımdan indik bir yol geçiyoruz. Yeni bir kaldırıma çıktık. Sağ tarafımızda büyük bir binanın önüne geldik. Bunu arıyordum ben de. Bu büyük binayı geçtikten sonra son dönüşümüz olacak. Binanın önünden geçiyoruz. Sesin yankısı iyice değişti. Yankı arttı. Binayı geçtik. Bundan sonra sağa dönüş var. Bunu geçiyoruz. Bir pano olmalıydı. Hah buldum. Bu panoyu takip ediyorum. Bundan sonra gelen ilk sağa döneceğim. Çalı sırası var sağ tarafımda.

Buradan sağa dönüyoruz. Bir eğim var yolda. Dönüşten hemen sonra karşımızda paraşüt kulesi var.

Rota tamamlama süresi: 27.53 dakika

P.4. (25.02.2015 – 11.00)

Lozan kapısı arkamızda kaldı. Bir kenar bulmam lazım ki sola dönüşü kaçırmayayım.

Sola döndüm. Önüm gayet geniş ve sakin bir yolda yürüyoruz. Önümde herhangi bir engel yok. Yerler baya ıslak yağmur yağdığı için. Bu benim için dezavantaj. Yeri tam anlayamıyorum. Fakat sağımda ve solumda bulunan ağaçlar beni sınırlandırıyor ve düz gitmeme yardımcı oluyorlar. Yol çok sakin olduğu için ortadan gitmeyi tercih ediyorum. Kenarlarda çöp kutuları olabiliyor çünkü. Uzun bir süre düz yürüyeceğim. Böyle bir alanda zemin benim için çok önemli. Bu yürüdüğüm zeminden daha farklı bir zemin hissedersem örneğin toprak anlarım ki yoldan çıktım. Çünkü burada bütün yol boyunca zemin aynı. Burası Kemeraltı'na göre daha rahat. Stres seviyesi orada çok fazla. Hareket etmemiz burada çok daha kolay. Yön bulma konusunda iki alanda da sıkıntı olduğunu düşünmüyorum. Çünkü Kemeraltı'nda da dönüşleri hesaplıyordum, aklımda tutmaya çalışıyordum. Belirteçlerim neler dönüşlerden önce onları takip ediyordum. Burada ise dikkat edeceğim tek şey zemin. Sakin de olunca konsantrasyon bozukluğu olmayacaktır. Buradaki dezavantaj şu: Yollar birbirine çok benziyor. Dönüşleri kaçırmamak için zeminden daha farklı bir şeylere odaklanmamız lazım. Kenarlarda sık ağaçlar var. Beni sınırlandırıyorlar. Şimdi yolun kenarını takip ediyorum. Çünkü bir süre yürüdük. Yolun sonuna yaklaştığımızı düşünüyorum.

Evet yolun sonunda ki kazığı buldum. İşte buradan sağa döneceğim. Sağımız solumuz yine çimenlik. Sağa döndükten hemen sonra koşu pistini geçiyorduk ve geçtik. Düz devam ediyorum. Ben nereye gidersem gideyim en önemli şeyler zeminin malzemesi, yolun inişi-çıkışı, rampalar ve eğimlerdir. Buradaki bir başka zorluk da şu: Düz giderken yollar hafif kavis yapıyor. Düz yürüdüğümüzü sanırken birden çime giriyoruz. Herhangi bir sınırlayıcı yok şu anda yürüdüğümüz yol üzerinde. Ara ara yollar var. Ama biz düz devam edeceğiz. Bu parkur da ilki gibi uzun bir yol. Kaldırımdan iniyoruz, karşıdan karşıya geçiyoruz. Diğer kaldırıma çıkıyoruz. Düz yürüyorum. Son dönüşe nispeten yaklaştık. Benim için güzel bir mekan ne kadar rahat hareket ettiğimle doğru orantılıdır. O yüzden İzmir Fuar benim için güzel bir yer. (Sağ tarafta önünden geçtiğimiz binayı fark etmedi, zemine o kadar çok odaklandı ki). Burada engel yok. Yani Kemeraltı'nda binalar hava akımını kesiyordu, ama burası o kadar geniş ki, hava akımı da kesilmiyor. O yüzden bir tek zemin kaldı elimde.

Şimdi çıktığımız kaldırımdan indik, demek ki sağa dönüş yapacağız. Ve bitti.

Rota tamamlama süresi: 13.15 dakika

P.8. (17.02.2015 – 1300)

Trafiğin ve insanların az olduğu, yeşilliğin çok fazla olduğu bir yerdeyiz. Lozan kapısı arkamızda.

İlk sola dönüyoruz. Zemin burada hep aynı. Kemeraltı'nda hep değişiyordu. Burada kaldırım taşları değişmiyor. Sol tarafımızda dalgalı dalgalı gelen bir yankı var. Sanırım bunlar ağaç sırası. Sağ tarafımızda da ağaç sırası var ama onlar bize uzaklar. Tam üzerimizde, ağacın üst kısmında bir kuş ötüyor. Böyle bir yolda ortada yürümeyi tercih ediyorum. Çünkü anladığım kadarıyla sağımızda ve solumuzda ağaç sıraları var. Bize bastonumuzla yeri kontrol etmek kalıyor. Burada kesilmemiş ağaç yaprakları tehlikeli olabilir, eğer kıyı takibi yaparsak. O yüzden ortadan yürümek en sağlıklısı. Sağ ve sol tarafımda su olukları olduğunu düşünüyorum. Sol tarafımda yolun biraz genişlediğini hissediyorum. Belki de ağaç sırası azaldı. Ama sanki yol genişledi. Paralelimizde trafik yolu devam ediyor. Bu tür boş alanlarda Kemeraltı'na göre daha rahat hareket edebiliyoruz. Çünkü algılarımızı daha rahat kullanıyoruz. Yolumuzu bulmak için çok fazla enerji harcamıyoruz. Ya da yankıları duymak için. Burada kuşlar bile bize yardımcı. Kuşlar böyle bir yerde havada az gezer. Genelde ağaçların üzerindedirler. Böylece ağaca ne kadar yaklaştığımı kuş sesinden anlayabiliyorum. Ben ergenlik dönemindeyken görme engelimden utanıp baston kullanmazdım. Ama yürümek için yankı duymam gerekiyordu. O yüzden elimde hep bir anahtarlıkla gezerdim. Onu sallayarak çevremdeki engelleri dinlerdim. Sağımızda ve solumuzda bulunan ağaçların yaprakları sanki üzerimizde kenetleniyor. Yazın burada yürüyüş yapmak iyi olabilir. Sağımızda ilerde bir futbol sahası var. Trafik yolu biraz öncekine nazaran bizden uzaklaşıyor. Yol üzerinde çöp kovaları var. Artık yol bitmek üzere.

Yol bitiminden sağa dönüş yapacağız. Bu yol biraz öncekine göre daha dar. Sağ tarafımız baya geniş bir boşluk. Solumuzda daha sınırlayıcı bir şey var. Bir yürüyüş yolu geçtik. Bu yürüyüş yolu fuarı çepeçevre sarıyor bildiğim kadarıyla. Enlemesine geçtik biz bu yolu. Sağ tarafımız geniş bir çimenlik alan. Çünkü bana gelen yankı çok hafif, yok gibi bir şey. Sağ tarafımızda bir şey var. Kapı gibi bir şey. Neydi bu? Otopark? Sanırım o otopark alanına geldik. Sağ tarafımızda bisiklete binmeden yürüyen biri var. Çünkü pedal boşa dönüyor. Elinde tutuyor bisikleti. Şu anda o havalandırma kabinine geldim. Şimdi kaldırımdan ineceğim ve cadde geçip tekrar kaldırım çıkacağım.

Kaldırım üzerinde yürüyoruz. Ama buradaki ağaç sırası bir öncekinden farklı. Buradaki ağaçlar kaldırımın içinde kutucuklara yerleştirilmiş gibi. Toprağın içersinde değiller direk. Sağ tarafımızda alçak ağaçlar var. Sağ tarafımızda bir duvar var. Bir bina. Bu bina son dönüşe yaklaştığımı gösteriyor. Bastonun sesi, cebimdeki bozuk paranın sesi dahi sağ tarafımızda bir bina olduğunu gösterir bana. Sol tarafımızda ileride Göl Gazinosu var. Sağımızdaki duvar hala devam ediyor. Sağımızdaki bina şu anda bitti. Burada koku algısını kullanmak çok mümkün değil. Her yerden aynı koku geliyor. Yön tayin etmemde en önemli etken böyle bir yerde, bastonun çıkardığı sestir. Yankıdır yani.

Şimdi yol bitti, son dönüşümüz burası. Karşımızda yuvarlak bir boşluğun içinde Paraşüt Kulesi var.

Rota tamamlama süresi: 29.38 dakika

P.9. (19.02.2015 – 13.00)

Arkamda Lozan kapısı var. İlk dönüşümüz sol tarafa doğru olacak. O yüzden sol tarafta bir takip çizgisi bulmalıyım. Çünkü baya geniş bir alan burası. Burada duyabileceğim bir şey yok.

Takip çizgimi buldum ve ilk sola dönüyorum. Buranın güzel tarafı açık bir alan, çok fazla referans alınacak bir şey yok, ama yollar bizi götürüyor. İstediğimiz yerden başka bir yöne gitme ihtimalimiz yok. Yol bizi zaten yönlendiriyor. Burada insan kalabalığı daha az olduğu için çok rahat. Daha ferah bir yerde yürüdüğümüz için bunun bendeki yansıması daha farklı Kemeraltı'na göre. Çok daha homojen dağılan bir ses ve homojen dağılan bir kokusu var. O yüzden burası daha güzel bir yer benim için. Sol tarafımızda trafik sesi kesildi, araya bir engel girdi. Sanırım Evlendirme Dairesi'ne geldik. Bir tokluk oldu sol tarafımda. Burada bir müzeye gelmiştim. Çok güzel bir yerdi orası da. Dokununca anlıyorsunuz tabi güzelliğini. Bildik-sıradan bir bina gibi değildi. Geniş bir yerdi. Düz devam ediyoruz buradan. Evlendirme Dairesi dışında bir bina yok henüz buralarda. Binayı fark etmek kolay da kapısı bulmak çok zor. Kalabalık neredeyse o bir belirteç aslında. Ya da kapı girişi, içerdeki ısının en yoğun hissedildiği yerdir. Isı farkını çok rahat hissedersiniz. İçerideki yankıyı duymaya başladığınızda kapı burada diyebilirsiniz. Ama çok zor işte.

Burada yol bitti. Sağa dönüyoruz. Başka bir yola girdik. Daha dar bir yol burası. Koşu pistinin üzerinden geçtik. Bastonu birkaç kez yere vurdum ki yolun genişliğini anlayayım. Kaldırım çıkıntıları bize bu anlamda yardımcı oluyor. Şu anda yine sol yol takibi yapıyorum ve düz devam ediyorum. Şapkayı çıkarttığımda boyut değişiyor. Burada çıkartmak istiyorum şapkamı. Önceden çok zorlanırdım şapka kullanmakta ama şimdi alıştım. Kaldırım bitti, eğim var, karşıya geçiyoruz. Düz devam ediyoruz. Burada zemin farklılaştı. Ağaç sıraları var yine sağ ve sol tarafta. Sağ tarafta bulunan, önünden geçtiğimiz bir bina var. Bu binayı geçtikten sonra son dönüşümüz gelecek. Binanın önünden yürüyoruz.

Kaldırım bitti, buradan sağa dönüyoruz. Sağa döndük, tam karşımızda paraşüt kulesi ve onun içersinde durduğu meydanı var. Bu rota üzerinde çok az belirleyici vardı. Önünden geçtiğimiz iki bina benim için tek belirteçlerdi. Yol zaten götüreceği yere

götürüyor dediğim gibi. Çok fazla kafa karıştırıcı bir şey yok. Kemeraltı'ndaki gibi kalabalık, insan sesi, mekan sesi, engelleyici tezgahlar yok. Yönümüzü kaybettirecek bir engel yok. Aslında bütün bunlar referans gibi gözükse de Kemeraltı'nda, bir şeyleri akılda tutmak çok zor orada. O yüzden burası çok daha kolaydı yön bulma açısından ve akılda tutma açısından.

Rota tamamlama süresi: 18.53 dakika

APPENDIX G

TRANSCRIPTION OF VERBAL DESCRIPTIONS IN CASE STUDY IN LISBON

P.1. (25.06.2015 – 17.00)

Video – 1st.mp4

Start	*End*	*Text*
00:01.0	00:10.4	The sound indicates the position about... under the Arc.
00:10.4	00:12.1	(Didem)You can say it in Portuguese also. Don't worry.
00:13.4	00:18.8	We are below the Arc, and the echo allows us to know that we are under it.
00:18.9	00:24.1	Hitting with the cane on the floor, we know more or less that we under or very close to the Arc.
00:25.8	00:28.4	And cars over there passing by...

Video – 2nd.mp4

Start	*End*	*Text*
00:06.6	00:11.5	I'm not really remembering all the route right now.\N(3 mins after this without subtitles)
03:11.9	03:26.8	At this point we are here in a flat surface and the sidewalk starts to become more... more... where the paving stones are more spread away from each other (most likely he felt them being more irregular)
03:26.8	03:36.7	We can hear someone singing Opera. The cars in front of us are in front and back from us. The opera sound is coming from our left.
03:36.7	03:45.9	With the sound is difficult to understand because the singing seems like a soprano, I don't understand much about music but...
03:45.9	03:52.0	There's a slight slope on our right in the direction we are walking.
03:54.0	04:01.5	The sun is coming from our left, from the west.
04:01.5	04:12.7	Now we are walking a bit until we get to this street to cross. The cars are coming from our left.
04:12.7	04:21.4	From the right to the left (that was strange, I think he made a mistake there).
04:27.9	04:31.5	Now we are crossing the street.
05:11.1	05:15.9	So, if I recall correctly we still had to continue on this street and then we would turn right on the next one, correct?
05:16.7	05:22.2	(Luís)No, on the third street. (I made a mistake here and helped

		him, sorry about that)
05:23.3	05:37.2	Now we are continuing through here, we have a wall on our right and to our left, I know that because of the sound, \Nand we have an obstacle to our left here.
05:40.1	05:49.0	The street where the cars pass and the music there at our left.
05:52.1	05:58.7	And here the smell doesn't, doesn't.... and once again the sun to our left.
05:59.2	06:08.3	A flat surface here. We now cross another street, similar to the first one.
06:08.3	06:29.3	The crossing sign has a sound. Here we have the smell of coffee, at our right we have a coffee shop\N and the noise inside of people and coffee cups.
06:30.0	06:43.8	We are progressing through the right. And there is a showcase (clear sound of the cane hitting it) from a bookstore.
06:43.8	06:53.7	From the smell it is clear that is a bookstore, the smell of paper, to magazines coming from a typography.
06:54.8	07:09.7	We are making the third street crossing. This one seems to have tram tracks.
07:09.7	07:19.8	And now, once again... I think we have to turn right on the next one.
07:33.1	07:43.2	The smell here... it's from perfumes, most likely from people nearby.
07:43.2	07:53.2	Now we are going to enter on Rua de São Nicolau.
08:03.4	08:09.9	-What did I had to ask in the kiosk?\N-(Luís)The magnet.
08:10.5	08:13.9	And the other task was the coins, right?
08:18.9	08:26.6	Now we are crossing the 4th street with the terrace.
08:26.6	08:35.6	Now we go here to left. Now we have a...
08:37.3	08:44.7	There's music here.
08:44.7	08:53.5	Now the smell of tobacco.
08:54.0	09:10.2	We have the terrace to our right and we have an area that is dividing the sidewalk from the terraces.\NNow we have a street to the left.
09:10.2	09:19.7	It was on this one right?\NAnd we had to ask in which restaurant?
09:21.4	09:31.6	(some slight confusion of where the restaurant was)
09:33.6	09:48.9	There's a terrace here. (Task 1 - and he asks to the lady in the restaurant how much is the meal)
10:32.6	10:39.1	Now it is curious because there aren't smells that are that different.
10:44.2	10:51.1	This street seems easy to walk since it doesn't seem to have many obstacles.
10:51.1	10:55.3	Now there's a smell of tobacco and coffee to our right.
10:56.2	11:03.3	There seems to be another coffee shop to our left, by the sound of it.
11:06.6	11:10.7	Now the surface is much smoother (flatter) here.
11:19.4	11:21.7	Another coffee shop to our right.
11:29.5	11:44.2	This street... we are on the sidewalk on the left, there's terraces in the middle and coffee shops on the left and right\Nand it has a very flat surface.
11:47.2	11:50.8	I'm recognizing it more or less.
11:52.1	11:58.9	Now we are changing to the other type of surface (more irregular)
12:01.5	12:07.4	-Now here is to the right, correct?-(Luís)Yes.

12:07.4	12:13.1	And then we turn to the left and we find the kiosk, right?
12:13.5	12:21.0	-(Luís)Yes, but before you still have...\N-The statue man. (I noticed that I "helped" a lot...sorry about that)
12:23.4	12:29.1	We are getting close to it (the statue man). This street seems wide.
12:29.7	12:34.4	Now the shoe store.
12:38.8	12:42.5	And a music now.
12:47.4	12:56.4	-Now we are arriving near the statue man\N-(Luís)There's still a bit (wow, I helped a lot... sorry!!)
12:56.4	12:58.4	Smell of tobacco.
13:12.7	13:15.2	Now the perfume.
13:20.0	13:34.0	At the time it was easier to detect because the music was closer.\NNow the music is behind us so...Now we passed through that street.
13:42.0	13:46.9	We are probably close, I was confusing with the other music.
13:46.9	13:58.2	There it is, music sometimes is a point of reference. Now it's the correct music.
13:58.2	14:08.2	Exactly, because the other one was more... now someone place a coin in a box on the left.
14:08.2	14:10.2	(Luís) It was your second task.
14:17.3	14:21.3	- It was near here?\N-(Didem)Yes, here.
14:22.2	14:33.4	(weird, from here not much interesting things and the video stops before the end of the route)

Video – 3rd.mp4

Start	***End***	***Text***
00:04.0	00:10.4	It not because that... a guy...well, I don't even knew that there was... the man had a box there and I had to hit it with the cane like this you understand?
00:27.5	00:33.4	Oh, now this is that street and we can go through here.
00:33.9	00:35.4	This is a street with calçada (those typical irregular squares on sidewalks, the portuguese sidewalk type of pavement).
00:35.4	00:42.1	It's a street with a smell that's very.... let's say, unpleasant.
00:42.1	00:47.8	This is a street with a older pavement (calçada), with a very irregular floor.
00:48.1	00:52.7	In which it starts to smell to restaurants, food from restaurants.
00:52.7	00:58.3	We have here on our left the music from before, from a disco/club.
01:01.0	01:03.5	We have a smell from a restaurant.
01:04.5	01:08.2	Now we have here the Arc, there it is, the echo from the Arc.
01:08.5	01:14.0	And we arrived to the destination point.
01:18.1	01:32.9	(Didem) And can you ask about the first test? How was the trial now. Maybe can explain the experience briefly.
01:32.9	01:38.3	(Luís) Can you make a summary... but first we need to get back because there's a car coming.
01:38.3	01:40.3	OK, very well.
01:53.1	01:59.7	-(Didem) Maybe we can stop here, and I can take this\N-Very well.

01:59.9	02:02.7	(Luís) Can you describe a bit of...\NYes, Yes
02:04.2	02:07.4	So, the route was...
02:08.3	02:18.8	I... in the first route more or less I tried to be attentive to the route itself, on the second time I already knew it better.
02:19.2	02:29.2	Obviously, as we are walking on a route, we are knowing better the terrain, the highs and lows, the type of floor we are walking...
02:31.2	02:39.1	I only had that difficulty regarding... detecting the place where the "statue man"
02:39.1	02:42.1	To the extent that
02:42.1	02:46.2	it was the first time that I knew that he was there, I didn't know that.
02:46.5	02:51.0	And then, since at that time, I thought that...
02:52.1	02:55.4	I set as a reference point that music.
02:55.4	02:57.9	And that's why I told you initially that we were close to it.
02:57.9	02:59.9	But I was wrong because we were still far away from it.
03:02.7	03:06.3	Because if there's no music, it is very difficult
03:06.3	03:08.9	Only if a person passes through there several times
03:09.0	03:13.4	can know that it is close and then turn left,
03:13.4	03:18.1	It can have a slope as we have here, for example.
03:18.4	03:25.4	If I come here more often, I know that we are here near this restaurant because
03:27.2	03:32.1	if they don't change the type of pavement here, I know that we are here near the restaurant.
03:32.1	03:34.1	And we can enter here.
03:34.9	03:39.6	Of course that now I could come back here.
03:41.7	03:46.8	Well, we blind people detect things by the smell.
03:46.8	03:52.3	I said that at the time, when we passed by that shoe store and wanted to enter there,
03:52.3	03:57.2	I would move more to the wall to know where the door is and asked,
03:57.2	04:03.2	but I could even enter in the wrong door because the doors are very close to each other and I could enter the wrong one.
04:03.2	04:06.5	If it were the first time I would go there.
04:06.5	04:11.5	I often go to court houses outside of the country, you see?
04:14.3	04:19.9	For example, inside the audiences room, I already know how that is structured.
04:21.0	04:26.9	*After this, things aren't that interesting, he is just saying that we can contact him and such.*

Video – 4th.mp4

Start	***End***	***Text***
02:18.9	02:30.7	Now the music stopped. It is good that it stopped now that we are going to cross the street\NBut now it started again.
06:17.4	06:29.9	-Now here we have to ask. It's in this street we have to ask.\N-(Luís)Yes, it is.
06:30.2	06:46.1	(he asks the price of the meal)

07:48.1	07:51.4	(just confirming that he was still hearing the music)
08:08.1	08:15.1	It's here.... no, no, not yet.
09:26.3	09:34.4	Now the music stopped... it started again. (changing tracks)
10:42.2	10:45.9	We already passed the kiosk and I didn't even notice.
11:40.9	11:44.2	We arrived here near the Arc.
11:47.7	11:58.1	We this (headphones) is much more complicated. I think I already made a mistake.
11:59.2	12:09.3	-I changed in the previous street didn't I?\N-(Luís)Yes.
12:37.9	12:45.2	Now we arrived.
12:45.2	12:48.3	I turned on the previous one.
12:56.8	13:04.5	(Afterwards interview from here)
13:10.4	13:20.7	What hindered me the most was having my ears covered.
13:21.1	13:30.7	Since I had my ears covered I was paying more attention to the type of surface.
13:33.9	13:41.5	And of course, when you were holding my arm I was much more confident in moving.
13:41.8	13:57.6	Without the arm to walk alone was more difficult obviously but I tried through the type of surface and the cane\Nnear the wall to know when the streets ended.
13:57.6	14:04.3	When a person has the sound available, through the sound, a person knows more or less if it is getting close to the end or not.
14:04.6	14:16.1	And here I had to use other instruments that weren't the hearing, like the cane and the surface
14:16.1	14:22.1	and that's why I turned in the previous street.
14:22.1	14:34.2	I miscalculated and then I went searching for the kiosk to the right and since I was in the previous street I couldn't find it.
14:34.2	14:45.3	And then I saw... when I entered this street with a more irregular surface, I tried
14:45.3	14:56.5	I even thought to turn to the kiosk street but since it wasn't part or the route I didn't.
14:56.5	15:03.2	(Luís) And what was the element that made you think that you were on the wrong path?
15:03.2	15:15.2	When I leaned more to the right I noticed that the wall was different, that there weren't the intervals. (that he was expecting)
15:15.2	15:28.5	-(Luís) It wasn't smells or other elements?\N-No, when I started turning I thought that I was in the right street.
15:28.5	15:39.2	But then I tried to get back but then the route that I would take would be biased \N(he was more concerned on the outcome of the test)
15:39.2	15:46.3	Then I thought that when I entered the street and started to walk faster...
15:46.3	15:55.4	At the time I even though that the kiosk was closed. \NThat's why when I got to the other street I said that I was close to the Arc.
15:55.4	16:02.4	When I said we were close to the Arc, we were probably near the street that I was supposed to turn.
16:13.4	16:18.4	(Luís) In what why the headphones affected you negatively?
16:18.4	16:28.9	In the sounds, I couldn't perceive if I had an open or closed sound to my right or left.
16:28.9	16:43.1	To all the sounds that surrounded me, if there was music or coffee

		cups sounds.
16:43.1	16:54.7	It was in that way, and in the contact with you.

P.2. (09.07.2015 – 17.00)

Video – 1st.mp4

Start	*End*	*Text*
00:01.9	00:04.6	Near Terreiro do Paço.
00:04.6	00:08.9	The most beautiful square of Portugal
00:08.9	00:12.8	that competes with Praça de São Marcos in Venice.
00:14.2	00:18.6	I think this one is better, the other one is smaller
00:18.6	00:22.8	and we are here starting Rua Augusta, Terreiro do Paço
00:22.8	00:28.9	in the direction of Rossio.
00:30.6	00:33.5	And now it is autonomously or with your arm?
00:33.5	00:36.6	(Ana) With the arm but only with <something>
00:41.4	00:43.4	For me is safer.
01:15.4	01:22.3	This route between Rua do Comércio and Terreiro do Paço has
01:22.3	01:29.8	a very smooth surface, without big problems
01:34.3	01:36.2	of irregularity.
01:39.9	01:44.5	It's not difficult for a blind person that has \Na good sense of orientation
01:45.8	01:49.0	to do this route.
01:49.0	01:53.4	Now we are here between Rua do Comércio and \N and Rua de São Julião.
01:53.4	01:58.6	We have a museum here. What's its name?
02:03.3	02:07.7	It has music as it is possible to hear.
02:24.6	02:28.7	(Ana) Why don't you use your cane?
02:29.4	02:33.7	Because I'm confident since I'm holding your arm.
02:49.5	03:00.4	The texture of the floor precisely because of the \Ntactile sensibility of the feet.
03:05.6	03:15.3	The shapes we distinguish between the surface (calçada) \Nand the other surface that was different.
03:16.0	03:22.5	The other type of flatter, smoother surface that is\Nbeing used now.
03:23.4	03:25.5	We are crossing Rua da Conceição.
03:34.4	03:39.4	-(Ana) Would it be difficult to not use the arm?\N-No, no, that's why I was asking.
03:42.0	03:45.6	(Ana)Because Didem prefers like that to make use \Nof your autonomy.
03:53.7	04:01.1	In that case I will have to use my reference points,\Nnamely the sidewalk here.
04:12.7	04:20.0	I'm not going as relaxed as before because I have to\Npay attention to other things, such as sound
04:20.9	04:26.4	eventually to another obstacle that might show up\Nand that requires paying more attention.

Video – 2nd-1.m4v

Start	*End*	*Text*
00:00.0	00:05.0	Now we are going to turn right to ask\Nthat thing about the dinner.

Video – 3rd-1.m4v

Start	*End*	*Text*
0:00:3	0:00:4	Now we are going to go right to cross to that other side.
0:00:4	0:00:5	Because it is easier to later detect \Nthe crossing to the left.
0:00:5	0:00:5	Rua dos Correeiros.
0:01:2	0:01:2	Now lets see where is the man, there are so many\Nbars here that I don't remember which one is it.
0:01:2	0:01:3	We can choose any here.
0:01:3	0:01:3	We have one that looks <something>.
0:01:5	0:01:5	It is here. It is here right?
0:02:0	0:02:0	I don't know if it was on the left or right.
0:02:3	0:02:4	(he asks for the dinner here. \NThe sound is terrible for his voice)
0:03:1	0:03:2	(basically she read all the menu)
0:04:1	0:04:2	Maybe now we have to go there because of the
0:04:2	0:04:2	gentleman that was painting
0:04:2	0:04:3	and Didem will tell me where the man has the box with the coins.
0:04:4	0:04:4	As you can see here, the surface here is \Nmuch more smoother/regular.
0:04:4	0:04:5	A surface that is easier to walk,
0:04:5	0:04:5	that it doesn't have pitfalls/drawbacks
0:04:5	0:05:0	we can move more easily
0:05:0	0:05:0	this type of surface in Turkey are ideal (!?!?)
0:05:3	0:05:4	Sometime ago it happened something \Nthat I even get goosebumps
0:05:4	0:05:4	when I hear babies crying around.
0:05:4	0:05:5	Near Marquês de Pombal,
0:05:5	0:05:5	I was at a shoe shiner and he had a baby
0:05:5	0:05:5	sleeping on the floor!
0:05:5	0:06:0	And I stepped on the child.
0:06:0	0:06:0	I was completely in a revolt/bothered.
0:06:0	0:06:1	I was angry that I called the police
0:06:1	0:06:1	and I made them take steps to \Nremove the child from there.
0:06:1	0:06:2	They were from somewhere <I didn't got the rest>
0:06:2	0:06:2	The mother was around there but not near the child.
0:06:2	0:06:3	I was completely bothered/shocked. \NNow is in this direction right?
0:06:3	0:06:3	The box is here?
0:07:0	0:07:1	Now we are going...
0:07:1	0:07:1	Now we are going to ask the price
0:07:1	0:07:2	the price of the magnets.

0:07:2 0:07:2 Maybe the kiosk is already closed.
0:07:3 0:07:3 The kiosk is on that side, right?
0:07:3 0:07:3 On that side there are terraces.
0:08:0 0:08:0 This surface is much more irregular.
0:08:0 0:08:1 It requires more attention, I cannot go as relaxed.
0:08:1 0:08:2 Please ask her if the surfaces in Turkey \Nare like this or not.
0:09:1 0:09:1 I think that was Rua da Assunção.
0:09:2 0:09:2 As you can see, we have here a scaffolding\Nwhich is one of the biggest enemies
0:09:2 0:09:3 for mobility.
0:09:5 0:09:5 This is Rua de Santa Justa.
0:10:0 0:10:0 Lets see if we already passed...
0:10:1 0:10:2 We already passed, we are <near?> Rossio.
0:10:2 0:10:2 Maybe we should go ask the price...
0:10:2 0:10:3 We should go back, if it is still open.
0:10:3 0:10:4 Now you will probably want to know how I know\Nwe got to the edge/limit.
0:10:5 0:10:5 Because I have the information that there
0:10:5 0:10:5 was passing a bus.
0:11:0 0:11:0 I know that only in Rossio there are buses.
0:11:0 0:11:1 From Terreiro do Paço until here there aren't buses\Npassing in the transverse direction.
0:11:1 0:11:1 Only vertically, in Rua do Ouro and Rua da Prata.
0:11:1 0:11:1 or in Rua dos Fanqueiros.
0:11:1 0:11:2 So that is a fundamental element.
0:11:2 0:11:2 If I didn't know the name of the streets
0:11:2 0:11:3 I knew that buses passing through there
0:11:3 0:11:3 and <something>(it wasn't?) of the route that we did.
0:11:5 0:11:5 I'm looking if I get the street
0:11:5 0:12:0 to start
0:12:0 0:12:0 It is through here right?
0:12:1 0:12:1 It's here, but the kiosk is closed right?
0:12:4 0:12:5 (Ana) The kiosk is nearby, on our right.
0:13:0 0:13:0 (he asks the prices of the magnets)
0:14:0 0:14:0 Now we are going back, right?
0:14:1 0:14:1 (Ana)This was the last task.
0:14:2 0:14:2 (Ana)But there's still a bit to the end.
0:14:2 0:14:2 The route... wasn't the one from...?
0:14:3 0:14:3 Under the Arc, right?
0:14:3 0:14:3 (Ana) Yes, it is in a Arc.
0:14:3 0:14:4 I suppose it was here in this street
0:14:4 0:14:4 That is Rua dos Sapateiros.
0:14:5 0:14:5 Now it is through here.
0:14:5 0:14:5 I think it is through here.
0:15:0 0:15:1 I will do as I usually do, I'll go through here and the\Ncar go by the sidewalk.
0:15:1 0:15:1 -(Ana) <something> didn't use?\N-That's the problem.

0:15:1	0:15:2	Fortunately I have not come across with such situation.
0:15:3	0:15:3	An obstacle here.
0:15:3	0:15:4	I prefer to go down here (road).
0:16:0	0:16:1	Tell her that my intention was really to buy the magnet\Nto offer it to Didem.
0:16:1	0:16:1	It was the other way
0:16:1	0:16:1	we have to find an alternative.
0:16:2	0:16:2	We have near the end of the route, right?
0:16:3	0:16:3	-(Ana) How did it went the route for you?\N-It went well, normally,
0:16:3	0:16:3	as usually goes.
0:16:3	0:16:4	Maybe a little facilitated by your intervention\Nin the most complicated moments with obstacles.
0:16:5	0:16:5	But it usually goes like this.
0:1:57.	0:17:0	Sometimes I have tasks that are more difficult,
0:17:0	0:17:0	which is to look around for a store, sometimes
0:17:0	0:17:1	I don't know the number of the door
0:17:1	0:17:1	and by trial and error, or someone that might know\Nthe name of the store
0:17:1	0:17:1	or that is able to read <something> of the store.
0:17:1	0:17:2	and sometimes at the 10th or 20th try
0:17:2	0:17:2	and here what happens is that there's a lot\Nof foreign people
0:17:2	0:17:3	and finding someone that knows portuguese is not\Nvery easy.
0:17:3	0:17:4	(didn't understand part of the sentence)
0:17:4	0:17:5	We don't know where
0:17:5	0:17:5	the stores are, or the reference points to find them
0:17:5	0:17:5	(didn't understand...wind)
0:18:0	0:18:0	-(Ana) And are you feeling alright? Do you want a water?\N-No, I'm ok.

Video – 4th-1.m4v

Start	***End***	***Text***
00:00.4	00:04.5	(Ana)You were speaking earlier about the feeling \Nof the surface and the lack of...
00:04.5	00:12.4	Lets say that a good part of the orientation \Nof blind people is
00:12.4	00:19.3	related with something that is connected \Nwith kinesthetic sensations.
00:19.8	00:27.7	The kinesthetics sensations allow us that when \Nwe don't exactly know
00:27.7	00:34.2	the route and we don't have physical reference points
00:34.2	00:40.3	such as the floor/surface, walls, some sounds
00:41.7	00:44.9	that are always <difficult> (not 100% sure)
00:45.5	00:48.8	For example, <some words I didn't get at all>, that can be
00:49.6	00:56.1	I know when I'm arriving to Rossio or I'm near Rua de Santa Justa.
00:57.7	01:04.2	There's a place there that has music from Amália (Rodrigues), day and night.

01:06.9	01:12.5	It is a very specialized house of Fado
01:12.5	01:14.5	but it has always Fado from Amália.
01:16.2	01:21.7	And as such, in terms of sound, I have that \Nplace as a strong reference point.
01:22.8	01:27.3	I know that when I go from Rossio towards the river,\NI usually go by Rua do Ouro
01:29.0	01:35.4	I know that I'm getting to Rua de Santa Justa.\NWhen I'm coming in the reverse direction I know\Nthat I passed Rua de Santa Justa.
01:37.4	01:40.7	And I know that I'm arriving to Rossio.
01:40.7	01:46.7	On the other hand, the kinesthetic sensations allow that
01:46.7	01:48.6	when we are going in a specific path
01:48.6	01:54.3	and disappears (I think he meant appears) \Na different physiologic sensation
01:55.2	02:00.9	that if you try to close your eyes in a corner
02:05.0	02:12.0	and if you continue to walk with your eyes closed,\N you will feel that there's something opening
02:12.0	02:17.7	something that opened
02:17.7	02:21.7	which is fundamental for the orientation.
02:21.7	02:29.8	In this case, as I said before, this route that I did,\Nif it weren't for the arm
02:30.9	02:37.2	I would have much more difficulty or would be\Nalmost impossible to do this route.
02:37.2	02:39.2	Because it is the same as you close your eyes.
02:39.9	02:43.6	I was with my ears completely closed/blocked
02:43.6	02:50.2	It was <something> the other elements \Nthat I had as a reference
02:50.2	02:52.2	in that area to orient/guide myself.
02:53.0	02:58.8	And because of that it wasn't always assertive.
02:59.7	03:07.5	That system, for people that \Ndon't have a minimum of vision
03:07.5	03:12.7	that allows them to guide through the light or shadows,
03:13.3	03:17.5	no one does that, it is completely impossible
03:17.5	03:21.8	Moreover with music at the volume that it was.
03:22.3	03:27.4	It wasn't very loud but it was loud enough to\Ndistance me from everything.
03:27.4	03:32.0	It blocked, abstracting the environment.
03:32.0	03:36.9	With more music, I was thinking in the music.
03:36.9	03:45.6	-I had to have a supplementary mind.\N-(Ana)You spoke, at times, about the surface.
03:45.6	03:51.0	-(Ana)The change of the surface.\N-That was fundamental for me to orient.
03:51.0	03:56.7	It was the surface and that sidewalk line.
04:00.5	04:07.2	I didn't have any more elements to guide me, \NI was completely oblivious of everything that was around me.

P.3. (09.07.2015 – 17.00)

Video – 2nd-1.m4v

Start	*End*	*Text*
00:07.0	00:12.2	This experience was different, very different
00:12.2	00:17.3	and it is a route complicated with a lot of obstacles\Nbut it is a nice experience.
00:17.3	00:24.7	because really shows that we have a lot of autonomy\Nif we know the route
00:24.7	00:30.5	and if we have a possibility to orient ourselves,\Nif you have a previous idea of the route
00:30.5	00:35.1	it is relatively easy to do it and know exactly
00:35.1	00:43.0	where our starting points and the points where\Nwe have to go and stop in the middle of the route
00:43.0	00:46.2	it is relatively easy if we have that knowledge.
00:46.2	00:51.1	And that as an orientation tool is simply fantastic.
00:51.1	00:57.3	Have the guide-dog and a good orientation tool is\Nhalfway to have complete autonomy.
01:11.9	01:19.7	Honestly, the turning points... there was one that it wasn't me\Nthat recognized, it was the dog.
01:19.7	01:31.9	The first right turn, the dog was the one that knew.\NI was giving the instruction to turn.
01:32.7	01:38.1	In the first turn, I didn't know exactly where to turn\NI knew she had to turn right
01:38.1	01:44.8	because I counted the streets, I knew it were three \Ncrossings and then turn right, not sure where.
01:45.3	01:52.5	I knew that I had to walk a little further, but it was\Ncomplicated to know exactly where
01:52.5	01:55.8	because I cannot use the reference point of the \Ntable or some obstacle
01:55.8	01:59.8	With the dog there aren't obstacles and that \Nis what's difficult
01:59.8	02:03.9	but after that it was all a succession of anticipations
02:03.9	02:09.3	and since I created a mental map of the route\NI knew it was right and then the first left
02:09.3	02:12.5	which was easy because it's when there's no more \Nshadows on the left
02:12.5	02:19.6	and then when the surface changes I needed to change\Nleft and in the next surface change I had to turn right.
02:20.3	02:25.8	In the end, I knew that there was a street artist\Nnear the left turn
02:26.1	02:29.9	and then I also knew
02:30.9	02:36.8	the street artists and I was looking more or less \Nat the distance between the reference points.
02:37.0	02:43.8	and by the steps, not really the steps but the time \NI took to get to the places.
02:43.8	02:50.1	Although the headphones transmitted sound it was\Npossible to hear the sound from the street performers.
02:50.2	02:54.6	The physical obstacles don't help because of the dog.

02:54.6	03:00.1	In the case of the guide-dog, only the surface clues\Nhelp, other than that there's no help.
03:00.2	03:06.4	The poles and such.
03:06.4	03:11.5	I had more difficulty in the third task because the dog
03:11.5	03:14.5	memorized but I didn't believe in her
03:14.5	03:17.4	she tried to turn there but I didn't believe
03:17.4	03:20.9	and since I wasn't hearing the echo that surrounded me
03:20.9	03:27.2	since from the right eye I see less shadows than on the left\Nthat was my main difficulty, because the rest was easy.

Video – 3rd-1.m4v

Start	***End***	***Text***
02:19.1	02:24.4	Here is a <something> surface. \N(I didn't understand the rest, sorry)
02:24.4	02:29.6	I can detect the shadows of the walls on the left\Nand right.
02:29.6	02:33.3	I know I will have a crosswalk in a bit.
02:38.6	02:45.4	Here I know because the dog stopped and also \Nbecause the texture of the surface changes.
02:49.0	02:53.9	I'm trying to listen to the traffic, to see if it is\Nred or green.
02:58.5	03:02.7	In this case I didn't hear anyone I had to go here <something>. \N(I couldn't understand)
03:04.2	03:06.4	There wasn't a way to know.
03:20.8	03:24.0	Here I cannot perceive what is around.
03:25.4	03:27.7	With the dog there aren't obstacles.
03:27.7	03:33.4	I can hear the cars ahead so I guess that we are \Nclose to another street crossing.
03:43.8	03:50.2	Here the surface is lowered than before and \Nthe dog also gives me that information.
03:50.2	03:52.2	Cars are moving so I cannot cross.
04:01.2	04:06.8	At this point I would cross because there are people\Ncrossing, but since they are crossing on red it would induce me in error.
04:15.5	04:18.2	There's an auditory sign but we cannot hear it.
04:18.2	04:22.9	We can only hear it when we get to this side of the crosswalk.
04:51.6	04:54.2	People. Obstacles.
05:08.9	05:14.3	Another crosswalk, she did go forward, created a barrier.
05:20.5	05:24.5	The cars are moving.
05:29.2	05:33.8	The traffic here flows in both ways, I have to pay \Nattention to that.
05:35.0	05:38.0	At this moment there isn't traffic, it's telling me to cross \Nand I'll do it.
05:38.0	05:44.2	It's the third crossing that I do. I can feel the tram tracks here.
05:44.4	05:50.6	So I know I have to turn right after a few meters.
05:53.8	05:59.2	Here I know, because of the sound, some street performers.
05:59.7	06:04.0	The street is not very narrow. You can feel the wind a lot.
06:04.4	06:08.0	The obstacles here are really the people.
06:10.5	06:16.4	Some terraces here but mostly is the noise \Nthat you can hear.

06:18.7	06:21.3	She keeps dodging.
06:31.9	06:38.4	More people on the left, there must be something \Naround here such as terraces or something similar.
06:40.2	06:44.4	She (the dog) is moving to the \Nright because she knows I need to turn right.
06:55.4	06:59.9	Here I can detect the terrace by the sounds.
07:00.8	07:02.6	I knew I had to turn right.
07:04.8	07:10.3	This street here is easy to recognize because there \Nare several restaurants. Smell of food.
07:12.0	07:16.8	And there are many people, he are near dinner \Ntime and I wouldn't mind.
07:21.2	07:27.5	This is the place of the first task, where I have to\Nask the price of a meal.
07:27.5	07:31.2	I knew that I had to turn left because the wall ended.
07:34.7	07:40.9	The wall ends but there's no shadow so I feel the wind\Non my face, coming from the left
07:40.9	07:45.5	and I knew that I had to turn left. Know I'm going \Nforward, there's some terraces here.
07:46.1	07:47.8	She deviates from everything.
07:48.3	07:51.5	And now I'm going to look for my next reference point\Nwhich is the change of the surface.
07:51.5	07:53.5	From calçada to a flat surface.
08:15.9	08:20.3	Here I found the flat surface and she knows that she has to turn left.
08:24.2	08:31.8	Some terraces. (not sure but from the other video\N"There's another street performer.")
08:39.0	08:44.3	She is dodging because there are more obstacles.
08:44.8	08:49.5	Here the flat surface ends and I know that I have \Nto go around all these people and turn right.
08:52.6	08:55.3	I'm giving the command to the dog so she can turn right
08:55.4	09:01.4	and we are going after the next task which is a street performer.
09:02.5	09:04.1	There are more people here.
09:07.3	09:10.2	She is trying to overtake some people.
09:14.0	09:15.9	I passed the people.
09:19.4	09:21.3	I'm hearing the music.
09:21.3	09:25.1	But as I recall it wasn't the first, it was the second.
09:44.0	09:49.1	I'm hearing a stronger (louder) music.
09:52.0	09:55.0	I'm walking with confidence because \Nshe already knows the route.
09:55.0	09:57.1	It's the third time that she is doing it.
09:58.2	09:59.8	Here there's a point we have to reach.
10:03.5	10:07.3	Now I'm searching for the sound. There are some terraces on the left.
10:07.4	10:14.0	Because of the smell and the noise of the silverware and plates.
10:18.9	10:21.4	The smell of sardines, nice.
10:34.6	10:37.4	Here there are more restaurants.
10:37.4	10:41.4	You can hear the plates.
11:33.0	11:35.2	Here I knew I had to turn left.
11:36.3	11:38.2	This is narrow.

11:39.6	11:41.4	Here is the shadow of the kiosk.
11:44.9	11:47.3	Here there's the shadow of the kiosk and she knows it.
11:52.7	11:55.5	Here it smells really well, makes you want to eat.
11:58.4	12:00.3	People, obstacles.
12:01.7	12:03.5	This is a smaller street.
12:06.3	12:08.3	She is trying to pass.
12:11.8	12:14.6	She goes by the sidewalk as a well-educated dog.
12:16.2	12:20.8	The wall on the right ended and she knew that she had to turn right.
12:21.2	12:26.3	And I gave it that command, with the shadow of the wall and things,
12:26.3	12:28.2	and the eco-location of them.
12:30.0	12:34.5	She is telling me that there's an obstacle here and I have to go to the road.
12:34.5	12:38.8	She stops to inform me that there's an obstacle that she cannot pass.
12:40.2	12:44.5	And I give her a command to solve it and she \Ndecided to go to the road.
12:45.2	12:48.7	Now she goes on the road because she already knows this.
12:50.1	12:55.0	And I'm giving her the command for her to go where we were before
12:55.8	12:57.3	I'm already feeling the wind.
12:57.8	13:00.0	And hearing the characteristic noises of the area.
13:01.7	13:04.6	I have to stop <something> (I couldn't understand).

Video – 4th-1.m4v

Start	***End***	***Text***
00:00.3	00:05.0	People crossing when it's a red light and that \Ninduced me in error.
00:12.9	00:21.1	This traffic light has sound but we can only hear \Nit when we get to this side of the sidewalk.
01:06.0	01:10.3	There's another crosswalk here, she didn't cross and stopped me.
01:17.6	01:20.7	The cars are moving.
01:26.8	01:32.3	The traffic here flows in both ways, I have to pay \Nattention to that.
01:32.3	01:36.3	At this moment there isn't traffic, it's telling me to cross \Nand I'll do it.
01:36.3	01:41.7	It's the third crossing that I do. I can feel the tram tracks here.
01:42.8	01:48.4	So I know I have to turn right after a few meters.
01:51.5	01:55.9	Here I know, because of the sound, some street performers.
01:56.7	02:02.0	The street is not very narrow. You can feel the wind a lot.
02:02.0	02:04.0	(I couldn't understand, sorry)
02:08.0	02:15.4	Some terraces here but mostly is the (street sounds? not sure) \Nthat you can hear.
02:17.2	02:19.7	(I couldn't understand)
02:29.1	02:33.8	More people on the left, there must be something around here.
02:34.7	02:41.1	Terraces on the left. She (the dog) is moving to the \Nright because she knows I need to turn right.
02:53.0	02:58.1	Here I can detect the terrace by the shades (of color/gray).

02:58.6	03:01.0	I knew I had to turn right.
03:01.8	03:06.4	This street here is easy to recognize because there \Nare several restaurants.
03:06.4	03:08.4	The smell of food.
03:09.7	03:14.5	And there are many people, he are near dinner \Ntime and I wouldn't mind.
03:18.8	03:25.0	This is the place of the first task, where I have to\Nask the price of a meal.
03:25.7	03:32.0	I knew that I had to turn left because the wall ended.
03:33.0	03:38.5	The wall ends but there's no shadow so I feel the wind\Non my face, coming from the left
03:38.6	03:43.0	and I knew that I had to turn left. Know I'm going \Nforward, there's some terraces here.
03:43.7	03:45.4	She deviates from everything.
03:45.4	03:49.2	And now I'm going to look for my next reference point\Nwhich is the change of the surface.
03:49.2	03:51.2	From calçada to a flat surface.
04:14.2	04:18.0	Flat surface and she knows that she has to turn left.
04:32.9	04:35.8	There's another street performer.
04:35.8	04:40.8	She is understanding where there are more obstacles.
04:42.4	04:47.2	Here the flat surface ends and I know that I have \Nto go around all these people and turn right.
04:50.1	04:53.5	I'm giving the command to the dog so she can turn right
04:53.5	04:59.0	and we are going after the next task which is a street performer.
04:59.0	05:01.0	There are more people here.
05:05.0	05:07.4	She is trying to overtake some people.
05:12.1	05:14.4	I passed the people.
05:17.6	05:19.5	I'm hearing the music.
05:20.6	05:26.4	But as I recall it wasn't the first, it was the second.
05:41.2	05:47.0	I'm listening a stronger (louder) music.
05:49.0	05:52.1	I'm walking with confidence because \Nshe already knows the route.
05:52.5	05:54.9	It's the third time that she is doing it.
05:55.7	05:58.8	Here there's a point we have to reach.
06:01.3	06:05.5	Now I'm searching for the sound. There are some terraces on the left.
06:07.9	06:12.1	Because of the smell and the noise of the silverware and plates.
06:16.6	06:19.1	The smell of sardines, nice.
06:32.1	06:36.3	Here there are more restaurants.
06:37.1	06:41.4	You can hear the plates.
07:30.3	07:33.0	Here I knew I had to turn left.
07:33.9	07:36.1	This is narrow.
07:36.9	07:38.8	Here is the shadow of the kiosk.
07:42.7	07:46.6	Here there's the shadow of the kiosk and she knows it.
07:50.3	07:53.0	Here it smells really well, makes you want to eat.
07:56.3	07:57.8	People, obstacles.
07:59.5	08:04.3	This is a smaller street.
08:04.3	08:08.7	She is trying to pass.

08:14.0	08:18.1	The wall on the right ended and she knew that she had to turn right.
08:18.1	08:23.7	And I gave it that command, with the shadow of the wall and things,
08:23.7	08:25.7	and the eco-location of them.
08:25.7	08:30.7	She is telling me that there's an obstacle here and I have to go to the road.
08:32.2	08:36.4	She stops to inform me that there's an obstacle that she cannot pass.
08:38.2	08:41.9	And I give her a command to solve it and she \Ndecided to go to the road.
08:42.9	08:47.3	Now she goes on the road because she already knows this.
08:47.6	08:52.9	And I'm giving her <something> so she can go until\Nwhere we were before (I couldn't fully understand)
08:52.9	08:54.9	I'm already feeling the wind.
08:55.5	08:57.9	And hearing the characteristic noises of the area.
08:59.6	09:04.0	I have to stop <something> (I couldn't understand).

Video – 5th-1.m4v

Start	***End***	***Text***
00:34.6	00:40.1	Now without the headphones was easier without a \Ndoubt because I was able to use my hearing.
00:40.1	00:47.7	My hearing was trained, it was prepared to make\Nthis localization by hearing.
00:49.2	00:54.5	What is said about the congenital blindness, \Nthat we use eco-localization to orient is true.
00:54.5	01:00.6	Because we hear a lot what surrounds us more than what we see
01:00.6	01:07.2	and prove of that is that today I'm having a greater \Ndifficulty in my eye than usual.
01:07.2	01:13.3	Nonetheless I was able to use the eco-localization.
01:13.3	01:18.1	The hearing allows me to know if I'm on a wider \Nor narrower street.
01:18.1	01:23.9	It allows me to identify the sounds of streets\Nto know when to cross and its proximity.
01:23.9	01:29.2	Or the proximity of the street performers which\NI used as a reference.
01:29.2	01:36.0	When the sound of the second street performer,\N I knew the first one had the music louder
01:36.0	01:41.4	and I knew that I had to turn in a wider place,\Nmy eco-localization told me that I was in that wider\Nspace and I had to turn left.
01:41.4	01:47.0	And I couldn't find the second task\Nbecause I was looking for the second sound which wasn't there.
01:47.3	01:55.7	So there wasn't another way to identify it. If I \Nreally needed to identify I would have to find someone to help.
01:55.7	02:04.2	Staying still and looking around and hoping that someone\Nwould think that I was lost and offer me help.
02:06.9	02:14.4	The localization of the third test, the kiosk,\N was also resorting to the shadows(shade).

02:14.4	02:19.8	But mostly due to eco-location because earlier I wasn't\Nable to locate it and now I did.
02:19.8	02:28.6	And then regarding turning left or right, it was\Nprecisely that. End of walls, wind
02:29.0	02:37.7	other sensations, near restaurants the silverware noises and the smell of food.
02:38.7	02:45.5	Here in the Arc was the characteristic noise that we hear under it.
02:45.5	02:52.8	I knew that I was going up a bit and the sound of the Arc \Nand wind I knew it had to be here.
02:52.8	02:57.9	It was easier now than earlier, especially with the \Ndog is always easier,
02:57.9	03:00.4	and for her it was even easier since it's the third \Ntime she does the route.
03:04.9	03:14.0	(Luís)Out of curiosity, we passed a moment where in the first\Nroute there was still a stronger sun
03:14.0	03:17.2	-(Luís)the warmth of the sun helps?\N-Yes, it does.
03:17.2	03:22.4	-(Luís)And did it hinder in this last route?\N-No.
03:22.4	03:26.7	No, because in my case, my peripheral vision\Nimproves when it gets darker.
03:28.7	03:33.2	It has to do with myself, what I can see of shadows,
03:33.3	03:43.3	because my vision of shadows improves when it is darker.
03:43.3	03:50.0	The sun doesn't make it more difficult, it helps when \Nit's there but when it's not there there are other strategies to use.
03:50.0	03:58.2	As I said, I was very trained to be alone and be autonomous in moving,
03:58.2	04:03.5	not all everyone is prepared like that
04:03.5	04:11.9	because I had training for 2 years. I had 4 years of classes\Nand during 2 years I didn't had a cane.
04:11.9	04:15.9	I was trained to move without using anything.
04:15.9	04:18.7	And that gave me an incredible preparation.
04:18.7	04:26.1	It was already expected for me to have a guide-dog someday.\Nand with the dog all the references we have are tactile,
04:26.1	04:27.4	of the surface.
04:27.4	04:32.7	For the rest, we have to orient ourselves with the \Neco-location and the dog.
04:32.7	04:36.2	and trust and go forward.

P.4. (12.07.2015 – 17.00)

Video – 1st-1.m4v

00:00:06 [ANA] I want to ask permission to film while Didem, eeehm ...
00:00:11 [ANA] to film, actually Didem is filming to ask you how this experience was
00:00:18 [ANA] how did you feel? what were the difficulties?
00:00:22 [JOANA] I think for me the main difficulty was to go with music in both ears.
00:00:27 [JOANA] I completely lose the references that I use daily, which is my hearing
00:00:33 [JOANA] that is to say, I go there and it seems that I'm in an entirely separate world
00:00:38 [JOANA] in which all the rest are puppets that get out of the way.
00:00:40 [JOANA] It is very weird
00:00:42 [ANA] And didn't you feel lost?
00:00:46 [JOANA] Sometimes I felt that I didn't remember if I had passed there or not
00:00:52 [JOANA] but for me the entire route ...
00:00:54 [JOANA] It's one thing when someone takes me by the arm, when someone guides me
00:00:59 [JOANA] I can't understand the reference points, contrary to when I go alone
00:01:04 [JOANA] and that basically made me feel lost the entire way
00:01:10 [ANA] but you, Joana, seemed very confident in some routes
00:01:14 [ANA] and actually were going in the correct direction and way

Video – 2nd-1.m4v

00:02:02 [ANA] Now please describe what you are feeling
00:02:13 [JOANA] This area is always a bit more confusing
00:02:16 [JOANA] because it's almost as if though I were in a very wide space
00:02:48 [JOANA] and here I know that I'm almost at the crosswalk
00:03:13 [ANA] Joana, is there a reason why you follow the wall?
00:03:18 [JOANA] Yes, when the wall finishes I know I'm arriving at the road.
00:03:37 [JOANA] To be able to orientate myself and to know I should go down this street
00:03:42 [JOANA] I need to know when the wall finishes so I can know that that street finished
00:03:48 [JOANA] If I go down the middle I can't get any reference points
00:04:55 [ANA] Is there anything specific in this area?
00:04:58 [JOANA] Yes, the smell, it smells like some kind of spices
00:05:07 [JOANA] It's not quite curry, nor cinnamon, it's something weird
00:05:13 [ANA] Cumin maybe
00:05:14 [JOANA] Maybe, yes
00:05:33 [ANA] Joana, could you understand where you were in the street? How many streets?
00:05:39 [JOANA] yes, yes, yes
00:06:54 [ANA] How did you understand where you should turn?

00:06:57 [JOANA] Because the feeling of having a wall to my right ended
00:07:02 [JOANA] so the wall on my right ended and I understood I should turn.
00:07:18 [ANA] Can you explain these small things, these decisions that you make.
00:07:28 [JOANA] Here for instance, the wall on the right ends and I know I need to turn left
00:07:36 [JOANA] And here somewhere should be the first point again.
00:07:41 [JOANA] Which was the restaurant, but I think it was a bit further.
00:07:48 [ANA - NOT UNDERSTANDABLE]
00:07:51 [JOANA] And here was the first.
00:07:56 [JOANA] May I continue?
00:08:39 [ANA] Is there anything special in this street?
00:08:42 [JOANA] In this street I essentially smell food. Just food, food.
00:08:50 [JOANA] And this street is also wider but seems to have higher buildings
00:08:56 [JOANA] and as it is emptier..
00:08:57 [JOANA] And here is where I think I should turn left
00:09:00 [JOANA] But while previously the sun shone on my face
00:09:03 [JOANA] now the sun is lower and doesn't shine on my face anymore
00:09:06 [JOANA] because of the floor which was smooth
00:09:48 [JOANA] Here will be the flower lady, I already hear the plastic of the packages
00:09:55 [JOANA] and now it was to the left
00:10:09 [JOANA] And now this area is always the most confusing.
00:10:18 [ANA] We are now in the wrong place and need to turn back.
00:11:13 [ANA] Now you're on the left side... you were walking on the right side
00:11:20 [ANA] and now you're on the left side, is there any specific reason?
00:11:23 [JOANA] No, the reason is just that it happened.
00:11:31 [JOANA] But....
00:12:05 [JOANA] Here was the area of the statue
00:12:20 [ANA] She's putting a coin.
00:12:27 [ANA] It's another bronze statue
00:12:30 [ANA] I don't know how they do that to the clothes but it must get completely ruined
00:12:35 [JOANA] And here was the kiosk, somewhere....
00:12:47 [JOANA] is this the kiosk?
00:12:49 [ANA] No
00:12:50 [JOANA] No? ah ok
00:12:51 [JOANA] no, this wasn't it
00:13:01 [JOANA] just the statue, right?
00:13:04 [ANA] before the kiosk and after the statue
00:13:08 [JOANA] before the kiosk and after the statue...
00:13:11 [JOANA] before the kiosk and after the statue...
00:13:13 [ANA] which the previous time you remembered perfectly
00:13:16 [JOANA] the florist?
00:13:17 [ANA] yes
00:13:18 [JOANA] ah, but I always think the florist is before.
00:13:22 [ANA] before the statue?
00:13:23 [JOANA] yes, yes, yes, I thought it was before
00:13:26 [ANA] before the statue?
00:13:27 [JOANA] yes
00:13:28 [ANA] ah ok

00:13:29 [ANA] but it isn't
00:13:30 [JOANA] yes, she'll appear in front of us around here somewhere
00:13:37 [JOANA] what a smell of shoes
00:13:41 [ANA] and bags
00:13:42 [JOANA] yes, it's the smell of leather
00:13:44 [JOANA] the florist was next, I think
00:13:50 [JOANA] this area has so many people
00:13:54 [JOANA] that I get a bit confused
00:14:21 [JOANA] and now left
00:14:30 [JOANA] because I hit the florist's chair
00:14:40 [JOANA] and now it is the kiosk
00:15:20 [ANA] do you want to turn? do you want to go straight ahead?
00:15:22 [ANA] there's a car right in front of you
00:15:23 [JOANA] I was going to go around the car
00:16:08 [ANA] Is the end point around here?
00:16:12 [JOANA] No I think where I hit the car I should have turned immediately right
00:16:16 [ANA] why did you come here?
00:16:18 [JOANA] because I wasn't sure.
00:16:21 [ANA] so do you want to go back
00:16:23 [JOANA] yes
00:16:24 [JOANA] it was here to the left, right?
00:16:25 [ANA] yes
00:16:27 [JOANA] right, but as the car was stopped, I thought it was some parking space.
00:16:34 [ANA] that car wasn't there last time.
00:16:36 [JOANA] indeed
00:16:53 [JOANA] Now I'm going to that side of the street to go to the usual spot.
00:16:58 [JOANA] so I don't make a mistake
00:17:12 [JOANA] garbage bin
00:17:22 [JOANA] more garbage
00:17:53 [JOANA] and now we can already hear the discotheque
00:18:15 [JOANA] and here we are
00:18:29 [JOANA] oh right, of course, here behind
00:19:04 [ANA] now, what did you feel?
00:19:10 [ANA] what are for you the most important senses to do be able to walk a route?
00:19:17 [JOANA] without a doubt for me the most important is really hearing
00:19:22 [JOANA] the first time I did it with the headphones
00:19:26 [JOANA] the route seemed much longer
00:19:30 [JOANA] and I constantly seemed to be more lost
00:19:34 [JOANA] and this time it seemed to me much more [...]

Video – 4th-1.m4v

00:00:00 [ANA] we would like you to tell about the experience again
00:00:03 [ANA] what did you feel?
00:00:05 [ANA] what are for you the most important senses to do be able to walk a route?

00:00:12 [ANA] smell... or hearing...
00:00:13 [JOANA] without a doubt for me the most important is really hearing
00:00:17 [JOANA] the first time I did it with the headphones
00:00:21 [JOANA] the route seemed much longer
00:00:25 [JOANA] and I constantly seemed to be more lost
00:00:30 [JOANA] and this time it seemed to me much more
00:00:34 [JOANA] more simple, because I could hear
00:00:37 [JOANA] for instance I knew that I was close to a road I had to cross
00:00:40 [JOANA] or I could understand where areas with cafés with terraces were
00:00:45 [JOANA] and I knew after we went the first time
00:00:48 [JOANA] I knew when there were terraces I might have to turn left or right
00:00:52 [JOANA] I used mostly hearing for my reference points.
00:00:57 [ANA] But many times, I noticed you mentioned about smell
00:01:01 [JOANA] yes the smell, that was because they were characteristic smells for the areas I was passing
00:01:05 [JOANA] but I couldn't for instance link the smell of curry with the fact that I would have to turn left
00:01:10 [ANA] so it's not a reference to walk a route?
00:01:12 [JOANA] no, for me this time it wasn't a reference.
00:01:16 [JOANA] maybe, if I were for instance looking for a restaurant or a café
00:01:23 [JOANA] maybe it could work as a reference.
00:01:25 [JOANA] for instance if I want to go to a pharmacy
00:01:28 [JOANA] I know there's a pharmacy somewhere in this street
00:01:31 [JOANA] and normally it has a characteristic smell
00:01:34 [JOANA] and in that case I use it as a reference point, but essentially it's sound
00:01:42 [ANA] why did you feel lost? why did you lose yourself?
00:01:48 [JOANA] first of all I think because you were guiding me away from the confusion, from the people
00:01:55 [JOANA] and then there's the situation in which I think I'm going correct
00:01:59 [JOANA] but sometimes all it takes is for someone to pass me and I turn slightly
00:02:02 [JOANA] and then I get lost

P.5. (14.07.2015 – 17.00)

Video – 1st.mp4

Start	*End*	*Text*
12:16.7	12:21.4	This is Rua de São Nicolau?
12:22.4	12:25.3	-(Luís)No.\N-This is Rua Augusta.
12:25.7	12:28.2	This (headphones) disorients a lot.
12:29.8	12:38.4	The statue (man) is the third task?
12:39.2	12:44.3	- (Luís) The statue (man) was the second task.\N-Oh, so I still have the first one to do.
12:44.3	12:46.3	- (Luís)The first one already passed.\N-Oh really?
12:46.3	12:48.3	- (Luís)It's ok.
12:48.3	12:50.1	This (headphones) disorients a lot.
15:50.2	15:54.8	I knew that there was music near the statue (man).
16:01.0	16:05.7	- (Luís) But aren't you sure?\NNo.\N-(Luís) But it is here.
16:05.7	16:14.4	I had a feeling that is was this beat (of the sound), but I wasn't sure if it was the right sound.
16:15.7	16:22.5	The headphones really hinder me. I have never tried to walk on the street with headphones.
17:35.3	17:37.9	The flowers.
18:03.3	18:06.4	The kiosk... I'm not sure if it was around here.
18:08.4	18:20.2	-(Luís)We passed a bit, not by much.\NI needed some time to reorganize myself.
19:01.5	19:03.4	Can I share something?
19:04.6	19:09.6	Something is that curious is that I don't see anything at all
19:09.6	19:18.7	and the feeling that I have... I don't see absolutely nothing, my left eye \Nis a prosthesis and the right has 0% of vision.
19:18.7	19:25.6	I have the sensation that I'm in a darker area. \NDon't ask me why because I don't know.
19:25.6	19:30.4	(Luís) Maybe it is because of the sun that is not hitting directly.
19:30.4	19:37.3	But I already passed in spaces in a shade where\NI didn't had this feeling.
19:40.0	19:44.2	I really feel that the environment is more closed.
20:26.6	20:31.8	(Luís) Do you want to go back since we already passed the turning point?
20:35.8	20:39.3	Oh, it was after the poles.
22:29.4	22:36.0	-There's a lot of wind here. We are at the Arc?\N-(Luís)There's still missing a bit.
24:29.4	24:42.9	Why did I passed Rua dos Sapateiros? Why are cities much easier for us? \NBecause we go in the sidewalks and know where we need to turn.
24:43.6	24:56.0	Where the sidewalk ends. I went by the road and I didn't see that change.
24:59.7	25:04.6	(Luís) If you can say again, the biggest difficulty that you had in this route.

25:14.9	25:21.1	The headphones with the music close me completely \Nfrom the outside world.
25:21.1	25:26.0	I lose all the references except the ones given by \Nmy feet.
25:26.0	25:31.0	(it ends abruptly...strange)

Video – 2nd-1.m4v

Start	*End*	*Text*
02:13.2	02:24.8	We are in a very open space.
02:24.8	02:38.2	That car is almost in the corner right? So from here to there is around 15-20m.
02:44.6	02:53.1	We are getting close to Rua do Comércio. At least I think that's the name (it was correct).
03:01.8	03:12.3	It's a street that I admire a lot but appreciate little. Because we can only walk here and not buy anything.
03:12.5	03:23.4	-(Luís) What made you cross the street?\N-I felt the car stopping, then I felt a touch from Didem but it was mostly the car.
03:23.4	03:31.5	Feeling the car stopping is fundamental for us, it means that we can advance.
03:31.5	03:35.6	(Luís)The crossing signs have an auditory sign but I don't think that they are working.
03:35.6	03:44.2	(Luís)There's a street that one of them is working but the others aren't.
03:44.2	03:57.3	Curiously, and this is a feeling from me, not sure if it coincides with reality\Nbut this part of Rua Augusta is narrower than the previous one.
03:57.3	04:02.1	-(Luís)Yes, slightly.\N-I feel that, and why?
04:02.1	04:08.2	Because I imagine that music there is close to the wall and not in the middle.
04:08.2	04:17.4	-And it seems to be closer to us, about 10m.\N-(Luís) A bit less.
04:17.4	04:26.0	But the street might have around less 5-10m less than the previous one.
04:26.0	04:34.8	I feel the space being a bit closer, I feel more in a "tunnel". And that also helps a lot.
04:38.8	04:47.2	Now we are getting close to Rua de São Julião, a few meters.
05:43.9	05:49.6	I think we have a coffee shop in our right.
05:49.6	06:00.9	To the left we have a person, not sure if a man or woman, playing guitar.
06:00.9	06:11.1	It should be a classic guitar and I identify, by the sound, without a doubt\Nthat it has nylon strings.
06:32.5	06:40.8	-We have here Rua de São Julião.\N-(Luís)No, Conceição.
06:48.4	06:52.8	And now what interests me is to locate the next street.
06:54.4	06:58.8	How do we usually do this in wide spaces?
06:59.1	07:07.3	When it is possible, we lean to the wall so we don't make mistakes.
07:21.1	07:26.0	It continues to be a street with a lot of people.
07:26.0	07:28.0	Some obstacles, garbage can.
08:24.7	08:31.0	We are entering in Rua de São Nicolau.
08:36.2	08:39.8	On the left side...

09:02.4	09:04.7	Restaurants..
09:07.1	09:09.9	It is also a very narrow street.
09:19.0	09:25.2	That connects Rua Augusta to Rua dos Correeiros.
09:29.8	09:33.6	For someone that didn't know this area, it is not that bad.
09:42.7	09:49.0	The restaurant where we were before it is around here.
10:03.5	10:14.7	(we was remembering the dish on the restaurant)
11:01.1	11:09.6	- The flower stand.\N-(Luís)No, it's not here yet.\N-Oh, this surface tricked me.
11:19.3	11:32.2	Since the surface changed and since I didn't memorized the route well \Nand it's an area that I don't know well and I'm learning now.
12:52.2	13:01.9	- (Luís) Are you looking for the flower stand?\N-Yes.\N-(Luís)And are we in the right street?
13:04.0	13:06.5	I suppose.
13:09.6	13:12.4	(Luís)The flower stand is in Rua Augusta.
13:19.0	13:23.7	So I have to turn here to the left.
13:24.2	13:32.3	(some rambling where he finally realized that he was on the wrong street)
13:39.3	13:41.5	Around here we should have the kiosk.
13:42.8	13:44.1	(Luís) Not yet.
13:48.4	13:52.9	(Luís) There's a kiosk but it's not the right one.
14:10.1	14:14.2	I got an idea that the kiosk would be on this street.
14:17.7	14:25.8	- We are in Rua Augusta.\N-(Luís)The kiosk was not in Rua Augusta, it was after, here you have the flower stand.
14:29.0	14:33.1	Oh, right right, then I have to turn to Rua dos Sapateiros.
14:34.3	14:37.6	It too much information and...
14:37.6	14:42.8	(Luís) We should have turned in the previous street.
14:44.4	14:49.5	I didn't had many references so I passed it.
15:07.9	15:12.3	We continue in Rua Augusta.
15:21.1	15:25.0	I was thinking that the statue (man) was here, but it's not.
15:31.6	15:36.9	Or at least that music I don't recognize.
15:41.6	15:44.5	The are some restaurants or coffee shops here.
15:49.9	15:52.1	They smell as shellfish.
16:09.2	16:15.6	Now I have a problem. Is that my reference...
16:17.5	16:24.4	My reference relative to the statue (man) disappeared.
16:24.4	16:35.1	- (Luís) As a matter of fact, you noticed. It was that other one.\N-Oh, but since it was another type of music, I wasn't sure.
16:39.9	16:50.4	At first I thought it would be there, but then I wasn't sure\Nbecause the change in music changed the context.
16:50.4	16:54.5	The sound is very important.
17:16.6	17:20.9	And the kiosk is right here in the beginning.
18:05.2	18:07.7	To turn here in Rua dos Sapateiros.
18:10.0	18:22.0	A street that usually smell bad. It's not a nice street, a typical non-decent street.
18:27.8	18:33.2	This street here reminds me a lot of the older Lisbon streets, Bairro-Alto, Alfama.
18:34.1	18:36.3	Maybe because it is narrower.
19:20.3	19:27.4	There's a restaurant here named...
19:37.7	19:42.0	Here there's a lot of wind but that tricks us a bit, it is still further

		away.
19:55.6	19:58.3	We arrived.
19:58.3	20:00.3	(Luís) We passed a bit.
20:01.5	20:10.3	I felt that we passed the Arc and then I came here only to confirm \Nthat's an open space.

Video – 3rd-1.m4v

Start	***End***	***Text***
00:00.0	00:05.0	(Luís) The biggest difficulty that you felt in this route?
00:13.8	00:21.5	The difficulties... the headphones with the music closed me completely from the outside world.
00:21.5	00:28.9	I lose all the reference points except the ones given me by the feet.\NWhat happens? If I go by the road...
00:28.9	00:40.9	If I go through the road I don't have the tactile reference \Nfrom the feet on the sidewalk to know when to turn, if I should turn on the first one, on the second, etc.
00:40.9	00:50.8	Since I'm going by the road, I don't have that reference and I don't have the capacity to hear the space that a side street would give me.
00:50.8	01:02.6	If I'm between buildings and I keep walking, as soon as I reach to a street I feel the openness of the space.
01:02.6	01:09.9	With the headphones, that is not possible and that was the major difficulty.
01:09.9	01:24.5	And then listening to a sound (music) and the brain being conditioned to the sound that comes from the headphones,
01:24.5	01:29.1	closing completely the environmental noise which is very important.
01:29.1	01:38.4	For example I can hear something in the restaurant and with the headphones that's not possible.
01:38.4	01:44.6	I could try to detect olfactively but since I have allergic rhinitis it is a problem.
01:46.0	01:58.1	(Luís)Regarding the first task that you didn't do, did you notice why you weren't able to do it or...
01:58.1	02:06.7	I have the feeling that I should've turned right in a specific street that I didn't.
02:06.7	02:13.8	And why? Because I didn't know the street. \NIf I already passed there several times and I knew that street,
02:13.8	02:23.6	my mental organization would be tuned to that knowledge.
02:23.6	02:35.6	Since it is a street that I don't usually go, probably it was the first or second time, \NI was completely disoriented, without knowing where it was.
02:35.6	02:47.4	I knew that after the third street I needed to turn and I could have used\Na strategy which I didn't, that sometimes it works sometimes not really,
02:47.4	02:54.9	that I needed to know that after the third street crossing,
02:54.9	03:03.7	I had to walk for example 30m, almost 30 steps, but I really didn't know where the street was.
03:03.7	03:16.7	Therefore, I passed the street without even noticing.\NI was thinking that I needed to turn right somewhere but I couldn't

		identify where.
03:16.7	03:28.3	-(Luís)That street is also more difficult because the surface is the same as in Rua Augusta.\N-Yes, there's no sidewalks. I would have to feel there a air draft,
03:28.3	03:38.0	or an atmospheric change in the environment so I could identify the street.\NBut I don't really knew if it would be the first or the second.
03:38.0	03:44.8	And then the third street to cross.
03:46.6	03:58.0	(Luís)Regarding the second task, you were practically in the right place, \Nbut you asked before arriving to the place if you were in the right place or not.
03:58.0	04:04.3	(Luís)Do you think that was because you didn't turn before and you got more or less and idea of the distance?
04:04.3	04:11.3	There is more connected with my knowledge of Rua Augusta.\NRua Augusta is a long street,
04:11.3	04:20.0	And I was thinking, more or less 20m in 200m is not much,
04:20.0	04:28.1	it should be around here. Then what led me to conclude it was there?\NIt was the music.
04:28.1	04:33.8	And I was able to hear it because it overlapped the music from the headphones.
04:33.8	04:44.6	And I was with the impression that that music was similar to that I passed in the first passage (recognizance route).
04:45.4	04:51.9	-(Luís)Regarding the third task, you passed a bit the place.\N-Yes, I did,
04:51.9	05:04.3	because, to be honest, I was really distracted with the music, but then\NI thought "calm down because you already passed through the flowers"
05:04.3	05:16.2	Because in the meanwhile, I detected the flowers, but since I was\Ninvolved in the music, it passed me but then all of a sudden I remembered "it is here".
05:16.2	05:24.4	More or less meter, it was near here because it was near the flowers.
05:25.2	05:33.5	(Luís) Regarding the sun, does that help you orient or not really?
05:34.0	05:42.1	With the headphones in the head... (it seems he didn't get the question here)
05:42.1	05:53.0	-(Luís) With the sun more to the left for example?\N-Yes, yes, it helps a lot, that's why I said that I felt that street was darker.
05:53.0	06:01.6	I felt that area darker. In the same way I feel this area darken than I felt in Rua Augusta.
06:01.7	06:07.5	-You could say to me that there's the Arc, but\N-(Luís) The buildings here are more together.
06:07.5	06:25.1	The building are taller, the sound doesn't spread as much \Nand it doesn't dilute in the atmosphere, in the environmental noise and I can feel that.

Video – 4th-1.m4v

Start	***End***	***Text***
00:02.3	00:08.5	-(Luís) If you can describe this route, the biggest difficulties...\N-

		OK.
00:09.4	00:11.8	(Luís) You can start whenever you want.
00:12.2	00:24.8	Well, Rua Augusta didn't present any difficulty. \NHowever, Rua de São Nicolau it's a small street...
00:24.8	00:36.4	It's a small, narrow street with a lot of restaurants which for people with visual deficiency becomes unpleasant \Nbecause we are constantly tripping on obstacles.
00:36.7	00:40.3	Limit us a bit.
00:40.3	00:55.7	(not sure, audio is strange here) Limits us our speed and even though we \Naren't exactly individuals that run, at a snail speed it bothers us especially when there are many obstacles.
00:58.7	01:12.1	The Rua dos Correeiros (the one with Task 1) is a street that I don't\Nknow well and it's difficult in a first or second passage...
01:12.1	01:25.4	In a very short time-frame to create reference points to identify the context and that's the reason I passed (the point where he should have asked? or the correct street? please confirm).
01:26.1	01:33.8	-Because it's a street I don't know.\N-(Luís) But on that street you detected correctly the restaurant...
01:33.8	01:38.2	I didn't detect, it was afterwards, the place where I was supposed to turn.
01:38.2	01:51.4	And then since I didn't detect and then I was trying to do what the GPS does, recalculating the itinerary...
01:51.4	01:56.0	I was a bit lost between those thoughts and more.
01:56.0	02:05.5	Thence I was getting an idea, which I didn't from the beginning, \NI was confused and thought that it was the flowers area...
02:05.5	02:12.8	but that because I got lost with the concern of turning (in the right place).
02:12.8	02:21.8	because in Rua Augusta I also knew that I needed to turn in the flowers part\Nand these two ideas conflicted with each other and I got confused.
02:21.8	02:28.0	-This confuses me.\N-(Luís)But you commented, in a very interesting way, that since the surface changed..
02:28.0	02:31.4	-Yes, yes.\N-(Luís) That was in that point you should've turned.
02:31.4	02:37.0	-Exactly.\N-(Luís) But you mentioned that were there something that stayed in your memory.
02:37.0	02:39.0	Exactly.
02:41.1	02:47.0	(Luís) For the statue man, what was the biggest indecision?
02:47.0	02:54.6	I passed twice there with the same type of music.
02:54.6	03:00.7	And as in a Portuguese way, if it happens twice, it will happen again, but after all, it didn't.
03:00.7	03:09.5	I was expecting to find the same type of music and I arrived there \Nand I was not listening anything more forward.
03:09.5	03:16.8	So it's probably here, even though it was a different thing that I was listening than before.
03:16.8	03:22.4	I got the sensation that it would be there, but the reference point I created didn't showed me that.
03:22.4	03:29.7	-(Luís) But in terms of distance you got it correctly.\N-Yes, I was getting the feeling it was in that location.
03:29.7	03:39.8	But the music was not. All these environmental contexts end to be very important.

03:39.8	03:49.0	And then, the entry in Rua Augusta...
03:49.0	03:58.1	and then go to Rua dos Sapateiros didn't present any problems.
04:04.6	04:12.6	And I stopped because I started feeling the wind but I knew\N I was going to stop before the Arc, but when I stopped feeling all the wind...
04:12.6	04:25.4	I knew I was near the Arc.

VITA

Born in Denizli in 1982. Received her bachelor degree in Architecture from İzmir Institute of Technology in 2006 and her M.Des degree in Design Studies from İzmir University of Economics in 2009. She completed her thesis process in Scotland in Duncan of Jordanstone College of Art and Design and submitted the thesis titled with "Daylighting Concepts for University Libraries and Their Influences on Users' Satisfaction". She has an article published in Journal of Academic Librarianship in 2011 (D.Kan Kilic and D.Hasirci, (2011). Daylighting Concepts for University Libraries and Their Influences on Users' Satisfaction, *The Journal of Academic Librarianship*, Vol. 37, No. 6, 471-479).

She attended several conferences in Europe and U.S.A under the theme "Environment and Behavior" (D. Kan Kilic, 2015, Spatial Cognition of Blinds During Wayfinding Process. *Environmental Design Research Association/Proceedings Of EDRA46 Conference*, 247-247. D. Kan Kilic, 2015, Seeing the Environment from the Eye of Blinds. *European Academy of Design/Proceedings of EAD'11 Conference*. D. Kan Kilic, 2015, A Research Approach to the Wayfinding Behavior of Airport Users. *European Academy of Design/Proceedings of EAD'11 Conference*. D. Kan Kilic, 2014, Correlation between the Identity of Main Character (blindness) and the Mise-en-scene of the Film. *DAKAM / Cine Cri'14/Film Studies And Cinematic Arts Conference On Cinema And Politics*, 77-82. D. Kan Kilic, 2012, Non-visual Aspects of Spatial Knowledge: Comparing Visually Impaired Subjects' Verbal Descriptions to Sighted Subjects' Representations. *EDRA / Proceedings of The 43rd Annual Conference of The Environmental Design Research Association*, 67-71).

She completed her Ph.D degree in Architecture in İzmir Institute of Technology in 2016. Between the years 2006-2011 she worked as a research assistant in İzmir University of Economics, Department of Interior Architecture and Environmental Design and since April 2011, she has been working as an instructor at the same department. She teaches "Future Interior Architecture Studies", "Graduation Project" and "Graduation Thesis" courses. "Environmental Psychology" and "Non-visual aspects of spatial knowledge" are among her research interests.