THE INFLUENCE OF FAMILIARITY AND SIGNAGE ON WAYFINDING IN ACADEMIC LIBRARIES: THE CASE OF BILKENT UNIVERSITY LIBRARY

A Master's Thesis

by
İDİL ESEN DURAN

Department of
Interior Architecture and Environmental Design
İhsan Doğramacı Bilkent University
Ankara
September 2016

To my wonderful parents; Esma Birer, Seyit Esen

&

Bertan Duran

THE INFLUENCE OF FAMILIARITY AND SIGNAGE ON WAYFINDING IN ACADEMIC LIBRARIES: THE CASE OF BILKENT UNIVERSITY LIBRARY

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

İDİL ESEN DURAN

In Partial Fulfillment of the Requirements for the Degree of

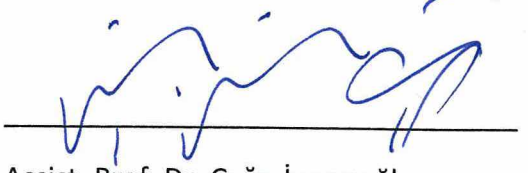
MASTER OF FINE ARTS

in

THE DEPARTMENT OF
INTERIOR ARCHITECTURE AND ENVIRONMENTAL DESGIN
İHSAN DOĞRAMACI BİLKENT UNIVERSITY
ANKARA

September, 2016

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Fine Arts in Interior Architecture and Environmental Design.



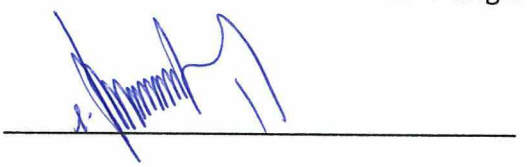
Assist. Prof. Dr. Çağrı İmamoğlu
Supervisor

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Fine Arts in Interior Architecture and Environmental Design.

Assist. Prof. Dr. Yasemin Afacan

Examining Committee Member

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Fine Arts in Interior Architecture and Environmental Design.



Assist. Prof. Dr. Elif Güneş

Examining Committee Member

Approval of the Graduate School of Economics and Social Sciences

Prof. Dr. Halime Demirkan

Director

ABSTRACT

THE INFLUENCE OF FAMILIARITY AND SIGNAGE ON WAYFINDING IN ACADEMIC LIBRARIES: THE CASE OF BILKENT UNIVERSITY LIBRARY

Duran Esen, İdil

MFA, Department of Interior Architecture and Environmental Design

Supervisor: Assist. Prof. Dr. Çağrı İmamoğlu

September 2016

The purpose of the study is to investigate the relationship between utilized signage types, familiarity and confidence in respondents' cognitive maps in academic libraries. Besides, it is to understand the influence of utilized signs on wayfinding performance. The experiment was administered in Bilkent University Library. Seventy one non-architecture university students from Bilkent University participated in the study, which was conducted in two parts. The first part was a library tour which involved reaching two target rooms. The second part utilized a questionnaire which inquired about respondents' familiarity, confidence in their cognitive maps and signage. The study found that although newcomers had higher number of wrong turns and time spent to reach destination points, there was no difference in hesitation. As in other types of spaces, wrong turns and time spent decreased with increasing familiarity.

Keywords: Academic Library, Confidence, Familiarity, Signage, Wayfinding Performance

ÖZET

AKADEMİK KÜTÜPHANELERDE AŞİNALIK DURUMUNUN VE İŞARET TÜRLERİNİN YÖN BULMAYA ETKİSİ: BİLKENT ÜNİVERSİTESİ KÜTÜPHANESİNDE BİR ÇALIŞMA

Duran Esen, İdil

İç Mimarlık ve Çevre Tasarımı Yüksek Lisans Programı

Tez Yöneticisi: Y. Doç. Dr. Çağrı İmamoğlu

Eylül 2016

Bu çalışmanın amacı akademik kütüphanelerde yararlanılan işaret türleri ile aşinalık durumu ve bilişsel haritanın güvenilirliği arasındaki ilişki durumunu araştırmaktır. Ayrıca yararlanılan işaretlerin aşinalık ve güvenilirlik açısından yön bulma yetisi üzerindeki etkilerini anlamaktır. Deney, Bilkent Üniversitesi Kütüphanesinde gerçekleşmiştir. Çalışmaya mimarlık öğrencileri haricindeki yetmiş bir öğrenci katılmıştır. Çalışma iki bölümden oluşmaktadır. İlk bölüm kütüphane içerisinde belirlenen iki odaya ulaşılan turdur. İkinci bölüm ise tur sonrasında katılımcıların aşinalık ve bilişsel haritalarının güven durumu ve işaretlerin değerlendirildiği ankettir. Çalışmanın sonucuna göre kütüphaneye ilk defa gelenlerin kütüphaneye aşina olanlara göre hatalı dönüş sayısı ve turu tamamlama süresinde artış görülürken, duraksama sayısında bir farklılık olmadığı görülmüştür. Akademik kütüphanede de önceki yapılan araştırmalarda bahsedilen diğer mekânlar gibi aşinalık durumu arttıkça hatalı dönüş sayısı ve harcanan zaman azalmaktadır.

Anahtar Kelimeler: Akademik Kütüphane , Aşinalık, Güven, İşaretler, Yön Bulma Performansı,

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Assist. Prof. Dr. Çağrı İmamoğlu his invaluable support, endless patience, supervision and guidance throughout my graduate education and in this study. I consider myself as privileged for being one of his students.

I would like to thank to my jury members Assist. Prof. Dr. Yasemin Afacan and Assist. Prof. Dr. Elif Güneş for their contributions and feedbacks

I am grateful to all faculty members and staff of İhsan Doğramacı Bilkent University Department of Interior Architecture and Environmental Design and Department of Architecture.

I am mostly grateful to my family. I am indebted to my father Seyit Esen, my mother Esma Birer for their endless love and trust throughout my life but especially the patience during this study. Last but not the least; I would like to thank my husband Bertan Duran for his endless support throughout my thesis.

TABLE OF CONTENTS

ABSTRACT ii

ÖZET iv

ACKNOWLEDGEMENTS vi

TABLE OF CONTENTS vii

LIST OF TABLES x

LIST OF FIGURES xii

CHAPTER 1: INTRODUCTION 13

1.1. Aim of the Study 16

1.2. Structure of the Thesis 16

CHAPTER 2: SPATIAL COGNITION 19

2.1. Definition of Cognition 19

2.2. Types of Spatial Knowledge 20

CHAPTER 3: WAYFINDING 23

3.1. Definition of Wayfinding 23

3.1.1. Strategies of Wayfinding 25

3.2. Factors Affecting Wayfinding Behavior 27

3.2.1. Physical Factors 27

3.2.2. Psychological Factors 30

3.3. Wayfinding Performance Criteria 31

3.4. Signage Systems 33
3.4.1. Signage Types and Their Functions 34
3.4.2. Regulations of Signs 37
3.4.3. The Reasons of Problems on Signs 41
3.5. Familiarity and Wayfinding 42
3.6. Wayfinding in Libraries 44
3.6.1. Library as a Place 44
3.6.1. Wayfinding in Library 46
CHAPTER 4: THE STUDY 48
4.1. Aim of the Study 48
4.1.1. Research Questions 49
4.1.2. Hypothesis 49
4.2. Method of the Study 50
4.2.1. Selecting the Destination 50
4.2.2. Sample 51
4.2.3. Questionnaire 52
4.2.4. Procedure 53
CHAPTER 5: RESULTS 58
5.1. Descriptive Statistics 58
5.2. Statistics for The Relationship between Signage Types and Wayfinding Performances 60
5.3. Statistics for The Relationship between Signage, Familiarity and Confidence 63
CHAPTER 6: DISCUSSION 70
6. 1. Analysis of Library Signage System 70
6.2. Evaluation of Signage Types, Familiarity and Confidence 72
CHAPTER 7: CONCLUSION 75
7.1. Limitations of the study 76

REFERENCES 78

APPENDICES

APPENDIX A: LIBRARY PLANS and PHOTOGRAPHS..... 87

APPENDIX A1: Library Plans 88

APPENDIX A2: Library Photos 90

APPENDIX B: QUESTIONNAIRE and RESEARCHER NOTE CARD 97

APPENDIX B1: Questionnaire 98

APPENDIX B2: Researcher Note Card 101

APPENDIX C: STATISTICAL ANALYSIS of THE STUDY 102

LIST OF TABLES

Table 1: Subjects' number according to their sex.....52

Table 2: Frequency tables of the study 103

Table 3: Correlation analysis for relationship between wrong turn, hesitation and time spent in Halil İnalcık Room 108

Table 4: Correlation analysis for relationship between wrong turns, hesitation and time spent in Multimedia Room 109

Table 5: T Test for comparison between wrong turn, hesitation and time spent for direction sign 110

Table 6: T test for comparison between wrong turn, hesitation and time spent for identification sign.....111

Table 7: T Test for comparison between wrong turns, hesitations and time spent for orientation sign 112

Table 8: T test for comparison between wrong turn, hesitation and time spent for library using time 113

Table 9: T test for comparison between wrong turn, hesitation and time spent for frequency of library using 113

Table 10: T test for comparison between wrong turn, hesitation and time spent for familiarity 114

Table 111: Respondents' confidence with cognitive map of building 114

Table 12: Correlations for overall 115

Table 13:Evaluation with library using and signage types.....116

Table 14:T Test for comparison between wrong turns, hesitation and time spent for orientation signs and confidence in cognitive map 117
Table 15: T Test for comparison between wrong turns, hesitation and time spent for directional signs and confidence in cognitive map 117
Table 16:T Test for comparison between wrong turns, hesitation and time spent for identification signs and confidence in cognitive map 118
Table 17:Mean of number of wrong turn, hesitation and time spent 118

LIST OF FIGURES

Figure 1: Building directory, an example of orientation sign 35
Figure 2: An example of directional sign 36
Figure 3: Examples of identification signs 37
Figure 4: Dimension of text height 38
Figure 5: The cone of vision of pedestrians 39
Figure 6: The placement of signs 40
Figure 7: Surface color of signs 41
Figure 8: The components of academic library 46
Figure 9: Flow chart for the process of the study 56
Figure 10: Basement floor plan 88
Figure 11: Ground floor plan 89
Figure 12: Second floor plan 89
Figure 13: View from entrance of library 90
Figure 14: Orientation signs at ground floor 91
Figure 15: The bridge between A block and B block 92
Figure 16: Orientation signs at first floor 93
Figure 17: Directional signs at first floor 94
Figure 18: Identification signs at ground floor 95
Figure 19: Directional signs at basement floor 96
Figure 20: The questionnaire 100
Figure 21: Example of researcher note card 101

CHAPTER 1

INTRODUCTION

People make a picture of different routes in their mind to plan how to get from one place to another. It can vary from person to person and it is related with navigational strategies. Navigation is a main functional requirement for people to arrive in either familiar or unfamiliar environment. Navigation depends on updating one's location and orientation with respect to the environment. Bell and Salvier (2004) indicated that navigation is a complex crucial problem that is usually met and solved by humans and other animals. Navigation is a coordinated and directed movement through a space (Mantollo & Freundschuh, 2005). It consists of two parts which are travel and wayfinding. Mantollo and Freundschuh (2005) explain these two notions that whereas travel is the actual motion from the current location, wayfinding indicate to the cognitive coordination to the distant environment and contain activities such as planning and route choice.

The cognitive element of navigation is called wayfinding, which is important to any environment that claims movement over large scale (Darken & Peterson, 2001). On the other hand, wayfinding can start to analyze in small scale. Going to work or school, walking through buildings and returning back home could be accepted by navigation in daily routine. While people realize these activities, they use their knowledge and previous experience to find their way in the environment; these routine activities are an unconscious process (Doğu, 2001).

The goal of wayfinding design is to provide the information required for users to correctly make and execute decisions within the environment (Passini, 1984). People require information to make the accurate decision on a route thus they find their way to a desired destination. With the help of environmental design elements like layout, landmarks, signage and color, people reach where they want to go. In large scale built environments, wayfinding becomes a significant design issue because it can be difficult to find the way and go through from place to another place. In this situation, visual accessibility, architectural differentiation, building plan configuration are accepted to affect wayfinding decision (Doğu, 2001).

Wayfinding research is done in large and complex buildings such as municipal buildings (Best, 1970), hospitals (Başkaya, 2004), shopping mall (Doğu,& Erkip, 2000), airports (Seidel, 1982; Churchill, Dada; de Barros & Wirasinghe, 2009), public libraries (Beecher, 2004; Mandel, 2013).Libraries

may be evaluated in large, complex built environments like shopping malls, hospitals, airports and public buildings. In all of these facilities, people go into the facilities to carry out specific needs. Signs are tools that aid in wayfinding. According to O'neill (1991), signage is used to enhance wayfinding efficiency especially in setting with complex floor plan configuration in which wayfinding is a serious problem such as subways, hospital and large governmental buildings.

Downs (1979) identified that library is an architectural maze where improved wayfinding can increase the effectiveness, frequency and volume of use and therefore should be considered when arranging interior spaces. In past researches, wayfinding has been studied generally in libraries and public libraries were used as a task. Public library users may differ from academic library users in important ways, such as being a more heterogeneous population comprised of people of varying ages and educational backgrounds (Mandel, 2013). Literature about library signage has highlighted that wayfinding behavior for library users in entry area of public library facility (Mandel, 2013); the impact of signs on the success of library users in locating (Eaton, Vacino & Taylor, 1992); a comprehensive signage audit for best guidelines (Stemper & Polger, 2013). In this thesis, the relationship between utilized signs and familiarity with regards to wayfinding performance was mentioned.

1.1. Aim of the Study

The main purpose of this study is to investigate the relationship between utilized signage types with familiarity and confidence of cognitive map in academic libraries. Besides, it is to understand the influence of utilized signs on wayfinding performance with regards to familiarity and confidence. Signs seem helpful an adequate detail to direct people from place to place. Also some directors may be helpful and enabling people to reach the goal without error and hesitation. In this thesis, what types of signs are utilized was investigated and the relationship between signage types with familiarity and confidence was searched with regards to wrong turns, hesitations and time spent in academic libraries.

The findings of the study may provide guidelines how signs can be altered to improve facilitate better wayfinding in case study building that is Bilkent University Main Campus Library. Besides, the findings may help not only architects, interior architects but also sign makers, educators and building directors who may influence the accurate wayfinding cues for library users.

1.2. Structure of the Thesis

The thesis consists of five chapters. The first chapter is introduction. An aim of the study is mentioned. The definition of wayfinding is stated generally. Also, the importance of wayfinding is touched on. One of the important tools,

signage, are mentioned in terms of its relation to building types and the importance of wayfinding.

The second chapter examines the concept of cognition. First of all, cognition was mentioned as definition and spatial knowledge is defined because it is important how people acquire, store, organize and recall a location's of information, distance and arrangements in building (Gifford, 2002). Secondly, to understand spatial knowledge accurately, types of spatial knowledge that are landmark, route and survey knowledge was identified.

The third chapter consists of wayfinding. Its process and requirements are stated in order to understand the importance of wayfinding in human activities and psychology. General factors affecting wayfinding which are physical and psychological characteristics are stated. This study analyzes the wayfinding performances; in order to have better results, performances criteria are explained. Besides, the effects of familiarity are discussed. Finally, Signage system is mentioned in this chapter. To understand which types of signs help to reach destination easily, signage types are defined. Besides, literature shows that in complex buildings, signs are problematic and when people navigate the built environment and strive or become lost, they feel frustration, stress and anxious (Arthur & Passini, 1992). In order to prevent these types of situation, signs are important tools. Although they are arranged in built environment, people have trouble with sign. In this chapter,

also why people have trouble with signs are explained. Finally, due to the goal of this thesis, library building is described with the example of literature.

The fourth chapter includes the experiment of the study. The aim of the study, research questions, and hypothesis are described. The methodology of the experiment is defined with description of the selected library building. The identification of sample group and explanation of the experiment procedure are mentioned. Finally, the results are statically analyzed and evaluated.

Chapter five is conclusion part. In this chapter, a summary about thesis is written and it is mentioned about the limitation of the study. Besides, finally what will be done in future study is suggested.

CHAPTER 2

SPATIAL COGNITION

2.1. Definition of Cognition

People interact within the environment to get to the destination they want to go. During this action, they gain spatial cognition (knowledge) about their own movements and about spatial relations with the environment (Montello, Hegarty, Richardson & Weller, 2004). How people acquire, store, organize and recall information about location, distances and arrangements in building, streets and great outdoor is called spatial cognition (Gifford, 2002). Therefore, it can be understood that spatial cognition has an important role to adapt to the environment and easy navigate (Kaplan, 1983). There are different spatial cognition measurements techniques that include sketch maps, model constructions or manipulation, distance estimation, virtual environments and naturalistic observation in mazes or everyday settings. It also includes cognitive maps which are pictorial and semantic images in people's heads related to how places are arranged (Kitchin, 1994). Cognitive processing also varies from one person to the next. Cognitive maps assist people for overcoming spatial problems such as how to deduce the way from one place to another when people have directly travelled the route and where to find requisite resources of all kinds. Cognitive map is described as a

mental portrait or set of representation of the spatial layout of the environment (Montello and Freundschuh, 2005). Allen (2000) identified as ‘’ integrated of relationship among spaces’’. Cognitive maps are not tools for conscious planning; they are a template that helps people in making short term predictions like where we are going (Golledge, 1999).

It is important to understand difference between perception and cognition. Arthur and Passini (1992) explain these notions. Whereas perception is the process of achieving information through the senses; cognition is defined as understanding and being able to manipulate information. Spatial cognition is also affected by many factors which are personality, intelligence, self-efficacy, culture, education, emotion, time pressure, risk, interest, testosterone level, level of economic development (Gifford, 2000). Besides, signs and numbering systems, visibility of the destination, differentiation, and configuration influence spatial cognition and wayfinding (Weisman, 1981).

2.2. Types of Spatial Knowledge

In order to understand spatial cognition, we should describe three types of environmental knowledge, which are landmark, route and survey knowledge (Parush & Berman, 2004).

Landmark knowledge: Schlender, Peter and Wienhöfer (2000) stated that landmark knowledge is derived from the knowledge of noticeable objects in

an environment. ‘’It involves apparent objects to orient easily in a new environment (Edwards, Thompson & Barfield, 2000, p.13).’’ It does not involve spatial information; it plays an important role in route knowledge by specifying decision points (Sancaktar, 2006). It also provides remembering information (Edward et al., 2000).

Route Knowledge: It is also called as procedural knowledge. It is defined as an inner appearance of the procedures needed for finding one’s way from place to place (Montello et al., 2004, p.270).’’ It is related with person’s capability to navigate from one location to another. It occurs an information about the order landmarks and minimal information about the appropriate action (Montello, 1998). Route knowledge has a greater impact on wayfinding performance compared to survey knowledge (Hölscher, Merlinger, Vrachliotis, Brösame & Knauff, 2007).

Survey knowledge: It is gained when routes and landmark are combined into a cognitive map. Van Dijk, op Den Akker, Nijholt and Zwiers (2003) identified survey knowledge as the ability to conceptualize the space as a whole. Survey representations facilitate spatial influences that can be useful during wayfinding through large spaces (Infield, 1991). Survey knowledge is not equivalent to wayfinding performance and a clear superiority of familiar people with respect to survey knowledge could be established (Hölscher, et al., 2007). The ability to use survey knowledge is referred to sense of direction. Sense of direction is relevant with wayfinding. People who have

good sense of direction find out and attend to details in new environment and remember new routes better than people who have a poor sense of direction (Padgitt & Hund, 2012). On the other hand, people who have a poor sense of direction are more likely to lose their way and worry about learning becoming lost (Sholl, Acacio, Marker & Leon, 2000).

CHAPTER 3

WAYFINDING

3.1. Definition of Wayfinding

The term wayfinding was first used by Kevin Lynch in his effective book ‘The Image of the City (1960) to explain people’s orientation patterns in a city. Wayfinding is a movement which needs complete involvement with the environment (Passini, 1984) and it is the process finding a destination, whether in familiar or unfamiliar environments (Arthur & Passini, 1992). Lynch suggests fundamental ideas for wayfinding and realizing the city by forming mental maps consisting of paths, edges, landmarks, and nodes and district. Paths were defined as ‘the channels along which the observer customarily, occasionally and potentially by Lynch (1960). Passini (1984) states that corridors, promenades, walk on galleries are equivalent at the building scale. Edges were defined as the boundaries between two areas, the equivalent points at the building scale are walls. Landmarks were identified as a type of point references, a defined object: building, signs, store or mountain (Lynch, 1960). Also, landmarks are often noticed and remembered due to dominance of visible form, shape of structure or socio-

cultural significance (Doğu, 2002). At building scale, shops, bars, cinemas, information booths, sculptures, structural and decorative elements may be examples of landmarks. Landmarks function as sub-goals to provide people connection to the point of origin and destination during wayfinding path (Allen, 2000) and they help people build a visual mode of environment (Toms & Denis, 2004). Padgitt and Hund (2012) stated that landmark can be points of a route where a choice required to which direction to proceed of a route where no decision needs to be made. Nodes were defined as points of intensive activity (Lynch, 1960). The equivalent points at the building scale are circulation intersections, halls and indoor squares. Districts addresses as medium to large sections of the city, conceived of as having a two dimensional scope that are noticeable as having some common describing character (Lynch, 1960). Changes in function and floor numbers may be suitable example at building scale. If five elements are taken out from the environment and gotten used to compose a cognitive map of a building, spatial conceptions should be emphasized. In order to do this, legibility should be increased (Passini, 1984). Ramadier and Moser (1998) stated that when legibility is just evaluated as a spatial or functional form, it fails to include the impact of social meaning on spatial cognition. In addition, Doğu (2002) stated that familiarity is a significant contributing influence that may clear on how and why some aspects of environments are recalled easily and some are not.

Lynch explored how the differential feature of an urban space influenced people and physical features in it. Lots of works were done and new

definitions were composed for in built environment, also the knowledge about wayfinding was broadened. Weisman (1981) enhanced four categories of environmental factors thought to be impressive on wayfinding. Familiar cues for visual access or landmarks are first factors of these categories. Second can be said the architectural differentiation level among varied areas of a building that can assist remembrance and orientation. Third is the use of signs and room numbers to supply identification or directional information. Last one is the configuration of building which influences the case with which one can realized the overall layout of the building.

.

Arthur and Passini (1992) argue that wayfinding is a spatial problem solving activity that involves three ways which are making a decision, executing a decision and processing information. Decision making in wayfinding is the period of deciding with path to traverse when faced with series of alternatives (Xia, Arrowsmith, Jackson & Cartwright, 2008). Whereas making a decision is the development of a floor plan, executing a decision converts the plan into proper behavior at that space and processing information realize in its generic sense as containing environmental perception and cognition.

3.1.1. Strategies of Wayfinding

The aim of wayfinding design is to provide the information for people to correctly make and execute decisions within the environment (Passini, 1984). In the forthcoming years, Arthur and Passini (1992) explain that wayfinding

design purposes to plan the appropriate circulation system and stage interior design in order that elements allow to easy wayfinding.

Wayfinding involves two strategies which are route and survey strategy (Hund & Gill, 2014). Route strategy includes adopting main perspective such that the point of view creates from people. In route strategy, locations are identified using description like left, right, front, back. Hund and Gill (2014) described the definition with an example that to get café; take a left at the gas station and go straight. The café will be on the right. Daniel, Tom, Manghi and Denis (2003) stated that route cues are effective in terms of preference rating and achievement in finding destination. Survey strategy includes adopting a fixed references frame using the surrounding environment (Allen, 2000; Taylor & Tversky, 1996). In survey strategy, locations are identified with cardinal descriptions like north, south, east or west and distances. Hund and Gill (2014) explained it with an example that to get to the café, turn west at the gas station; travel 25m, the café is on the north side of the road. Chai and Jacobs (2009) found that when people use a survey strategy, they have better wayfinding performance during directional wayfinding task also Hund and Minarik (2008) stated that survey descriptors caused to more effective wayfinding such as faster times and fewer errors than route descriptors. On the other hand, Allen (2000) found that when using route description, people committed fewer errors and Denis (1999) stated that people who follow directions with using route cues, they did fewer errors than people who followed directions containing fewer of these cues. Besides, route cues have

higher effectiveness rating, faster and accurate wayfinding and fewer errors than did survey cues (Hund & Gill, 2014).

3.2. Factors Affecting Wayfinding Behavior

3.2.1. Physical Factors

Environmental factors affect wayfinding. ‘’Environmental information plays a central role in the conceptualization of wayfinding; it is fundamental in the making of decisions and decisions plan as well as in their execution (Doğu, 2002, p. 25)’’. It includes architectural, audible and graphic expressions that provide the essential information for wayfinding (Arthur & Passini, 1992). According to Weisman (1981), there are four categories to identify spatial factors that affect wayfinding. These are the ability to see through or out of a setting; types of signage provided; the extension one location looks different from others; the overall plan or layout of a setting. Also, Doğu (2002) has categorized environmental information in four headings in her study that architectural information is involved or inherent in the built environment; a building shape or layout may be difficult or easy to read; general information about building tenant, directions in a building and the identification of destinations may be collected under a heading as graphic information; verbal information includes the kind of information that it can be transmit to passer-by, security guards and occupants. In this study, to have reliable assessment, environmental factors should be analyzed with the subheadings which are visual accessibility, building configuration and architectural differentiation.

Visual Accessibility: When buildings become larger, architectural obstacle arises. The reason for this is complexity of spatial organizations, obstacles preventing *visual accessibility*. Visual accessibility is important factor in wayfinding because it provides people information about the circulation system, the horizontal and vertical paths, spaces adjacent to these paths (Doğu, 2002). If visual information becomes easily accessible, the legibility of the space is enhanced. Legibility is the apparent clarity of the environment and it is one of the significant concepts of environmental psychology and is important for environmental setting (Lynch, 1960). According to Garling (1983), a low visual access situation was created by artificially restricting participants' vision. The visual access group learned significantly more slowly than people with visual access. Visual accessibility may provide information about the physical accessibility of a space as well as continuity and transition of the circulation system. Doğu (2002) has given an example about this statement to understand; luminous openings that give clues about a space which can be perceived from a relatively darker space may become mystical if it is not directly accessible but that circulation system allows the people with information just enough to reach it .

Building Configuration: It is important in wayfinding and understanding of configuration is often the final development stage of learning of settings (Peponis, Zimring, & Choi, 1990). Weisman (1981) founded that the building's plan configuration, the ease and accuracy which one can create a mental image of it has some significant effect on wayfinding behavior. In later years Passini (1984) states that the comprehension of the principle by which

spaces are organized appears as the significant factor in simplification image formation of a building.

Plain and organized getting may reduce wayfinding problems with spaces to make easy predications. In complex settings, people are compressed with stimulation of all kinds of information and so finding relevant information becomes difficult (Arthur & Passini, 1992). Peponis et al. (1990) and O'neill (1991) also suggest that the complexity of a floor plan configuration is the primary influence on wayfinding performance negatively, when plan complexity was increased, errors were also increased. Bronzaft and Dobrow (1984) claimed that simplicity and regularity of floor plans assist people in learning about layout of a setting. But, getting lost in spaces that are too much alike is common and similar spaces are hard to differentiate. On the other hand, O'Neill (1991) found that even with increases in floor plan complexity, people have big problems with realizing spatial layout and diminished wayfinding performances. That is, the complexity of a floor plan forms affect wayfinding performance negatively.

Besides, a significant predictor of wayfinding is building configuration that contains spatial content such as organization of floor plan configuration and circulation system. The architectural expression of the circulation system makes a building easier to understand. Arthur and Passini (1992) assert that a building created around an open core have the profit of providing entry to the form of the circulation system for people. It makes a building easier to understand so a person perceiving a well-articulated building is in possession

of precious wayfinding information. In addition to these, Abu-Obeid (1998) claim that symmetric and continuous rectilinear floor plans that are called as gestalt way of thinking that are decent forms to remember easily and which are believed to relieve forming cognitive maps and to assist people's orientation. The building configuration and circulation system of the building, scale has a significant influence in understanding a space. It is an important factor in the gain of spatial knowledge.

Architectural differentiation: It also becomes an important factor that affects wayfinding positively and negatively. Arthur and Passini (1992) state that using color, material and texture differences in spatial features such as structures above or below paths articulate the building organization. In architecture, a certain degree of environmental complexity is required because even if being simple, repetitive elements in architectural composition is factor that creates difficulty because of their repeated sameness (Passini 1996).

3.2.2. Psychological Factors

Psychological factors may be included individual differences such as gender, age, educational, occupational and cultural differences; they should directly or indirectly influence wayfinding (Xia et al., 2008). Gender, age and familiarity have been examined in previous studies. Gender is a significant factor which affects the use of architectural and graphical elements and so wayfinding process is influenced because of this. There are some studies to

examine the importance and differences in gender in wayfinding. Lawton (1996) reported that men were importantly more accurate than women when indicating the direction of the destination. Cornell, Sorenson and Mio (2003) said that males tent to express more confidence in spatial abilities when compared females. Besides, performances of females were poor in wayfinding tasks and they were slower than male in estimation of bearing. According to Schmitz (1999), men were more talented in recalled route directions in maps and description than women but they were weak in the use of landmarks to route direction in comparison to women (Allen, 1999). In addition, time spent has some differentiation between female and male for finding their way and they found less wayfinding points than male participants did.

Age is the other factor influence architectural and graphical elements. Cubukcu and Nasar (2005) state that age produced a significant effect on navigation errors. That is; age increased, performance declined. Galea and Kimura (1993) found that younger people scored higher than adults did not only on landmark selection but also on scene recognition, distance ranking, map placement and route execution task.

3.3. Wayfinding Performance Criteria

To obtain quantitative data, wayfinding performance criteria are significant issue by measuring wayfinding performance consistently. There are three levels of metric for evaluating wayfinding. These are users' task performance

like time spent, distances and number of errors made), physical behavior (looking around, classification of time and error), decision making which is think aloud, interview, and questionnaire (Ruddle & Lessels, 2006). According to the suggestion of Ruddle and Lessels (2006), these levels are used for wayfinding performance in order to measure the contribution of signage types on wayfinding performance in this study. Wayfinding performance was measured through dependent variables: time spent, the number of errors, hesitation, rate of travel and backtracking during wayfinding tasks. Similar measures have been used in other studies (Carpmen, Grant, & Simmons, 1984; Weisman, 1981; O'neill, 1991; Helvacıoğlu, 2007; Kumoğlu, 2013). The classifications of measurements are explained at below.

Wayfinding is the ability to reach a destination in short time without experiencing fear and stress (Peponis et al., 1990). Therefore, *time spent* is the important factor for measurement of wayfinding performances. Coluccia and Iasue (2004) examined that wayfinding time is correlated with error (wrong turns) and hesitation frequencies. People who made more errors and hesitations spend more time to reach a destination. Additionally, *the number of errors* is frequently used as a measure of performance. Ruddle and Peruch (2004) explain that the type of error that is most commonly identified in wayfind a miss, which happens when a user moves within view of a given location without turning to look at it or takes a wrong turn. Also, *decision points* are related with route between a main and a desired destination (Golledge, 1999). According to Raubal and Egenhofer (1998), if people choose a long route, the number of decision point's increase and that

influence the inconvenience of wayfinding task. Best (1970), and Arthur & Passini indicate that the number of decision points affects a wayfinding task performance. That is, it can be said that the more choice points, the more likely the respondent was to report becoming lost. Besides, *hesitation* is also used a performance measurement. The number of full stops is defined as hesitation (Devlin & Bernstain, 1998; Lawton et al., 1996; Raubal & Egenhofer, 1998; 2006; Helvacıoğlu & Olguntürk, 2011). Whereas rate of travel is defined as a measurement in feet per second; backtracking is defined as a retracking of a path in the opposite direction of how it was first travelled (O'neill, 1991).

3.4. Signage Systems

Signs are an important element in wayfinding. They tell people what is, where and when they refer to an event and also specify when and how likely it is to occur. Sigs can be composed of any sorts of graphics or text for providing information for the users. O'Neill (1991) claimed that signage is used to enhance wayfinding efficiency especially in setting with complex floor plan configuration where wayfinding is a chronic problem such as subways, hospitals and large governmental buildings. Also, it can be said that signage systems include visual information systems that use graphic and letters to communicate environmental information with regard to direction, identification, safety and regulations (Colori & Vonden-Eynden, 2015) to specific groups, providing safe and walking experience (Zhang, Jia & Qin, 2016).

Graphic information is utilized as communicator and help visitors to orient themselves in spaces. O'Neill (1991) found that when people use textual signage, they have the fewest number of wrong turns. Where people use graphic signage, they have significantly small number of wrong turns and if people do not utilize signage, they have lots of wrong turns.

3.4.1. Signage Types and Their Functions

There are various types of signage. These provide to individuals for reducing the risk of disorientation and for helping them understanding the environment (Bourdeau & Chebat, 2003). Signs whether exterior or interior have three functions which directly correspond to the functional information types there are orientation, directional and identification signs (Arthur & Passini, 1992).

Orientation signs: ‘’They give users an overview of what 'shape' the building has, where they are, and where the destination lies, as well as other relevant information about the general setting (Arthur and Passini, 1992, p. 143).'' Maps, floor plans, exploded views and models, all with you are here map, clearly identifying corridors, destination zones and building directories rank as examples of this signage type (see Figure: 1).

Figure 1: Building directory, an example of orientation sign

https://www.pinterest.com/pin/6122149471259222/

Directional signs: ‘’They are the common process description. They give information about a destination to lead people along a determined route (Arthur & Passini, 1992, p. 143).’’ Mostly directional signs include arrows and elevator button panels (Giuliani, 2001, p. 50). Also, Arthur and Passini gave floor directories in elevator lobbies as an example of directional signs (see Figure: 2). They are used for showing people which way they need to go (Miller & Lewis, 1999). Arrows that are placed too far from the text they refer to reduce the effectiveness of directional signs.

Figure 2: An example of directional sign

http://shriadvertising.com/

Identification signs: Passini (1984) state that *identification signs* are the most significant state explanation of location. They provide information about the destination. They involve building signage, floor numbers and room identifiers provided at the destination (see Figure 3). These signs only used when destination is reached. That is; these kinds of signs tell people where they are and where they have arrived at their destination (Miller & Lewis, 1999).

Figure 3: Examples of identification signs

https://www.signbox.co.uk/interior/room

3.4.2. Regulations of Signs

Basic international guidelines and standards have indicated the principles and criteria of designing and locating signs to provide that signage system is legible, nonerasable and intelligible (Coté, 2011; Ministry of Public Security of the People's Republic of China, 2008; Ministry of Public Security of the People's Republic of China, 2005; British Standards Institution, 1990). The decision of providing either graphic or textual signs should be done through planning signage.

Content of signs: According to Signage Design Guidelines (2009), signage should be less; text should be concise to read easily on the move; pictures and graphic should speak volumes; the use of signage both pictures and graphics hierarchy should be achieved consistently. Also, Janet and Mayron (1993) stated that the characters of signage text styles must be sans serif or

sample serif; letters must be between 1.5cm and 5cm in height (see Figure 4). The content of the signage should be considered because of the remembrance of signs. When the number of word increase, the level of remembrance of signs decrease (Bourdeau & Chebat, 2003). Long horizontal signs should not use. Mclean (1993) claims that 40-50 characters start to distract visitor attention, disturb eye and tend to lose place. Signs should not be more than five messages and five lines of text in a single character height, stroke width font type; surface characteristics should be considered (Pollett & Haskell, 1979).

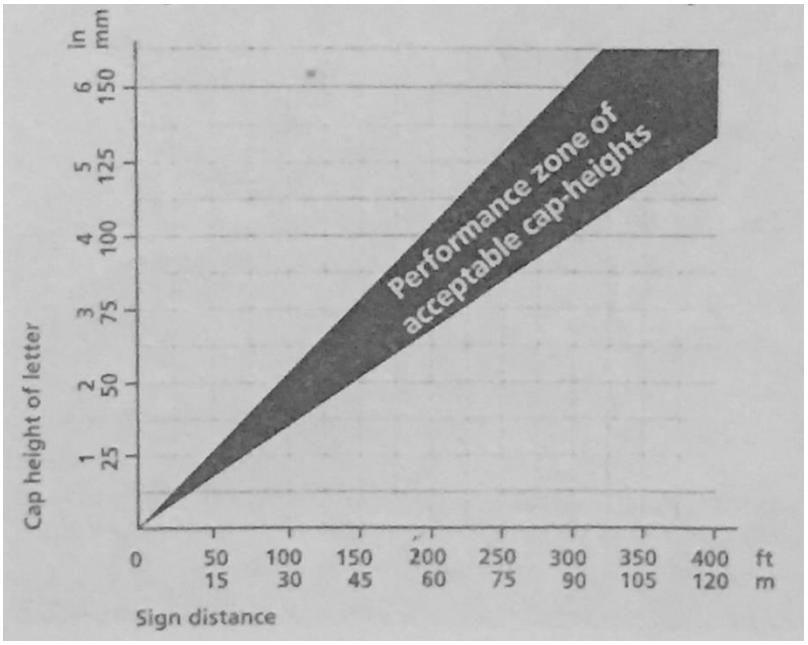


Figure 4: Dimension of text height

derived from *Way-finding: People, Signs and Architecture*

Location of signs: Arthur and Passini (1992) categorized the construction a sign in three ways: self-supporting on a post, a slab; wall mounted flat on vertical surface and suspended from a soffit or ceiling. Transitional and

intersection areas are appropriate for location of signs in terms of visibility (Pollet & Haskell, 1979). Arthur and Passini (1992) stated that decision points show themselves as corridor intersections because this provide maximum visibility of the information for people coming from all directions especially in complex buildings like hospitals or university buildings. The signage visibility is rest upon the distance between the pedestrian and the signage; longer viewing distances prevent intersections between the signage and the pedestrian (Wang, Lo, Lui, & Kuang, 2014; Nassar, 2011). The visible distance of signage is related with its height, size (Garvey, Pietrucha, & Meeker, 1997), color (Wong & Lo, 2007) and viewing angle (Xie et al., 2007) and is influenced by pedestrian age (Chrysler et al., 2001), vision level (Scott, Atkins, Bentzen, & Barlow, 2012) and obstacles (Zhang et al., 2016) (see Figure 5). Rousek (2011) state that eye level signs could attract the attention of users more frequently.

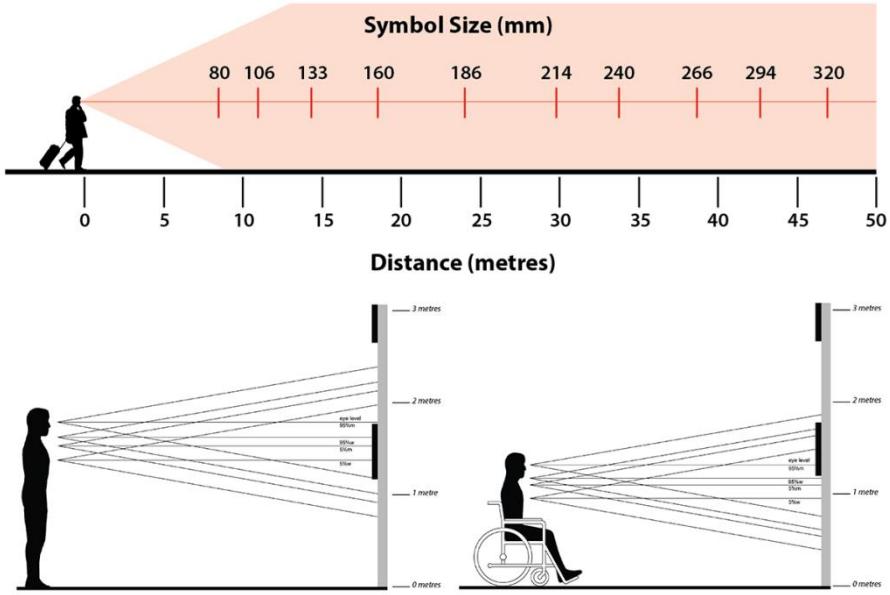


Figure 5: The cone of vision of pedestrians

(http://www.greshamsmith.com/projects/singapore-changi-airport-(sin)-wayfinding-study)

Graphic information in horizontal should be located 1200mm above from the floor due to the cone of vision of pedestrians, children, adults and people with wheelchair (Arthur & Passini, 1992). Also they states that the display of large pictographs has been placed above door height 2200mm and extending ceiling height 3000mm in order to utilize from display (Arthur & Passini, 1992) (see Figure 6).

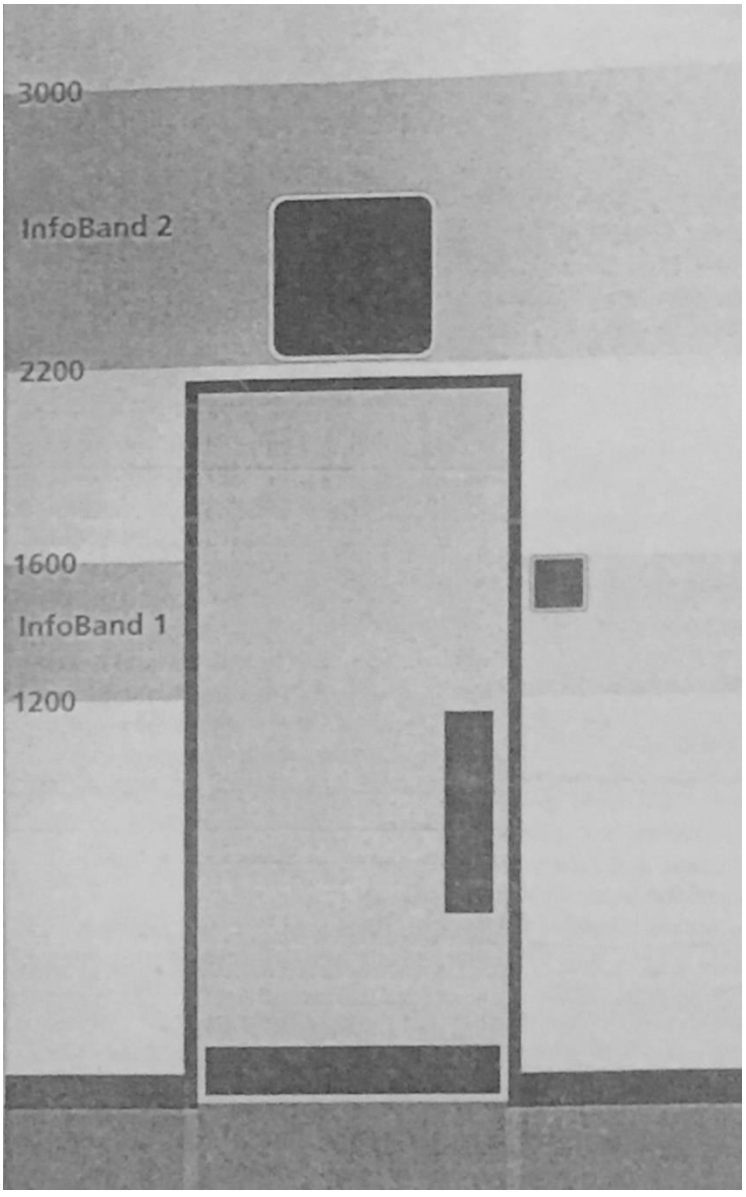


Figure 6: The placement of signs

Derived from *Way-finding: People, Signs and Architecture*

The finishing of signage: It should be involved that letters should have an eggshell, matte or other non-glare finish. Also, letters of texts should have a minimum 70 percent reflectance contrast with their background and can be either light character on dark background or dark characters on a light background (Janet & Myron, 1993, p.82) (see figure 7).

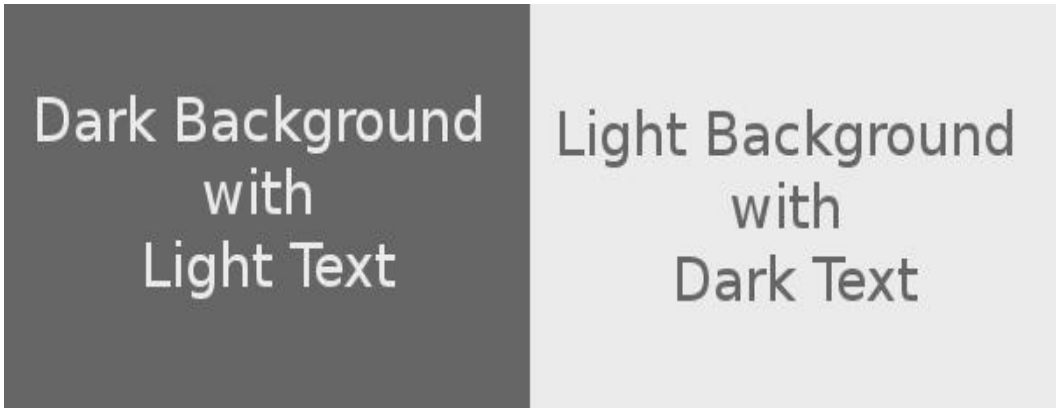


Figure 7: Surface color of signs

http://onlineincometeacher.com/tips/typography-tips/

3.4.3. The Reasons of Problems on Signs

Inaccurate, incoherent and invisible signs create problems on wayfinding in unfamiliar environments. Arthur and Passini (1992) explain why people have trouble with signage. The reasons of problems of signs were explained at below:

Ambiguity: Even if a message might be clear for person who originally put the sign up, it may be unclear; it causes *ambiguity*.

Conflict: Two close signs to each other create also difficulties. This situation is faced when new signs are installed and old ones are not taken; so it creates *conflict*. Deficiency: It creates a problem with little information. Signs should contain information that people need at particular places.

Confusion: When more data which are provided at given decision points, *confusion* is faced. If signs are well illuminated, they are much more efficient; therefore, signs should place opposite windows.

Illegible: Messages that are *illegible* are too small to be seen from the reading distance of sign, even if there may be nothing wrong with the message. Signs should give the right information. Finally, people should give full orientation to the wayfinding task because if it is not provided, they may miss important information, signs, landmarks and architectural feature.

3.5. Familiarity and Wayfinding

Familiarity is one of the crucial factors affecting wayfinding process. It influences improvement of sense of direction and wayfinding ability. O'neill (1992) states that as familiarity with an environment increases, wayfinding performance improve and the degree of complexity of the layout becomes less important. Familiarity also affects the spatial orientation. People who are familiar to the environment used more information stored in their long term memory, asked less help for wayfinding and used fewer maps, but people

who are unfamiliar used external sources more like maps, signs and other people(Chebat, Chebat &Therrien, 2005). Spatial orientation is related with wayfinding. Passini (1996) explains the difference between spatial orientation and wayfinding: ‘’spatial orientation is about the ability of people to reflect the spatial characteristics of a setting and to position him or herself thin that representation (p. 321).’’ ‘’Wayfinding is broader as it involves all the mental process which is included in purposeful mobility (p. 322).’’ If people cannot place themselves and cannot enhance a plan to arrive the destination, they tend to feel disorientation. The wayfinding activity can be investigated as a continuous sequence of problem solving tasks requiring information about the environment (Passini, 1984). Garling, Lindberg and Mantyla (1983) point out that familiarity with a building has crucial impact on wayfinding behavior. People who are familiar with the building rely on their knowledge and they walked on completely planned route; also they navigate faster than unfamiliar people taking the same route (Hölscher et al., 2007). Besides, people with their knowledge did not gather as much as information from their environment as unfamiliar people who are obliged to search and look at signs (Hölscher et al., 2007).

3.6. Wayfinding in Libraries

Libraries are more complex areas than being simple areas; they also include human conception and imagination (Leckie & Buschman, 2007). According to these definitions, libraries are important places because they provide social interactions and maintain privacy for people.

3.6.1. Library as a Place

A library as a place has been consulting to people in the way libraries have long been centers of social and cultural activities and also information and learning (Kim, 2016). The definition of library in Association of Research Libraries (2008) is explained the physical environment of the library as community place for individual or group work and inspiration; comfortable and inviting location.

The perception of user of the library building has inference for the effective design of library space (Kim, 2016). Beecher (2004) stated that the user of public library that they have people to utilize from different ages, background and education levels. Academic libraries may be different from academic libraries in terms of the perception of users. There is limited research on the perception of academic libraries. Academic libraries have faced the need to inform people about changes in the campus. Academic libraries are also identified, like public libraries, as an information and services place and they serve as place to socialize, relax in campus (Kim, 2016). They are also

community centers in addition to their traditional role as academic centers. They have important role for academic and social activities in academic institutions.

The common activity of academic library is seeking information and it involves information resources and effective services (Peterson, 2005). There are some determined items on the element of academic library as place based on previous researches (Demans, 2005; Shill & Tanner, 2004; Waxman, 2007; Weise, 2004). They were compiled under the parts which are physical setting of place includes the exterior-interior of the building, books and print materials, individual group study space, space for reading-digital information-library services, outdoor seating, computer and wireless connection, seminar rooms, café-lounge areas, exhibition spaces; the person of library involve staff, students at subsidiary facilities; events and workshops. These items were compiled at below Figure 8.

Element	Item
Physical setting of place	Exterior of the library building
	Interior of the library building
	Books and print materials (including journals and newspapers)
	Individual study space
	Group study space
	Space for reading
	Space for digital/multimedia information
	Space for library services
	Outdoor seating
	Computers
	Wireless connection
	Seminar rooms/conference rooms
	Café
	Lounge
	Exhibition space
	Copy/print/scan area
Person	Library staff
	Student workers
	Staff at subsidiary facilities
Act	Reference and information services
	Circulation
	Library cultural events
	Instructions/workshops

Figure 8: The components of academic library

3.6.1. Wayfinding in Library

Wayfinding is important for library building like hospitals, shopping malls, education and governmental buildings and airports. According to Downs (1979), developed wayfinding can increase the effectiveness, frequency and usage of library. Therefore, when arranging interior spaces of library, the statement of wayfinding should be considered. In library buildings, there are some studies about complexity, visibility and signage on library buildings.

O’neill (1991) stated that floor plan complexity increases, wayfinding performances decreases. Besides Li and Klippel (2012) connected this statement with familiarity and they found that if a building has a high complexity, people face difficulties regardless of their familiarity of the environment (Li & Klippel, 2012). When we looked at the relationship between library and wayfinding performance, Beecher (2004) defends that people’s wayfinding performance with access to signage in the complex building remained equivalent, or poorer than simple settings with n signage. Besides, O’neill (1991) found that graphic signage generates the greatest role of travel, but textual signage was the most effective in diminishing wayfinding errors like wrong turns and backtracking. In literature, it can be shown that directional signs help people for orientation and navigation; thus they might be more important to easing wayfinding than informational signs (Mandel, 2013) because directional signs should provide additional information to the mental image of the area (Beecher, 2004). A review of literature of wayfinding in libraries demonstrated an emphasis of the signage; though there is brief mention of the effect of architecture also studies the location of items in an academic library. In this thesis, the relationship between utilized signage and wayfinding performances in academic library as a task was investigated.

CHAPTER 4

THE STUDY

4.1. Aim of the Study

The main purpose of this study is to investigate the relationship between utilized signage types with familiarity and confidence of cognitive map in academic libraries. Besides, it is to understand the influence of utilized signs on wayfinding performance with regards to familiarity and confidence. Signs seem helpful an adequate detail to direct people from place to place. Also some directors may be helpful and enabling people to reach the goal without error and hesitation. In this thesis, what types of signs are utilized was investigated and the relationship between signage types with familiarity and confidence was searched with regards to wrong turns, hesitations and time spent in academic libraries.

4.1.1. Research Questions

1. Is there a relationship between utilized types of signs and wayfinding performance in academic libraries?
2. Is there a relationship between signs and familiarity according to time spent, the number of errors and hesitations in academic libraries?
3. Is there a relationship between signs and confidence in cognitive map of building according to wayfinding performance in academic libraries?

4.1.2. Hypothesis

1. The improvement of wayfinding performance is related with utilized signs in academic libraries.
2. Number of wrong turns decreases with increasing familiarity in academic libraries.
3. Hesitations turns decreases with increasing familiarity in academic libraries.
4. Time spent decreases with increasing familiarity in academic libraries.

4.2. Method of the Study

4.2.1. Selecting the Destination

Library is a place where enhanced wayfinding increase the frequency and effectiveness of library use so it should be considered when arranging library interior spaces (Downs, 1979). According to results of previous works researches, public library and academic library may have some different approaches and results because of their user profiles. Based on this approach, in this study, an academic library which is located on Bilkent University main campus was selected as an experiment sample and Bilkent University Library building is a complex and large building (see Appendix A).

The library building is utilized by student and academic people of Bilkent University. A well-known building is located at main campus. The library is multi-storey large scale building. It has been designed by Erkut Şahinbaş. It consists of two blocks. First block which is called B Block or old building have also two parts. First part was built in 1987 and second one was built in 1992. Second block that is called A Block or new building was built in 1995. These two different main parts are connected together with a bridge and a gateway. Whereas a bridge stays on first floor, a gateway locates at basement floor. When the scale and the complexity of the building are taken into consideration, perception of the building is gotten hard (O'neill, 1991; Arthur & Passini, 1992). The literature of wayfinding at library focuses on signage (Brown, 2002; Mallery & DeVore, 1982; Pollet & Haskell, 1979). In this study, the relationship between signage of library building and users' wayfinding

performances was examined. In order to analyze the present study in better way, the signage system and signs of library will be mentioned at below.

In the library building, there are orientation, directional and identification signs to lead people where they want to go expect reading and studying areas. In library, orientation signs are faced in each floor. They are located on the stair exists (see Figure A2.2) and the bridge when passing from new building to old building (see Figure A2.4). Directional signs located intersections of hallway on floor by hanging from the ceiling (see Figure A2.5). Identification signs take place above the doors to specify the room number (see Figure A2.6). In the building, there is no you-are-here map but there is an informational graphic involved the section of the building. This graphic located both at the entrance on a stand and computer screens all over the building. Orientation signs have dark characters on a light background; identification and directional signs have light character on a dark background in the library building (see Figure A2.2 and A2.5).

4.2.2. Sample

The sample was composed of graduate and undergraduate university students from Bilkent University. Seventy one students were chosen using convenience sampling. However, architecture students were excluded from the study because of their space perception ability (Gifford, 2002). There were 36 women, 34 men and one unspecified. The experiment was conducted individually because navigating with another person likely alters

routes. That is, people who followed or joined another person were more likely to navigate routes with five or more stops than people who navigate alone (Li & Klippel, 2012).

Table 1: Subjects' number according to their sex

Female	Male	Unspecified	TOTAL
36	**34**	**1**	**71**

4.2.3. Questionnaire

In this study, a questionnaire was used as an instrument (see Appendix B1). The questionnaire was composed of 15 questions related with familiarity, use of library, use of signs and confidence level of cognitive maps. First four questions are related with the use of library building such as how long have you been using the library; how often do you use the library; how do you feel familiar with the library; how much time has passed since last use? These questions help to measure the familiarity. Question 5 is related with the level of findable the destination points which are Halil İnalcık Room and Multimedia Room. Question 6-9 are related with the evaluation of signs in library building. Question 6 measures what is the level of assist of signs to reach rooms. Question 7 measures understandability of signs to reach rooms. Question 8 measures what is the level of assist of directional signs to reach rooms. Question 9 measures a density of signs to reach rooms. Five point likert scales is used to evaluate these questions. Question10 and 11

are related with types of signage and question 12-14 are prepared for evaluation of confidence level of cognitive map. These questions are selected from previous study which was conducted by Weisman (1981) and was adapted to this study. Finally, last question is open ended which was interrogated signs according users' opinions.

Before the study, a pilot study was done with 22 graduate and undergraduate students to check the comprehensibility of the adjectives, the understandability of questions and the questionnaire form in general. Some questions were changed because of ambiguity of adjectives and some questions were also changed according to the aim of the study.

4.2.4. Procedure

Before the experiment, the plans of library were examined and destinations where located from different parts of library building. In determining destinations, it was regarded that selected targets would have been far away from each other. There were determined two different destination points. Whereas one of them named 'Halil İnalcık Collection Room' was located at basement floor of A Block, other one named 'Multimedia Room' was located at second floor of B Block. The reasons why Halil İnalcık Collection Room were selected as one of the target are that directional signage are not sufficient and observations before the present experiment showed that this room is lesser known. On the contrary, according to the observations before the experiment, Multimedia Room is well known. Students utilize there

frequently. Despite this, signs which direct to this room are insufficient. Therefore, the reasons why Multimedia Room was selected as a target are being well known and have insufficient signage system.

4.2.4.1. The Experiment

For the experiment, three different days were selected. Both weekdays and weekends were selected to include different density situations. The first selected day was a weekday during classes; second day was a weekday after classes and third day was a weekend. On these days, no signs were altered; current states of signs were used. The experiment was continued during 15 days in March and April 2016.

The experiment was conducted in two phases. The first phase was to reach the destinations after completed the tour in library, participants filled out a questionnaire which has fifteen questions included personal information, familiarity, use of sign types and finally confidence and task performances.

Before beginning the experiment, a pilot study was done. The reason why the pilot study conducted was to understand the comprehensible destination and questionnaire. The pilot study was done with twenty two volunteer students who were undergraduate and graduate students from Bilkent University. They were selected using convenience sampling. According to the results of pilot study some questions in questionnaire were altered. In direction of pilot study, Weisman's questionnaire (1981) was a resource of this present study. Questions about familiarity and confidence were used in the present study.

As mentioned above, the experiment was conducted in two parts. In the first part, the task was composed of convenience sampling and selected students started the entrance of library building. The aim of the study and tour information was narrated by the researcher. After that, the tour was able to start. The sequence of the destinations and which route would be used was determined by the participants. During the tour, the researcher saw people to destination; however participants were requested not to ask question to the researcher. Within this time period, wrong turn – errors, hesitations, and time spent and the sequence of destinations were taken notes by the researcher to understand and evaluate relation between wayfinding, types of signs and performances.

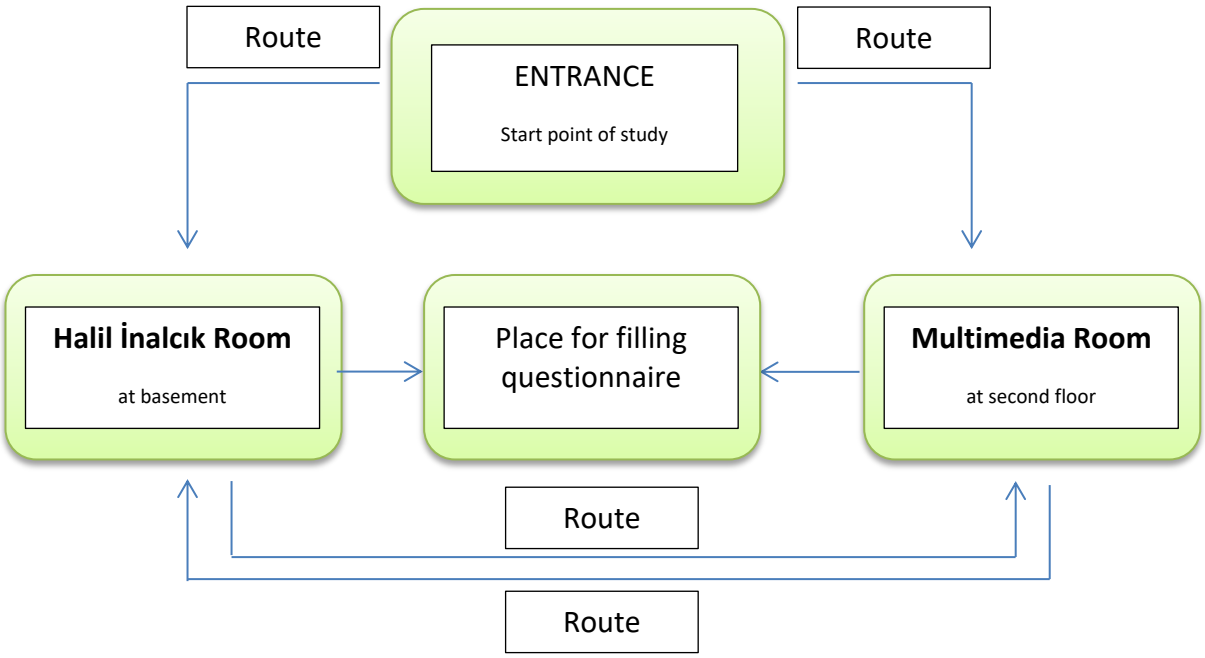


Figure 9: Flow chart for the process of the study

The tour started at the library entrance and it ended after reach the two destinations points were reached. The mean tie for the completion of the tours was 237, 35 seconds for each participant. After completed the library tour, the second part of the experiment was started; fill the questionnaire.

CHAPTER 5

RESULTS

Statistical Package for the Social Sciences (SPSS) 22.0 was used to analyze the data. Frequency tables (see Appendix C), correlation tables, *t*-test and the one way analysis of variance *F*-test (ANOVA) was used to analyze the data.

5.1. Descriptive Statistics

According to the results, 71 graduate and undergraduate students from 14 departments participated in the study. Eighty percentages of participants reported using the library for more than one year. The frequency of library use reported by participants was 32.4% once a week; 29.6% once a month; 28.2%; and 7% were first time user. Besides, 34% of participants felt familiar to the library building.

In the evaluation of current signage according to the questionnaire, respondents reported that signs helped often in ratio of 43.7%. Signs that were used to reach room were found to be coherent in ratio of 39.4%. Also, signs often help to participants to find the rooms in ratio 39.4%. During the tour, density of signs was sufficient in ratio 40.8%. When evaluating the types of signage, the most widely used type is directional signage with the ratio of 69% (49 participants); orientation signs were used in ratio 53.5% (38 participants); identification signs were used in ratio 36.6% (26 participants). Also, building staff and picture on computer screens helped and orient people to find the rooms.

Types of signs and use of library were evaluated to understand their relations among each other in terms of familiarity. We see that 81.6% (31 participants) who have been using the library more than one year reported that they used orientation signs; 79.6 % (39 participants) that they used directional signs; 88.5% (23 participants) reported that they used identification signs (see Table 13 in Appendix C). When analyzed the relationship between types of signs and frequency of using the library, we see that 31.6% (12 participants) who have been using the library everyday reported that they used orientation sign; 22.4% (11 participants) of those reported that they used directional signs and 19.2% (% participants) use identification signs. Types of signs and level of familiarity were also evaluated to understand the relationship among each other. We see that 55.35 (21 participants) who feel familiar with the library reported that they are quite familiar to this building.

93% (66 participants) stated that they can direct people may places like rooms, stairs, exits… 62 % (44 participants) thought that to draw the layout of this building or corridors was hard and 76 % (54 people) could not ensure their own drawing (see Table 2).

Besides in the study, it can be seen that people preferred Halil İnalcık Room which was the closer at the start point than Multimedia Room in ratio 59.2%. Whereas 74.6% of participants found Halil İnalcık Room easily, 87.3% of those found Multimedia Room easily. Some of participants found both of them easily. We see that 86.8% of participants who easily found Halil İnalcık Room and 85.5% of participants who easily found Multimedia Room reported that reported that they have been used the library more than a year.

5.2. Statistics for The Relationship between Signage Types and Wayfinding Performances

For the first research question that utilized signs improve wayfinding performance in academic libraries, correlation analyses were done for the relationship between wayfinding performances criteria (the number of wrong turns, hesitations and time spent) and target rooms. After that the relationship between the utilized types of signage during wayfinding task and wayfinding performance criteria were analyzed with t tests. According to correlations analysis for relationship between wrong turns and hesitation with

time spent for Halil İnalcık, wrong turns and time spent were significantly correlated, r = .40, p< .05 (see Table 3). There was a significant correlation of .00 (p=n.s) between wrong turns and time spent. The result suggests that when the number of wrong turns increases, time spent increases as well. According to correlations, hesitation and time spent were strongly correlated, r= .51, p< .05. There was a significant correlation of .00 (p=n.s) between hesitation and time spent. The result suggests that the number of hesitation increases, time spent increase as well.

According to correlations analysis for relationship between wrong turns and hesitation with time spent for Multimedia Room, wrong turns and time spent were significantly correlated, r = .62, p< .05 (see Table 4). There was a significant correlation of .00 (p=n.s) between wrong turns and time spent. The result suggests that when the number of wrong turns increases, time spent increases as well. On the other hand, according to correlations, hesitation and time spent were strongly correlated, r= .34, p< .05. There was a no significant correlation of .07 (p=n.s) between hesitation and time spent.

A paired sample t test (see Table 5) was conducted to compare the number of wrong turns for not using directional signs and using directional signs conditions which are measured with question10 and researcher' notes during wayfinding task. No difference was found in the scores for not using (M: 1.09, SD: .92) and using (M: .78, SD: .80) conditions: t: 1.468, p: .147. Also, a paired sample t test was conducted to compare the number of hesitations for

not using directional signs and using directional signs conditions. No difference was found in the scores for not using (M: 2.27, SD: 0.83) and using (M: 2.16, SD: 1.18) conditions: t: 0.394, p: .695. Finally, a paired sample t test was conducted to compare time spent for not using directional signs and using directional signs conditions. . No difference was found in the scores for not using (M: 245.91, SD: 57.61) and using (M: 233.51, SD: 60.50) conditions: t: 0.810, p: .421.

A paired sample t test (see Table 6) was conducted to compare the number of wrong turns for not using identification signs and using identification signs conditions which are measured with question10 and researcher' notes during wayfinding task. . No difference was found in the scores for not using (M: 0.76, SD: .83) and using (M: 1.08, SD: .84) conditions: t: -1.562, p: .123. Also, a paired sample t test was conducted to compare the number of hesitations for not using identification signs and using identification signs conditions. . No difference was found in the scores for not using (M: 2.11, SD: 1.01) and using (M: 2.35, SD: 1.20) conditions: t: -0.884, p: .380. Finally, a paired sample t test was conducted to compare time spent for not using identification signs and using identification signs conditions. . No difference was found in the scores for not using (M: 234.20, SD: 59.12) and using (M: 242.81, SD: 60.90) conditions: t: -0.585, p: .561.

A paired sample t test (see Table 7) was conducted to compare the number of wrong turns for not using orientation signs and using orientation signs

conditions which are measured with question10 and researcher' notes during wayfinding task. There was a significant difference in the scores for not using (M: 1.09, SD: .88) and using (M: .68, SD: .77) conditions: t: 2.07, p: .04. Also, a paired sample t test was conducted to compare the number of hesitations for not using orientation signs and using orientation signs conditions. There was not a significant difference in the scores for not using (M: 2.27, SD: 0.91) and using (M: 2.13, SD: 1.21) conditions: t: 0.55, p: .59. Finally, a paired sample t test was conducted to compare time spent for not using orientation signs and using orientation signs conditions. There was not a significant difference in the scores for not using (M: 249.36, SD: 56.68) and using (M: 226.92, SD: 60.64) conditions: t: 1.60, p: .11. As a result, participants who utilized orientation signs had lower number of wrong turn.

5.3. Statistics for The Relationship between Signage, Familiarity and Confidence

The second research question was affected the types of signage and familiarity. It consists of three concern which are familiarity decreases the number of wrong turns, hesitations and time spent by using signs in academic libraries. To understand the relationship between signs and familiarity, first of all the effects of familiarity on wayfinding performances was examined, also a correlation analysis between signs and the value of familiarity was done (see Table 12 in Appendix C).

A paired sample t test (see Table 8) was conducted to compare the number of wrong turns for library using in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 5, SD: 1.8) and high familiarity (M: 64, SD: .81) conditions t: 4.38, p: .00. Besides, a paired sample t test (see Table 8) was conducted to compare time spent for library using in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 5, SD: 307) and high familiarity (M: 64, SD: 261.98) conditions t: 2.836 p: .00. Also, a paired sample t test (see Table 8) was conducted to compare hesitation for library using in low familiarity and high familiarity conditions. No significant difference was found between hesitation and library using time in low and high familiarity conditions. As a result, people who are in high familiarity conditions have low number of wrong turns and low time spent in wayfinding task.

A paired sample t test (see Table 9) was conducted to compare the number of wrong turns for frequency of library using in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 7, SD: 1.43) and high familiarity (M: 43, SD: .79) conditions t: 2.02, p: .05. Besides, a paired sample t test (see Table 9) was conducted to compare time spent for frequency of library using in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 7, SD: 282.57) and high familiarity (M: 43, SD: 224.3) conditions t: 2.65 p: .01. Also, a paired sample t test (see Table 9) was

conducted to compare hesitation for frequency of library using in low familiarity and high familiarity conditions. No significant difference was found between hesitation and library using time in low and high familiarity conditions. As a result, people who are in high familiarity conditions have low number of wrong turns and low time spent in terms of frequency of library using in wayfinding task.

A paired sample t test (see Table 10) was conducted to compare the number of wrong turns for familiarity of library in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 17, SD: 1.29) and high familiarity (M: 37, SD: .57) conditions t: 2.92, p: .00. Besides, a paired sample t test (see Table 10) was conducted to compare time spent for familiarity of library in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 14, SD: 264.64) and high familiarity (M: 37, SD: 217.92) conditions t: 2.83 p: .00. Also, a paired sample t test (see Table 10) was conducted to compare hesitation for frequency of library using in low familiarity and high familiarity conditions. There was a significant difference in scores for low familiarity (M: 14, SD: 2.64) and high familiarity (M: 37, SD: 1.95) conditions t: 2.20 p: .03. As a result, people who are in high familiarity conditions have low number of wrong turns, hesitations and low time spent in terms of familiarity in wayfinding task.

A correlated coefficient was computed to assess the relationship between comprehend or understand of signs and overall familiarity value. (see Table 12 in Appendix C). There was a positive correlation between to variables, r=.27 n=71 p=.02. Overall, there was a positive correlation between comprehend or use of signs and overall familiarity value. When the use of sign increases, familiarity increases. To evaluate familiarity and wayfinding performances, a correlation coefficient was computed to assess the relationship between the number of wrong turns and overall familiarity value. There was a negative correlation between two variables r= -.34 n=71 p=.00. Overall, there was a negative correlation between the number of wrong turns and overall familiarity. A correlation coefficient was computed to assess the relationship between hesitation and overall familiarity value. There was a negative correlation between two variables r= -.24 n=71 p=.04. Overall, there was a negative correlation between hesitation and overall familiarity. A correlation coefficient was computed to assess the relationship between time spent and overall familiarity value. There was a negative correlation between two variables r= -.38 n=71 p=.00. Overall, there was a negative correlation between time spent and overall familiarity. When familiarity increases, the number of wrong turn, hesitation and time spent decrease.

The third research question that respondents' confidence in cognitive map of building improves wayfinding performance by using signs in academic libraries was affected signs and confidence on wayfinding performance. To

understand the relationship between signs and respondents' confidence in cognitive map on wayfinding, a paired sample t test and correlation analysis was done.

A paired sample t test (see Table 14) was conducted to compare the number of wrong turns for using orientation signs in low confidence and high confidence conditions. There was a significant difference in scores for low confidence (M: 17, SD: 1.29) and high confidence (M: 37, SD: .57) conditions t: 2.92, p: .00. Besides, a paired sample t test (see Table 14) was conducted to compare time spent for using orientation signs in low confidence and high confidence conditions. No significant difference was found between time spent and using orientation signs in low and high confidence conditions. Also, a paired sample t test (see Table 14) was conducted to compare hesitation for using orientation signs in low confidence and high confidence conditions. No significant difference was found between hesitation and using orientation signs in low and high confidence conditions. As a result, people who are in low confidence conditions have low number of wrong turns in terms of confidence in cognitive in wayfinding task.

A paired sample t test (see Table 15) was conducted to compare the number of wrong turns for using directional signs in low confidence and high confidence conditions. No significant difference was found the number of wrong turns and directional signs in low and high confidence conditions. Besides, a paired sample t test (see Table 15) was conducted to compare

time spent for using directional signs in low confidence and high confidence conditions. No significant difference was found between time spent and using directional signs in low and high confidence conditions. Also, a paired sample t test (see Table 15) was conducted to compare hesitation for using directional signs in low confidence and high confidence conditions. No significant difference was found between hesitation and using directional signs in low and high confidence conditions.

A paired sample t test (see Table 16) was conducted to compare the number of wrong turns for using identification signs in low confidence and high confidence conditions. No significant difference was found the number of wrong turns and identification signs in low and high confidence conditions. Besides, a paired sample t test (see Table 16) was conducted to compare time spent for using identification signs in low confidence and high confidence conditions. No significant difference was found between time spent and using identification signs in low and high confidence conditions. Also, a paired sample t test (see Table 16) was conducted to compare hesitation for using directional signs in low confidence and high confidence conditions. No significant difference was found between hesitation and using identification signs in low and high confidence conditions.

A correlation coefficient was computed to assess the relationship between signs and overall confidence. There was no correlation between signs and confidence r=.05 n=71 p=.66. Also, there was no correlation between the

number of wrong turns and confidence r= .14 n=71 p=.25. There was no correlation between hesitation and confidence r=.01 n=71 p=.97. There was no correlation between time spent and confidence r=.13 n=71 p=.28.

CHAPTER 6

DISCUSSION

6. 1. Analysis of Library Signage System

We can classify the signs in library building in terms of their functions accordingly purpose of this study. These are orientation signs located on wall mounted (see Figure 14), directional signs located on suspended from ceiling (see Figure 19) and identification signs located on both wall mounted and above doors (see figure 18). When we examined these signs, they have dark background with light text and light background with dark text (Janet & Mayron, 1999). As we mentioned in Chapter 3, whereas all orientation signs were designed with light background and dark characters, identification and directional signs were designed with dark background and light characters. When the signs were investigated in terms of their content, they do not have more than five messages and five lines as literature said (Mclean, 1993; Pollet & Haskell, 1979). When we examined the sing in terms of locations, areas with maximum visibility like intersections of hall, exits of stairs (Arthur & Passini, 1992) were chosen for placement of the signs. When taking into consideration the cone of vision of people, orientation signs was put on the

walls at eye level, the mounting heights of the 95th and 5th percentile of men and women with respect to vertical location (Pollet & Haskell, 1979; Arthur & Passini, 1992; Zhang et al., 2016). Because of their location with maximum visibility, according to the results of questionnaire, 53.5 % of people utilized orientation signs.

On the other hand, identification and directional signs are problematic in library building, when examine in terms of their location. The visibility of signs are dependent on the distance between people and the signage; longer viewing distance obstacles interacting between the signage ant people (Wang et al., 2014; Nassar, 2011). According to Li and Klippel (2012), the smallest pointing error related with highest visibility. Although people stated that they used directional signs in ratio 69%, according to the observation of researcher, seeking and realizing these signs took time. Even their distance with people was no longer viewing distance, due to their heights are problematic. That is, directional signs with hanging suspended from the ceiling should be 220cm in height (Arthur & Passini, 1992), but in the library, the height of signs digressed the appropriate height and people' the cone of vision. For this reason, also according to observation and taking notes by researcher, the interaction hallways and the exits of stairs with high traffic flow was affected wayfinding task performance due to location of signs and if signs are not visible the wayfinding task performance was influence in negative way. They created the more hesitation and the more time spent.

6.2. Evaluation of Signage Types, Familiarity and Confidence

The first hypothesis was examined that the relationship between signage types and wayfinding performance in academic library. In literature, there is limited information about this relation especially in academic library. Mandel (2013) stated that directional signs are significant to easing wayfinding than informational signs. In this study, even participants stated that they utilized directional signs for finding targets, according to the results of finding of target and signage use and observations during wayfinding task, the statistical analysis show that when participants use orientation signs, they have lower number of wrong turns, but there is no significant difference between other types of signs. People may prefer to utilize orientation signs unconsciously because of the locations of orientation signs which are put on the maximum visible areas in library. With regards to these results, we can say that there is a relationship between orientation signs and wayfinding performance on number of wrong turn in academic library.

The second hypothesis was investigated the relationship between signs and familiarity according to wayfinding performance in academic library. In literature, O'neill (1991) explained that wayfinding performance improves and the complexity degree of layout becomes less important when familiarity increases. Also, when the environment is less complex, the familiarity of the environment is the main factor affecting wayfinding performance. Like a literature, this study has similar implications. According to results, participants who use library at first time have highest number of wrong turns and

completion time when compare to familiar participants. That is, when familiarity increases, the number of wrong turns, hesitations and time spent decrease in academic library also. When we analyzed the relationship between use of signs and familiarity, we found that when familiarity increases, the use of signs also increased. On the contrary unfamiliar people with a public space use external sources like signs; if people are familiar to be prone to used information from stored in memory (Garling et al., 1986; Abu-Ghenzzen, 1996). Besides, Chebat, Chebat & Therrien (2005) supported that people who are familiar to the building used information stored in long term memory. As a result, in contrast with literature, in this study, there is a relationship between signs and familiarity; that is familiar people to the library building use signs to find their way and their wayfinding task performances improved by decreasing the number of wrong turns, hesitations and time spent.

The third research question was related with the confidence with and wayfinding performance. When scale and the complexity of building are considered, perception of the building is gotten hard. When the library building analyzed in terms of building configuration and layout, we can say that it has complex building structure. During the wayfinding task and observations, it can be seen that people have difficulty in perception of the building, but in statistical analysis, it is just contrary (see Table 12). According to observations which was conducted during and after wayfinding task and also wayfinding performance criteria that are measured by the number turns of error, hesitations and time spent, people felt relaxed because they claimed

that signs directed themselves to the right route and so they did not become lost in the building. Arthur and Passini (1992) stated that people suffer frustration, stress and aggravation and can blame themselves, feel anxious and angry when they struggle to orient themselves into the built environment. As mentioned before, in this study, people felt comfort because they orient themselves by using signs. However, there is no significant relation between signs and confidence.

CHAPTER 7

CONCLUSION

The reflection of users' perspective is crucial for planning library spaces; also academic library users want to take place care of to design attractive places for their positive sense of places (Kim, 2016). These places should not be given the feelings of being lost; for this reason signs have an important role as a wayfinding strategy. The study conducted Bilkent University Library to investigate the influence of familiarity, people's confidence in cognitive maps on buildings and signage on wayfinding performance. In literature, signs and familiarity help to wayfinding performances (Arthur & Passini, 1992; O'neill, 1991; Mandel, 2013 Beecher, 2004). However, there is limited information about the relationship between utilized signs and people's confidence in cognitive map. As a result of the study, orientation signs help the improvement of wayfinding performance task. Even if people familiar with the building, they utilize signs and it causes the improvement of wayfinding performance task. However, it can found that there is no significant relation between signage and confidence.

7.1. Limitations of the study

In the study there are some limitations because participants are in communication with researcher. During wayfinding task, participants try to ask some questions. Even if researcher does not answer and not talk with participants, this situation may affect participants' behavior and it causes distractibility. Besides, following participant by researcher may cause pressure on them and participants may think that they make a mistake or they have difficulty to find destination for these reasons; they are embarrassed. To avoid this situation, a camera may help to follow the participants. They may feel comfort and they have concentrate on the study more effectively. That is, instead of following participants, a monitor system in the building may be an appropriate method.

In the future studies, after wayfinding task, the description of route from participants should be wanted to describe, it is investigated which types of route strategy help to people for describing their route and also people's perception of the understandability of building can be evaluated accurately. This study was conducted only one academic library. If the future studies composed with more than one building by comparing signs, it can be understood what type of signs are more helpful to find way and therefore a guideline should be composed related with signs and academic library.

This study is also limited to working area. In this study only general areas were included. In the future, this type of study should be conducted on reading and shelves area because their locations and layout are considerably

complex and directories are needed. Besides, this study includes types of signs but their locations are also important for wayfinding (Arthur & Passini, 1992). In future studies, the locations of type of signs should be investigated.

The findings of the experiment may provide some clues for interior architects, graphic designer, sign makers, building managers and environmental psychologists who may be interested in different factors affecting user behavior.

REFERENCES

Abu-Ghazzeh, T. M. (1996). Movement and wayfinding in the King Saud University built environment: A look at freshman orientation and environmental information. *Journal of Environmental Psychology, 16*(4), 303-318.

Abu-Obeid, N. (1998). Abstract and Scenographic imagery: the effect of environmental form on wayfinding. *Journal of Environmental Psychology, 18*, 159-173.

Allen, G. L. (1999). Spatial abilities, cognitive maps and wayfinding: Bases for individual differences in spatial cognition and behaviour. In R. G. Golledge (Ed.). *Wayfinding Behavior: Cognitive Mapping and Other Spatial Processes*, 46-80.

Allen, G. L. (2000). Principles and practices for communicating route knowledge. *Applied Cognitive Psychology, 14*, 333-359.

Arthur, P. & Passini, R. (1992). *Wayfinding: People, Signs and Architecture.* New York: Mc. Graw-Hill.

Association of Research Libraries. (2009). Retrieved from LibQUAL+ 2009 survey. Washington, D.C.: Association: http://www.csuchico.edu/library/libadmin/LibQual2009.pdf

Başkaya, A., Wilson, C. & Özcan, Y. Z. (2004). Wayfinding in an unfamiliar environment: Different spatial settings of two polyclinics. *Environment and Behavior,, 36*(6), 839-867.

Beecher, A. B. (2004). *Wayfinding tool in public library buildings: A multiple case study.* unpublished doctoral thesis, Universty of North Texas, Denton, TX.

Bell, S. & Saucier, D. (2004). Relationship among environmental pointing accuracy, mental rotation, sex, and hormones. *Environment and Behavior, 36*(2), 251-265.

Best, G. A. (1970). Direction Finding in Large Buildings. *Architectural Psychology*, 72-91.

Bourdeau, L. & Chebat, J. C. (2003). The effect of signage and location of work of art on recall of titles and paining in art galleries. *Environment and Behavior, 35*(2), 203-226.

British Standard Institution. (1990). *Fire safety signs, notices and graphic symbols. Specification for fire safety signs*.

Bronzaft, A. & Dobrow, S. (1984). Improving Transit Information. *Journal of Environmental Systems, 13*, 365-375.

Brown, C. A. (2002.). *Interior design for libraries: Drawing of function and appeal.* Chicago: American Library Assosication.

Carpmen, J. R., Grant, M. A. & Simmons, D. (1984). *No more mazes. Research about design for wayfinding.* The University of Michigan, Ann Arbor, Michigan.

Chai, X. J., & Jacobs, L., F. (2009). Sex differences in directional cue use in a virtual landscape. *Behavioral Neuroscience, 123*(2), 276-283.

Chebat, J. C., Chebat, C. G. & Therrien, K. (2005). Lost in a mall, the effect of gender, familiarity with the shopping mall and the shpping values on shoppers' wayfinding processes. *Journal of Business Research, 58*, 1590-1598.

Churchill, A., Dada, E., de Barros, A. G. & Wirasinghe, S. C. (2009). Qualifiying and validating measures of airport terminal wayfinding. *Journal of Air Transport Management, 14*, 151-158.

Chrysler, S., Tranchida, D., Stackhouse, S., & Arthur, E. (2001). Improving street name signs legibility for older drivers. *Proceeding of the Human Factors and Ergonomics Society Annual Meeting, 45*(23), 1597-1601.

Colori, C., & Vanden-Eynden, D. (2015). *Signage and wayfinding design: A complete guide to creating environmental graphic design systems.* John Wiley & Sons.

Coluccia, E. & Louse, G. (2004). Gender differences in spatial orientation: A review. *Journal of Environmental Psychology, 24*, 329-340.

Cornell, E. H., Sorenson, A. & Mio, T. (2003). Human sense of direction and wayfinding. *Annals of the Association of American Geographers, 93*(2), 399-425.

Coté, R., & Harrington, G. E. (2011). *Life safety code handbook.* National Fire Protection Association.

Cubukcu, E. & Nasar, J. L. (2005). Relation of physical form to spatial knowledge in large-scale virtual environments. *Environment and Behavior, 37*(3), 397-417.

Daniel, M.P., Tom, A., Manghi, E., & Denis, M. (2003). Testing value of route directions through navigational performance. *Spatial Cognition and Computation, 3*(4), 269-289.

Darken, R. P. & Peterson, B. (2002). Spatial orientation, wayfinding and representation. *Handbook of Virtual Environment Technology*, 1-22.

Denis, M., Pazzaglia, F., Cornoldi, C., & Bertolo, L. (1999). Spatial discourseand navigation: an analysis of route directions in the city Venice. *Applied Cognitive Psychology, 13*, 145-174.

Demas,S. (2005). From the ashes of Alexandria: What's happening in the college library?. In G. T. FreeMan (Eds.). L*ibrary as place: Rethnking roles, rethinking space*. (pp. 25-40) Washington, D.C.: Council on Library and Information Resources

Devlin, A. S. & Bernstain, J. (1998). Interactive wayfinding: Map style and effectiveness. *Journal of Environmental Psychology, 17*, 99-110.

Doğu, U. & Erkip, F. (2000). Spatial factors affecting wayfinding and orientation: A case study in a shopping mall. *Environment and Behavior, 32*(6), 731-755.

Doğu, U. (2001). *Spatial familiarity as a dimension of wayfinding.* unpublished doctoral thesis, Bilkent University, Ankara.

Downs, R. M. (1979). *Mazes, minds and maps.* New york: R. R. Bowker.

Eaton, G., Vocino, M. & Taylor, M. (1992). evaluating signs in a university library. *Collection Management, 16*(3), 81-101.

Galea, L. A. & Kimura, D. (1993). Sex differences in route-learning. *Personality and Individual Differences, 14*(1), 53-65.

Garling, T., Lindberg, E. & Mantyla, T. (1983). Orientatiion in buildings: Effects of familiarity, visual access and orientation aids. *Journal of Applied Psychology, 68*, 177-186.

Garvey, P., Pietrucha, M., & Meeker, D. (1997). Effects of front and capitalization on legibility of guide signs. *Transportation Research Record: Journal of Transportation Research Board, 1605*, 73-79.

Gifford, R. (2002). Environmental attitudes, appraisals and assessments. In B. C. Victoria, & (Ed.), *Environmental Psychology: Principles and Practice* (pp. 56-99). Canada Optimal Books.

Giuliani, R. W. (2001). *Universal Design New York.* New York: Mayor Publicaiton.

Golledge, R. G. (1999). *Wayfinding behavior: Cognitive mapping and other spatial processes.* Baltimore: John Hopkins University Press.

Helvacıoğlu, E. & Olguntürk, N. (2011). Color and Wayfinding. *Optics & Laser Technology, 43*(1), 410-419.

Helvacıoğlu, E. (2007). *Color contribution to children's wayfinding in school environment.* (Master dissertation). The department of interior architecture and environmental design and the institute of fine arts Bilkent University, Ankara.

Hölscher, C., Meilinger, T., Vrachliotis, G., Brösamle, M., & Knauff, M. (2006). Up the down staircase: Wayfinding stragies in multi-level buildings. *Journal of Environmental Psychology, 26*, 284-279.

Hund, A. M., & Gill, D. M. (2014). What constitutes effective wayfinding directions: The interactive role of descriptive cues and memory demands. *Journal of Environmental Psychology, 38*, 217-224.

Hund, A. M., & Minarik, J. L. (2006). Getting from here to there: Spatial anxiety, wayf,nding strategies, direction type, and wayfinding efficiency. *Spatial Cognition and Computation, 6*, 179-201

Infield, S. D. (1991). *An investigation in to the relationship between navigation skill and spatial abilities.* Doctoral dissertation, University of Washington.

Janet, R., & Myron,A. (1993). *Design That Care.* Baskerville: American Hospital Publishing.

Kaplan, S. (1983). A model of person-environment compatibility. *Environment and Behavior, 15*(3).

Kim, J. A. (2016). Dimensions of user perception of academic library as place. *The Journal of Academic Librarianship*, in press.

Kitchin, R. M. (1994). Cognitive maps: What are they and why study them? *Journal of Environmental Psychology, 14*.

Kumoğlu, Ö. (2013). *The effects of correlated color temperature on wayfinding: A study in a virtual airport environment.* (Master dissertation). The department of interior architecture and environmental design and the institute of fine arts Bilkent University, Ankara.

Lawton, C. A. (1996). Strategies for indoor wayfinding: The role of orientation. *Journal of Environmental Psychology, 16*, 137-145.

Leckie, G. J., & Buschman, J. E. (2007). Space, place and libraries: An introduction. In J. E. Buschman, & G. J. Leckie (Eds.). *The library as place: History, community, and culture*. Libraries Unlimited: Westport, CT.

Li. R. & Klippel, A. (2012). Wayfinding in libraries: Can problems be predicted? *Journal of map and Geography Libraries, 8*, 21-38.

Lynch, K. (1960). *The image of the city.* Cambridge: The Technology Press and Harvard University press.

Mallery, M. S., & DeVore, R. E. (1982). *A signs system for libraries.* American Library Association.

Mandel, L. H. (2013). Finding their way: How public library useers wayfind. *Library and Information Science Research, 35*, 264-272.

McLean, K. (1993). *Planning for people in museum exhibitions.* Wahington DC: Association of Science Technology Centers.

Miller, C. & Lewis, D. (1999). *Wayfnding:Effective wayfinding and signing systems-guidance for healthcare facilities.* London: The Stationery Office Books.

Ministry of Public Security of the Peoples Republic of China. (2005). *Design code for fire protectionof high rise civil architecture*.

Ministry of Public Security of the Peoples Republic of China. (2008). *Safety signs and guidelinesfor the use*.

Montello, D. R. (1998). A new framework for understanding the acquisition of spatial knowledge in large scale environments. In M. J. Egenhofer, & R. G. Golledge (Eds.). *Spatial and Temporal Reasoning in Geographic Information System* (pp 143-154). New York: Oxford University Press.

Montello, D. R. & Freundschuh, S. (2005). *Cognition of Geographic Information.* Boca Raton: CRC Press.

Montello, D. R., Hegarty, M., & Waller, D. (2004). Spatial memory of real environments, virtual environments, and maps. In G. L. Allen (Ed.). *Human spatial Memory: Remembering Where* (pp 251-285). Matwah, NJ: Erlbaum.

Nassar, K. (2111). Sign visibility for pedestrians assessed with agent-based. *Transpotation Research Record: Journal of the Transportation Research Board, 2264*, 18-26.

O'neill, M. J. (1991). Effects of signage and floor plan configuration on wayfinding accuracy. *Environment and Behavior, 23*(5), 553-574.

O'neill, M. J. (1992). Effects of familiarity and plan complexity on wayfinding in simulated buildings. *Journal of Environmental Psychology, 12*, 319-327.

Padgitt, A. J., & Hund, M. A. (2012). How good are these directions? Determining direction quality and wayfinding efficiency. *Journal of Environmental Psychology, 32*, 164-172.

Parush, A. & Bermen, D. (2004). Navigation and orientation in 3D user interfaces: The impact of navigation aids and landmarks. *Journal of Human Coputer Studies, 61*, 375-395.

Passini, R. (1984). *Wayfinding in Architecture in Architecture.* New York: Van Nostrand Reinhold.

Passini, R. (1996). Wayfinding design: Logic, application and some thoughts on universality. *Design Studies, 17*, 319-331.

Peponis, J., Zimring, C. & Choi, Y. K. (1990). Finding the building in wayfinding. *Environment and Behavior, 22*, 555-590.

Peterson, C. A. (2005). Space designed for lifelong learning: The Dr. Martin Luther King Jr. Joint-Use Library. In G. T. Freeman (Eds.), *Library as place: Rethinking roles, rethinking space* (pp. 56-65). Washington DC: Council on Library and Inform Resources.

Pollet, D. & Haskell, P. (1979). *Sign systems for libraries: Solving the wayfinding problem.* New York: Idea Publications.

Ramadier, T. & Moser, G. (1998). Social legibility, the cognitive map and urban behavior. *Journal of Environmental Psychology, 18*, 307-319.

Raubal, M. & Egenhofer, M. (1998). Commparing the complexity of wayfinding tasks in built environments. *Environment and Planning, 26*(6), 895-913.

Rousek, J. B. & Hallbeck, M. S. (2011). The use of simulated visual impairment to identify hospital design elements that contribute to wayfinding difficulties. *International Journal of Industrial Ergonomics, 41*, 447-458.

Ruddle, R. A. & Lessels, S. (2006). Three levels of metric for evaluating wayfinding presence. *Teleoperators and Virtual Environments, 15*, 637-654.

Ruddle, R. A., & Peruch, P. (2004). Effects of proprioceptive feedbback and environmental characteristics on spatial learning in virtual environments. *International Journal of Human-Computer Studies, 60*, 299-326.

Sancaktar, İ. (2006). *Updating spatial orientation in virtual environments.* (Master dissertation). The department of interior architecture and environmental design and the institute of fine arts Bilkent University, Ankara.

Schlender, D., Peters, O. H., & Weinhöfer, M. (2000). The effects of maps ant textual information on navigation in a dekstop virtual environment. *Spatial Cognition and Computation, 2*, 421-433.

Schmits, S. (1999). Gender differences in acquisition of environmental knowledge related to wayfinding behavior, spatial anxiety and self estimated environmental competencies. *Sex and Roles, 41*, 71-93.

Scott, A., C., Atkins, K. N., Bentzen, B. L., & Barlow, J. M. (2012). *Perception of pedestrian traffic signals by pedestrians with varying levels of vision.* Technical Report.

Seidel, A. (1982). Wayfinding in public spaces: The Dallas Forth Worth, USA Airport. *20th International Congress of Applied Psychology.* Edinburgh.

Shill, H. B., & Tonner, S. (2004). Does the building still matter? Usage pattern in new, expanded and renovated libraries, 1995-2002. *College & Research Libraries, 65*(2), 123-150.

Sholl, M. J., Acacio, J. C., Makar, R. O., & Leon, C. (2000). The relation of sex and sence of direction to spatial orientation in an unfamiliar environment. *Journal of Environmental Psychology, 20*, 17-28.

Signage Design Guidelines. (2009). Retrieved from http://www.olis.ri.gov/services/ce/presentation/SJW-SignageDesignGuidelines.pdf

Taylor, H. A., Tversky, B. (1996). Perception in spatial description. *Journal of Memory and Language, 35*, 371-391.

Tom, A. & Denis, M. (2004). Language and spatial cognition: Comparing the roles of landmarks and street manes in instructions. *Applied Cognitive Psychology, 18*, 1213-1230.

Van Dijk, B., Op Den Akker, R., Nijholt, A., & Zwiers, J. (2003). Navigation assistance in virtual worlds. *Incoming Science Journal, 6*, 115-125.

Wang, W. L., Lo S.M., Liu S. B., & Kuang, H. (2014). Microscopic modelling of pedestrian movement behavior: Interacting with visual attractors in the environment. *Transportation Research Part C: Emerging Technologies, 44*, 21-33.

Waxman, L. (2007). The library as place: Providing students with opportunities for socialization, relaxation, and restoration. *New Library World, 108*(9/10), 424-434.

Weise, F. (2004). Being there: The library as place. *Journal of Medical Library Association, 92*(1), 6-13.

Weisman, J. (1981). Evaluating architectural legibility. *Environment and Behavior, 13*(2), 189-204.

Wong, L. T., & Lo, K. C. (2007). Experimental study on visibility of exists signs in buildings. *Building and environment, 42*(4), 1836-1842.

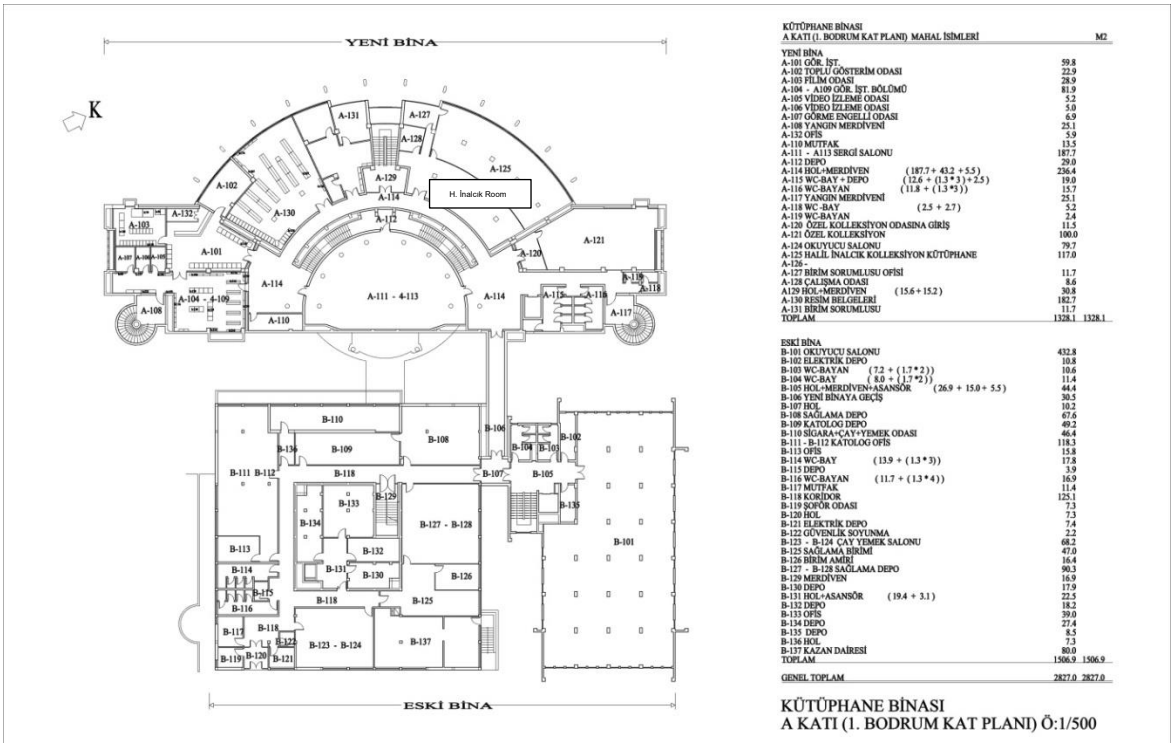
Xia, J., Arrowsmith, C., Jackson, M., & Cartwright, W. (2008). The wayfinding process relationship between decision-making and landmark utility. *Tourism Management, 29*, 445-457.

Zhang, Z., Jia, L., & Qin, Y. (2017). Optimal number and location planning of evacuation signage in public space. *Safety Science, 91*, 132-147

APPENDIX A

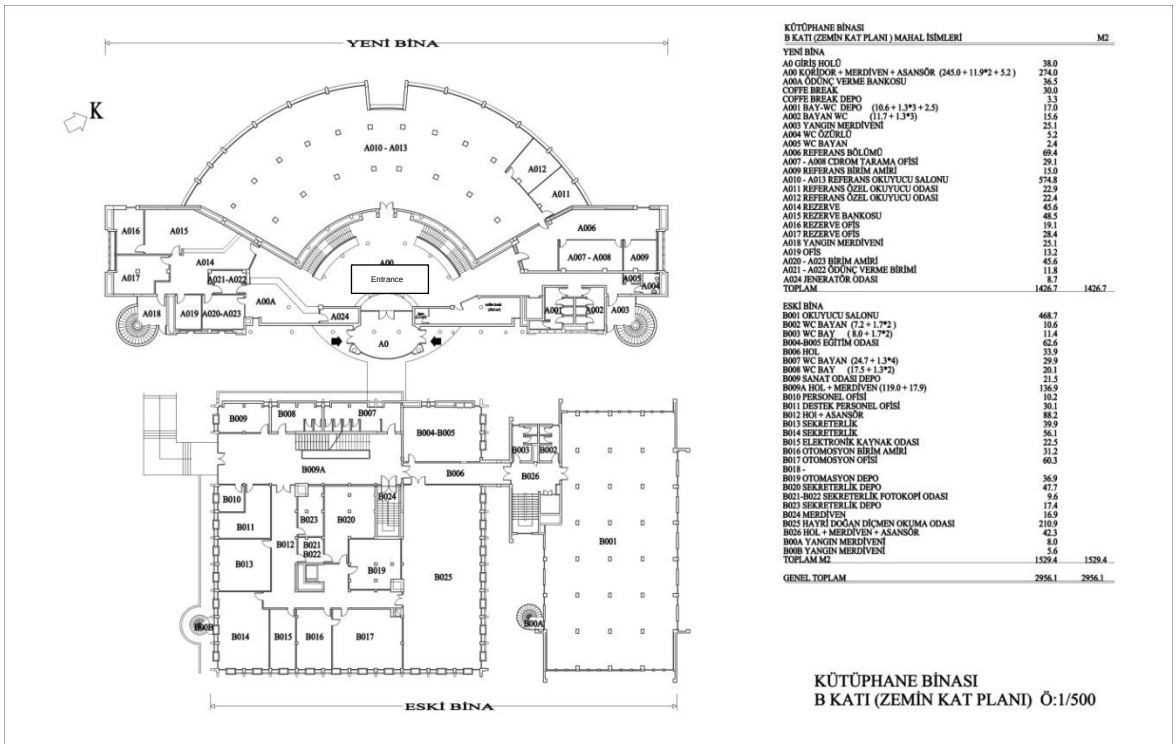
LIBRARY PLANS and PHOTOGRAPHS

APPENDIX A1: Library Plans



KÜTÜPHANE BİNASI A KATI (1. BODRUM KAT PLANI) MAHAL İSİMLERİ		M2
YENİ BİNA		
A-101 GÖR. İŞT.		59.8
A-102 TOPLU GÖSTERİM ODASI		22.9
A-103 FİLİM ODASI		28.9
A-104 - A109 GÖR. İŞT. BÖLÜMÜ		81.9
A-105 VİDEO İZLEME ODASI		5.2
A-106 VİDEO İZLEME ODASI		5.0
A-107 GÖRME ENGELLİ ODASI		6.9
A-108 YANGIN MERDİVENİ		25.1
A-132 OFİS		5.9
A-110 MUTFAK		13.5
A-111 - A113 SERGİ SALONU		187.7
A-112 DEPO		29.0
A-114 HOL+MERDİVEN	(187.7 + 43.2 + 5.5)	236.4
A-115 WC-BAY + DEPO	(12.6 + (1.3 * 3) + 2.5)	19.0
A-116 WC-BAYAN	(11.8 + (1.3 * 3))	15.7
A-117 YANGIN MERDİVENİ		25.1
A-118 WC -BAY	(2.5 + 2.7)	5.2
A-119 WC-BAYAN		2.4
A-120 ÖZEL KOLLEKSİYON ODASINA GİRİŞ		11.5
A-121 ÖZEL KOLLEKSİYON		100.0
A-124 OKUYUCU SALONU		79.7
A-125 HALİL İNALCIK KOLLEKSİYON KÜTÜPHANE		117.0
A-126 -		
A-127 BİRİM SORUMLUSU OFİSİ		11.7
A-128 ÇALIŞMA ODASI		8.6
A129 HOL+MERDİVEN	(15.6 + 15.2)	30.8
A-130 RESİM BELGELERİ		182.7
A-131 BİRİM SORUMLUSU		11.7
TOPLAM		1328.1 1328.1
ESKİ BİNA		
B-101 OKUYUCU SALONU		432.8
B-102 ELEKTRİK DEPO		10.8
B-103 WC-BAYAN	(7.2 + (1.7 * 2))	10.6
B-104 WC-BAY	(8.0 + (1.7 * 2))	11.4
B-105 HOL+MERDİVEN+ASANSÖR	(26.9 + 15.0 + 5.5)	44.4
B-106 YENİ BİNAYA GEÇİŞ		30.5
B-107 HOL		10.2
B-108 SAĞLAMA DEPO		67.6
B-109 KATOLOG DEPO		49.2
B-110 SİGARA+ÇAY+YEMEK ODASI		46.4
B-111 - B-112 KATOLOG OFİS		118.3
B-113 OFİS		15.8
B-114 WC-BAY	(13.9 + (1.3 * 3))	17.8
B-115 DEPO		3.9
B-116 WC-BAYAN	(11.7 + (1.3 * 4))	16.9
B-117 MUTFAK		11.4
B-118 KORİDOR		125.1
B-119 ŞOFÖR ODASI		7.3
B-120 HOL		7.3
B-121 ELEKTRİK DEPO		7.4
B-122 GÜVENLİK SOYUNMA		2.2
B-123 - B-124 ÇAY YEMEK SALONU		68.2
B-125 SAĞLAMA BİRİMİ		47.0
B-126 BİRİM AMİRİ		16.4
B-127 - B-128 SAĞLAMA DEPO		90.3
B-129 MERDİVEN		16.9
B-130 DEPO		17.9
B-131 HOL+ASANSÖR	(19.4 + 3.1)	22.5
B-132 DEPO		18.2
B-133 OFİS		39.0
B-134 DEPO		27.4
B-135 DEPO		8.5
B-136 HOL		7.3
B-137 KAZAN DAİRESİ		80.0
TOPLAM		1506.9 1506.9
GENEL TOPLAM		2827.0 2827.0

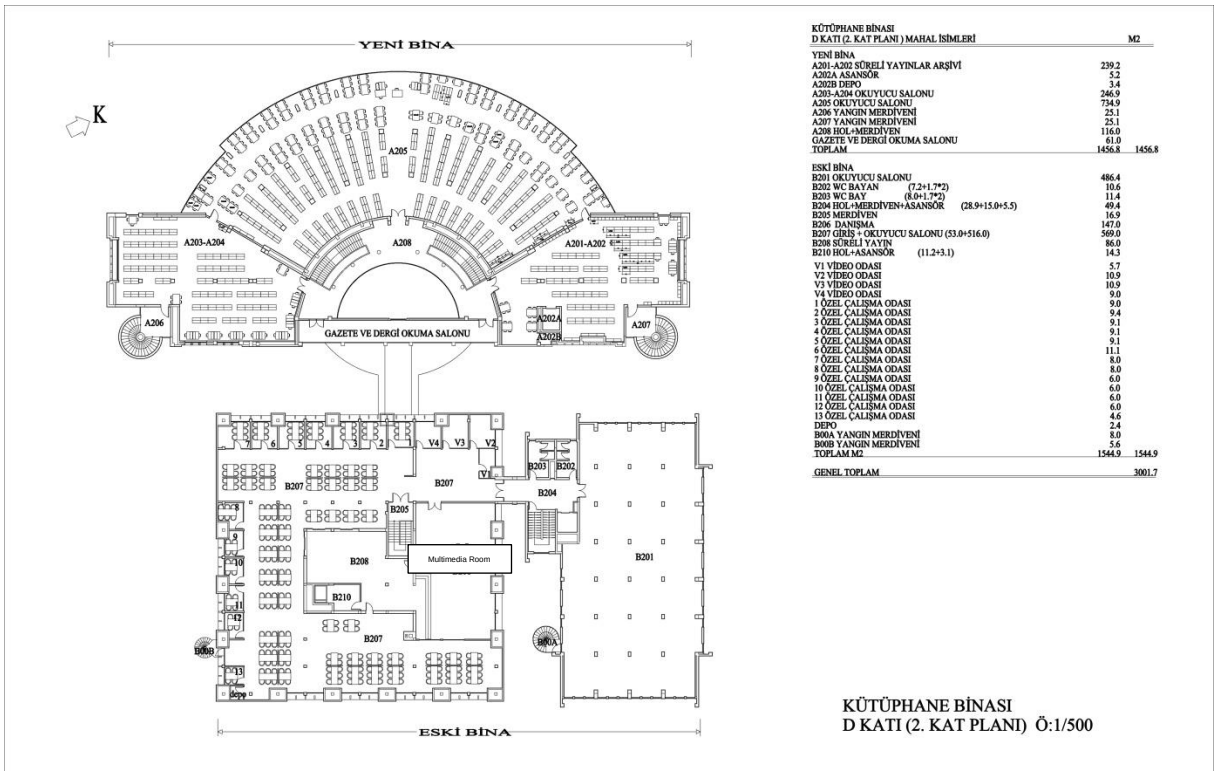
Figure 10: Basement floor plan



KÜTÜPHANE BİNASI B KATI (ZEMİN KAT PLANI) MAHAL İSİMLERİ		M2
YENİ BİNA		
A0 GİRİŞ HOLÜ	38.0	
A00 KORİDOR + MERDİVEN + ASANSÖR (245.0 + 11.9*2 + 5.2)	274.0	
A00A ÖDÜNÇ VERME BANKOSU	36.5	
COFFE BREAK	30.0	
COFFE BREAK DEPO	3.3	
A001 BAY-WC DEPO (10.6 + 1.3*3 + 2.5)	17.0	
A002 BAYAN WC (11.7 + 1.3*3)	15.6	
A003 YANGIN MERDİVENİ	25.1	
A004 WC ÖZÜRLÜ	5.2	
A005 WC BAYAN	2.4	
A006 REFERANS BÖLÜMÜ	69.4	
A007 - A008 CDROM TARAMA OFİSİ	29.1	
A009 REFERANS BİRİM AMİRİ	15.0	
A010 - A013 REFERANS OKUYUCU SALONU	574.8	
A011 REFERANS ÖZEL OKUYUCU ODASI	22.9	
A012 REFERANS ÖZEL OKUYUCU ODASI	22.4	
A014 REZERVE	45.6	
A015 REZERVE BANKOSU	48.5	
A016 REZERVE OFİS	19.1	
A017 REZERVE OFİS	28.4	
A018 YANGIN MERDİVENİ	25.1	
A019 OFİS	13.2	
A020 - A023 BİRİM AMİRİ	45.6	
A021 - A022 ÖDÜNÇ VERME BİRİMİ	11.8	
A024 JENERATÖR ODASI	8.7	
TOPLAM	1426.7	1426.7
ESKİ BİNA		
B001 OKUYUCU SALONU	468.7	
B002 WC BAYAN (7.2 + 1.7*2)	10.6	
B003 WC BAY (8.0 + 1.7*2)	11.4	
B004-B005 EĞİTİM ODASI	62.6	
B006 HOL	33.9	
B007 WC BAYAN (24.7 + 1.3*4)	29.9	
B008 WC BAY (17.5 + 1.3*2)	20.1	
B009 SANAT ODASI DEPO	21.5	
B009A HOL + MERDİVEN (119.0 + 17.9)	136.9	
B010 PERSONEL OFİSİ	10.2	
B011 DESTEK PERSONEL OFİSİ	30.1	
B012 HOL + ASANSÖR	88.2	
B013 SEKRETERLİK	39.9	
B014 SEKRETERLİK	56.1	
B015 ELEKTRONİK KAYNAK ODASI	22.5	
B016 OTOMOSYON BİRİM AMİRİ	31.2	
B017 OTOMOSYON OFİSİ	60.3	
B018 -		
B019 OTOMASYON DEPO	36.9	
B020 SEKRETERLİK DEPO	47.7	
B021-B022 SEKRETERLİK FOTOKOPİ ODASI	9.6	
B023 SEKRETERLİK DEPO	17.4	
B024 MERDİVEN	16.9	
B025 HAYRİ DOĞAN DİÇMEN OKUMA ODASI	210.9	
B026 HOL + MERDİVEN + ASANSÖR	42.3	
B00A YANGIN MERDİVENİ	8.0	
B00B YANGIN MERDİVENİ	5.6	
TOPLAM M2	1529.4	1529.4
GENEL TOPLAM	2956.1	2956.1

KÜTÜPHANE BİNASI
B KATI (ZEMİN KAT PLANI) Ö:1/500

Figure 11: Ground floor plan



KÜTÜPHANE BİNASI D KATI (2. KAT PLANI) MAHAL İSİMLERİ		M2
YENİ BİNA		
A201-A202 SÜREL YAYINLAR ARŞİVİ	239.2	
A202A ASANSÖR	5.2	
A202B DEPO	3.4	
A203-A204 OKUYUCU SALONU	246.9	
A205 OKUYUCU SALONU	734.9	
A206 YANGIN MERDİVENİ	25.1	
A207 YANGIN MERDİVENİ	25.1	
A208 HOL+MERDİVEN	116.0	
GAZETE VE DERGİ OKUMA SALONU	61.0	
TOPLAM	1456.8	1456.8
ESKİ BİNA		
B201 OKUYUCU SALONU	486.4	
B202 WC BAYAN (7.2+1.7*2)	10.6	
B203 WC BAY (8.0+1.7*2)	11.4	
B204 HOL+MERDİVEN+ASANSÖR (28.9+15.0+5.5)	49.4	
B205 MERDİVEN	16.9	
B206 DANIŞMA	147.0	
B207 GİRİŞ + OKUYUCU SALONU (53.0+516.0)	569.0	
B208 SÜRELİ YAYIN	86.0	
B210 HOL+ASANSÖR (11.2+3.1)	14.3	
V1 VİDEO ODASI	5.7	
V2 VİDEO ODASI	10.9	
V3 VİDEO ODASI	10.9	
V4 VİDEO ODASI	9.0	
1 ÖZEL ÇALIŞMA ODASI	9.0	
2 ÖZEL ÇALIŞMA ODASI	9.4	
3 ÖZEL ÇALIŞMA ODASI	9.1	
4 ÖZEL ÇALIŞMA ODASI	9.1	
5 ÖZEL ÇALIŞMA ODASI	9.1	
6 ÖZEL ÇALIŞMA ODASI	11.1	
7 ÖZEL ÇALIŞMA ODASI	8.0	
8 ÖZEL ÇALIŞMA ODASI	8.0	
9 ÖZEL ÇALIŞMA ODASI	6.0	
10 ÖZEL ÇALIŞMA ODASI	6.0	
11 ÖZEL ÇALIŞMA ODASI	6.0	
12 ÖZEL ÇALIŞMA ODASI	6.0	
13 ÖZEL ÇALIŞMA ODASI	4.6	
DEPO	2.4	
B00A YANGIN MERDİVENİ	8.0	
B00B YANGIN MERDİVENİ	5.6	
TOPLAM M2	1544.9	1544.9
GENEL TOPLAM		3001.7

KÜTÜPHANE BİNASI
D KATI (2. KAT PLANI) Ö:1/500

Figure 12: Second floor plan

APPENDIX A2: Library Photos

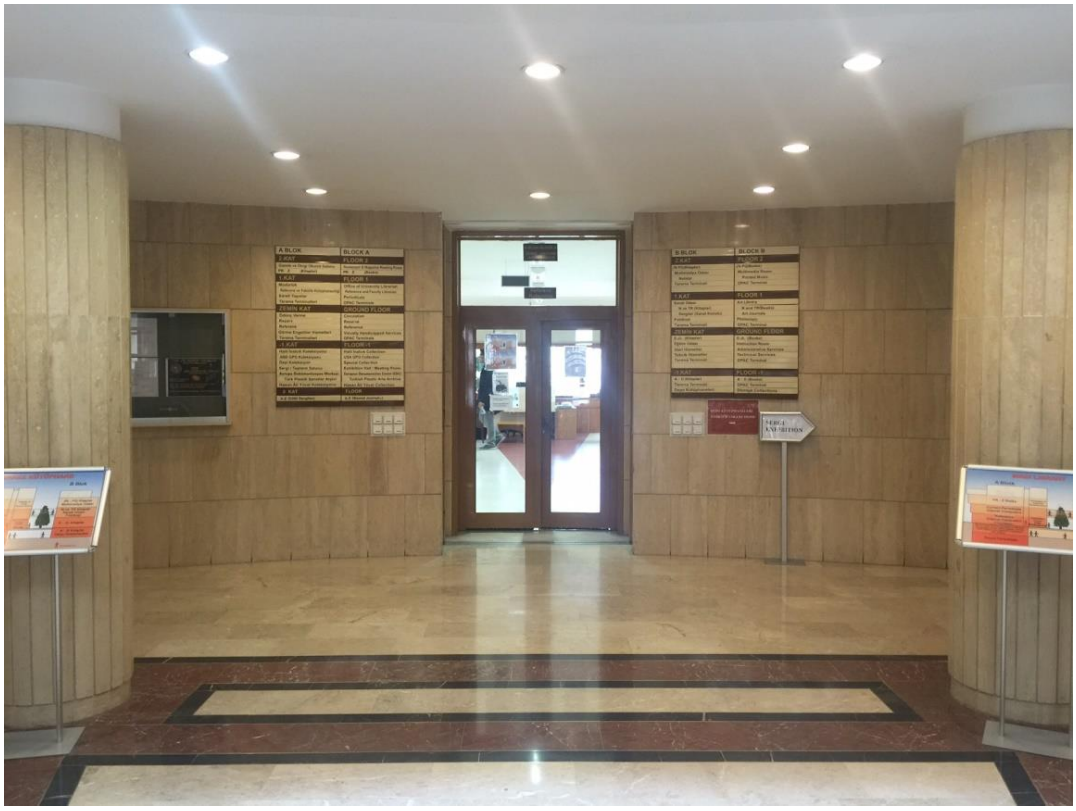


Figure 13: View from entrance of library

Figure 14: Orientation signs at ground floor

Figure 15: The bridge between A block and B block

Figure 16: Orientation signs at first floor

Figure 17: Directional signs at first floor

Figure 18: Identification signs at ground floor

Figure 19: Directional signs at basement floor

APPENDIX B

QUESTIONNAIRE and RESEARCHER NOTE CARD

APPENDIX B1: Questionnaire

Kütüphane Mekân Değerlendirme Çalışması

Bu çalışmanın amacı iç mekân kullanımı hakkında bilgi edinmektir.
Sizden istenen girişten başlayıp aşağıda belirtilen iki odaya gitmenizdir; bu sırada rotanızı kendiniz belirleyiniz. Odalardan biri 'Halil İnalcık Odası' diğeri ise 'Multimedya Odası'dır.

Tur boyunca bir araştırmacı size eşlik edecektir.
Bu çalışmaya katılımınız isteğe bağlıdır. Araştırma sonuçları sizinle ilişkilendirilmeyecek ve bu çalışma dışında herhangi bir yerde kullanılmayacaktır.

Çalışmadan sorumlu araştırmacı: İdil Duran - İç Mimarlık ve Çevre Tasarımı Bölümü, Yüksek Lisans Öğrencisi; Sorularınız için: idilesen87@gmail.com

Okuduğunuz Bölüm	
Cinsiyet	( ) K ( ) E ( ) Diğer

1. Bu kütüphaneyi ne zamandan beri kullanıyorsunuz?	( ) İlk kullanışım ( ) 1 haftadan az ( ) 1 hafta – 1ay ( ) 1 ay – 1yıl ( ) 1 yıldan fazla
2. Kütüphaneyi ne sıklıkla kullanıyorsunuz?	( ) Bu ilk gelişim ( ) Her gün ( ) Haftada birkaç kez ( ) Ayda birkaç kez ( ) Yılda birkaç kez
3. Binaya kendinizi ne kadar aşina hissediyorsunuz (ne kadar tanıdığınızı düşünüyorsunuz)?	( ) Bu ilk gelişim ( ) Biraz aşinayım ( ) Aşinayım ( ) Oldukça aşinayım ( ) Çok aşinayım
4. Bu binayı en son kullandığınızdan beri ne kadar zaman geçti?	( ) 1 yıldan az ( ) 1 – 3 yıl arası ( ) 3 – 5 yıl arası ( ) 5 – 7 yıl arası ( ) 7 yıldan fazla

5. Odaları kolay buldunuz mu?	Halil İnalcık ( ) Evet, kolay buldum. ( ) Hayır, bulmakta zorlandım. Sebebini yazınız: _____ ( ) Diğer: Lütfen belirtiniz: _____	Multimedya Odası ( ) Evet, kolay buldum. ( ) Hayır, bulmakta zorlandım. Sebebini yazınız: _____ ( ) Diğer: Lütfen belirtiniz: _____

	Hiç	Nadiren	Ara Sıra	Sıklıkla	Her Zaman
6. Odalara ulaşmada işaretler yardımcı oldu.					
7. Odalara ulaşmak için kullanılan işaretleri kolaylıkla anlayabildim.					
8. Yol gösteren işaretler odaları bulmama yardımcı oldu.					
9. Odalara ulaşmak için kullanılan işaretler sayıca yeterliydi.					

10. Odalara ulaşmak için aşağıdakilerden hangileri size yardımcı oldu?

11. Odalara ulaşırken yukarıda belirtilen işaretler dışında yandakilerden hangileri size yardımcı oldu?	( ) Bina görevlileri ( ) Güvenlik ( ) Öğrenciler ( ) Bina krokileri ( ) Bilgisayar ekranlarındaki tablolar ( ) Diğer: Lütfen yazınız

12. Bir yabancıyı bina içerisinde birçok yere (örneğin; odalar, merdivenler, çıkışlar) yönlendirebilir misiniz? Yaklaşık kaç faklı yere yönlendirebilirsiniz, lütfen belirtiniz?	( ) Evet, yönlendirebilirim. Lütfen kaç farklı yere yönlendirebilirsiniz belirtin. ( )
	( ) Hayır, yönlendiremem.
13. Eğer bu binanın dış hattını ve içindeki koridorların düzenini çizmeniz istenseydi bunu gerçekleştirmek zor mu kolay mı olurdu?	( ) Kolay olurdu ( ) Zor olurdu
14. Çizdiğiniz bina taslağından ne kadar emin olurdunuz?	( ) Kesinlikle emin olurdum. ( ) Emin olmazdım.

15. Kütüphanedeki turunuz boyunca işaretlerle ilgili görüşleriniz nelerdir, lütfen yazınız.

Figure 20: The questionnaire

APPENDIX B2: Researcher Note Card

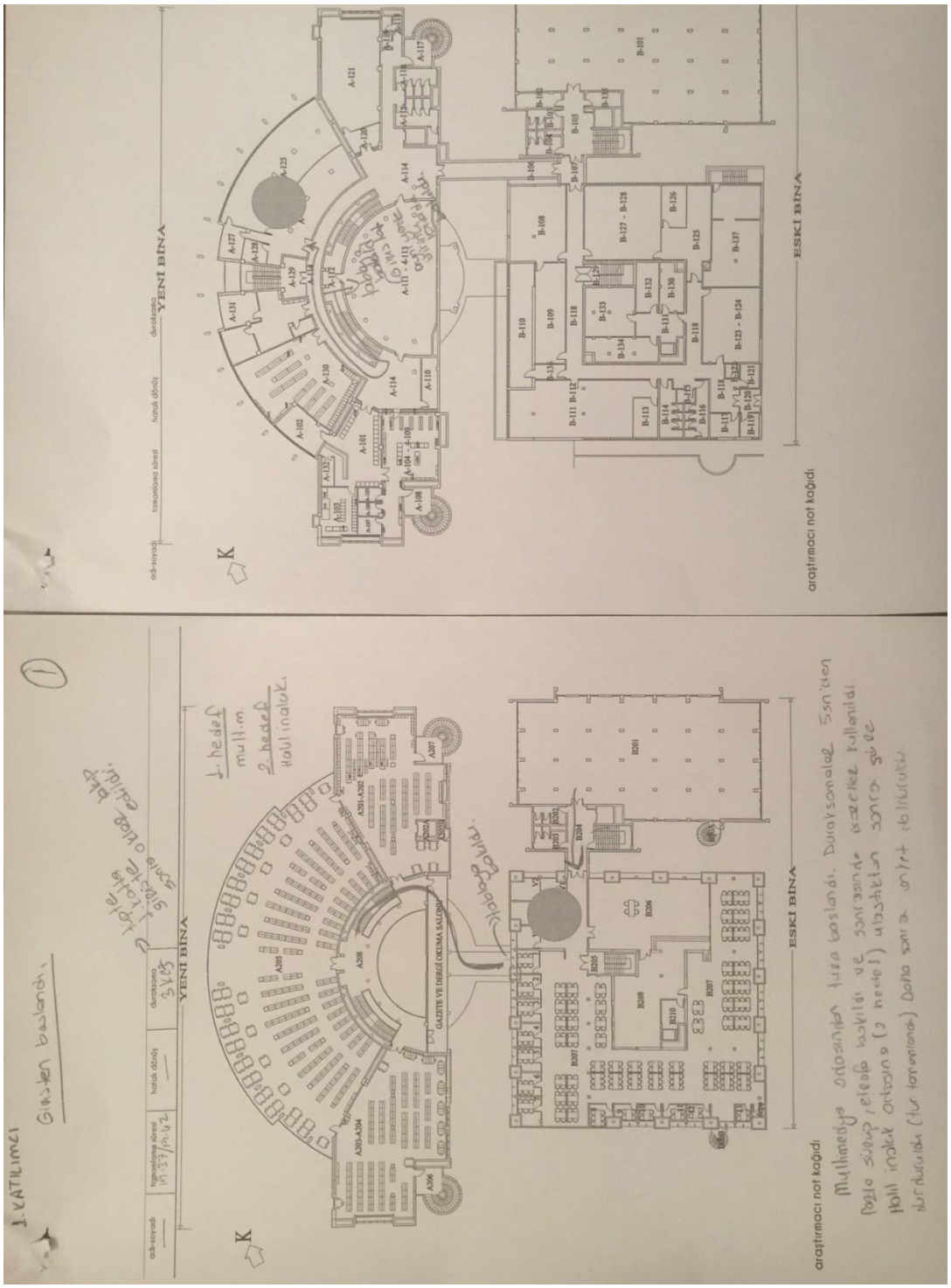


Figure 21: Example of researcher note card

APPENDIX C

STATISTICAL ANALYSIS of THE STUDY

Table 2: Frequency tables of the study

Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Law	14	19,7	19,7	19,7
	Industrial Eng.	12	16,9	16,9	36,6
	International Relations	2	2,8	2,8	39,4
	Management	8	11,3	11,3	50,7
	Political Science	4	5,6	5,6	56,3
	Psychology	3	4,2	4,2	60,6
	Economy	7	9,9	9,9	70,4
	Philosophy	3	4,2	4,2	74,6
	Molecular Biology	2	2,8	2,8	77,5
	Chemistry	5	7,0	7,0	84,5
	Math	3	4,2	4,2	88,7
	American Culture	3	4,2	4,2	93,0
	Computer Eng.	3	4,2	4,2	97,2
	Elect. Eng.	2	2,8	2,8	100,0
	Total	71	100,0	100,0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	other	1	1,4	1,4	1,4
	female	36	50,7	50,7	52,1
	male	34	47,9	47,9	100,0
	Total	71	100,0	100,0	

How long have you been using the library?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	first use	5	7,0	7,0	7,0
	1 week -1month	2	2,8	2,8	9,9
	1month-1year	7	9,9	9,9	19,7
	more than one year	57	80,3	80,3	100,0
	Total	71	100,0	100,0	

Tablo 2 (cont'd)

How often do you use the library?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	first use	5	7,0	7,0	7,0
	every day	20	28,2	28,2	35,2
	Few times a week	23	32,4	32,4	67,6
	Few times a month	21	29,6	29,6	97,2
	A few times in a year	2	2,8	2,8	100,0
	Total	71	100,0	100,0	

How do you feel familiar with the library (What is your level of familiarity with this library)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First use	5	7,0	7,0	7,0
	A little familiar	9	12,7	12,7	19,7
	Familiar	20	28,2	28,2	47,9
	Quite familiar	23	32,4	32,4	80,3
	Very familiar	14	19,7	19,7	100,0
	Total	71	100,0	100,0	

How much time has passed since the last use?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	63	88,7	88,7	88,7
	Between 1 -3 years	8	11,3	11,3	100,0
	Total	71	100,0	100,0	

Did you easily find the room? (Halil İnalcık Room)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Difficulty in finding	18	25,4	25,4	25,4
	Easy in finding	53	74,6	74,6	100,0
	Total	71	100,0	100,0	

Tablo 2 (cont'd)

Did you easily find the room? (Multimedia Room)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Difficulty in finding	9	12,7	12,7	12,7
	Easy in finding	62	87,3	87,3	100,0
	Total	71	100,0	100,0	

Signs helped to reach target rooms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	7	9,9	9,9	9,9
	rarely	8	11,3	11,3	21,1
	sometimes	14	19,7	19,7	40,8
	often	31	43,7	43,7	84,5
	always	11	15,5	15,5	100,0
	Total	71	100,0	100,0	

I can understand the signs easily to reach the rooms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	1	1,4	1,4	1,4
	rarely	5	7,0	7,0	8,5
	sometimes	19	26,8	26,8	35,2
	often	18	25,4	25,4	60,6
	always	28	39,4	39,4	100,0
	Total	71	100,0	100,0	

Directional signs helped to find the rooms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	6	8,5	8,5	8,5
	rarely	9	12,7	12,7	21,1
	sometimes	13	18,3	18,3	39,4
	often	28	39,4	39,4	78,9
	always	15	21,1	21,1	100,0
	Total	71	100,0	100,0	

Tablo 2 (cont'd)

The density of the signs was sufficient to reach the rooms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	7	9,9	9,9	9,9
	rarely	9	12,7	12,7	22,5
	sometimes	15	21,1	21,1	43,7
	often	29	40,8	40,8	84,5
	always	11	15,5	15,5	100,0
	Total	71	100,0	100,0	

Orientation Signs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not use	33	46,5	46,5	46,5
	use	38	53,5	53,5	100,0
	Total	71	100,0	100,0	

Directional Signs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not use	22	31,0	31,0	31,0
	use	49	69,0	69,0	100,0
	Total	71	100,0	100,0	

Identification Signs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not use	45	63,4	63,4	63,4
	use	26	36,6	36,6	100,0
	Total	71	100,0	100,0	

Tablo 2 (cont'd)

Which of the following helped to you to find the room?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	staff	15	21,1	21,1	21,1
	security	11	15,5	15,5	36,6
	students	7	9,9	9,9	46,5
	sketches	12	16,9	16,9	63,4
	tables on the computer screen	11	15,5	15,5	78,9
	other	15	21,1	21,1	100,0
	Total	71	100,0	100,0	

Could you direct a stranger to many places in the building (ex: rooms, stairs, and exits)? How many different place you direct?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not direct	5	7,0	7,0	7,0
	direct	66	93,0	93,0	100,0
	Total	71	100,0	100,0	

If you are asked to draw a layout showing the outline of building and arrangements of corridors inside, is it easy or difficult to perform?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	become difficult	44	62,0	62,0	62,0
	become easy	27	38,0	38,0	100,0
	Total	71	100,0	100,0	

How did you make sure that you draw the outline building?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not sure	54	76,1	76,1	76,1
	sure	17	23,9	23,9	100,0
	Total	71	100,0	100,0	

Sequence of Target Rooms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	halil inalcık	42	59,2	59,2	59,2
	multimedia	29	40,8	40,8	100,0
	Total	71	100,0	100,0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How many different place you direct?	71	0	20	4,73	3,950
The number of wrong turns	71	0	3	,87	,844
The number of hesitations	71	0	6	2,20	1,077
time spent	71	130	381	237,35	59,490
Valid N (listwise)	71				

Table 3: Correlation analysis for relationship between wrong turn, hesitation and time spent in Halil İnalcık Room

Correlations[a]				
		The number of wrong turn	Hesitation	Time spent
The number of wrong turn	Pearson Correlation	1	.479**	.404**
	Sig. (2-tailed)		,001	,008
	N	42	42	42
Hesitation	Pearson Correlation	.479**	1	.514**
	Sig. (2-tailed)	,001		,000
	N	42	42	42
Time spent	Pearson Correlation	.404**	.514**	1
	Sig. (2-tailed)	,008	,000	
	N	42	42	42
**. Correlation is significant at the 0.01 level (2-tailed).				
a. Sequence of target = halil inalcık room				

Table 4: Correlation analysis for relationship between wrong turns, hesitation and time spent in Multimedia Room

Correlations[a]				
		The number of wrong turn	Hesitation	Time spent
The number of wrong turn	Pearson Correlation	1	,293	.618**
	Sig. (2-tailed)		,122	,000
	N	29	29	29
Hesitation	Pearson Correlation	,293	1	,340
	Sig. (2-tailed)	,122		,071
	N	29	29	29
Time spent	Pearson Correlation	.618**	,340	1
	Sig. (2-tailed)	,000	,071	
	N	29	29	29
**. Correlation is significant at the 0.01 level (2-tailed).				
a.sequence of target = multimedia room				

Table 5: T Test for comparison between wrong turn, hesitation and time spent for direction sign

Group Statistics					
Directional Sign		N	Mean	Std. Deviation	Std. Error Mean
The number of wrong turn	not used	22	1,09	,921	,196
	used	49	,78	,798	,114
Hesitation	not used	22	2,27	,827	,176
	used	49	2,16	1,179	,168
Time spent	not used	22	245,91	57,608	12,282
	used	49	233,51	60,503	8,643

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The number of wrong turn	Equal variances assumed	,268	,607	1,468	69	,147	,315	,215	-,113	,744
	Equal variances not assumed			1,389	35,743	,173	,315	,227	-,145	,776
Hesitation	Equal variances assumed	3,390	,070	,394	69	,695	,109	,278	-,445	,664
	Equal variances not assumed			,449	56,290	,655	,109	,244	-,379	,598
Time spent	Equal variances assumed	,124	,726	,810	69	,421	12,399	15,305	-18,134	42,932
	Equal variances not assumed			,826	42,401	,414	12,399	15,019	-17,901	42,699

Table 6: T test for comparison between wrong turn, hesitation and time spent for identification sign

Group Statistics					
Identification Sign		N	Mean	Std. Deviation	Std. Error Mean
The number of wrong turn	not used	45	,76	,830	,124
	used	26	1,08	,845	,166
Hesitation	not used	45	2,11	1,005	,150
	used	26	2,35	1,198	,235
Time spent	not used	45	234,20	59,123	8,813
	used	26	242,81	60,899	11,943

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The number of wrong turn	Equal variances assumed	,783	,379	-1,562	69	,123	-,321	,206	-,732	,089
	Equal variances not assumed			-1,554	51,546	,126	-,321	,207	-,736	,094
Hesitation	Equal variances assumed	1,106	,297	-,884	69	,380	-,235	,266	-,765	,295
	Equal variances not assumed			-,843	45,215	,403	-,235	,279	-,796	,326
Time spent	Equal variances assumed	,106	,746	-,585	69	,561	-8,608	14,724	-37,982	20,767
	Equal variances not assumed			-,580	51,042	,565	-8,608	14,843	-38,406	21,190

Table 7: T Test for comparison between wrong turns, hesitations and time spent for orientation sign

Group Statistics					
Orientation Sign		N	Mean	Std. Deviation	Std. Error Mean
The number of wrong turn	not used	33	1,09	,879	,153
	used	38	,68	,775	,126
Hesitation	not used	33	2,27	,911	,159
	used	38	2,13	1,212	,197
Time spent	not used	33	249,36	56,680	9,867
	used	38	226,92	60,636	9,836

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The number of wrong turn	Equal variances assumed	1,630	,206	2,072	69	,042	,407	,196	,015	,798
	Equal variances not assumed			2,054	64,393	,044	,407	,198	,011	,802
Hesitation	Equal variances assumed	,887	,350	,548	69	,586	,141	,258	-,373	,655
	Equal variances not assumed			,559	67,678	,578	,141	,253	-,363	,645
Time spent	Equal variances assumed	,387	,536	1,603	69	,113	22,443	13,999	-5,486	50,371
	Equal variances not assumed			1,611	68,606	,112	22,443	13,932	-5,354	50,240

Table 8: T test for comparison between wrong turn, hesitation and time spent for library using time

Library Using Time		n	mean	SD	t	p
The number of wrong turn	low familiarity	5	1.80	0.45	4.38	0.00*
	high familiarity	64	0.81	0.83		
Hesitation	low familiarity	5	3.00	1.22	1.8	0.08
	high familiarity	64	2.11	1.06		
Time spent	low familiarity	5	307.00	35.65	2.83	0.00*
	high familiarity	64	231.98	58.05		

Table 9: T test for comparison between wrong turn, hesitation and time spent for frequency of library using

Frequency		n	mean	SD	t	p
The number of wrong turn	low familiarity	7	1.43	0.79	2.02	0.05*
	high familiarity	43	0.79	0.77		
Hesitation	low familiarity	7	2.43	1.40	0.79	0.43
	high familiarity	43	2.05	1.16		
Time spent	low familiarity	7	282.57	52.65	2.66	0.01*
	high familiarity	43	224.30	54.01		

Table 10: T test for comparison between wrong turn, hesitation and time spent for familiarity

Familiarity		n	mean	SD	t	p
The number of wrong turn	low familiarity	14	1.29	0.726	2.93	0.00*
	high familiarity	37	0.57	0.801		
Hesitation	low familiarity	14	2.64	0.929	2.22	0.03*
	high familiarity	37	1.95	1.026		
Time spent	low familiarity	14	264.64	60.185	2.84	0.00*
	high familiarity	37	217.92	49.460		

Table 111: Respondents' confidence with cognitive map of building

		n	**%**
Could you direct a stranger to many places in the building (ex: rooms, stairs, and exits)? How many different place you direct?	not direct	5	7
	direct	66	93
If you are asked to draw a layout showing the outline of building and arrangements of corridors inside, is it easy or difficult to perform?	hard	44	62
	difficult	27	38
How did you make sure that you draw the outline building?	not sure	54	76,1
	sure	17	23,9

Table 12: Correlations for overall

		Signs helped to reach target rooms	I can understand the signs easily to reach the rooms	Directional signs helped to find the rooms	The density of the signs was sufficient to reach the rooms	Number of wrong turns	Number of hesitations	Time spent	Familiarity	Confidence
Signs helped to reach target rooms	Pearson Correlation	1	.369**	.470**	.374**	.085	.089	.144	-.138	-.054
	Sig. (2-tailed)		.002	.000	.001	.481	.462	.232	.251	.655
	N	71	71	71	71	71	71	71	71	71
I can understand the signs easily to reach the rooms	Pearson Correlation	.369**	1	.605**	.676**	-.220	-.054	-.343**	.271*	.011
	Sig. (2-tailed)	.002		.000	.000	.066	.657	.003	.022	.930
	N	71	71	71	71	71	71	71	71	71
Directional signs helped to find the rooms	Pearson Correlation	.470**	.605**	1	.622**	-.117	.008	-.258*	.033	.143
	Sig. (2-tailed)	.000	.000		.000	.333	.949	.030	.786	.235
	N	71	71	71	71	71	71	71	71	71
The density of the signs was sufficient to reach the rooms	Pearson Correlation	.374**	.676**	.622**	1	-.348**	-.106	-.388**	.044	-.006
	Sig. (2-tailed)	.001	.000	.000		.003	.378	.001	.716	.958
	N	71	71	71	71	71	71	71	71	71
Number of wrong turns	Pearson Correlation	.085	-.220	-.117	-.348**	1	.389**	.480**	-.339**	.138
	Sig. (2-tailed)	.481	.066	.333	.003		.001	.000	.004	.252
	N	71	71	71	71	71	71	71	71	71
Number of hesitations	Pearson Correlation	.089	-.054	.008	-.106	.389**	1	.463**	-.244*	.005
	Sig. (2-tailed)	.462	.657	.949	.378	.001		.000	.040	.970
	N	71	71	71	71	71	71	71	71	71
Time spent	Pearson Correlation	.144	-.343**	-.258*	-.388**	.480**	.463**	1	-.377**	.130
	Sig. (2-tailed)	.232	.003	.030	.001	.000	.000		.001	.282
	N	71	71	71	71	71	71	71	71	71
Familiarity	Pearson Correlation	-.138	.271*	.033	.044	-.339**	-.244*	-.377**	1	-.042
	Sig. (2-tailed)	.251	.022	.786	.716	.004	.040	.001		.730
	N	71	71	71	71	71	71	71	71	71
Confidence	Pearson Correlation	-.054	.011	.143	-.006	.138	.005	.130	-.042	1
	Sig. (2-tailed)	.655	.930	.235	.958	.252	.970	.282	.730	
	N	71	71	71	71	71	71	71	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13:Evaluation with library using and signage types

		How long have you been using the library?					
		first use		one year		more than one year	
		n	**%**	**n**	**%**	**n**	**%**
Orientation Sign	Not used	5	15.2	2	6.1	26	78.8
	used	0	0.0	7	18.4	31	81.6
Directional Sign	Not used	0	0.0	4	18.2	18	81.8
	used	5	10.2	5	10.2	39	79.6
Identification Sign	Not used	4	8.9	7	15.6	34	75.6
	used	1	3.8	2	7.7	23	88.5

		How often do you use the library?							
		First come		everyday		Few times a week		Few times a month	
		n	%	n	%	n	%	n	%
Orientation Sign	Not used	5	15.2	8	24.2	8	24.2	12	36.4
	used	0	0.0	12	31.6	15	39.5	11	28.9
Directional Sign	Not used	0	0.0	9	40.9	6	27.3	7	31.8
	used	5	10.2	11	22.4	17	34.7	16	32.7
Identification Sign	Not used	4	8.9	15	33.3	14	31.1	12	26.7
	used	1	3.8	5	19.2	9	34.6	11	42.3

		How do you feel familiar with the library (What is your level of familiarity with this library)?					
		A little familiar		familiar		Quite familiar	
		n	**%**	**n**	**%**	**n**	**%**
Orientation Sign	Not used	8	24.2	9	27.3	16	48.5
	used	6	15.8	11	28.9	21	55.3
Directional Sign	Not used	3	13.6	6	27.3	13	59.1
	used	11	22.4	14	28.6	24	49.0
Identification Sign	Not used	10	22.2	10	22.2	25	55.6
	used	4	15.4	10	38.5	12	46.2

		How much time has passed since the last use?			
		less than 1 year		between 1 -3 years	
		n	%	n	%
Orientation Sign	Not used	29	87.9	4	12.1
	used	34	89.5	4	10.5
Directional Sign	Not used	20	90.9	2	9.1
	used	43	87.8	6	12.2
Identification Sign	Not used	41	91.1	4	8.9
	used	22	84.6	4	15.4

Table 14:T Test for comparison between wrong turns, hesitation and time spent for orientation signs and confidence in cognitive map

Orientation Sign		n	mean	SD	t	p
The number of wrong turn	low confidence	38	0.68	0.78	-2,07	0,04*
	high confidence	33	1.09	0.88		
Hesitation	low confidence	38	2.13	1.21	-0,55	0,59
	high confidence	33	2.27	0.91		
Time spent	low confidence	38	226.92	60.63	-1,60	0,11
	high confidence	33	249.36	56.68		

Table 15: T Test for comparison between wrong turns, hesitation and time spent for directional signs and confidence in cognitive map

Directional Sign		n	mean	SD	t	p
The number of wrong turn	low confidence	49	0.78	0.80	-1.47	0.15
	high confidence	22	1.09	0.92		
Hesitation	low confidence	49	2.16	1.18	-0.40	0.70
	high confidence	22	2.27	0.83		
Time spent	low confidence	49	233.51	60.50	-0.81	0.42
	high confidence	22	245.91	57.61		

Table 16:T Test for comparison between wrong turns, hesitation and time spent for identification signs and confidence in cognitive map

Identification Sign		n	mean	SD	t	p
The number of wrong turn	low confidence	26	1.08	0.85	1.56	0.12
	high confidence	45	0.76	0.83		
Hesitation	low confidence	26	2.35	1.20	0.90	0.38
	high confidence	45	2.11	1.00		
Time spent	low confidence	26	242.81	60.90	0.59	0.56
	high confidence	45	234.20	59.12		

Table 17:Mean of number of wrong turn, hesitation and time spent

	n	Minimum	Maximum	Mean	SD
The number of wrong turn	71	0	3	0.87	0.84
Hesitation	71	0	6	2.20	1.08
Time spent	71	130	381	237.35	59.49