ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

THE EFFECTS OF LEGIBILITY AND SPACE HIERARCHY ON WAYFINDING ACCURACY; THE CASE OF ZORLU CENTER SHOPPING MALL

M.Sc. THESIS

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Department of Architecture

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ISTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

MEKANSAL HİYERARŞİNİN VE OKUNABİLİRLİĞİN YÖN BULMA ÜZERİNE ETKİLERİ: ZORLU ALIŞVERİŞ MERKEZİ ÖRNEĞİ

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Faranak Azarnezhad, a M.Sc. student of İTU Graduate School of Science Engineering and Technology student ID 502111168, successfully defended the thesis/dissertation entitled "THE EFFECTS OF LEGIBILITY AND SPACE HIERARCHY ON WAYFINDING ACCURACY; THE CASE OF ZORLU CENTER SHOPPING MALL", which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

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To my mon and dad,

FOREWORD

I would like to present my immense gratitude to my supervisor Assoc.Prof.Dr. Dilek YILDIZ for all her support. I also would like to say thanks to my family for their support through out this research work.

October 2018

Faranak AZARNEZHAD
(Architect)

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ABBREVIATIONS

ICD **:** Inner Connection Density

SYMBOLS

t **:** Time

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THE EFFECTS OF LEGIBILITY AND SPACE HIERARCHY ON WAYFINDING ACCURACY; THE CASE OF ZORLU CENTER SHOPPING MALL

SUMMARY

Do we think about the cognitive processes undertaken as we move about in the environment. This daily routine, wayfinding in particular, in its smallest scale begins as we move around in our homes, and continues as we leave for work or school, as we walk through buildings, and as we return to home. During these activities, we receive environmental information, decode and process them, and recall them when necessary. Most of the time, this routine activity is an unconscious process and we tend to ignore the fact that even the simplest decisions we make to reach a destination are determined by our wayfinding ability. This ability affects us physically and psychologically as the brain and body reacts to stimuli emitted from the environment.

Most of our activities take place in large-scale built environments where wayfinding becomes an important design issue. Sometimes it can be quite difficult to find our way in such settings.The characteristics of the built environment generally accepted to affect wayfinding are legebility (visual accessibility), space hierarchy, sign system and landmarks, architectural differentiation, and building plan configuration. Another factor affecting wayfinding is the degree of familiarity one has with the setting and gender. How well we know the environment that surrounds us clearly is an important factor that affects our wayfinding behaviour and the perception of the setting as well as the facilities it offers. Throughout this dissertation the terms “Legibility” and “Space Hierarchy” will be used in order to emphasise the wayfinding accuracy.

Along with socio-cultural and socioeconomic changes, the lifestyle habits of the urban dweller, and therefore the consumption pattern and speed, have also changed. With all these changes, the formation of a "shopping mall" in cities began. Today, these places have become the new public spaces and living centers of the city.

In cities where fast life prevails, it has become important to reach the target Most designers give wayfinding low priority, seeing it as a hindrance to good design or a problem to be solved with signage (Carpman and Grant, 2002). Understanding a few basic principles of architectural wayfinding design can help designers to enhance building performance and to provide more inclusive solutions. The main topic of the study is the built environment and human behavior in mixed-use structures. Behaviors are guided by perceptual and cognitive processes. The physical environment is the measure, if you can not find your way, psychological or physiological effects begin to occur.

The main purpose of this study is to understand the effects of legibility and space hierarchy on wayfinding performance in shopping centers. It is important to understand how these concepts affects buyer's wayfinding performance yet it is not known whether they have effect on wayfinding performance or not.

There are too many reserches studing affects of familiarity and gender on wayfinding process in shopping centers. On the other hand there are less researches in literature exploring the relationship between legibility and space hierarchy and wayfinding performance. The goal of this study is to contribute to the understanding of human wayfinding behaviors in complex buildings. This paper argues that different inputs/sources from environment are the primary factors shaping wayfinding behavior. There should be a positive relationship between personal and environmental factors and the legibility of the space.

The research questions investigated were:

1. Which elements of a shopping center environment do effect users wayfinding behavior when they are navigating in it?

2.How does legibility and space hierarchy effect wayfinding in shopping centers?

3.How does the (visibility)built environment of a multi-story shopping center affect wayfinding?

The hypothesis identifies the main issues of the wayfinding accurecy in a shopping center environment as insufficient legibility and space hierarchy. These factors will be examined by wayfinding task, structured interview related to wayfinding task and space syntax method.

This study's primary focus was the case study involving Zorlu center shopping mall. The results of the case study were able to aid the researcher in answering the research questions posed in chapter 1. The first question, "which elements of a shopping center environment do effect users wayfinding behavior when they are navigating in it?" was also answered by the study. Participants relied heavily on signage, but did note that other interior elements contributed to helping them find their destination. Signs were both the most helpful and the most detracting elements analyzed by the study. Participants seemed to find the existing signage helpful, but the sign system as a whole detracted from their experience because it was lacking in some areas. Most confusion for participants came from not seeing a helpful sign or having to guess which level their assigned destination was on because they did not know.

The second question, "How does legibility and space hierarchy effect wayfinding in shopping centers?" was also answered by the study. Relied to questions 11 and 12, participants had problems knowing where they are and where they are heading to. All narrow and angeld hallways in Zorlu center make it more confusing to navigate. The effects of legibility have been shown recently in the field of advertising (Chebat et al., 2003; Lowrey, 1998): low legibility demands more cognitive efforts from the reader and affects negatively the wayfinding process in built environment.

The third question, "how does the built environment of a multi-story shopping center affect wayfinding?" proved to be the most important in understanding the particular wayfinding issues found in the shoping center.
Participants in the wayfinding analysis study commented that the existing signs were helpful, but they needed more to tell them what was on the other levels. There are some small signs with a list of departments on each floor near stairs and elevators, but most participants did not notice them. Some participants also commented on a need for maps. On the other hand location of moving stairs and elevators seemed to be confusing.

Wayfinding is an important issue in the management of shopping malls so wayfinding deserves more attention from the shopping mall managers, since it directly affects the nonmonetary costs of shopping.

This study looked at five specific locations within Zorlu center shopping mall. Future studies looking to improve the shopping mall should look at other locations as well. The participant phase of the study would not necessarily need to be repeated, but Passini's notation method and structural framework could be consulted for the other locations within the building.

MEKANSAL HİYERARŞİNİN VE OKUNABİLİRLİĞİN YÖN BULMA ÜZERİNE ETKİLERİ: ZORLU ALIŞVERİŞ MERKEZİ ÖRNEĞİ

ÖZET

Çevremizde hareket ettiğimiz üstlenilen bilişsel süreçleri düşünüyor muyuz? Özellikle en küçük ölçeğinde yer alan bu günlük rutin, evlerimizde dolaşırken başlıyor ve binalardan geçerken ve eve dönerken, iş ya da okul için ayrılırken devam ediyor. Bu aktiviteler sırasında çevresel bilgileri alır, şifresini çözer ve işleyip gerektiğinde geri çağırırız. Çoğu zaman, bu rutin faaliyet bilinçsiz bir süreçtir ve bir hedefe ulaşmak için aldığımız en basit kararların bile yol bulma yeteneğimiz tarafından belirlendiği gerçeğini görmezden gelme eğilimindedir. Bu yetenek, beyin ve bedenin çevreden yayılan uyaranlara tepki vermesiyle bizleri fiziksel ve psikolojik olarak etkiler.

Faaliyetlerimizin çoğu, yol göstermenin önemli bir tasarım konusu haline geldiği büyük ölçekli yapılarda gerçekleşir. Bazen bu tür ortamlarda yolumuzu bulmak oldukça zor olabilir. Yapılı çevrenin genel olarak yol bulmayı etkilediği kabul edilen özellikler, taşabilirlik (görsel erişilebilirlik), uzay hiyerarşisi, işaret sistemi ve işaretler, mimari farklılaşma ve yapı planı yapılandırmasıdır. Wayfinding'ı etkileyen diğer bir faktör, kişinin sahip olduğu bilgi ve cinsiyet ile olan aşinalık derecesidir. Bizi çevreleyen ortamı ne kadar iyi tanımamız, yol bulma davranışımızı ve ortamın algılayışını ve sunduğu olanakları da etkileyen önemli bir faktördür. Bu tez boyunca, yol bulma doğruluğunu vurgulamak için "Okunabilirlik" ve "Uzay Hiyerarşisi" terimleri kullanılacaktır.

Sosyo-kültürel ve sosyo-ekonomik değişimlerin yanı sıra kentlilerin yaşam tarzı alışkanlıkları ve dolayısıyla tüketim örüntüleri ve hızları da değişti. Bütün bu değişikliklerle şehirlerde bir "alışveriş merkezi" oluşumu başladı. Bugün bu mekanlar şehrin yeni kamusal alanları ve yaşam merkezleri haline geldi.

Hızlı yaşamın hüküm sürdüğü şehirlerde, hedefe ulaşmak önemli hale geldi. Çoğu tasarımcı, düşük önceliğe odaklanarak, iyi bir tasarımın engellenmesi ya da tabela ile çözülmesi gereken bir sorun olarak görüyor (Carpman ve Grant, 2002). Mimari yol bulma tasarımının birkaç temel ilkesini anlamak, tasarımcıların bina performansını artırmasına ve daha kapsamlı çözümler sağlamasına yardımcı olabilir. Çalışmanın ana konusu karma kullanım yapılarında yapılı çevre ve insan davranışlarıdır. Davranışlar algısal ve bilişsel süreçler tarafından yönlendirilir. Fiziksel ortam ölçüdür, eğer yolunuzu bulamazsanız, psikolojik veya fizyolojik etkiler oluşmaya başlar.

Bu çalışmanın temel amacı, alışveriş merkezlerinde okunaklılık ve mekan hiyerarşisinin yol bulma performansı üzerindeki etkilerini anlamaktır. Bu kavramların alıcının yol bulma performansını nasıl etkilediğini anlamak önemlidir, ancak yol bulma performansı üzerinde etkisinin olup olmadığı bilinmemektedir.

Alış-veriş merkezleri ve alışveriş merkezlerinde yol bulma işleminde toplumsal cinsiyete etki eden çok sayıda araştırmacı bulunmaktadır. Öte yandan, literatürde okunaklılık ve uzay hiyerarşisi ile yol bulma performansı arasındaki ilişkiyi araştıran daha az araştırma bulunmaktadır. Bu çalışmanın amacı, karmaşık binalarda insan davranışlarının anlaşılmasına katkıda bulunmaktır. Bu makale, çevreden gelen farklı girdilerin / kaynakların yol bulma davranışını şekillendiren başlıca faktörler olduğunu öne sürmektedir. Kişisel ve çevresel faktörler ile mekanın okunabilirliği arasında pozitif bir ilişki olmalıdır.

İncelenen araştırma soruları şunlardı:

1. Alışveriş merkezi ortamının hangi unsurları, kullanıcılar gezinirken davranış kurallarını etkiler mi?
2.Yerlik merkezlerinde okunabilirlik ve alan hiyerarşisi nasıl oluşur?
3.Çok katlı bir alışveriş merkezinin (görünürlük) yapılı ortamı, yol bulmayı nasıl etkiler?

Hipotez, bir alışveriş merkezi ortamında yol gösterme bilincinin ana konularını yetersiz okunabilirlik ve uzay hiyerarşisi olarak tanımlar. Bu faktörler, yol bulma görevi, yol bulma görevi ile ilgili yapılandırılmış görüşme ve uzay sentaksı yöntemi ile incelenecektir.

Bu çalışmanın temel odak noktası Zorlu merkez alışveriş merkezini kapsayan örnek olaydı. Vaka çalışmasının sonuçları araştırmacının Bölüm 1'de ortaya konan araştırma sorularını yanıtlamada yardımcı olabildi. İlk soru, "bir alışveriş merkezi ortamının hangi unsurları içinde gezinirken kullanıcı davranışlarını etkiliyor" sorusu da yanıtlandı. çalışma tarafından Katılımcılar büyük ölçüde tabelalara dayandı, ancak diğer iç unsurların hedeflerini bulmalarına yardımcı olmaya katkıda bulunduğunu belirtti. İşaretler, çalışmanın analiz ettiği en yararlı ve en yıkıcı elementlerdi. Katılımcılar mevcut tabelaları faydalı buluyor gibiydi, ancak bazı yerlerde eksik olduğu için işaret sistemi deneyimlerinden tamamen uzaktı. Katılımcılar için en fazla karışıklık, yararlı bir işaret görmemek veya bilmedikleri için atanan varış noktasının hangi seviyede olduğunu tahmin etmek zorunda kalmıştır.

İkinci soru, "Alışveriş merkezlerinde okunaklılık ve mekan hiyerarşisini nasıl etkiliyor?" Sorusu da cevaplandı. 11 ve 12. sorulara dayanan katılımcılar, nerede olduklarını ve nereye gittiklerini bilme konusunda problemleri vardı. Zorlu merkezindeki tüm dar ve melez koridorlar gezinmeyi daha da karmaşıklaştırıyor. Son zamanlarda reklamcılık alanında okunabilirliğin etkileri gösterilmiştir (Chebat ve ark., 2003; Lowrey, 1998): Düşük okunabilirlik, okuyucudan daha fazla bilişsel çaba gerektirmekte ve yapılı çevrede yol bulma sürecini olumsuz yönde etkilemektedir.

Üçüncü soru, "Çok katlı bir alışveriş merkezinin yapılı çevresi, yol bulmayı nasıl etkiliyor?" Sorusu, alışveriş merkezinde bulunan özel yol bulma konularının anlaşılmasında en önemli unsur olduğunu kanıtladı.

Wayfinding analizi çalışmasında yer alan katılımcılar, mevcut işaretlerin yararlı olduğunu, ancak diğer seviyelerde olanları anlatmak için daha fazlasına ihtiyaç duyduklarını belirttiler. Merdivenlerin ve asansörlerin yakınında her katta bir bölüm listesi bulunan bazı küçük işaretler vardır, ancak çoğu katılımcı bunları fark etmemiştir. Bazı katılımcılar da haritaya ihtiyaç duyduğunu belirttiler. Diğer yandan hareketli merdivenlerin ve asansörlerin yeri kafa karıştırıcı gibi görünüyordu.

Alışveriş merkezlerinin yönetiminde wayfinding önemli bir konudur, bu nedenle alışveriş merkezi yöneticileri, alışverişin parasal olmayan maliyetlerini doğrudan etkilediği için, alışveriş merkezi yöneticilerinden daha fazla ilgi görmeyi hak etmektedir.

Bu çalışma Zorlu merkez alışveriş merkezindeki beş özel yere baktı. Alışveriş merkezini geliştirmek isteyen gelecekteki çalışmalar, diğer yerlere de bakmalıdır. Çalışmanın katılımcı aşamasının mutlaka tekrarlanması gerekmeyecek, ancak binadaki diğer yerler için Passini'nin notasyon yöntemi ve yapısal çerçeveye danışılabilir.

1. INTRODUCTION

Do we think about the cognitive processes undertaken as we move about in the environment. This daily routine, wayfinding in particular, in its smallest scale begins as we move around in our homes, and continues as we leave for work or school, as we walk through buildings, and as we return to home. During these activities, we receive environmental information, decode and process them, and recall them when necessary. Most of the time, this routine activity is an unconscious process and we tend to ignore the fact that even the simplest decisions we make to reach a destination are determined by our wayfinding ability. This ability affects us physically and psychologically as the brain and body reacts to stimuli emitted from the environment.

Most of our activities take place in large-scale built environments where wayfinding becomes an important design issue. Sometimes it can be quite difficult to find our way in such settings.The characteristics of the built environment generally accepted to affect wayfinding are legebility (visual accessibility), space hierarchy, sign system and landmarks, architectural differentiation, and building plan configuration. Another factor affecting wayfinding is the degree of familiarity one has with the setting and gender. How well we know the environment that surrounds us clearly is an important factor that affects our wayfinding behaviour and the perception of the setting as well as the facilities it offers. Throughout this dissertation the terms “Legibility” and “Space Hierarchy” will be used in order to emphasise the wayfinding accuracy.

Along with socio-cultural and socioeconomic changes, the lifestyle habits of the urban dweller, and therefore the consumption pattern and speed, have also changed. With all these changes, the formation of a "shopping mall" in cities began. Today, these places have become the new public spaces and living centers of the city.

In cities where fast life prevails, it has become important to reach the target determined by the user as soon as possible by following a rational route. In this study, Zorlu shopping center with different functions and different types of users in urban life is determined as a place where the wayfinding experience can be examined. The scope

of this thesis is the concept of wayfinding. The cognitive, physical and spatial factors of wayfinding as an action related to the experience of the place and the experience of being inside is the main theme of this work.

1.1 Statement of the Problem

Most designers give wayfinding low priority, seeing it as a hindrance to good design or a problem to be solved with signage (Carpman and Grant, 2002). Understanding a few basic principles of architectural wayfinding design can help designers to enhance building performance and to provide more inclusive solutions. The main topic of the study is the built environment and human behavior in mixed-use structures. Behaviors are guided by perceptual and cognitive processes. The physical environment is the measure, if you can not find your way, psychological or physiological effects begin to occur.

1.2 Aims of the Study

The main purpose of this study is to understand the effects of legibility and space hierarchy on wayfinding performance in shopping centers. It is important to understand how these concepts affects buyer's wayfinding performance yet it is not known whether they have effect on wayfinding performance or not.

1.3 Significance and Contributions of the Study

There are too many reserches studing affects of familiarity and gender on wayfinding process in shopping centers. On the other hand there are less researches in literature exploring the relationship between legibility and space hierarchy and wayfinding performance. The goal of this study is to contribute to the understanding of human wayfinding behaviors in complex buildings. This paper argues that different inputs/sources from environment are the primary factors shaping wayfinding behavior. There should be a positive relationship between personal and environmental factors and the legibility of the space.

1.4 Research Question and Scope of the Study

The research questions investigated were:

1. Which elements of a shopping center environment do effect users wayfinding behavior when they are navigating in it?

2.How does legibility and space hierarchy effect wayfinding in shopping centers?

3.How does the (visibility)built environment of a multi-story shopping center affect wayfinding?

The hypothesis identifies the main issues of the wayfinding accurecy in a shopping center environment as insufficient legibility and space hierarchy. These factors will be examined by wayfinding task, structured interview related to wayfinding task and space syntax method.

1.5 Research Design

The issue of wayfinding incorporates a variety of factors that affect the behaviors of individuals. Spatial legibility is one important, yet insufficiently investigated variable in the field of environmental behavior that has no well-defined technical clarification, and is directly related to the wayfinding behavior.

Discussing the built environment from the point of view of wayfinding, Gray, Zimmerman & Rimmer (2012, p.no178) remarked, “it may be of interest to know which buildings people remember best, but more important... is an understanding of the physical and non-physical characteristics that make buildings memorable”. This thesis will be concerned with the physical characteristics of buildings, in particular, the configuration of its spaces with respect to wayfinding and environmental cognition. It is assumed that people learn about their environment as they move through it. In this diachronic process, the spatial information that is obtained is of a sequential nature and therefore a certain kind of mental activity is required to process this successive input into a comprehensive understanding of the environment. From such a position, it follows that movement can be taken as one indicator of cognitive activity.

The research uses wayfinding in complex architectural setting as observable behavior that reflects environmental understanding. As developed in the previous sections,

legibility and space hierarchy of the environment are taken as important environmental properties. The field work was carried out in Zorlu center shopping mall.

1.6 Methodology

1.6.1 Wayfinding task, Structured interview

This research project follows Passini's structural framework of wayfinding that was outlined in chapter 2. The framework will be used to analyze the findings of the case study. Decision hierarchies for each destination will be investifated. The information currently available at each decision point will be noted and compared to the results of the study. To do this, five destinations within the shopping center were first chosen and analyzed for potential issues based on knowledge gained through the literature review, interviews and observation conducted. Decision diagrams, similar to those used by Passini in Wayfinding in Architecture (1984), were created for each destination utilizing the two main stairwells and two main elevators. The analysis and decision diagrams for each destination follow.

A total of 10 participants were gathered. 70% of participants were female and 30% were male. Two participatants –one mail and one femail- were assigned for each five destinations.

1.6.2 Space syntax

Primarily Space Syntax is a theory about understanding architecture and urban areas from the point of view of their configuration. Two properties of configuration are taken to be crucial. The first is that depending on one's position, a complex seems different. The second property is that small changes in any part of the spatial system will affect the structural properties of the whole (Goldstein, 2010). "Configuration refers to the way in which spaces are related to one another, not only pair-wise but also with respect to the overall pattern that they constitute. In other words, configuration is about the overall pattern that emerges from pair-wise connections rather than elements or single connections taken by themselves" (Farr et al., 2012, 15).

Configuration of spatial layouts is described in terms of the pattern of connections between defined ‘units’ of spaces. It does not deal with metric distances, but with topological values. One importance of this theory lies in the fact that it gives an objective measure to each ‘unit’ of space as it relates to others in a configurational system. One assumption of Syntax researchers that is perhaps at odds with these psychologists is that, while configuration or the way spaces are laid out, is important, it is also something non-discursive; people cannot explain it, but they all understand it (Dischinger & Jackson, 2012Hillier then extends the argument about non-discursivity of configuration to its intuitive nature. He says: “Configuration seems ... to be what the human mind is good at intuitively, but bad at analytically. We easily recognize configuration without conscious thought, and just as easily use configuration in everyday life without thinking of them, and we do not know what it is we recognize and we are not conscious of what it is we use and how we use it” (De Couvreur & Goossens, 2011, p. 25).

This argument is then extended to space with the claim that since configuration is non-discursive but intuitively grasped, a sense of it may be attained by walking through spatial elements. This link to the understanding of configuration in real settings is perhaps not well substantiated by empirical work from the Space Syntax community. Understanding of configuration in reality is a diachronic experience. It is built up from a series of sequential experiences that are gained through movement. Since this research is partially based on Space Syntax with respect to human understanding and behavior, one aim shall be confirmation of the claim that people do indeed understand configuration by walking through layouts. If configuration is considered important, then it follows that even if shapes, sizes and other properties of constituent element spaces remain the same, configurational experience can be quite different. Conversely,

configurational experience can be the same even when moving through various kinds of unit spaces. Of course, both unit spaces and their connections influence real experience.

The theory of Space Syntax offers a method of quantifying the various levels of topological relationships within a layout. It also proposes a method of choosing Spatial units that are based on visual stability in a one and two dimension horizontal plane.

2. LITERATURE REVIEW

2.1 What is Wayfinding?

The term ‘wayfinding’ may be familiar to most readers, but it is not a word that is accepted in Standard English. Encyclopaedia Britannica (online) does not list it, nor does the Oxford English Dictionary. Nevertheless, it is well understood; especially by people who have had the unpleasant experience of navigating in less familiar or unfamiliar indoor and outdoor environments. The term wayfinding was introduced in the 16th century as “traveling or journeying by road”. Therefore a way finder is “a person who travels by road, especially on foot” (New Oxford American Dictionary, 2001). While moving through an environment we should have a target, to reach this targeted destination we should know where we want to go and how to get there without disorientation and getting lost.

Navigation is the art and science of determining the position of a ship, plane or other vehicle, and guiding it to a specific destination. Navigation requires a person to know the vehicle's relative location, or position compared to other known locations. Navigation is derived from the Latin navis (“ship”) and agere (“to drive”). Navigation is a coordinated and goal directed movement across the environment. Navigation usually takes place over very large natural settings and may involve the use of distant elements as a source of direction, the stars for example. The sea or the desert are some settings where navigation is required. On the other hand, wayfinding is defined as the process of selecting paths from a network or a configuration of paths. Typically wayfinding is carried out in comparatively smaller settings, but they are usually large enough for humans to need cognitive abilities to operate in them. Cities and complex buildings are some settings for wayfinding.

Kevin Lynch is the originator of the term ‘wayfinding’, he talked about it in his book Image of the City. He had recognized that a study of ‘legibility’ in cities must consider the act of ‘wayfinding’ because in such an act there “is a consistent use and organization of definite sensory cues from the external environment” (Lynch, 1960).

Kevin Lynch did not define wayfinding. Strangely enough, neither did many researchers following Lynch who have either worked in this area, or have used wayfinding as a research tool to understand other issues. However, the term 'wayfinding' is commonly used to refer to the act of finding the path or paths leading to ones destination and finding that destination itself. It is a person's ability to navigate and find a particular point within an environment.

Wayfinding is of three kinds:

1. The most basic kind where one simply follows a path to a destination
2. Tracing a sequence of decision points without necessarily being able to conceptualize either the total trip or the entire environment
3. Maintaining geometric relations through an extraordinarily detailed cognitive map (Weisman, 1979).

It should be noted that knowledge about the destination, or lack of it, is not featured in this model. Human in order to find their way to a destination need to have information so that they can make right decisions. Environmental psychologist Romedi Passini extended the concept of the term wayfinding by relating it to architecture and signage in his book Wayfinding in Architecture. Wayfinding is a decision-making and problem solving process. It is the process of reaching a destination, whether in familiar or unfamiliar environments (Passini, 1984).after Passini, Blades (1991) says that "Wayfinding is the ability to learn and remember a route through the environment" . Furthermore, it is "purpose behavior, involves interactions between attributes of the travelers and attributes of the environment". Human movement may typically be of three kinds: travel to familiar destinations, exploratory travel and travel to novel destinations. (Allen, 1999) .

According to Carpman and Grant (1993), "wayfinding refers to what people see, what they think about, and what they do to find their way from one place to another. Wayfinding involves five deceptively simple factors:

1. Knowing where you are
2. Knowing your destination
3. Knowing and following the best route to your destination
4. Recognizing your destination upon arrival

5. Finding your way back".

Furthermore, in the web page of her firm, Carpman Grant and Associates, she adds, "when people cannot do any or all of these things, outside or inside complex facilities, we say they are disoriented." Wayfinding, or the more general term human movement, can be of many categories and its classification varies according to the criteria chosen. For example, if differentiated by their guiding process, then it is of two kinds: navigation and wayfinding (Golledge, 1999).

"Wayfinding is the process of determining and following a path or route between an origin and a destination. It is a purposive, directed, and motivated activity. The trace is called a route. The route results from implementing a travel plan, which is an a priori activity that defines the sequence of segments and turn angles that comprise the path to be followed. The travel plan encapsulates the chosen strategy for path selection. The legibility of a route is the ease with which it can be known, or (in the environmental sense) the ease with which the relevant cues or features needed to guide movement decisions can be organized into a coherent pattern. Legibility influences the rate at which an environment can be learned" (Golledge, 1999).

From a different perspective, if choices provided by the environment is the criteria for classification, then wayfinding can hypothetically be of three kinds also:

1. Totally guided by the environment
2. The environment has some influence
3. The environment has no influence at all

If one is walking a mazelike path that has no branches at all, then s/he is entirely guided by the environment (Sherman & Sherman, 2012). S/he has no choice or decision in the travel. In this case there is no fear of getting lost, but in complicated layouts, a very slim chance of actually understanding it.

On the other hand, if the environment is entirely undifferentiated, then it cannot have any effect on wayfinding. It will depend entirely on the person. This kind of movement can be compared to drawing on a white paper, where the strokes are determined by the thoughts of the artist only. In contrast, the former kind is comparable to 'connecting the dots' kind of children's activity. In this case, the child has no control over the picture that is simply a factor of the position of the numbered dots. Real life wayfinding

is of course somewhere in between the two extremes described above. In this case some movement decisions are guided by the individual and some by the environment.

The study of wayfinding is the examination of "how humans navigate from an origin to a destination" (Devlin & Bernstein, 1995). Wayfinding involves two major components:

1. The actual environment 'out there'
2. The way it interacts with people.

In conjunction, these two produce the action of wayfinding.

2.2 Wayfinding as a Spatial Problem Solving

An important model of wayfinding was proposed by Passini in 1984. He developed it through three experiments utilizing 36 subjects done in five large urban complexes in downtown Montreal. In the experiment, he analyzed the decision protocols of the subjects that were collected by asking them to speak into a tape recorder that recorded their spatial decisions and the reasons behind them.

Passini's model is built around the core concept that wayfinding is a result of hierarchically structured spatial decision making. It takes into account the many interrelated issues that come to bear while a person is performing a wayfinding task. According to this model wayfinding is "cognitive processes comprising three distinct abilities:

1. A cognitive mapping or information generating ability that allows us to understand the world around us;
2. A decision making ability that allows us to plan actions and to structure them into an overall plan;
3. A decision executing ability that transforms decisions into behavioral actions.

Both decision making and decision execution are based on information generated by cognitive mapping" (Passini, 1984).

From this point of view, the necessary units of wayfinding are environmental information, decisions and behavioral actions.

Environmental information comes from three sources:

- Sensory information
- Memory information
- Any combination of the previous two kinds.

Passini cautions however, that access to information is influenced by personal and cultural characteristics. This information once obtained, has descriptive, locational and temporal components. For example, the descriptive part has, among others, content description, labels, taxonomy etc.; the locational information may be structured in an ego-centric or a relational manner, or be structured in reference to an abstract orientation system like the cardinal directions. Of course, the temporal component is also important because the information that comes from experience provides a sense of how long it took to accomplish a particular task and that, in turn, helps to decide how long a future task component will take. Together these environmental and cognitive components contribute towards dexterous decision making and hence efficient wayfinding. In his model Passini puts the most emphasis on the human aspects by focusing on the spatial decision making process. He proposes that this is done from hierarchically structured decision plans or travel plans where the most general ones are at the top and those leading to spatial behavior are at the bottom.

Executions of these travel plans lead to behavior. Since a travel plan have to be carried out at a specific location, they obviously have environmental components. These include both cognitive and physical dimensions. Although Passini has presented an extensive description of the decision making process, he provided less identification of specific environmental properties that would be relevant to wayfinding. However, he picks up this issue in a subsequent book (Arthur and Passini, 1992) and stresses recognition of environmental features as an important component of wayfinding. He points out that only after recognition a decision, such as turning left or right, can be carried out.

From this point of view Passini discusses environmental elements and includes entrances, exits, circulation systems, andd signage as the physical components of wayfinding. Additionally, he advocates logical zoning and an architectural expression of those to facilitate wayfinding. Unfortunately most of the environmental discussion takes the form of classification of the various elements with comments on suitability for wayfinding. A critical discussion on the environment will be titled in chapter 2.4.1.

2.3 Wayfinding in Terms of Perception and Cognitive Processes

Sherman & Sherman, (2012) referred to wayfinding as "a person's abilities, both cognitive and behavioral, to reach spatial destinations and refer to one's static relation to space as well as the dynamics involved in his/her purposeful mobility." Similar definitions were used by Xie et al., (2012). Xie et al., (2012) described wayfinding as "an overall task how people find their way through cluttered environments with ease and without injury." Steinfeld & Maisel, (2012) defined wayfinding as "the process used to orient and navigate.

According to Lang 1987 perception is the active and purposeful process of obtaining information from the environment through observation, while cognition is the process of thinking that involves learning and remembering (or forgetting), generalizing, feeling, and attitude information, liking and disliking. (Figure 2.1).

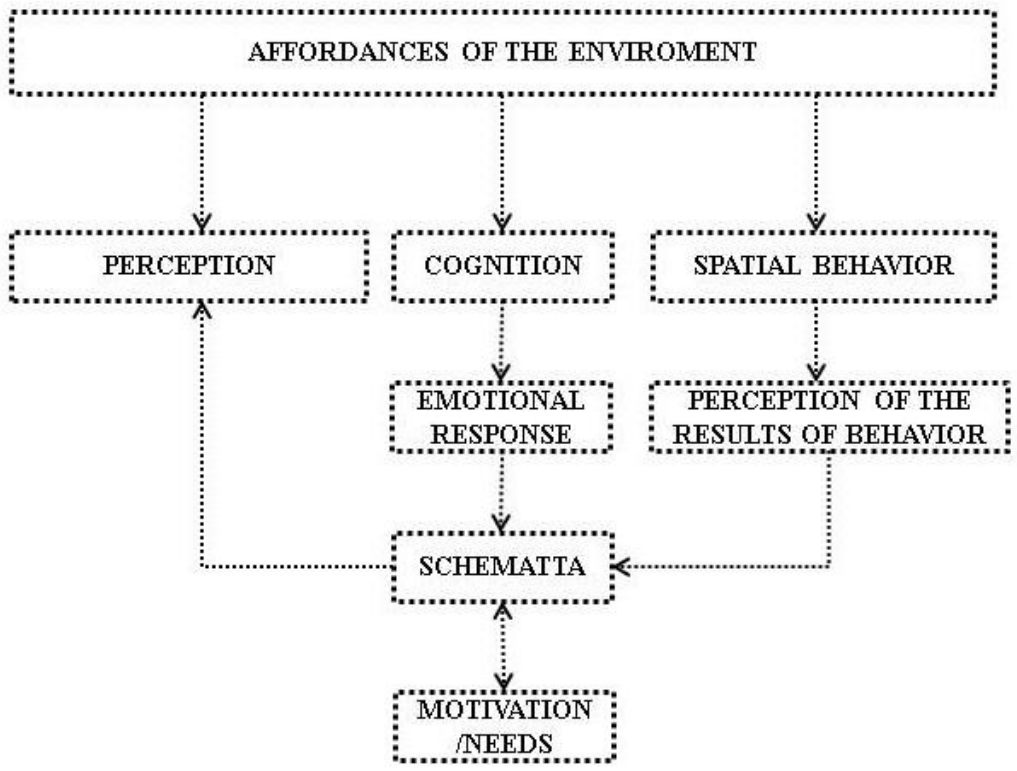


Figure 2.1 : Perceptual processes (Lang 1987, p.84).

There is an ambiguity by psychologists and other social scientists in distinction between perception and cognition, since it difficult to determine whether the word concerns the perception process itself or the product of it. According to experimental psychologists, perception "…involves the awareness of stimuli through the physiological excitation of sensory receptors" (Downs & Stea, 2005: 13). According to geographers, it is a comprehensive term that includes all psychological factors that needed for the formation of environmental cognition (Downs & Stea, 2005). Perception is closely connected with events, it is "…the process that occurs because of the presence of an object" (Downs & Stea, 2005: 14), so it is a direct experience sensory, whereas cognition is indirect sensory, thus it may be connected with the past or the future. In fact, cognition is an umbrella term that includes perception, thinking, problem solving and the organization of information and ideas. Stea (1969) differentiated between perception and cognition from a spatial point of view. According to him, cognition occurs when the perceived objects and events are larger than the field of view, so they must be organized mentally (Downs & Stea, 2005).

The overall goal of wayfinding is to accurately relocate from one place to another in a large-scale space." Large-scale space, as defined by Sherman & Sherman, (2012) is "a space whose structure is revealed by integrating local observations over time, rather than being perceived from a single vantage point." Xie et al., (2012) proposed a similar definition of large-scale space and described wayfinding tasks performed in large-scale environments as cognitive tasks.

Most spatial information is collected through the human senses and perceptual system, especially through the visual system. Some spatial information used in performing wayfinding tasks is retrieved from memory or generated by inference from other information. Not all spatial information retrieved from the surrounding environment or other representational media can be processed and saved in memory, however, because of the capacity limitations of attention filtering and working memory. Although no comprehensive categorical classification system for spatial information utilization has been created, psychologists distinguish spatial information by two ways in which humans gather and use it. The first called primary use, uses spatial information to guide a human's immediate orientation and action in the immediate surrounding environment. Primary use of spatial information is involved in registering and updating information about the immediate surroundings as an individual moves through an environment; it is relatively automatic in adults. The other usage of spatial

information, called secondary use, deals with information that is not necessarily directionally oriented. Secondary use of spatial information includes symbolic representation and various aspects of spatial thoughts that are required to cognitively manipulate spatial information (Steinfeld & Maisel, 2012).

For example, to utilize the target location information collected from map study in navigation tasks is a secondary use of spatial information. Humans can obtain new spatial information from either direct, primary orientation with the spatial environment, or through symbolic, indirect encounters, as with the study of maps. The source of spatial information for an individual acquires determines the predominant type of spatial knowledge stored in an individual's mind. Since the 1980s, several researchers have suggested that symbolic or secondary learning of spatial information may lead to a representation that is stored in an orientation-specific manner, like a photo image. Later attempts to use this type of stored information have been found to be biased in the specific orientation in which the information was learned. If the information is recalled for use in an orientation other than how it was learned, participants may have difficulty making correct orientation judgments when performing related spatial tasks. In contrast to symbolic studies, if spatial information is learned through some form of direct experience, then the resulting representation will be used more flexibly without the influence of orientation bias.

Environmental perception is usually defined as knowledge or feelings about the environment and how the act of apprehending the environment through senses. A more complete definition has been granted a psychologist William Ittelson, which describes the perception of the environment as a multidimensional phenomenon of a transactional process between man and the environment (Sherman & Sherman, 2012). He suggested three general conclusions about the nature of perception: first, not directly controlled by the stimulus; secondly, it is connected indistinguishable from other aspects of psychological functioning; and thirdly, it is relevant and appropriate to specific environmental contexts.

2.4 Wayfinding Research

Since wayfinding involves environmental understanding and a response to it, the 'act' of wayfinding, or behavior, which can be documented, becomes an important aspect for research. Traditionally scholars have looked at this 'act' and have used it for a

theoretical understanding of wayfinding, developing strategies and techniques for efficient wayfinding and to research on a horde of related issues such as spatial decision making (Garling, Saisa, Book and Lindberg, 1995), spatial recognition (Arthur and Passini, 1992), spatial orientation, spatial distribution, travel planning, route selection, route learning, influence of related environmental properties and so on (see Golledge, 1999 for a detailed review).

Simultaneously, wayfinding has also been important in other areas of research such as aging, environmental learning, urban design (Lynch, 1960), transportation (Burns, 1998), artificial intelligence, map learning, typography, cartography, etc. Applied research aimed at improving wayfinding includes the suitability and design of wayfinding aids such as signs, maps, booths, information terminals etc. (Devlin and Bernstein, 1997), creation of efficient navigation tools (Carpman, 1993), designing layouts for 'wayfinding friendly' conditions (Peponis, Zimring and Choi, 1990), improving the route guidance systems in vehicles (Jackson, 1998) and so on. Research in wayfinding can be broadly categorized into two kinds theoritecally. On one hand, many scholars put forward the 'cognitive model' of wayfinding; also called the mediational model. This is where some kind of internal process is said to mediate between the environment and the wayfinding behaviour. They claim that the sensory input from the environment is supplemented and enriched by knowledge that is already possessed by the perceiver. This is the position that this study takes. On the other hand, a few researchers accept the theories of ecological perception as proposed by Gibson, (1979) and hypothesize that the environment directly acts upon wayfinding behaviour, without cognitive mediation (Heft, 1983).

2.5 Factors Affecting Wayfinding

In the process of wayfinding, while determining the direction, many physical, sociological and psychological variables are influential. Wayfinding problem, can be defined as a process we have controlling these environmental variables. In this process, the individual overlaps with the individual sub-structure of the environmental data in the space in which it is located. Therefore, we can examine the factors affecting the direction finding process as environmental and individual factors.

From the spatial factors that affect user behavior in the wayfinding process is the plan format and the intelligibility of the space organization. The content of the space is

organization, and circulation of system.(Passini et al. (1998). Plan format, the complexity of the relationship between the preference points, such as the entrance hall or the corridors joining the building, is effective in determining direction. (Hiller, Hanson and Peponis, 1984; O'Neill, 1991; Peponis, Zimring and Choi, 1990). Even if the user is indoors or outdoors, architectural data is in the built environment. To understand a part of a structure or to understand its structure, the structure also contains rich data. Stairs, lifts, corridors, entrance halls, and floor finishes are runner points that are used to determine the given course (Sims, 1991).

2.5.1 Enviromental factors

2.5.1.1 Spatial layout

The spatial layout is an important factor in wayfinding. In order to find the directions, people need to be aware of their surroundings. This awareness is realized by perceiving the relationship between the individual and the space, the objects in space and the space-object. The more people communicate perceptually with space, the greater the quality of spatial layout is. The first factor in the perception of space is that it is what we see visually. It should not be forgotten that the place is perceived not only visually but also with all our senses. People can find their ways due to the information they gather from the place they are in.

Each organization has a spatial layout and each spatial layout has organizational side. People organize themselves to do their jobs and need a place to do them (Allen and Henn, 2007). According to this explanation, the concepts of human-space-layout have a structure that keeps them together. In other words, they need an organization that people can use and a place that can make use of the space easier. Spatial elements provide the information which is necessary for the user to achieve wayfinding behavior in space.

The general operation of a building and the location of the spaces in the building are important factors in wayfinding. Designs with directional design cause stress and fear associated with the disappearance of complex types of buildings while helping the person in the presence of the desired space (Proshansky et al., 1976). There are a number of features that the space must possess in reducing this stress. It is necessary to prevent elements that cause physical or psychological stress such as being warmer or colder than usual, darkness, airlessness. Space suitable for human capacity and

needs should be established and alternative multi-purpose designs should be added to these spaces. Finally, the space must be designed to be understandable. If the person is in an environment he or she does not know, it is necessary to examine the process and outcome of this action plan in order to figure out how to create the movement plan and keep the preceding data in the foreground (Garip,2003).

Environment-Human behavior; as it can be understood from the name, it is how human behaves with the influence of the conditions of the surrounding environment. In other words, it is behavior according to the environment in which the person is. People make decisions about how to behave in a physical environment, depending on the elements in that environment.

The behavior of the person in the direction of his decision can be explained in three ways.

1. People perceive and solution oriented in every case
2. The influence of the physical environment on the person is related to his self-satisfaction
3. Making it easier for people to decide on their own efforts to build a movement plan in the surrounding environment. (Proshansky et al., 1976).

When the process of organizing the environment is considered, it is seen that the person is an architect, and the surrounding is a building. The orientation and design of the spaces inside the building are influential in wayfinding in the interior space. This situation reveals the concepts of readability and complexity, which are two opposite conditions in the design of the building (Helvacıoğlu, 2007).

2.5.1.2 Complexity

It is a fact that something which is intense makes it much more difficult to perceive than making it more understandable. For this reason, unconventional forms in architectural spaces, the design of buildings which are required to bring an unconventional architectural understanding, can bring with it the problems of perception and wayfinding. Different corridor constructions, staircases and spatial layout insist the fact that the user needs to experience space more for perception. If it is desired to facilitate user wayfinding at this point, it is a must to see the fact that simple buildings are places where the user is less tired from wayfinding. O'Neill

(1991a, 1991b) discusses that during the wayfinding process the recallability of space, clarity of spatial relationships and level of complexity of the plan play important role. In the space, the level of complexity of the plan has direct relation with inner connections (inner connection density, ICD), he considered that places with high ICD are complex while recognizing, and has examined its impact on wayfinding and architectural perception.

Hölscher et al. (2006) found that the problem of wayfinding in multi-storey buildings has relation with the complexity of the decision points, the circulation spaces, the design and position of the ladder, the vertical mismatch of the floors, lack of graphics and the visibility of landmarks inside and outside.

2.5.1.3 Legibility

Legibility is where any phenomenon is and how it is easily understood. A legible interior design means a design where the location of the rooms and the spaces can be easily understood by the user. This can manifest itself in simple architectural designs rather than complex architectural designs.

Legibility concept by Lynch (1960) had a very big influence on the scopes of planning and architecture. According to Lynch legibility is ease of recognising and organising spce into a pattern. Architectural legibility provides the formation of an effective cognitive map that facilitates wayfinding in the environment.

According to Lynch (1960), it is easy to recognize and organize parts of a space in a certain order. Harmonization, order and simplicity are essential features for a legible environment. In large structures, the level of legibility gains value in order to improve wayfinding performance. In shopping centers, coridors, nodes, symbols, signs, colors and architectural elements are items that increase legibility.

As people experience the space, the connection between spaces can be perceived better by understanding distance and directions. Legibility varies depending on the brightness level, the background contrast, and the capabilities of the person. Because of these characteristics, legibility can be considered as an environmental and architectural concept. Plan complexity affects legibility as well as affecting cognitive mapping and wayfinding (O'Neill, 1991).

Legibility is the concept of where and what an object is. Designs where spaces and locations can be easily seen by people require a legible interior architecture. Buildings with an movement plan design that will avoid the risk of loss for people to must be

done. The design of the spatial infrastructure of the building can help wayfinding. The key elements of spatial legibility, such as entrances-exits, horizontal-vertical circulation, and important center points, are decisive factors in understanding the spatial organization of the structure. If a space does not have a clear spatial organization, legibility is poor and wayfinding data are insufficient (Passini 1992).

A clear and legible system of circulation makes understanding and using of environment easier. The form of the building, defines organization of the environment while defining the circulation system. The perception of the environment organization is the framework of the cognitive map that the user combines with the environmental data. (Passini, 1992)

Circulation gaps are important areas that shape the spatial organization within the building and must be designed before positioning other spaces. A well-designed circulation system allows the user to understand the building (Arthur & Passini, 1992). If the user can perceive the locations of circulation elements such as stairs, elevators in the building, it is possible to solve the direction finding behavior between the floors more easily by performing the vertical activities in the building more easily. In this context, the locations of the circulation gaps must be visually recognized or symbolized by the user.

From the view point of Canter (1974), in space organization, symmetry in space, continuity and rhythm are important factors. While Lawton (1970) argues that simple corridor systems and central atriums are important in visual perception and in understanding space. Doğu 2000 stated that the user finds the location easier in a shopping center where stores are located around a central atrium.

Finally, when "legibility is just measured as a spatial or functional form, it fails to analyse the influence of social meanings on spatial cognition because investigations generally isolate the social or cultural context of the relationship between individuals and surroundings" (Ramadier and Moser, 1998, p. 317). Although different spatial characteristics, it is necessary to analyse the person-environment relationship also with the social and individualistic dimensions.

2.5.1.4 Signage system

One of the methods used as a solution for wayfinding problems is signage systems. Graphical information should be considered together with architectural information. It

does not matter where the information is obtained from (graphics, architecture or other means), as long as it is readable, recognizable, and detectable.

Signage systems assist in finding directions enable the joining of space and time in motion (Sanoff, 1991). Signs at decision points, such as the intersection of corridors, can influence direction performance. Decision points usually show themselves at corridor intersections and in these points users often need help with the signs. The need for wayfinding should be provided with the right information in the right place (Arthur and Passini, 1992). Baskaya et al. (2004) emphasized the linear relationship between wayfinding difficulties and decision points, and have also shown that the signage systems positioned at decision points have improved direction finding in more complex spaces. Signage systems can be important in situations where construction is complex, but the complexity created by excessive stimulation of sound, image, and crowd can cause us to fail to perceive graphical information (Özbek, 2007). It is useful that the messages we want to read have a strong brightness and contrast. Brightness in color combinations optimizes readability (Arthur and Passini, 1992). In addition, letter selection, size and position affect the effectiveness of marking systems in graphical expression. Signage systems are one of the methods used for wayfinding problems, which are well known by everyone, but in some cases the result is ambiguous. Even if there are signs, users can often get lost for certain reasons. For example, if it is pointed out, users may not see them because the marks are too small, or the markers are big enough, but users can not even read or understand the images, or users cannot find them because positioning marks is not good (Arthur and Passini, 1992).

Signage systems are simple tools for effective design in wayfinding. They are particularly ineffective against complex navigation problems and cause expensive solutions.

Signage systems and graphical information can be used as an additional information system in terms of wayfinding, in complex structures or in places where architectural features are insufficient. Signage systems in complex structures, such as hospitals, airports or shopping centers, can facilitate wayfinding.

The signage systems and graphical representations directly taken by the environmental information are one of the spatial information in the resolution process of the wayfinding problem. Signage systems are often of great importance in emergency intervention areas such as hospitals and in places where there is intense pedestrian circulation such as the subway (Wiesman, 1981; Passini, 1998; O'Neill, 1991b).

According to the results of O'Neill (1991b) study conducted by the University of Wisconsin on the Milwaukee campus, the use of the signs was making time of trip 13% longer, but 50% less on incorrect turns, and 62% less on return. Despite the positive effect of sign systems on navigation, architectural design and architectural hints need to be carefully designed in order to design an effective space for wayfinding. The basic functions of signs are for them to be both noticed and read (Mollerup, 2005). To be noticed, they need to be placed in a good location. Information needs to be perceived at, or shortly before, a decision point if it is going to be noticed (Arthur and Passini, 1992). Something that makes this easier to accomplish is if users can identify an informational display before it can be read. People will start to recognize which signs are part of a system after having seen them only once or twice (Arthur and Passini, 1992). Often there can be signs from multiple signage systems in the same environment. Consistency in sign placement and design will help differentiate a sign system from others in the same environment, such as advertisements (Passini, 1984). For signs to be easily read, first care should be taken to make sure the information on the sign is visually grouped into no more than three items per group so that each group can be easily recognized at a glance (Passini, 1984).

Mollerup (2005) discusses the importance of grouping information on directional signs so that all arrows pointing the same direction are next to each other (figure 2.7). Next, the sign itself should be legible. Legibility concerns primarily come from three issues: vagueness of the information given, inaccessibility of information, and information overload (Passini, 1984).

2.5.1.5 Landmarks

Landmark objects are a legitimate object or element that provides a link or communication between the person and the environment. These objects are easily expressed as physical objects. They are usually external dichotomies that are reference points and cannot be entered into (Lynch, 1960).

Landmarks are regarded as a structure that have different design and gives the identity of the city or place that it is located in (Figure 2.2). Landmarks are symbolic objects, which are the reference points for the user in wayfinding, providing convenience for the users.

Figure 2.2 : Galata tower as a Landmark in Istanbul, Turkey.

Sherman & Sherman, (2012) described landmarks as:

(a) The beginning and end points of a route,

(b) Unique configurations of perceptual events at particular points, and

(c) Intermediate course-maintaining devices.

Xie et al., (2012) explained that objects become landmarks for two reasons: their distinctiveness and their personal meanings and functions. The term object from the perspective of visual perception is defined as a feature that can be recognized based on the difference between the amount of light reflected by the object and the light reflected by its immediate surroundings. Sherman & Sherman, (2012) claimed that objects could be distinctive for example, because of their architectural style, such as, their size and color. Steinfeld & Maisel, (2012) suggested that landmarks become more easily identifiable because they have clear forms, contrast with the background, have some prominence of spatial location, and own functional and symbolic importance.

When we look at the urban context, we are talking about constructionsor buildings, but when we enter the interior space, the concept of symbolic objects comes out as the use of objects. Symbolic objects provide a link with other items in the space, making

it easier for the user to reach the point where he or she wants to reach inland and become a recollection point. The most important feature of the symbolic objects is their strong connection with the place they are in. It is an important issue that these objects can be recognized by the user. The user describes the process of wayfinding a strong relationship between symbolic objects and space (Muhlhausen, 2006).

The user first perceives the symbolic objects visually. Since this perception is a mental perception, it appears that there is a strong link between cognitive maps and landmarks at this point. It is important that the landmarks are positioned at the points where the user needs to decide. An icon that is unrecognizable or positioned in the wrong place loses its character as a landmark.

Landmarks; color, form, visibility and so on, these variables have the right qualities to be the reference points. The fact that there is no other object that resembles a symbolic object and the one that is unique within the space in which it is located is another feature that should be possessed (Helvacıoğlu, 2007).Table 2.1 is prepared to summarize enviromental factors affecting wayfinding and researches who has worked on these subjects.

Table 2.1 : Researches who worked on environmental factors affecting wayfinding.

RESEARCHER	**ENVIRONMENTAL FACTORS AFFECTING WAYFINDING**
Passini, 1988	SPATIAL LAYOUT
Hiller, Hanson & Peponis, 1984; O'Neill, 1991; Peponis, Zimring & Choi, 1990, Lynch	LEGIBILITY
Canter, 1974	VISIBILITY

Lawton, 1970; Doğu, 2000	RELATIONSHIP BETWEEN CORRIDOR SYSTEMS AND CENTRAL ATRIA
O'Neill, 1991a, 1991b	COMPLEXITY
Abu-Obed, 1998; Lynch, 1960; Wiesman, 1981; Appleyard, 1969; Murakoshi, 2000	LANDMARKS
Wiesman, 1981; Doğu & Ekip, 2000; Passini, 1998; O'Neill, 1991b; O'Neill 1991a; Carpman, 1985	SIGNAGE SYSTEMS

2.5.2 Individual factors

2.5.2.1 Spatial Familiarity

One of the individual factors in the wayfinding process in the environment is spatial familiarity. According to (Chalmers and Knight, 1985), spatial familiarity is explicated as "how well a place is known" . Being familiar with an environment means that one has gained information regarding objects or locations in the environment, concerning to unfamiliar environments (Thorndyke and Hayes – Roth, 1982).

Regarding to this definitation as familiarity with an environment rises, performances on wayfinding and spatial orientation tasks inhance , and the volume of complexity of the layout of the environment becomes less important (O'Neill, 1992).

Garling (1983) considered spatial familiarity together with the visual perception of interior space. Garling (1983) argues that if the user's visual point of view in a large space is clear and understandable to combine the space elements, the user creates space knowledge more clearly. Therefore, the user's spatial familiarity can be related to the frequency of use. Depending on the user's space usage frequency, spatial familiarity and by distinguishing environmental data, it would also be more easy to find directions (East., 2000). As the corresponding familiarity increases, the rate of exploring the space also decreases (Erem, 2003). In the place where the person always is, he only recognizes certain things over time.

2.5.2.2 Gender

One of the individual (user-focused) factors in the wayfinding process is gender. In the process of wayfinding in the space, sex-dependent approaches change. In some studies, its discussed that during the wayfinding process, the men use landmarks (Bryant, 1982; Galea, 1993; Holding, 1989), maps (Harrell , 2000; Lawton , 1996; Harris, 1981; Miller, 1986; Ward , 1986; Mc Guiness ,1983) and starting points (Ward et al., 1986) more accurately than women and they perceive the layout of the space as a whole more easily. But on the other hands some studies say that gender differences are not determinant. (Passini, 1990; Beaumont , 1984; Brysch, 1996; Lawton and Charleston, 1996).

Table 2.2 : Rearches who worked on individuall factors affecting wayfinding.

RESEARCHER	INDIVIDUAL FACTORS AFFECING WAYFINDING
Bryant, 1982; Galea, 1993; Holding, 1989; Mc Guiness, 1983; Ward, 1986; Passini, 1990; Beaumont, 1984; Brysch, 1996	GENDER
Garling, 1983; Doğu & Ekip., 2000;Erem, 2003	SPATIAL FAMILIARITY

2.5.2.3 Decision making

Wayfındıng is defined as a cognitive process consisting of three components and these three components define the problem solving process (Passini, 1984):

- Cognitive map
- Decision-making ability
- To authorize the decision: to turn decisions into actions.

Decisions made to reach a goal define wayfinding behavior. These decisions shows two structural features (Passini, 1995):

1. Hierarchical structure: There is a hierarchical relationship between the decision sequences.

2. Decision plan: The main decision and the subordinate decisions that make up it come into play.

Decisions made to define behaviors from a point define a motion path to achieve a specific goal.

For example, in the decision hierarchy map and decision plan examples given by Passini (1984) and shown below, the decision plan shown in Figure 2.3 has “to sail according to Reef outline” in addition to “to set canoe on new course” as decisions needed to be able to accomplish the “to follow Reef to Big Dip” decision to the left (Figure 2.3).

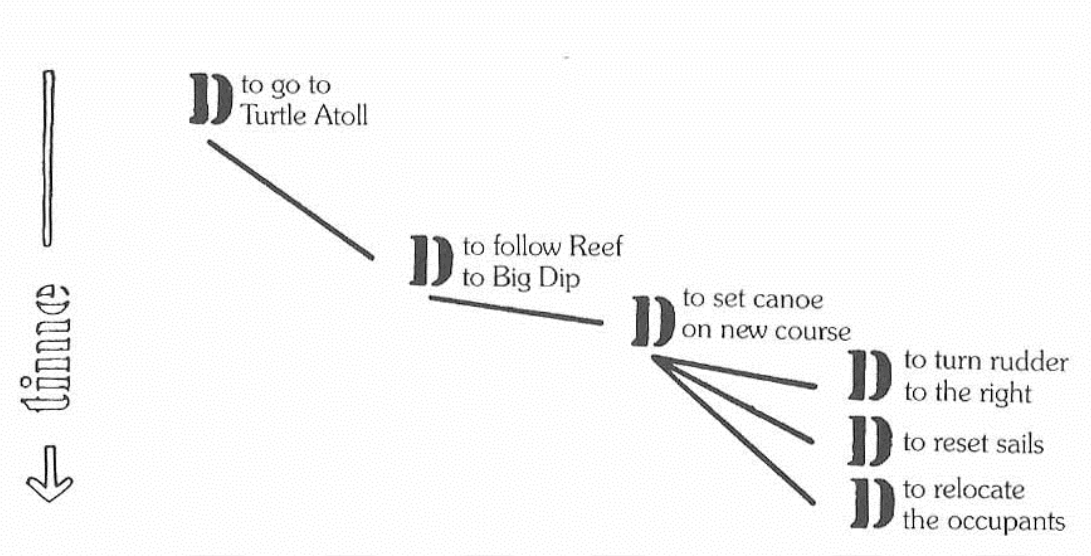


Figure 2.3 : Decision hierarchy example by Passini (1984, p. 64).

The second decision “to sail according to Reef outline” is a behavioral decision that is needed in addition to the more general “to set canoe on new course” in order to complete the decision to the left, “to follow Reef to Big Dip” (Figure 2.4).

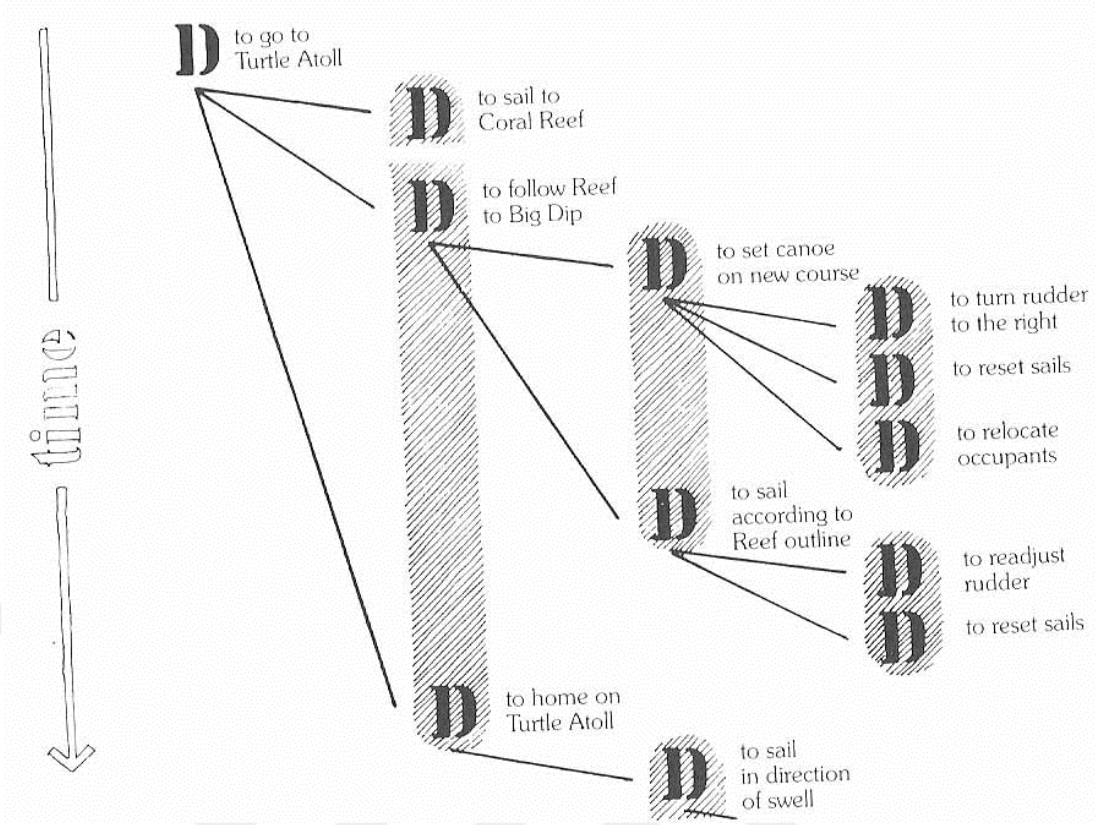


Figure 2.4 : Decision plan example by Passini (1984, p. 65).

Hao and Yen (2009) note that Passini's work follows cognitivist theories, which tend to view people as processing information and acting rationally and logically, while their (2009) work supports the views of postcognitivist theorists, who believe human activity tends to be irrational.

Passini's (1984) decision hierarchy and decision plan diagrams are useful in diagramming the decisions a user of an environment will make in detail to follow a certain route. A weakness of his diagrams is the element of time. Time is shown at the left of each diagram as an arrow pointing downward signifying that decisions shown farther down on the diagram will take place later in the chronology of the entire journey. Because time is not quantified, it becomes less important to the diagram's success and usefulness. An alternative might be numbering decisions in each group to show their order, but this should not be necessary as their order is implied by their arrangement in a list. The element of time could be removed altogether without sacrificing the integrity of the rest of the diagram. This is the case in all of Passini's (1984) diagrams with a similar representation of time (Figure 2.5).

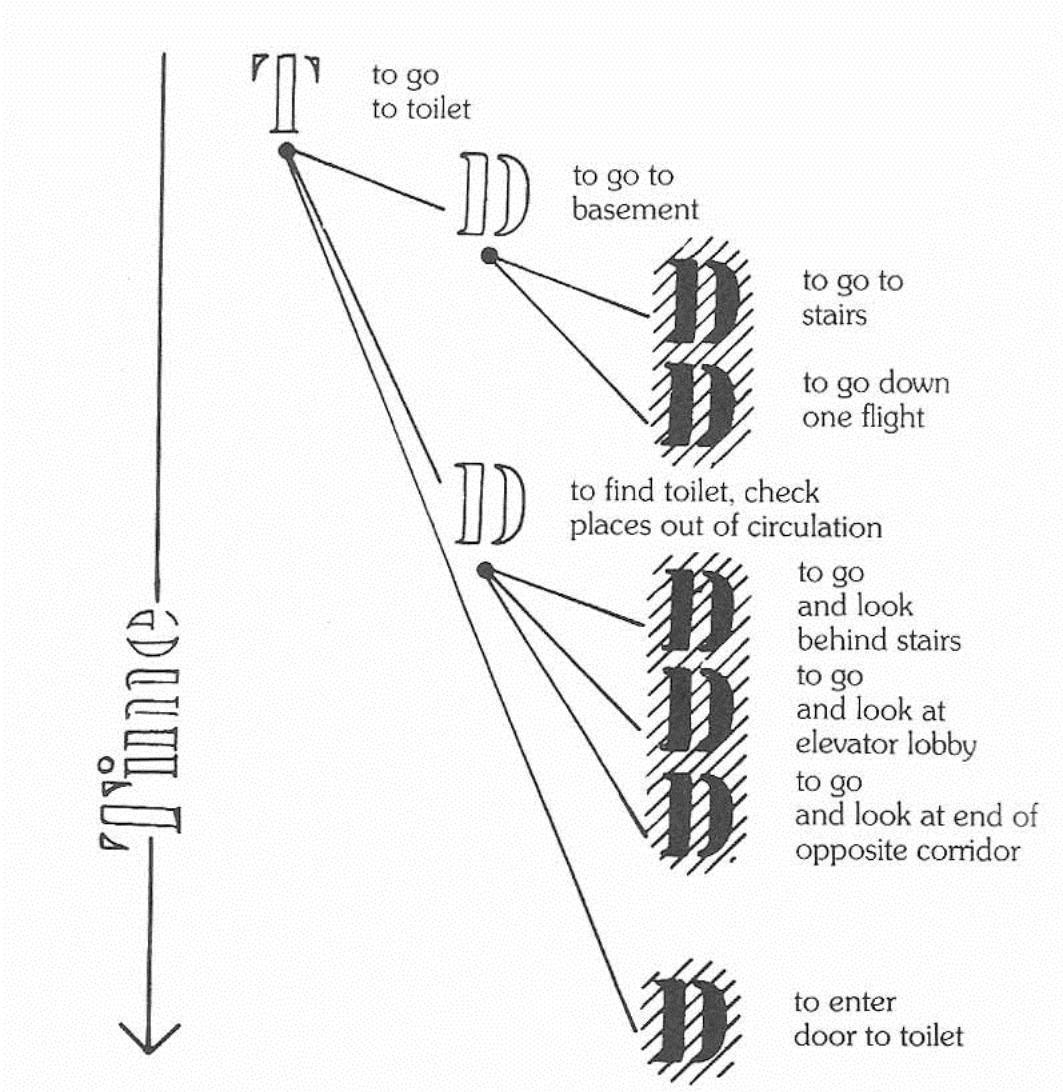


Figure 2.5 : Example of decision diagram by Passini (1984, p. 168).

One of the first and most important steps in wayfinding design is to recognize the moments during a user's journey where they need to make decisions, and therefore need information (Passini, 1984). If the space has already been built, wayshowing designers can use a sample of wayfinding episodes to find the weakest points in the current wayshowing system. These weak points would be decision points where users are given incorrect, misleading, or incomplete information (Passini, 1984). A way to identify these decision points and determine what information is needed at each is to use a notation system developed by Passini (1984) to create decision diagrams. Each decision (e.g. to find the podiatry department) is broken down into simpler decisions (e.g. to go to fourth floor, to find podiatry department down hallway), which are then broken down into even simpler decisions (e.g. to go to elevator, to go to fourth floor, to turn right after exiting elevator.) These decision diagrams end up essentially being

a decision plan for an environment that has already been built. This decision diagram can then be analyzed to ensure that adequate information is available at each decision point to make all of the correct decisions (Figure 2.6).

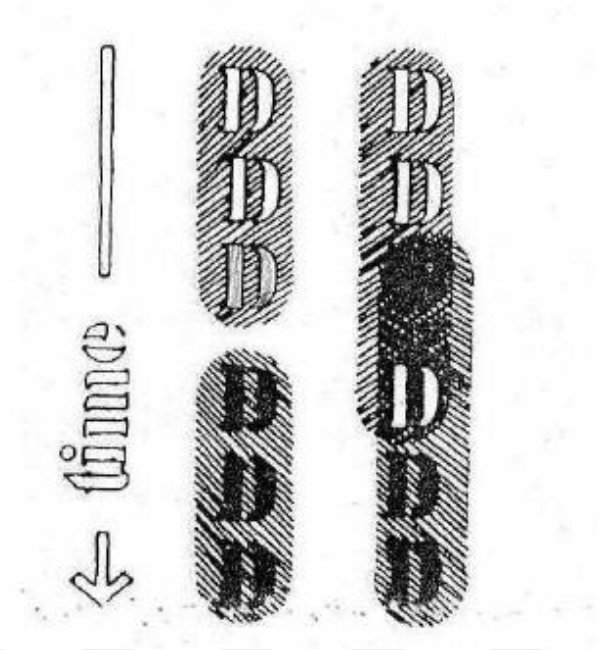


Figure 2.6 : Sequential and overlapping plans.(source: Passini, 1992).

The execution of a decision plan is where users tend to lose their way. They will typically have an image in their mind of what to look for to complete the particular decision at hand. Passini (1984) refers to this as the expected image and what the user actually sees as the perceived image. If the two match, the user will act to complete the decision, but if they do not the user will need to engage in further problem solving to continue to follow the decision plan.

Creating a new moving path is based on two procedures (Passini, 1995):

1. Adapting the new settlement by evaluating past wayfinding experiences.
2. Try to create a settlement by establishing links between different destinations.

"Turn right at the end of the corridor", "exit the stairs", "look at the map" There are two main types of decisions to be made; behavior (turning right, go to exit, look at) and indicate where or what the behavior will be (at the end of the corridor, on the stairs, on the map)(Passini, 1984, 1995).Hierarchical decision plans determine the range of behavior of the person to reach the target from the starting point (Figure 2.7).

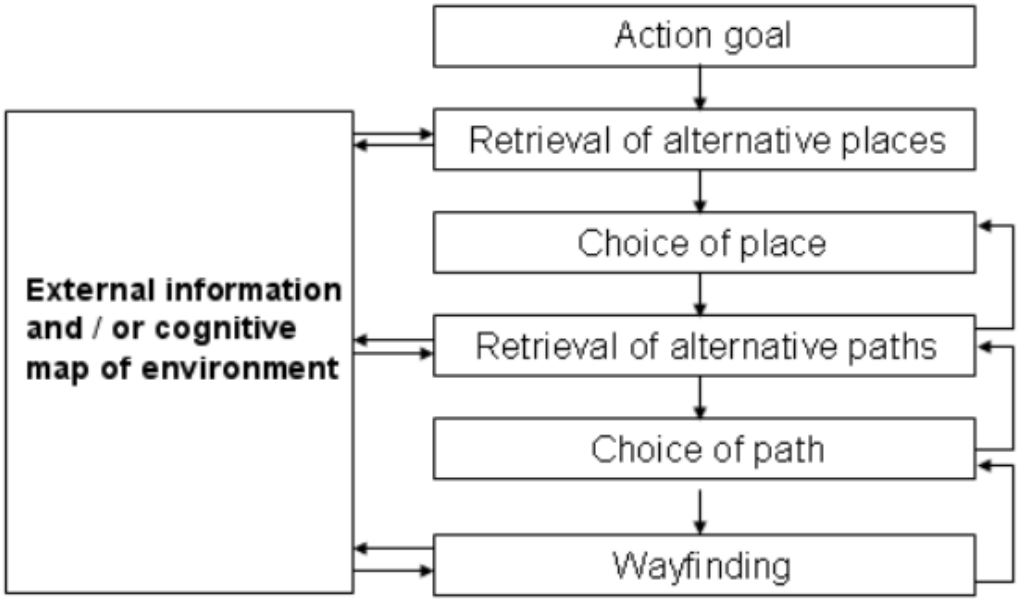


Figure 2.7 : Stages of spatial decision-making (source: Kitchin Freundschuh, 2000).

Several researchers have outlined their own suggested guidelines for wayshowing design.

The guidelines written by Passini (1984, p. 172-184) are very thorough. They are as follows: Passini's 7 steps in his guide to wayfinding design

1. Identification of wayfinding tasks
2. Identification of a user profile
3. Identification of wayfinding conditions
4. Formulating the design requirements (design problem)
5. Planning wayfinding solutions
6. Identifying environmental information
7. Synthesis, information system, and optimal location

While there are several guides to doing successful wayfinding design, not everyone chooses to use them. People often work of assumptions that are unfounded by research. A good example of this is how in the past, owners of department stores used to purposefully design to confuse shoppers on the assumption that people would buy more merchandise if they could be confused into staying on the premises longer (Arthur and Passini, 1992). There are plenty of guidelines, but each site varies in size, organization and the building's floorplan which all combine to create wayfinding issues unique to that particular site (Arthur and Passini, 1992). When a user enters a space and assesses the wayfinding issues related to the overall building environment,

they would create a decision plan as their solution to the issues present (Arthur and Passini, 1992). To create this decision plan, users will seek information. They will look for both internal information (existing knowledge about wayfinding in general as well as the specific environment) and external information, which includes off-route information (i.e. maps, verbal descriptions, and other advance information) and on-route information (i.e. cues given by signs and the environment itself; Mollerup, 2005). Some argue that modern technology, such as GPS, could replace typical wayfinding strategies (Mollerup, 2005). Relying too heavily on technology is a dangerous choice as it can fail; equipment malfunctions, software isn't kept up to date, and batteries lose power. Technology can enhance the wayfinding experience, but it is doubtful that it will actually replace these wayfinding strategies in the near future.

In addition to designing sign systems, wayfinding can be improved through other elements of the environment as well. Mollerup (2005) gives a list of suggestions, which are below with his original descriptions modified or added to:

1) Generally – Make destinations recognizable by variety, hierarchy, relative position and identification signs.

2) Track following – Use corridors, hallways, and other paths to guide users

3) Route following – Design so that the route is clear. Include on-route identification signs and landmarks.

4) Homing – Avoid creating one-way, dead-end routes for better circulation.

5) Educated seeking – Organize using common patterns that users will recognize from other environments they are familiar with.

6) Inference – Use sequentially ordered designations and consistent locations so that users can infer locations of places within a structure. This would include using a logical pattern for room numbering.

7) Screening – Organize space systematically so users can understand its organization after only quickly scanning the area.

8) Aiming – Use landmarks to aim the user and lead them in the correct direction.

9) Map reading – Coordinate nomenclature on maps and signs to lessen confusion.

10) Compassing – Use compass directions in names. Users that are aware of their cardinal directions within the space will be able relate to them and all users should remember the names better than an arbitrary name given to them. "West Elevators" may be easier to remember and locate than "Prescott Elevators".

The strength of Mollerup's (2005) writing lies in his knowledge of specific elements, such as color, and the roles they play in wayfinding. His wayfinding suggestions have some use, but tend to be vague and require interpretation. They are also lacking in direction as to when or where they should each be applied. Combining Passini's (1984) analysis of an environment through decision diagramming and steps to wayfinding design with Mollerup's (2005) guidance in the design of specific wayfinding system elements would capitalize on the strengths of each.

2.6 Wayfinding in Shopping Centers

The concept of space alone creates a sense of space when it is considered as a physical environment. However, in order for a place to exist, it must have a social life in it. Benedikt (1993) describes the reality of a structure, the physical elements that make up it; walls and roofs are created by the physical elements and are exposed as something that happens inside, but at the same time when the space is attached to the architectural forms, then only the perception and experience of the space is possible. (Verdil, 2007). When constructing a building, a physical environment is achieved by using a number of architectural systems. If it is assumed that experiences are produced continuously in this environment, it can be determined that there is an inextricable link between space-social life and experience (Hiller, Hanson, 1984). Hillier in his book, "The Social Logic of Space," has titled the sociological direction of space and cities. For him, the important thing is not the forms of space but the forms of movement of people in it.

Shopping centers are one of the building types that requires orientation and well organized systems. The fact that these places, which come to meet the personal needs of people, are often in a very complex and multi-layered structure, increases the risk of getting lost. The person wants to go to the point where he/she wants to reach at the shopping center as soon as possible and easily. In order for this to happen, the wayfinding in the shopping center has to be designed correctly. In shopping centers, it is desirable that the users are constantly moving, not bored, and spend much time in the space they are in. The role of the movement and perception of the environment has an important role. The relationship between people and the environment primarily occurs through perception. The point to be noted when designing shopping centers is

how the individual perceives the environment while moving. With the necessary wayfinding and information systems, this risk should be increased or removed.

The problem of wayfinding in complex buildings such as shopping malls, is under the influence of many variables. User-focused variables in human-environment-behavior relations play a major role in shopping centers. Shopping mentality is shaped by the different demographic characteristics of the user. The gender, age, occupation, and level of education of the user are the variables that cause the user to behave differently in the wayfinding process. The most decisive of the user-focused variables is the user's concept of shopping viewpoints and expectations from space. Researchers have also argued that shopping is a domain of social interaction (Graham, 1988), which we can feel with our senses (Holbrook ,1985, Underhill, 1999) while looking at it as a functional necessity for the concept of shopping (Bloch, 1986).

In the shopping experience, the user has to use the space for the a certain purpose and the concept of shopping in terms of utilitarian and hedonic perspective. (Hirschman ., 1982, Babin , 1994, Babin , 1995, Babin , 2000, Bloch , 1994).

True needy (utilitarian) users, use shopping centers to have products that they have already specified. On the other hand shopping centers for hedonic users (hedonic), is where they have had a fun shopping experience. Affected by emotional and psychological changes, they make instant shopping (Cockerham, 1995, Graham, 1988, Stoltman , 1991).

2.6.1 Design criteria for shopping centers

Shopping centers are places where many businesses live, where people living in the city spend a large part of their time with activities such as shopping, having fun, eating, socializing and being an integral part of the city.

When designing shopping centers some criteria should be taken into account:

1. The shopping center to be built catches a harmony with the surrounding environment
2. The shopping center to be built can continue its existence in the region it has been in for a long time
3. Users who visit shopping center spend a lot of time inside so that operator's profit level increase.

Providing the user to come to the shopping center on the urban scale and keeping the user in the shopping center can be seen as the main purposes in the shopping center

design.site selection and location, access and accessibility, demographic factors, spatial legibility and planning, architecture and management.

2.6.2 Legibility in shopping centers

Every minute a visitor spends is very important for shopping center managers. In order to increase this time, shopping centers should be designed spacious and easily legible as a whole, with little risk of disorientation and no wayfinding problem.

At the shopping centers, the user will feel so comfortable if he/she can provide a flowing and comfortable circulation. According to Lynch (1960), people read a place; (paths, nodes, edges, landmarks and their furniture) establishing an emotional connection, generalizing the space, grouping, and understanding what the space wants to say. The fact that the shopping centers are disconnected from the city can cause the user to feel himself/herself in the labyrinth. The legibility of the space can be increased with the help of architectural items such as color, materials and signage.

In a proper circulation system, the user needs to be able to perceive and read the space correctly. As long as the planning of the shopping center is simple and clear for the user, the user will be able to read the plan easily. In this regard it is important that the the user can imagine position of the vertical and horizontal circulation systems, how the eating and drinking areas are separated from the general place, and how store types are clustered within them. t is also important that family members should be able to shop near each other as well as similar tenants in the shopping center should be close to each other. Positioning of men's clothing and women's clothing in the corridor will ensure that consumers can have a good time at the same time.

The typologies of the shopping centers are shaped completely according to the established scenario. The number of entrance and escalators of the shopping center is very important for planning. A large number of entrances and exits can lead to security problems and confuse the user in finding their way.

Arthur (1992) states that "Architectural elements of a building; gives information about the spatial organization of the entrance, horizontal and vertical circulation structures. If a space does not have a clear spatial organization, the user is left alone in finding directions. " Intrance-exit doors and circulation systems are of great importance for the user to stay away from stress and to be able to navigate in an emergency. But it is often difficult to calculate the return points in structures with a complex spatial configuration, such as shopping centers. According to Arthur and

Passini (1992), emergency exits should also be used in daily routines and made available to users. This makes it easier to navigate in emergencies.

When circulation systems are designed correctly, they can make the building more understandable. It facilitates wayfinding by transferring sufficient information about the spatial configuration of the building to the user. Having a linear or circular architectural geometry affects legibility (Hillier and Hanson, 1984).

3. WAYFINDING IN ZORLU CENTER

3.1 Zorlu Center Shopping Mall

The Zorlu Istanbul project(Table 3.1) was organized in accordance with competition specifications in July 2007 by Zorlu GYO company and the project concept was created in anticipation of the contest structure program given without any changes .

Table 3.1 : A brief summary of Zorlu center.

Project Architects	Emre Arolat Architects, Tabanlıoğlu Architects
Client	ZORLU PROPERTY DEVELOPMENT AND INVESTMENT INC.
Location	Istanbul, Turkey Koru Sokak No: 2
Construction	2008
Completed	2013
Opened	10 October 2013
Planted Area	100000 sqm
Project Area	639.000 sqm
Constructor	Akturk construction industry
Structural	Balkar ins. engineering
Mechanical	Beta teknik , okutan engineering
Type	Mixed Use, Retail, Cultural Center, Residential,

The project has been designed as a symbolic structure with a different imagination to the city that can conduct innovation to the public area and is one of the earliest buildings at the junction of the Bosporus bridge at Europen and Asian connection which creates contemporary urban fragment experience that suggests a different lifestyle and connects the city center with the business district Maslak (Figure 3.1).

Figure 3.1 : A rendering of the Zorlu center, rising in Zincirlikuyu.

3.2 The location of Zorlu Center in the context

Zorlu complex is located on one of the most popular sites in İstanbul, with outstanding road connections. Observing Buyukdere street construction, no matter how topographic location is, the site is not establishing a different relationship with the land on which it locates. The relationship of the site with city is also horizontal(Figure 3.2).

Figure 3.2 : Zorlu Center's siluetthe in cityscape.

Location, of course, is everything. Zincirlikuyu is a place where a jumble of highways from Asia and Europe intersect, before heading off again into the central business district, the upmarket residential region of Etiler and the older commercial and residential venues of Nisantasi, Taksim and Besiktas (Figure 3.3).

Figure 3.3 : Zorlu Center's location.

Zorlu Center's connections with the metro lines has made the transportation so easy (Figure 3.4).

Figure 3.4 : Road connections to Zorlu center.

3.3 Architect's intentions and the design idea

A land in an important area of Istanbul which was a hill in ancient period, has been transformed into a green hill again and its topography was restored. The shopping center construction provided in the contest program is placed inside this hill. (Figure 3.5).

Figure 3.5 : Zorlu Center's conceptual render.

"What we're trying to do here is create a private place that is also very much a public part of Istanbul," said Mehmet Emre Zorlu, a board member of Zorlu Property Group who, born in 1984, also is a good example of the growing number of youthful businesspeople in this ancient city (Figure 3.6).

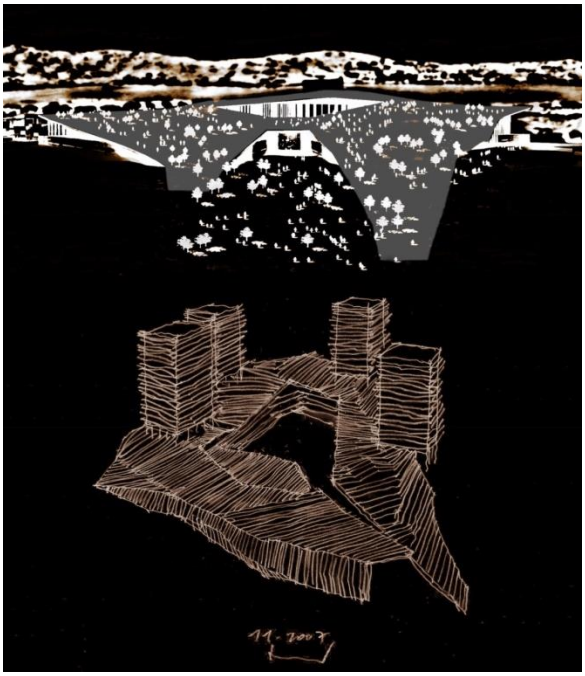


Figure 3.6 : Zorlu Center's sketch by Emre Arolat

To achieve that goal, the architects Emre Arolat and Murat Tabanlioglu — the Turkish winners of an international competition for the design — have created a south-facing terrace overlooking the Bosporus, partly as a level surface for construction and partly as a public gathering area. On this terrace, “we have a hard shell that evolves into a soft and green hill,” Mr. Arolat said. (Figure 3.7).

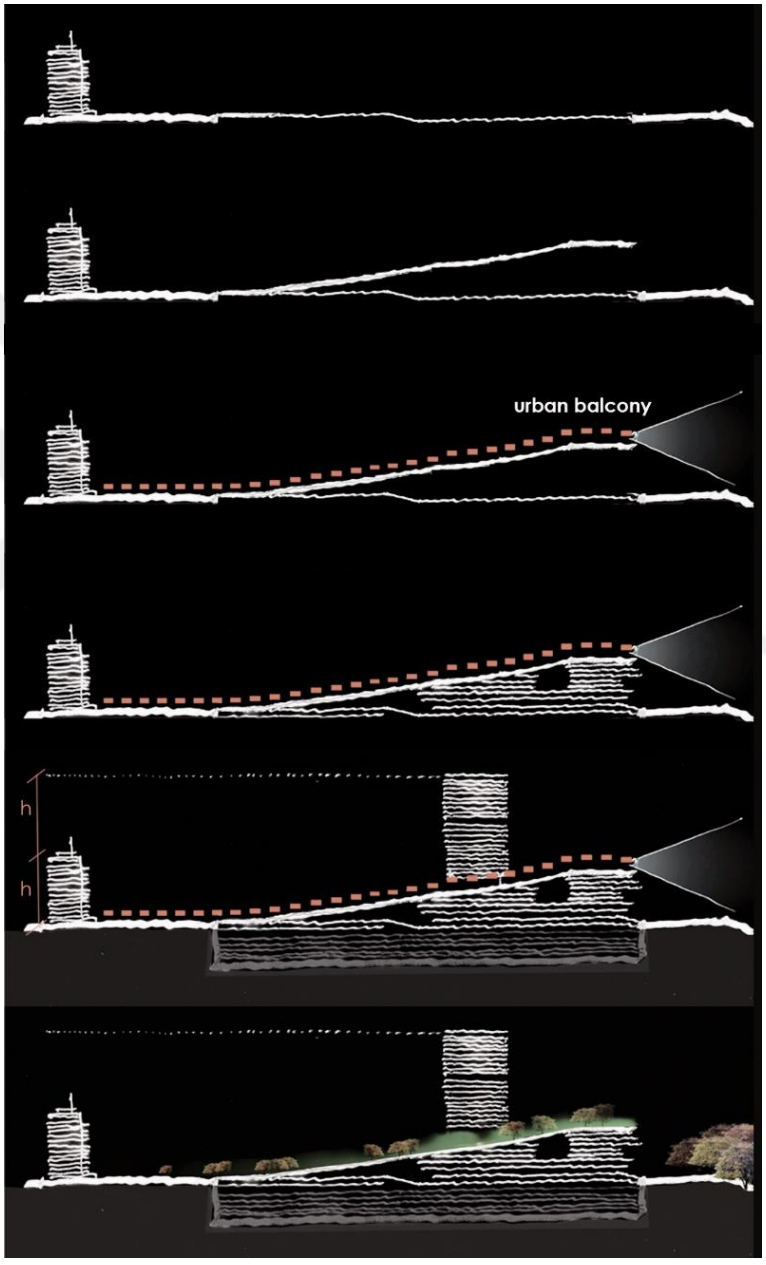


Figure 3.7 : Urban balcony as Zorlu center’s design idea..

As it can be seen in the schematic section of the Bosporus, a connection is established with general topographic character and the center of the hill is taken into the park and covered with a stepped structure to create the public space.

The part of the "Siluet Istanbul" project, rising from behind the Highways, forms a threshold with the Tatlıcı Towers of Büyükdere street. In addition, the structure designed to integrate with Bosporus, reflecting it's characteristics (Figure 3.8).

Figure 3.8 : Zorlu Center's scale in its urban context

The building, in relation to the city, shows the behavior of a courtyard to the Bosporus, where the valley is opened from different elevations. At the lowest elevations, it is possible to enter a different world without breaking the connection with the city by visiting the park and the Bosporus from one side and the Tatlıcı Towers and the highways from the other side in public spaces. However, Buyukdere street begins with a water element that reinforces the effect of mass on the ground with its reflections in its elevation, At this point, open and closed exhibition areas have organized settlements that can be allocated to digital performing arts.

3.4 Form, space, function relationships

This mixed-use project houses various functions from shopping mall to amusement, to residential and several accommodation conveniences, as well as dining options and social venues, mainly a performance and concert hall. This architectural design has become one of the city's most favorite destinations.

This mixed-use project deals with contradictions like grandeur and modesty, public and private, institutional and domestic, together with structural and topographical aspects (Figure 3.9).

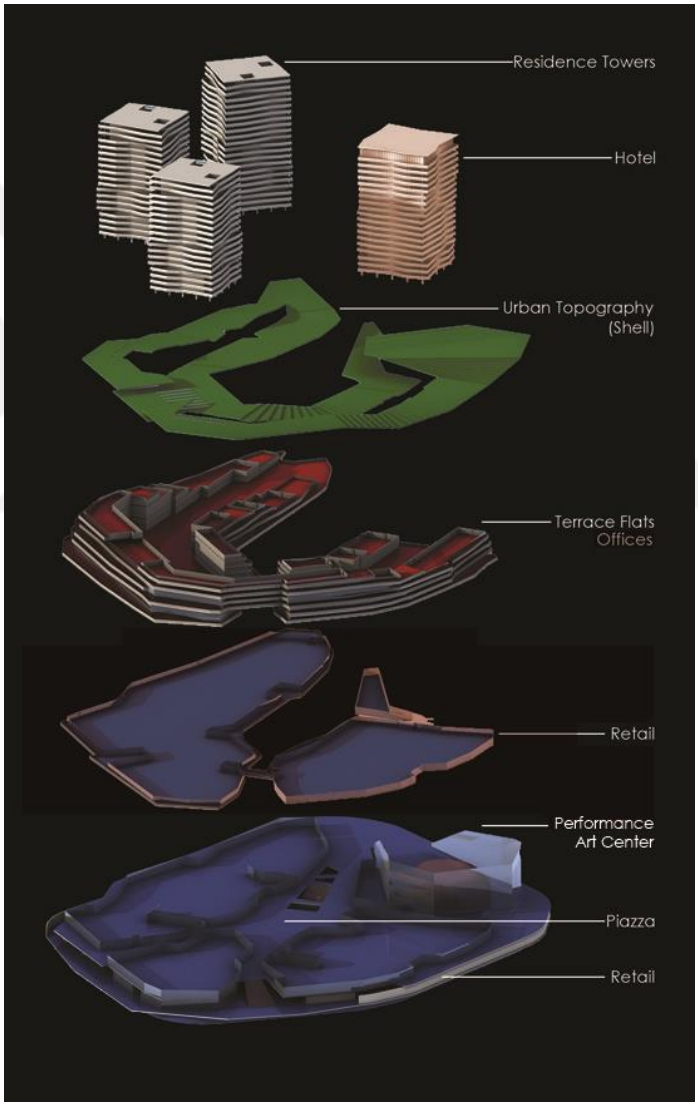


Figure 3.9 : Zorlu Center's concept diagram showing functional zones.

Different analyzes have been prepared which constitute the common public spaces such as park and activity area, and have been compared by known large public areas in urban terms.

Generally, private and public usages have been separated but they have been designed correlating with both the land and surroundings.

The trade center and socio cultural activities are designed in different elevations and are in relationship with the park, designed to emulate the gradual structure of the Bosporus.

The inner circulation of the upper mass aims to create the experience of a contemporary city piece that suggests a different lifestyle by articulating with semi-open streets and semi-public squares and gardens opening onto the road from the urban texture on the ridges of the Bosphorus (Figure 3.10).

Figure 3.10 : The entrance of Zorlu Center.

At the lowest trade-recreation level, public spaces are enriched by placing the areas that allow outdoor organizations (concerts, cinemas, etc.) in the parking lot.

Zorlu project added a new meeting place to the city by its relationship with green space and the Bosporus. On the rising floors of the building, there are planned restaurants, bars and meeting halls opening to the common usage. In addition, it is recommended to use the park, which is arranged in the field, by associating the public transportation stops in front of the Bosporus Bridge. Special functions in building have been grouped horizontally. (residential, offices, hotels and etc.)

The center is a four-tower, five-function structure group, including a public square, residential development, hotel, and office space. The design is stated to be "shaped by a modern understanding of architecture", based on the concept of a historical town square, incorporating "bold geometric lines that frame the sky, as well as large expanses of greenery".

It is home to Zorlu Center PSM, the largest performing arts center in the country, as well as the country's first Apple Store (Figure 3.11)

Figure 3.11 : Zorlu Center, PSM.

The shopping center contains over 200 shops, 40 cafés and restaurants. It contains stores of luxury brands such as Beymen, Atelier Rebul, Vakko, Cos, Moncler, Bulgari, Pomellato, Louis Vuitton, Fendi, Lanvin, Dior, Miu Miu, Burberry, Tory Burch, Michael Kors and Valentino, as well as Turkey's first Apple Store. Beymen's largest store in the center covers some 10,000 square metres (110,000 sq ft) filled with "every fashionable item imaginable, from ready-to-wear to couture, cosmetics to home

accessories, menswear to womenswear, accessories to books, and designers that are not available anywhere else in the city. Atelier Rebul is operated by Rebul, Istanbul's oldest drug store, and is a boutique selling specially made beauty products, including lavender, green tea, or jasmine (Figure 3.12).

Figure 3.12 : Zorlu Center Meydan floor shops.

Zorlu Center also contains numerous international restaurants and cafés, including Eataly, Fauchon, and Tom’s Kitchen. It also houses the restaurant Morini, owned by the AltaMarea Group, serving Italian and Mediterranean food under chef Michael White.

3.5 Horizontal and vertical circulation

Zorlu shopping center is a multi-storey building, which contains of four floors and also 3 floors of parking lot. There are five different entrances to the shopping mall from different floors.

3.5.1 Metro floor

The lowest floor is named as Metro Floor. There is one entrance from Zincirlikuyu metro station to the shopping mall. There are three moving stairways in this floor which one of them just links this floor to the lower floors that goes to the parking areas, One of the goes to upper floor and the other one goes up and down. There are also two elevators and two restrooms for men and women in this floor (Figure 3.13).

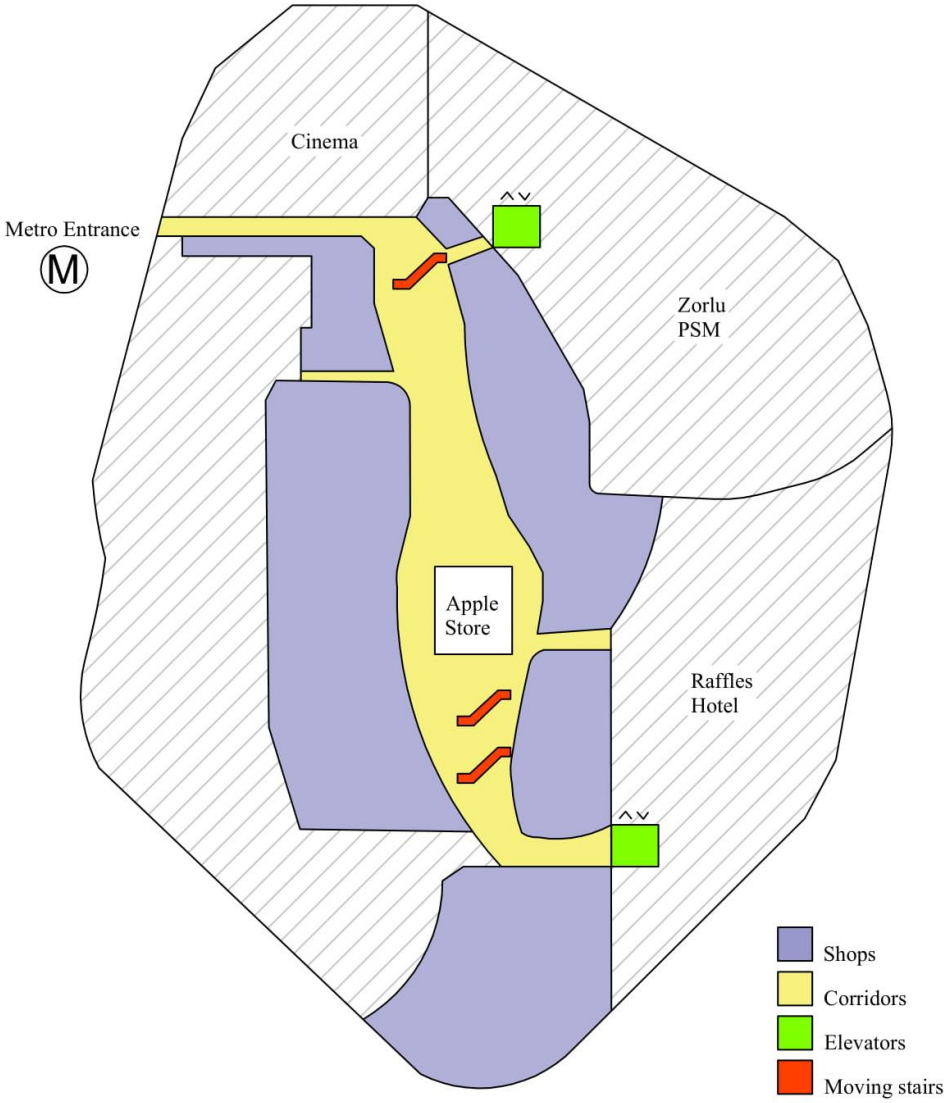


Figure 3.13 : Zorlu center metro floor plan.

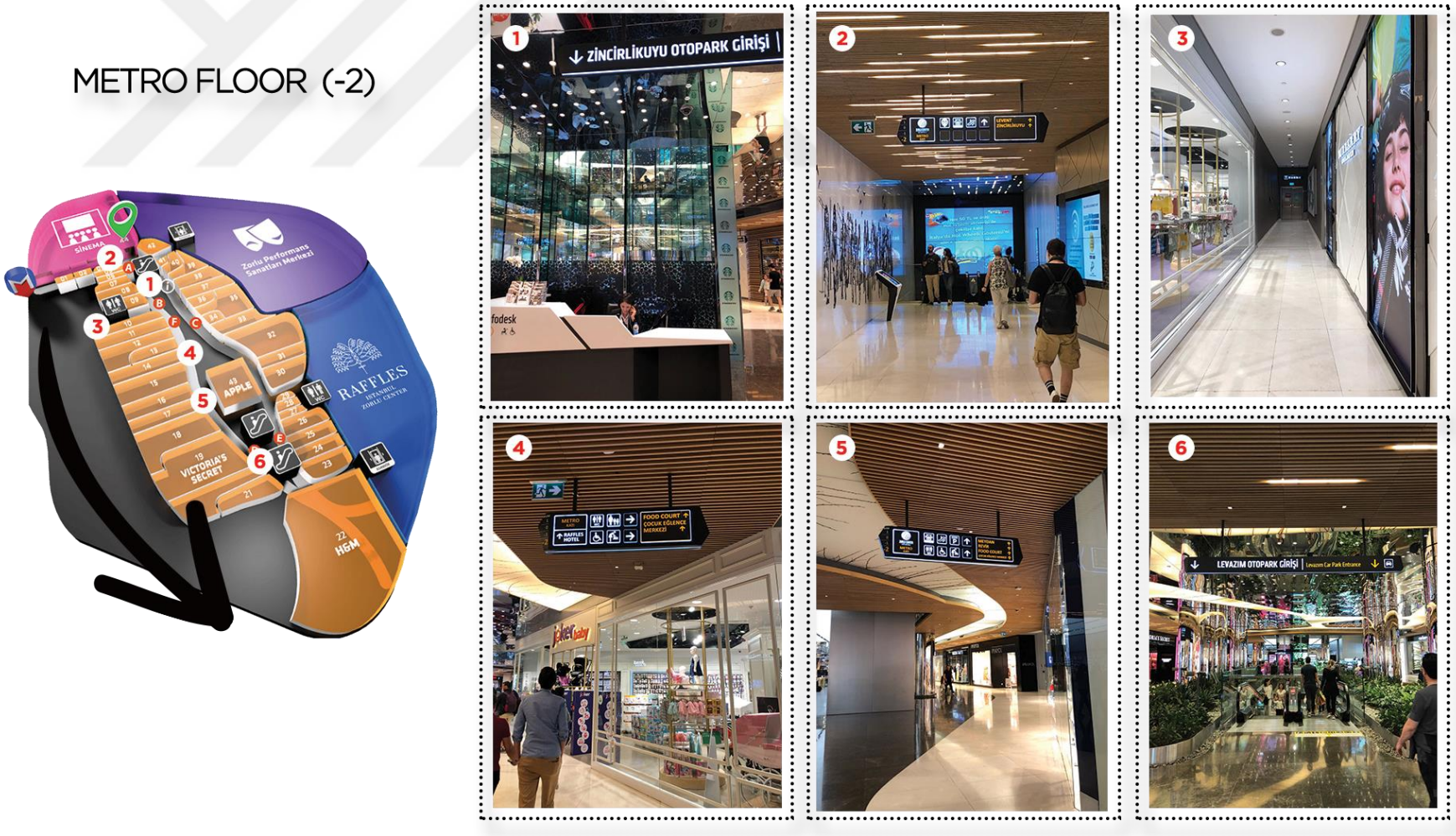


Figure 3.14 : Metro floor photografs showing on plan.

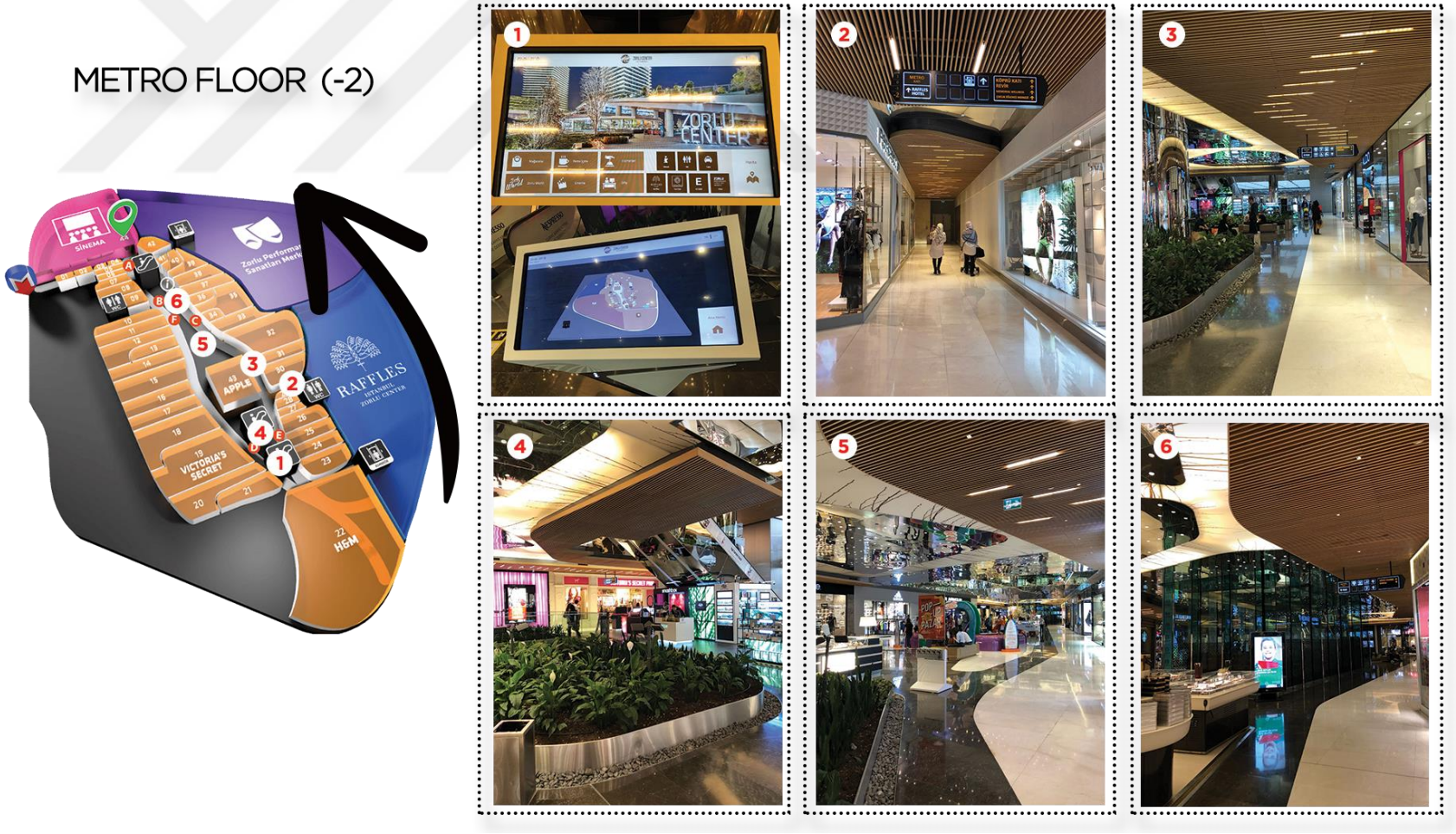


Figure 3.15 : Metro floor photografs showing on plan.

3.5.2 Bogaz floor

The Second floor is named as Bogaz Floor. There is one entrance from Levazim-Beymen to the shopping mall. There are two moving stairways in this floor, which connects this floor to the lower and upper floors. In this floor there are three elevators which two of them goes to up and down floors while the other one just has connection with the up stairs.There are two separate rest rooms for men and women in this floor (Figure 3.16).

Figure 3.16 : Zorlu center bogaz floor plan.

Figure 3.17 : Bogaz floor photografs showing on plan.

Figure 3.18 : Bogaz floor photografs showing on plan.

3.5.3 Meydan floor

The Third floor is named as Meydan Floor. There are three different entrances to this floor, one is the entrance from Levazim to the shopping mall using one straight moving stair, the other one is entrance from Zincirlikoy metro station, and the third one is the entrance located in Buyukdere Street. In this level, also Vale Park is available. There are three moving stairways in this floor (except the one in the entrance), which one of them just links this floor to the up stair, and the other two link this floor to down stair. In this floor there are three elevators which three of them go to up and down floors.There are three separate rest rooms for men and women in this floor (Figure 3.19).

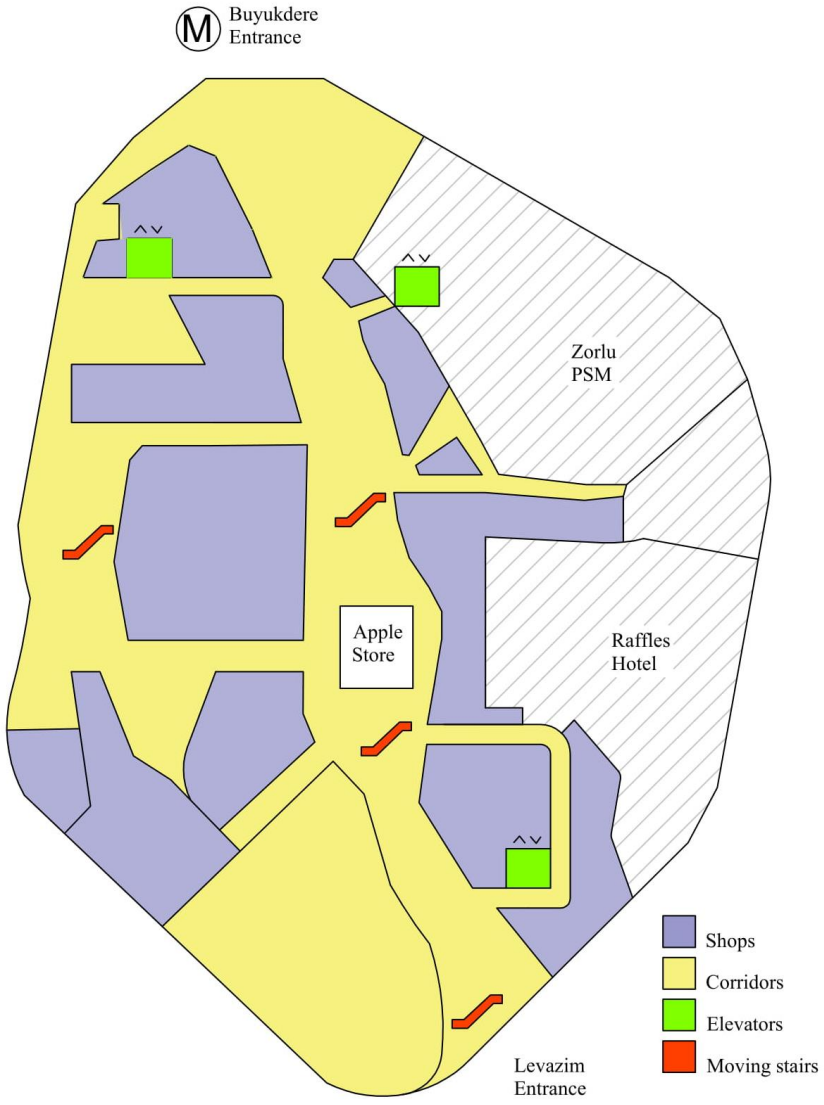


Figure 3.19 : Zorlu center meydan floor plan.

Figure 3.20 : Meydan floor photografs showing on plan.

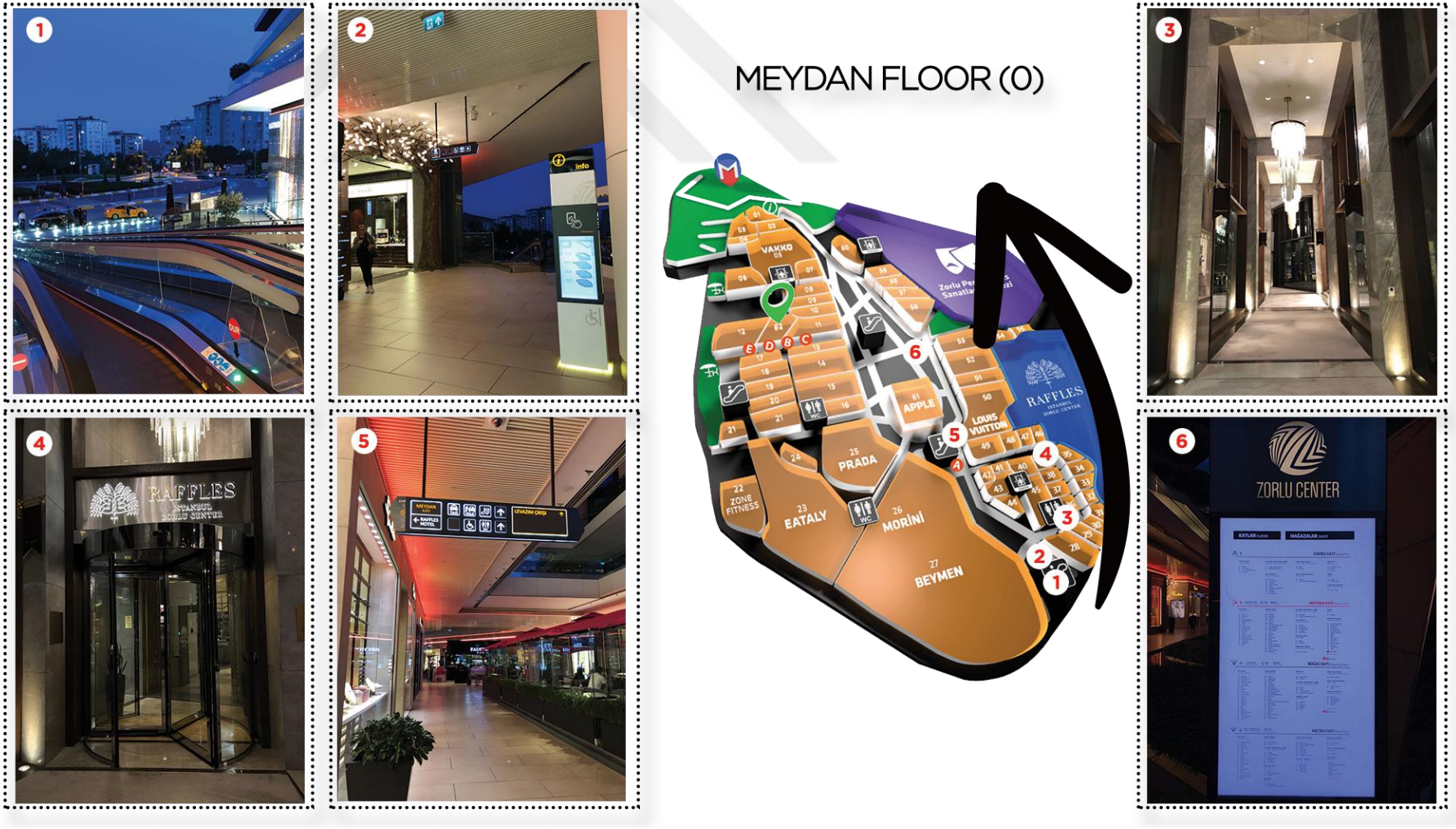


Figure 3.21 : Meydan floor photografs showing on plan.

3.5.4 Kopru floor

The Fourth floor is named as Kopru Floor. There are no direct entrances to this floor from outside of the shopping mall. There is just one moving stairway in this floor links this floor to down stair. In this floor there are three elevators which three of them go down floors.There are three separate rest rooms for men and women in this floor (Figure 3.22).

Figure 3.22 : Zorlu center kopru floor plan.

The layout of the coridors on every floor seems to be one and the same, but is actually different for each floor. For example, the configuration of the ground floor (metro floor) and the kopru floor differs significantly. In order to understand the configuration of building, the floors of the building with circulation areas and vertical circulation diagrams were conducted (Figure 3.23).

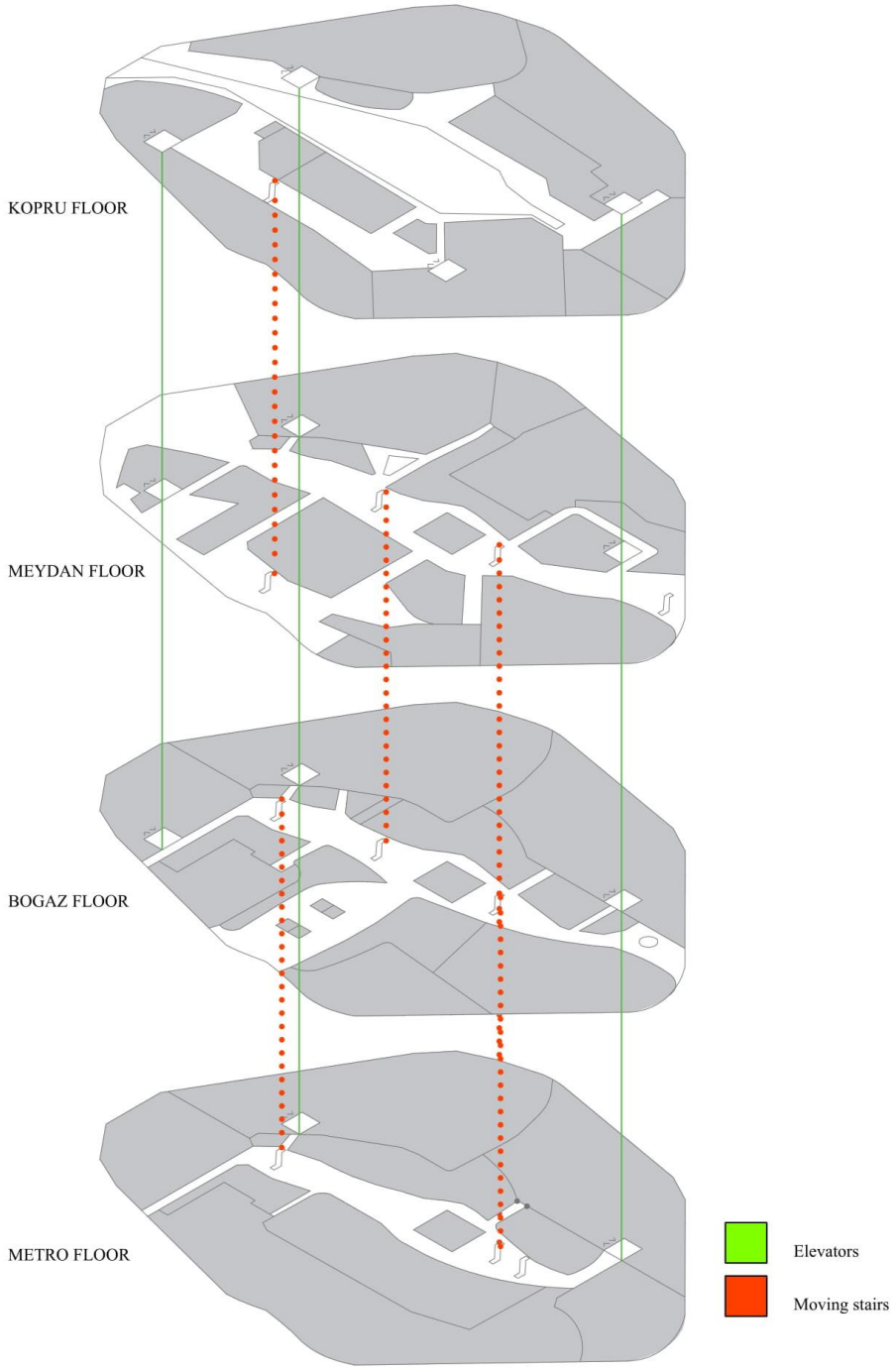


Figure 3.23 : Vertical circulation provided by moving stairways and elevators.

4. RESEARCH

4.1 Wayfinding Task Procedure

10 shoppers intercepted in Zorlu center shopping mall, described below, were requested to describe their own behavior to find a store within the mall. They were instructed to express their actions and their thoughts at the very moment when they came to their mind. They were taped recorded through all the process. More precisely, shoppers were asked:

(1) To say what they do.

(2) To say why they do what they decide to do (for example; I made a mistake, I have to come back).

(3) To record their thoughts on recorder.

This approach focuses not on the observation of what shoppers do, but on all the thoughts which lead them to act as they do. For instance, simple observations cannot tell why shoppers decide to come back on their way or what information they ask a passer-by. This method is also different than a self-report after the fact, shoppers describe what they have done and thought to find their way once the whole wayfinding process is over. These selfreports imply some problems, such as rationalization after the fact and loss of memory of certain steps in the process followed by shoppers. They were asked to participate in the study at the main entrance of the mall, before they start shopping. A short questionnaire related to their age, gender, and familiarity with the mall (frequency of visits) were first administered with them.

The shoppers were asked to assess if they are or not familiar with the Zorlu center shopping mall where the study was undertaken. A five-point Likert scale was used to measure the perceived frequency of visits to this mall (several times a month=5; never=1). One were classified as nonfamiliar and five as familiar with the mall.

The shoppers were given the instruction to find a store predetermined. Five stores were selected, and the starting points were different. The shoppers were instructed to record what they saw, their thoughts and decisions with the reasons behind from the moment they were indicated which store to find till they found it. After locating their assigned

destination, they were given part 2 of the study (questioannaire) and encouraged to write any relevant comments.

List of destinations:

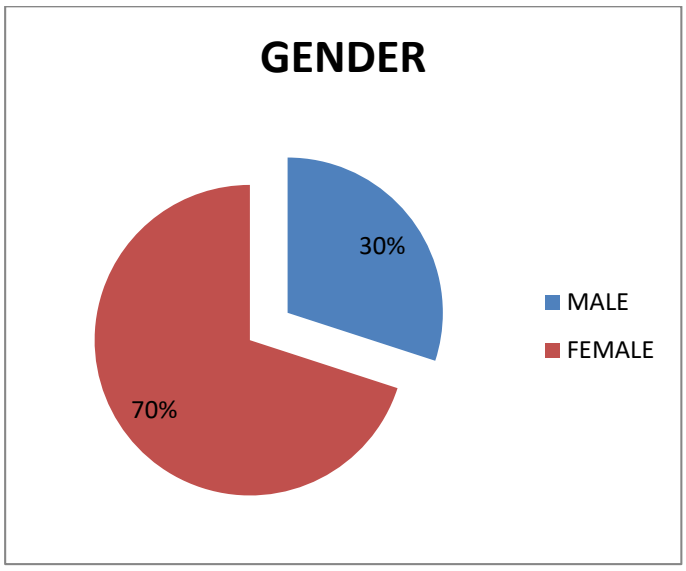
1. To go to Pasabahce from Metro Floor
2. To go to Gunaydin restaurant from Parking
3. To go to Cinema from Levazim entrance
4. To go to Remzi store from Zincirlikoy Street entrance in Meydan floor
5. To go to PSM from Levazim-Beymen entrance in Bogaz floor

For each destination, 2 shoppers were chosen. One familiar with the shopping mall and one nonfammiliar shopper.

4.2 Wafinding Analysis Study

A total of 10 participants were gathered. 70% of participants were female and 30% were male. Table 4.1 displays the number of subjects according to their gender. The participation was on a voluntary basis.

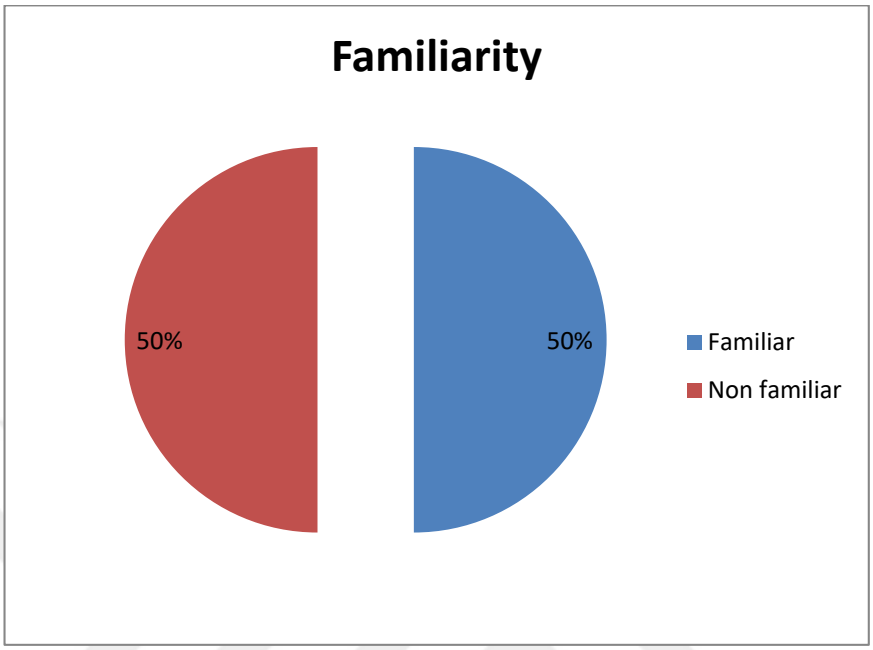
Table 4.1 : Subjects according to their gender.



2 were assigned for destination number 1(one female familiar and one male non familiar), 2 were assigned for destination number 2(one female familiar and one male non familiar), 2 were assigned for destination number 3(one female familiar and one male non familiar), 2 were assigned for destination number 4(one female familiar and

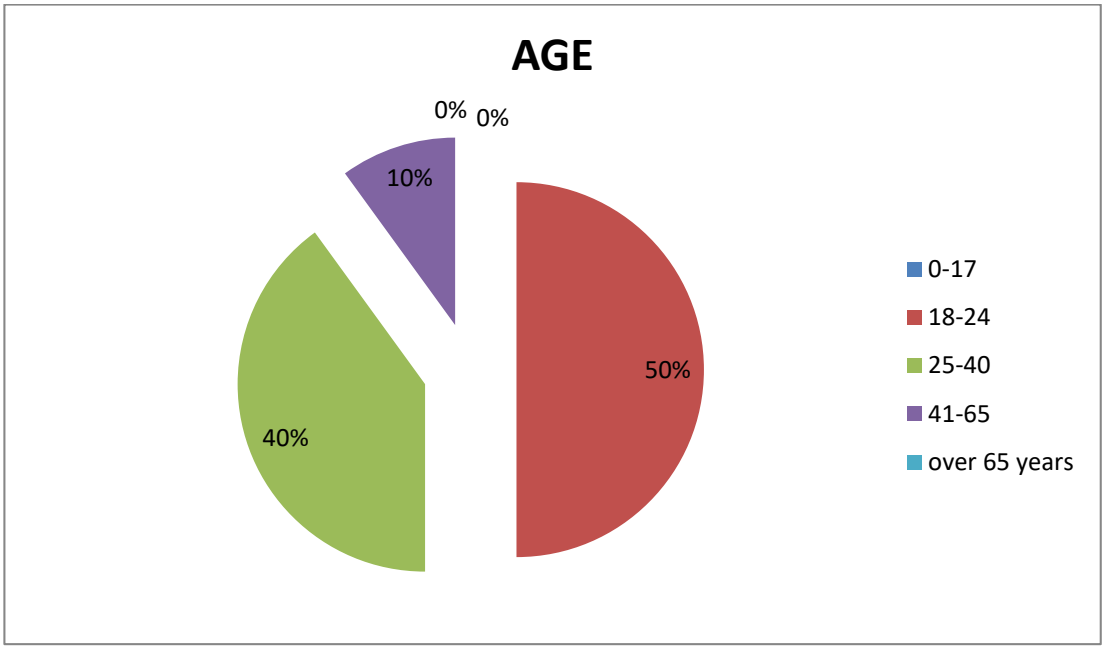
one female non familiar)and 2 were assigned for destination number 5(one female familiar and one female non familiar) (Table 4.2).

Table 4.2 : Subjects according to their familiarity.



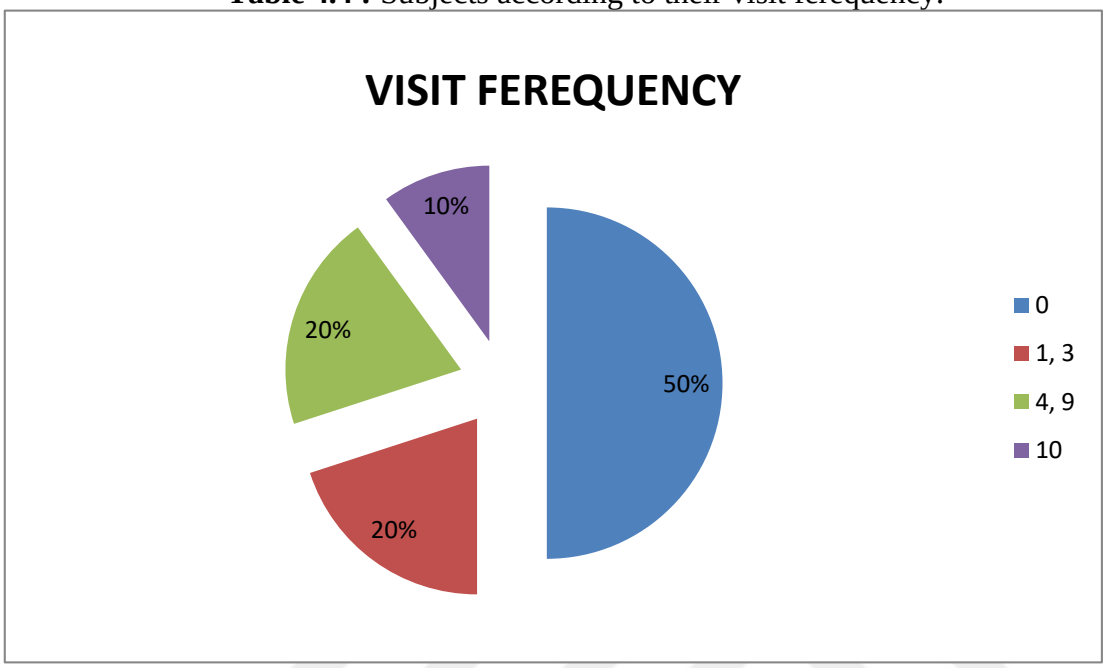
50% of participants were in the 18-24 year age range, while 40% were in the 25-40 year age range and 10% were in the 41-65 year age range (Table 4.3).

Table 4.3 : Subjects according to their age.



50% of participants had never been to Zorlu shopping mall previously, while 20% had 1-3 previous visits, 20 % had 4-9 previous visits, and 10% had 10 or more previous visits (Table 4.4).

Table 4.4 : Subjects according to their visit ferequency.



The survey had two parts to each question. One part asked participants to check boxes for their response, sometimes more than one if necessary. The other part was room for participants to write comments (open and closed question formats).

Destination 1:

According to studies done by researcher destination one which is to go to Pasabahce store from Metro station entrance is one of the most confusing wayfinding aspects of the Zorlu shopping center.

The most confusing aspect is that there is not a direct vertical circulation to reach to Pasabahce store if the visitor is coming from metro entrance.

Metro entrance is located in metro floor, which is the lowest level of Zorlu shopping mall, and Pasabahce store is located at 4^{th} level of shopping center which is kopru floor. The changing between levels is very confusing. When you enter Zorlu shopping center from metro entrance, you are in a small rectangle shaped space which does not have a high ceiling or open voids that you can have a general overview of where you are, and as well it is not welcoming. This may cause a visitor to have the feeling that they are not in a public place as they are expecting. The hallways located on the metro floor are also narrow and angeled, which increases this feeling of not being in the correct location because you are not able to see more than 10 meters ahead of you. In this case you can not see which stores are in this floor. The hallway is bright with too many lightings and the reflection of this lightings on metal materials used on ceilings also effects legibility of the space .For each task, the shortest route as well as a list of reasonable route alternatives was determined beforehand. Reasonable routes are defined as shortest and easiest to navigate.

Following are decision diagrams using Passini's (1984) notation method for each path to destination 1.

For this desination, three posible wayfinding routes are showed. Each route is shown by different color (Figure 4.1).

- In route 1 which is shown by orange color moving stairs are used to go to destination.
- In route 2 which is shown by red color elevators are used to go to destination.
- In route 3 which is shown by green color moving stairs are used to go up to bogaz floor, then elevator is used to fo to kopru floor directly.

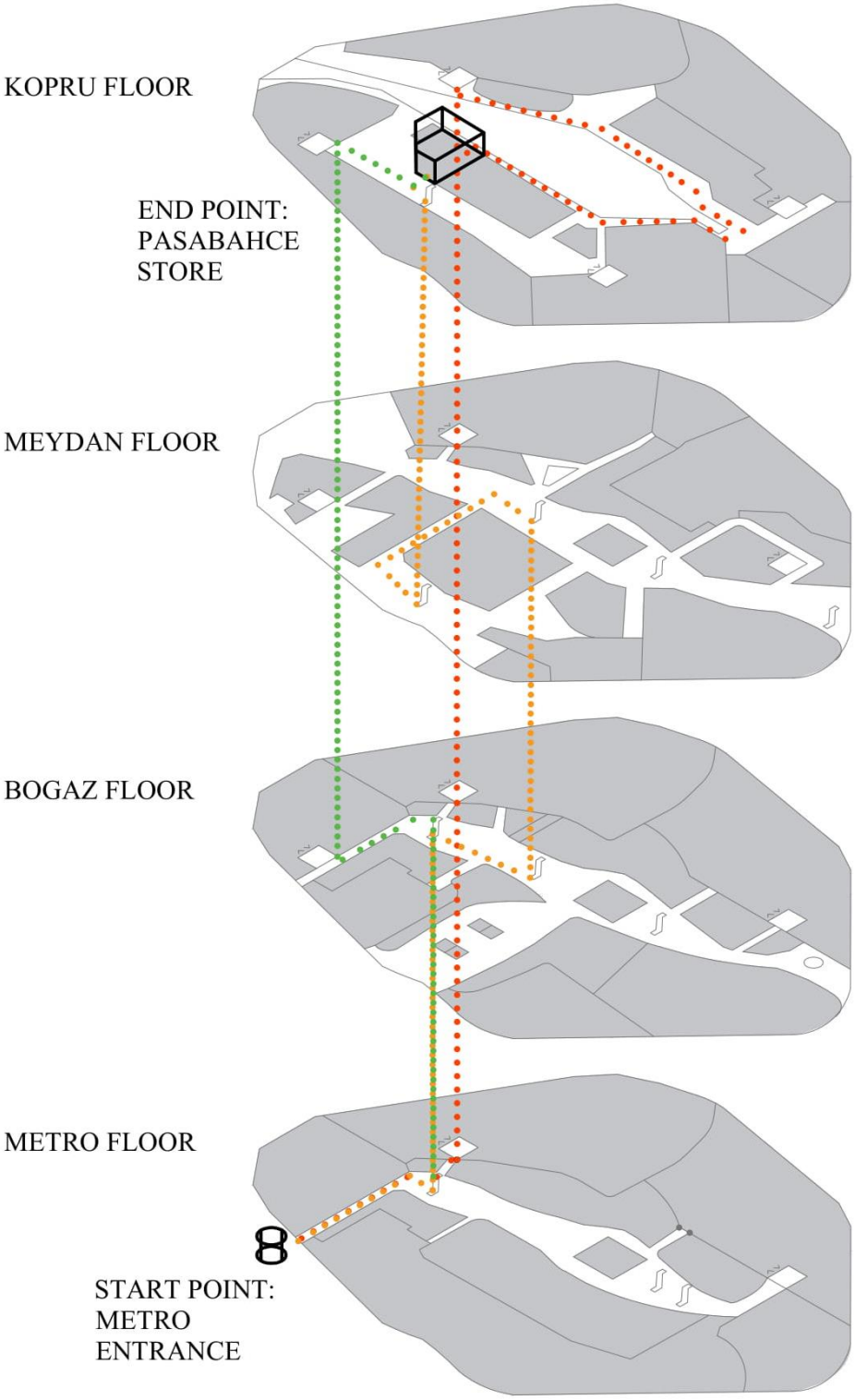


Figure 4.1 : Possible routes for destination 1.

Above you can see the wayfinding tasks for destination 1 done by and non familiar users (Figure 4.2).

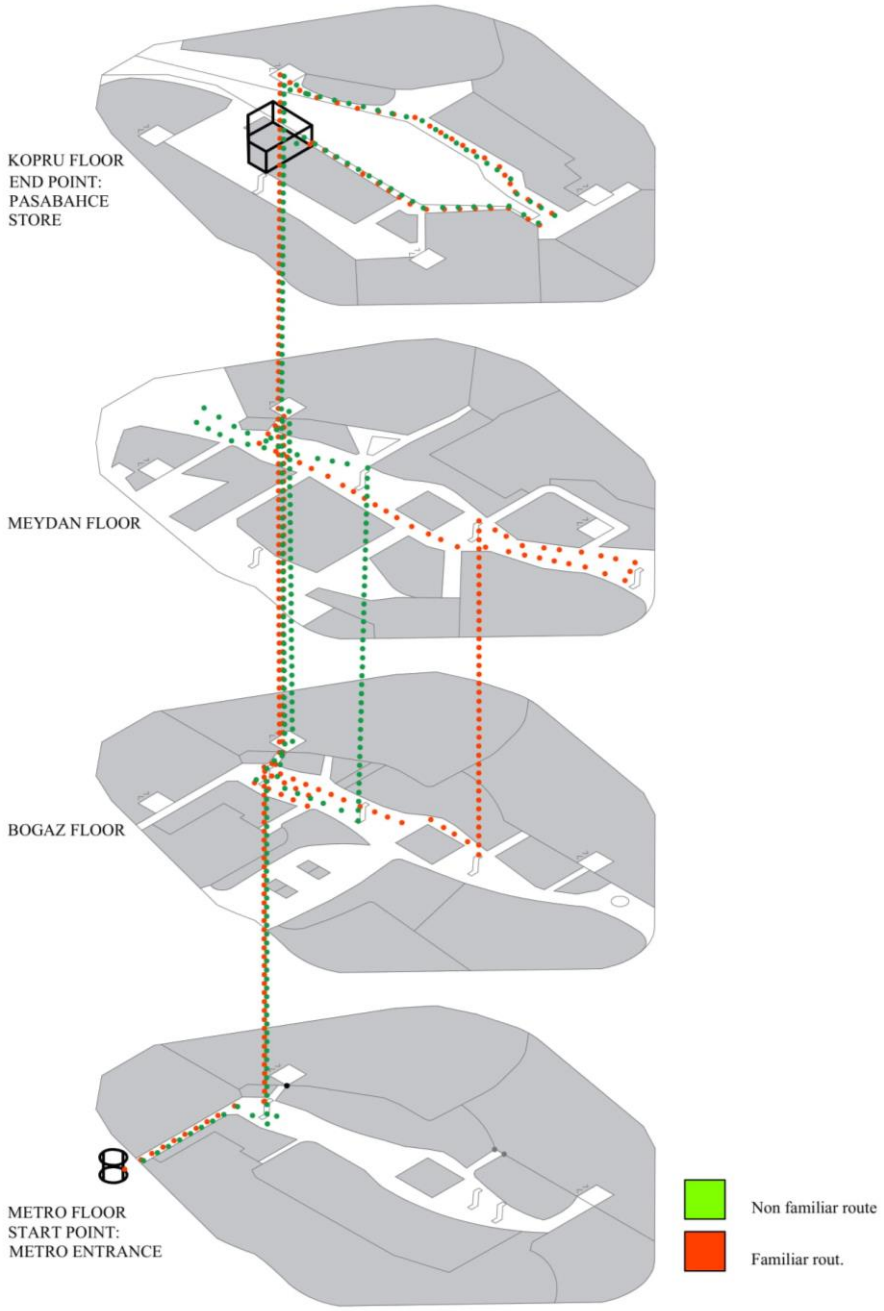


Figure 4.2 : Familiar and non familiar users wayfinding task.

Wayfinding task duration done by nonfamiliar user takes longer than the familiar users task.In both tasks users did not use landmarks. Nonfamiliar user made 5 wrong turns while familiar user made 2 wrong turns. For this destination two user had difficulties finding elevators and moving stairs locations in floors.

Destination 2:

According to the studies done by researcher, destination 2which is to go to Gunaydin restaurant from parking floor is one of the other confusing wayfinding routes of the Zorlu shopping center.

Parking entrance is located in lower levels than metro floor, and Gunaydin restaurant is located at third level of shopping center which is meydan floor. The changing between levels is very confusing

Following are decision diagrams using Passini's (1984) notation method for each path to destination 2.

For this desination 2 posible wayfinding routes are showed. Each route is shown by different color (Figure 4.3).

- In route 1 which is shown by green color moving stairs are used to go to destination.
- In route 2 which is shown by red color elevators are used to go to destination.

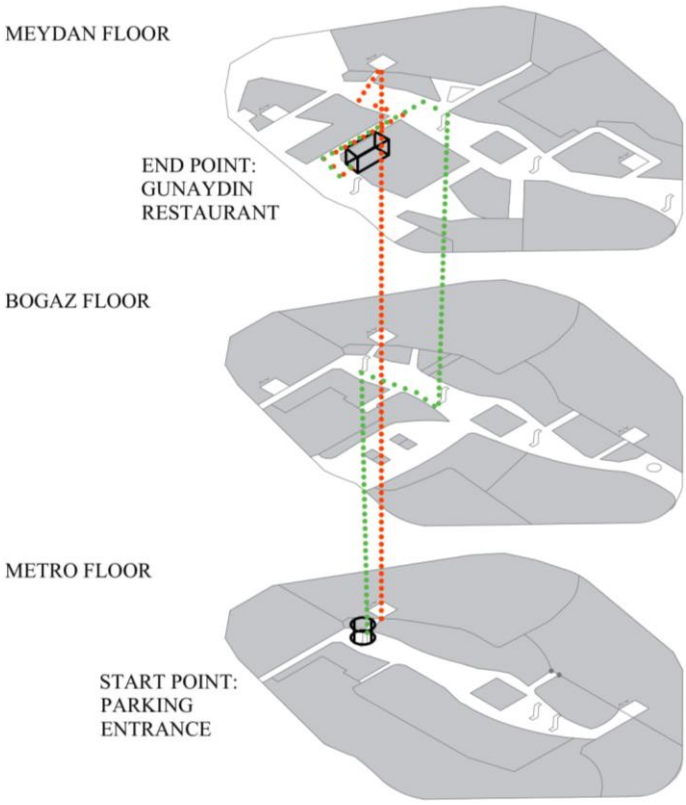


Figure 4.3 : Possible routes for destination 2.

Above you can see the wayfinding tasks for destination 2 done by and non familiar users (Figure 4.4).

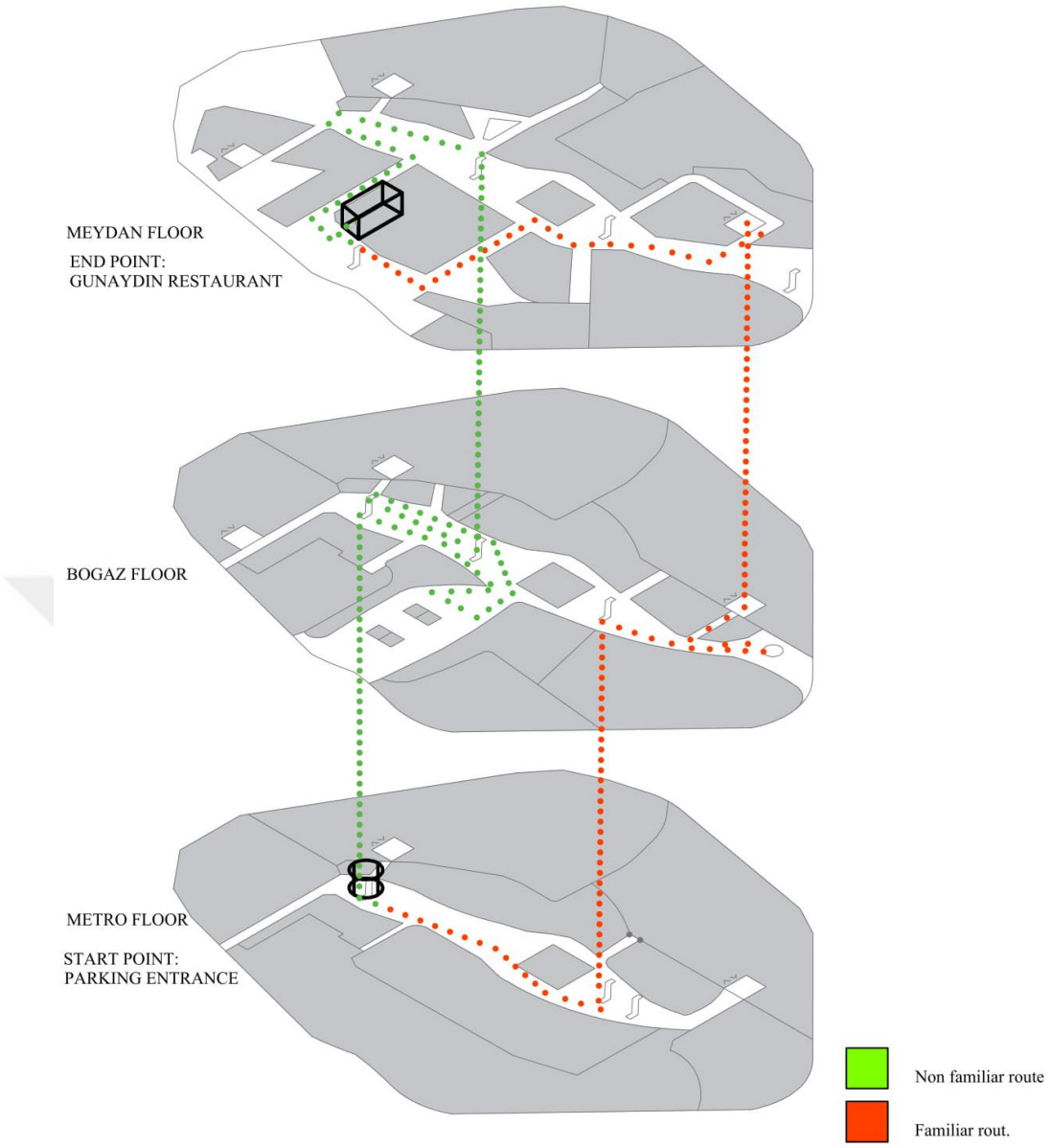


Figure 4.4 : Familiar and non familiar users wayfinding task.

The most confusing aspect is that Gunaydin Restaurant is located at a hallway which is at the back of the main hallway in meydan floor and is not visible from any moving stairs. Comparing to tasks shows that familiar user find destination easier than non familiar user. The familiar one made two wrong turns while non familiar user had 4 wrong turns. In this task, users made decision using maps and signs, and also used apple store as a landmark.

Destination 3:

According to the studies done by researcher destination 3, which is to go to cinema from Levazim entrance is one of the other confusing wayfinding routes of the Zorlu shopping center.

The most confusing aspect is linking between levels and the low ceilings without any voids that you can check around.

Levazim entrance is located in bogaz floor and cinema is just one level down in metro level.

Following are decision diagrams using Passini's (1984) notation method for each path to destination 3.

For this desination 2 posible wayfinding routes are showed. Each route is shown by different color (Figure 4.5).

- In route 1 which is shown by green color moving stairs are used to go to destination.
- In route 2 which is shown by red color elevators are used to go to destination.

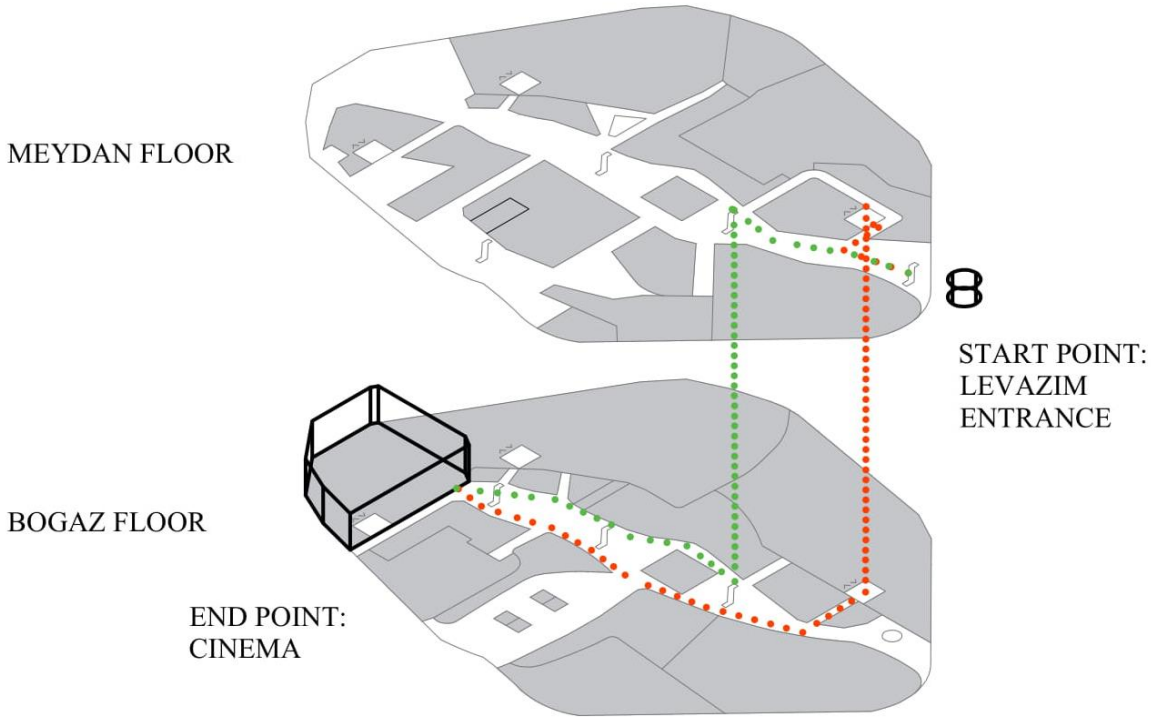


Figure 4.5 : Possible routes for destination 3.

Above you can see the wayfinding tasks for destination 3 done by and non familiar users (Figure 4.6).

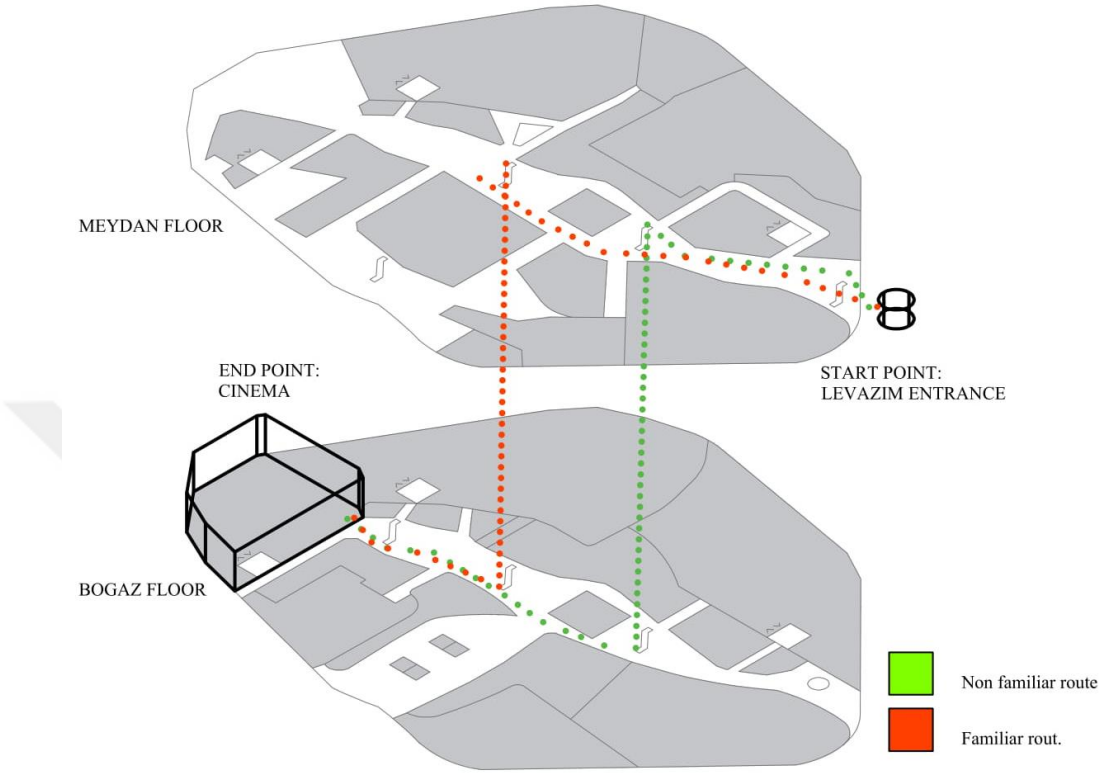


Figure 4.6 : Familiar and non familiar users wayfinding task.

For destination 3, tasks done by familiar user and non familiar are similar. Decision points and duration of task are the same. None of the users made wrong turns in this destination. Moving stairs were used to compelete task. While finding destination both non familiar user was not satisfied with angeled hallways because she was not able to see the location and be sure if she is in right route.

Destination 4:

According to studies done by researcher destination 3 which is to go to Remzi book store from Zincirlikoy Street entrance in is one of the other confusing wayfinding aspects of the Zorlu shopping center.

The most confusing aspect is location of Remzi book store which is in one of the dead ends hallways of shopping center.

Zincirlikoy Street entrance is located in meydan floor and Remzi book store is just one level down in bogaz level.

Following are decision diagrams using Passini's (1984) notation method for each path to destination 4.

For this desination 2 posible wayfinding routes are showed. Each route is shown by different color (Figure 4.7).

In route 1 which is shown by green color moving stairs are used to go to destination.

In route 2 which is shown by red color elevators are used to go to destination.

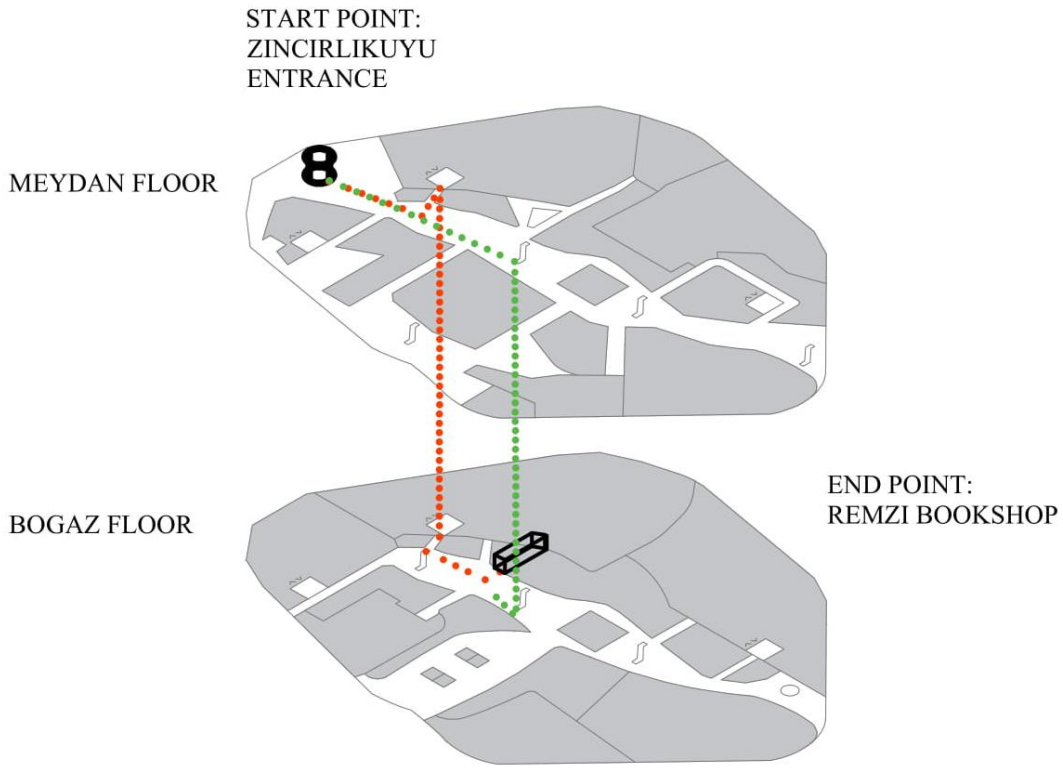


Figure 4.7 : Possible routes for for destination 4.

Above you can see the wayfinding tasks for destination 4 done by and non familiar users (Figure 4.8).

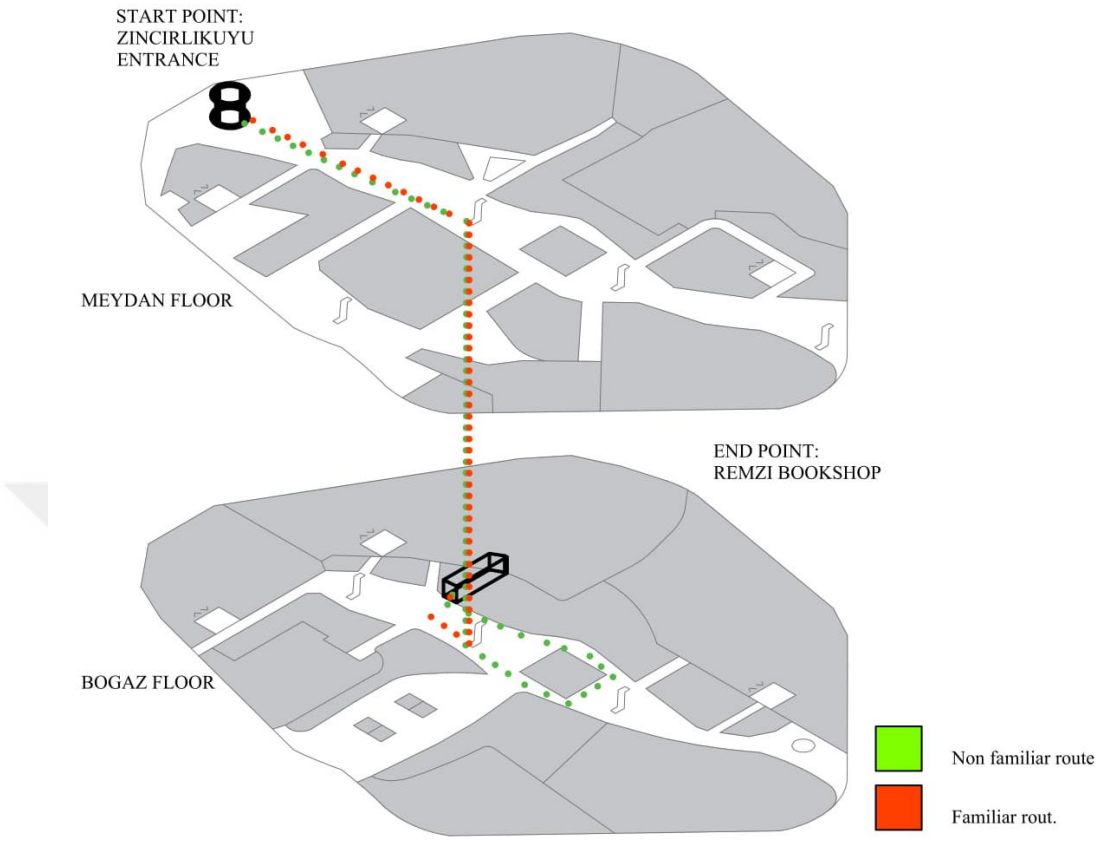


Figure 4.8 : Familiar and non familiar users wayfinding task.

Destination 4 task done by familiar user is very successful, time of task is 5 minutes and no wrong turns are made. Familiar user, completed task by using moving stairs. The non familiar one used moving stairs too. Duration of task is 5 miniutes longer than the other one. This user complained about low visibility of the floor since he made 1 wrong turn because he could not see the store which was very close to him.

Destination 5:

According to studies done by researcher destination 5 which is to go to PSM from Beymen shop is choosen not because it is one of the confusing wayfinding aspects of the Zorlu shopping center, but actualy because it is easy to find.

Beymen shop is located in bogaz floor and PSM is just one level upper in meydan floor.

Following are decision diagrams using Passini's (1984) notation method for each path to destination 5.

For this desination 2 posible wayfinding routes are showed. Each route is shown by different color (Figure 4.9).

In route 1 which is shown by red color moving stairs are used to go to destination.

In route 2 which is shown by green color elevators are used to go to destination.

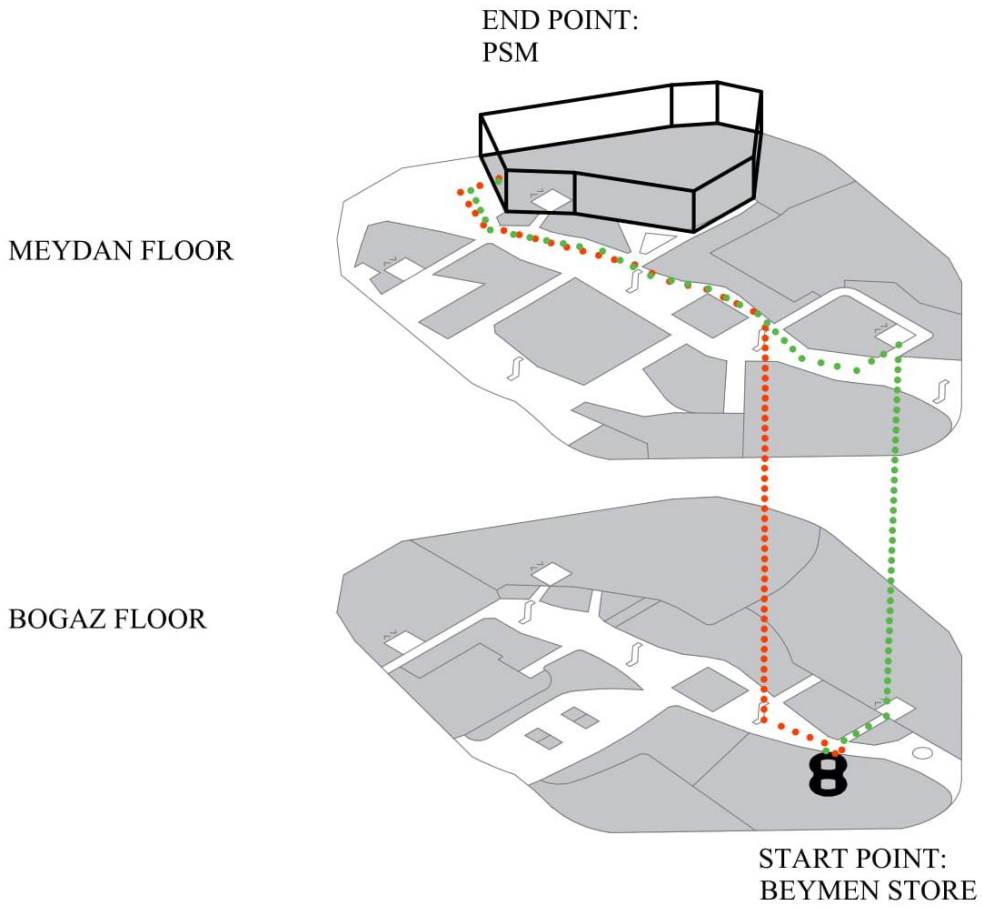


Figure 4.9 : Possible routes for destination 5.

Above you can see the wayfinding tasks for destination 5 done by and non familiar users (Figure 4.10).

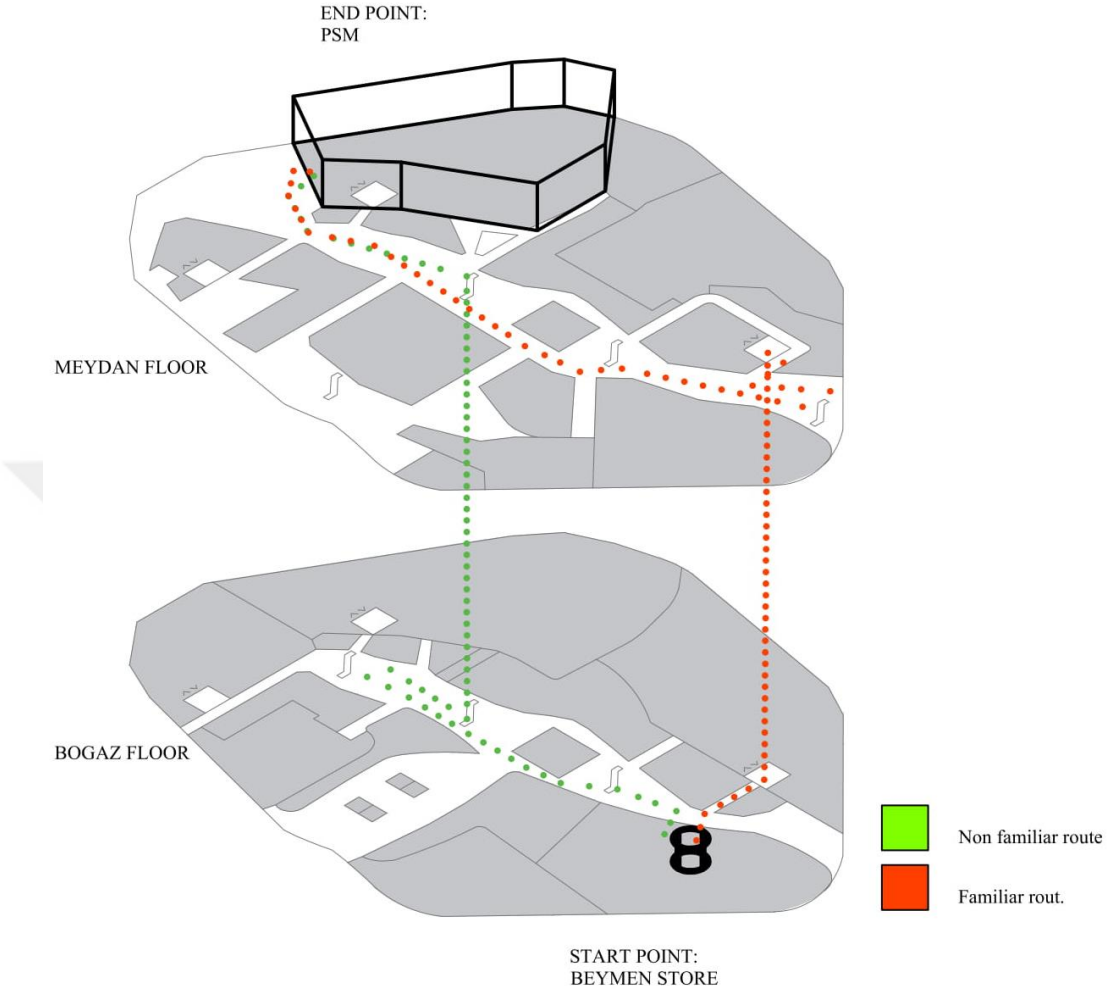


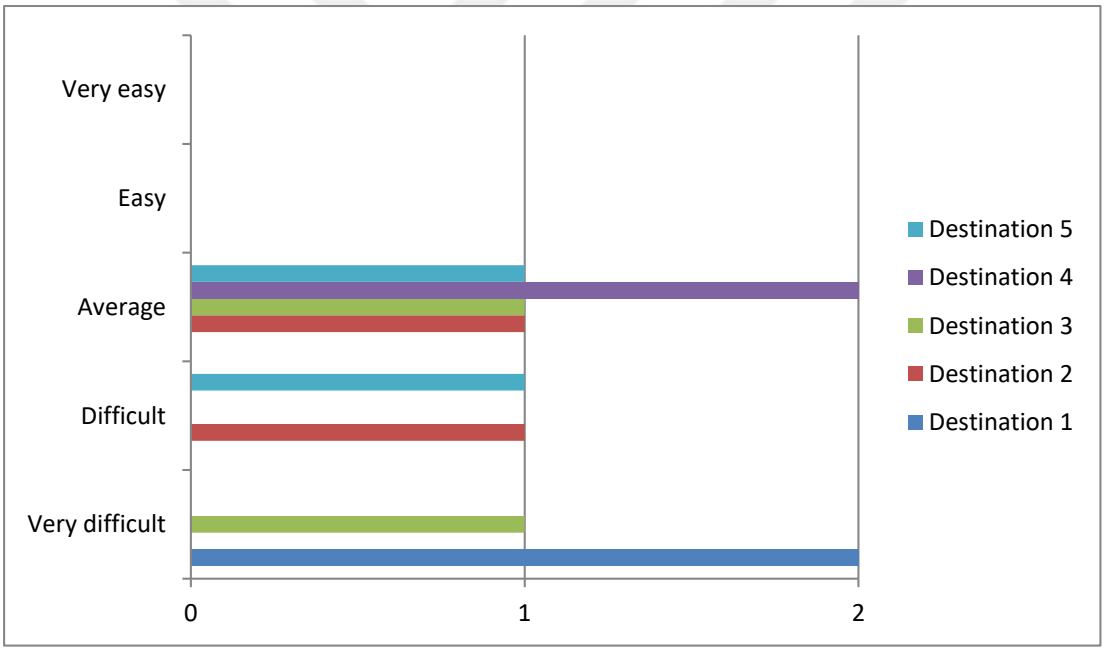
Figure 4.10 : Familiar and non familiar users wayfinding task.

Wayfing task to destination 5 done by familiar and non familiar users are very similar. They made 2 wrong turns while completing task and did not use any landmarkd. Both users find signage helpful. The only difference between tasks done is that, familiar one used elevators and non familiar one used moving stairs.

4.3 Analysis of structured interview related to wayfinding task

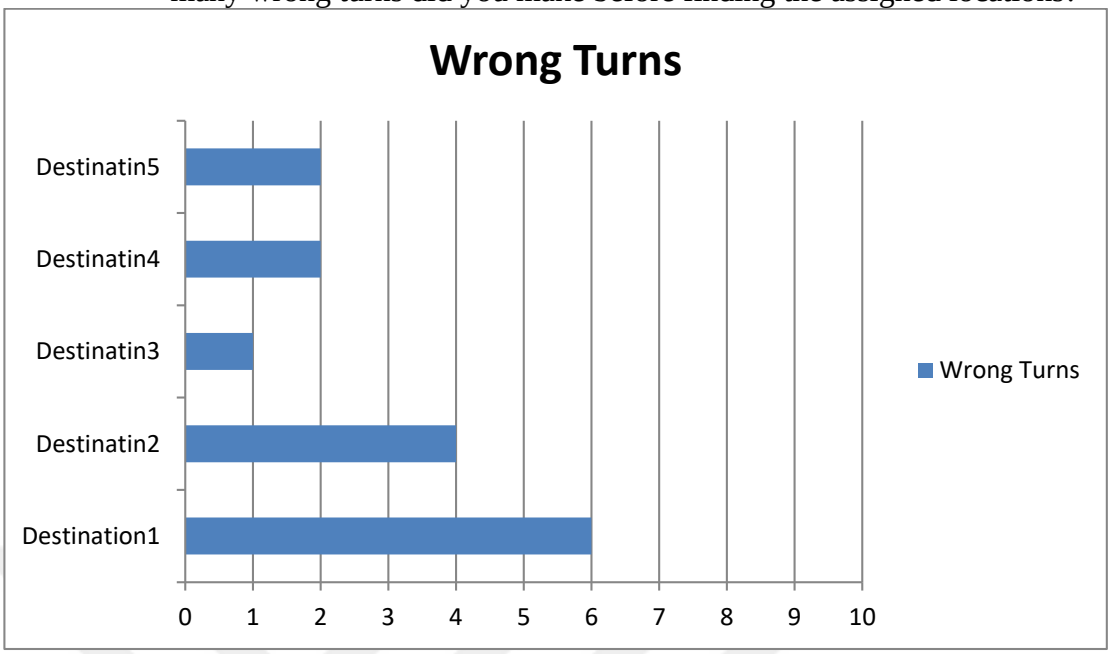
From the responses to question 1, which is how difficult the location is to find, it seems most respondents thought that their destination was neither very difficult nor very easy to find. Destination 1 (To go to Pasabahce store from metro entrance) has a higher proportion of "very difficult" responses. Destination 2 (to go to Gunaydin restaurant from parking) has 50-50 responses of difficult and average. Destination 3 (to go to cinema from Levazim entrance) was also very difficult and average.Destination 4 (to go to Remzi book store from Buyukdere entrance) was marked as average to find. Desination 5 (to go to PSM from Beymen store) was marked as difficult and average to find (Table 4.5).

Table 4.5 : Study participants' responses to survey question 1. How difficult was the location to find?



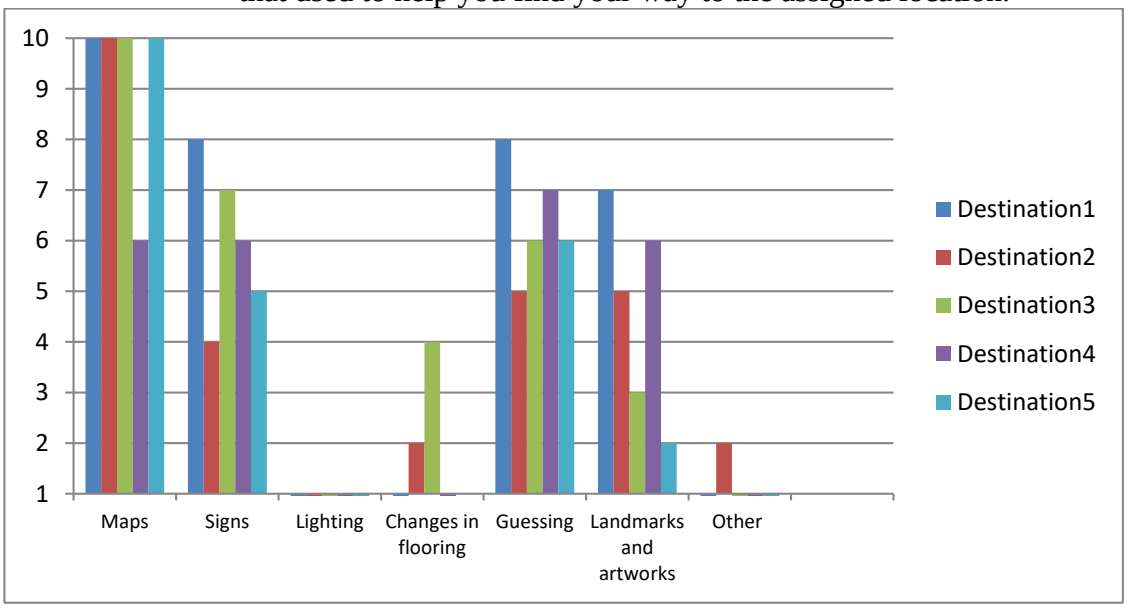
From the responses to question 2, which is approximately how many wrong turns the visitor made before finding the assigned locations, the large majority of participants made between 3 and 4 wrong turns before arriving at their destination. One participant made more than 6 wrong turns. This may be a reflection on the spatial layout of the building as it is not legiable and there is no space hierarchy (Table 4.6).

Table 4.6 : Study participants' responses to survey question 2: Approximately how many wrong turns did you make before finding the assigned locations?



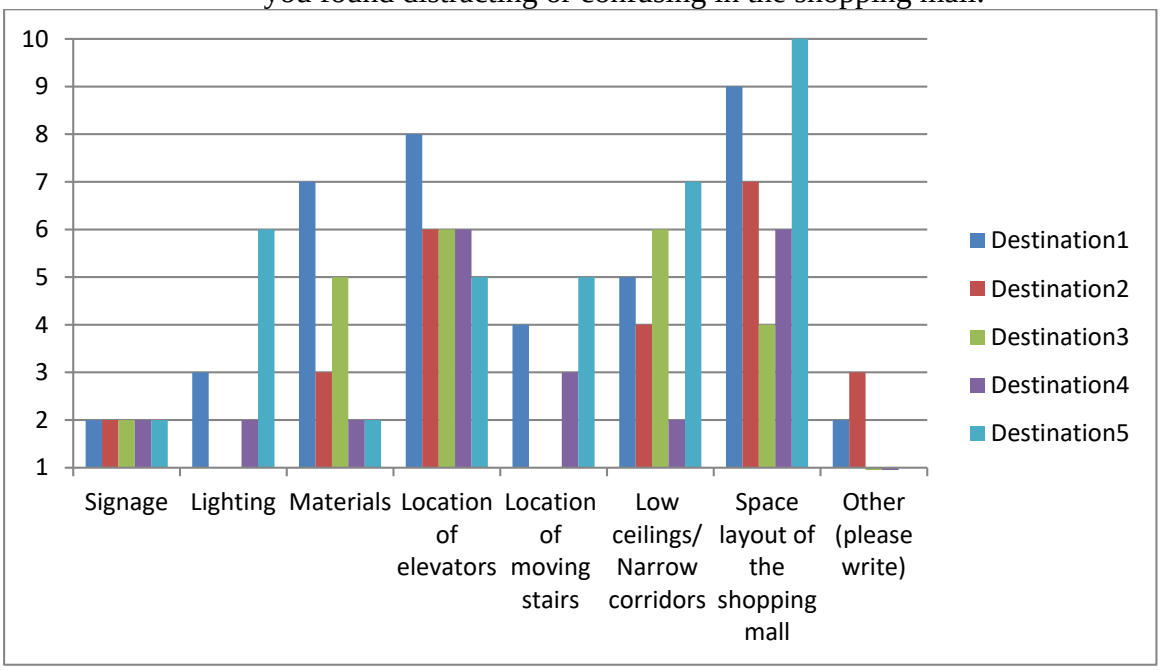
From the responses to question 3, Check all the items that used to help you find your way to the assigned location, maps were the most used wayfinding element with no participant reporting not having used them. Signs were the next most popular response. Landmarks and guessing had similar response levels. The other choices (changes in flooring, and other), all had similar response levels, while nobody marked lighting as a helpful element (Table 4.7).

Table 4.7 : Study participants' responses to survey question 3: Check all the items that used to help you find your way to the assigned location.



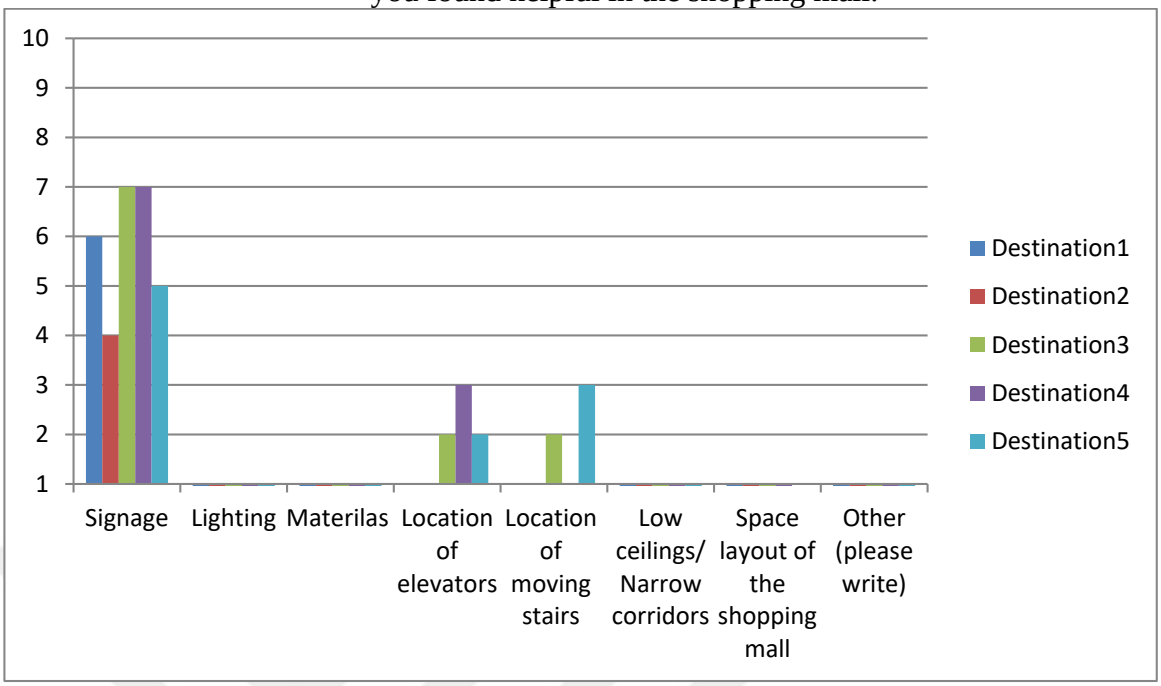
From the responses to question 4, check all items that you found distracting or confusing in the shopping mall, space layout of the shopping mall was seemed as the most distracting or confusing wayfinding element. Location of elevators was the second most distracting or confusing wayfinding element for all destination groups. Participants looking for destinations 2 and 3 did not find the location of moving stairs and lighting distracting or confusing, but for all other options at least one participant mark as confusing item (Table 4.8).

Table 4.8 : Study participants' responses to survey question 4: Check all items that you found distracting or confusing in the shopping mall.



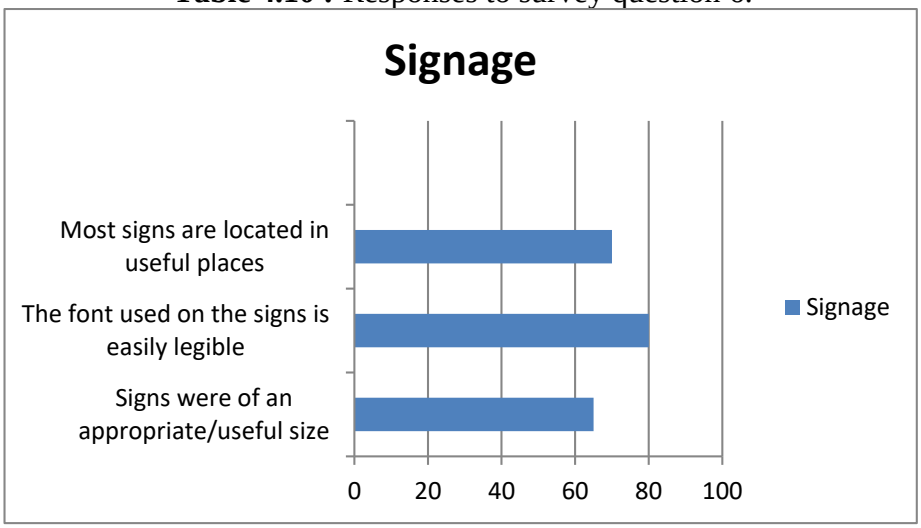
From the responses to question 5, check all items that you found helpful in the shopping mall, signage was the most pleasing or helpful wayfinding element for all groups, but had a much higher percentage of participants checking this answer in the destinations 3 and 4 (70%) than the destination 2 (40%). It would seem likely that signage is less helpful in finding destination 2 than in finding destination 1. Location of elevators and moving stairs were another area that differed between the destination groups. 30% of destination 4 and 5 participants checked that these elements were helpful, while no participant of the destinations 1 and 2 group responded this way. No participant checked the lighting, materials, low ceiling heights, narrow coridors and space layout of setting as pleasing or helpful elements (Table 4.9).

Table 4.9 : Study participants' responses to survey question 5: Check all items that you found helpful in the shopping mall.



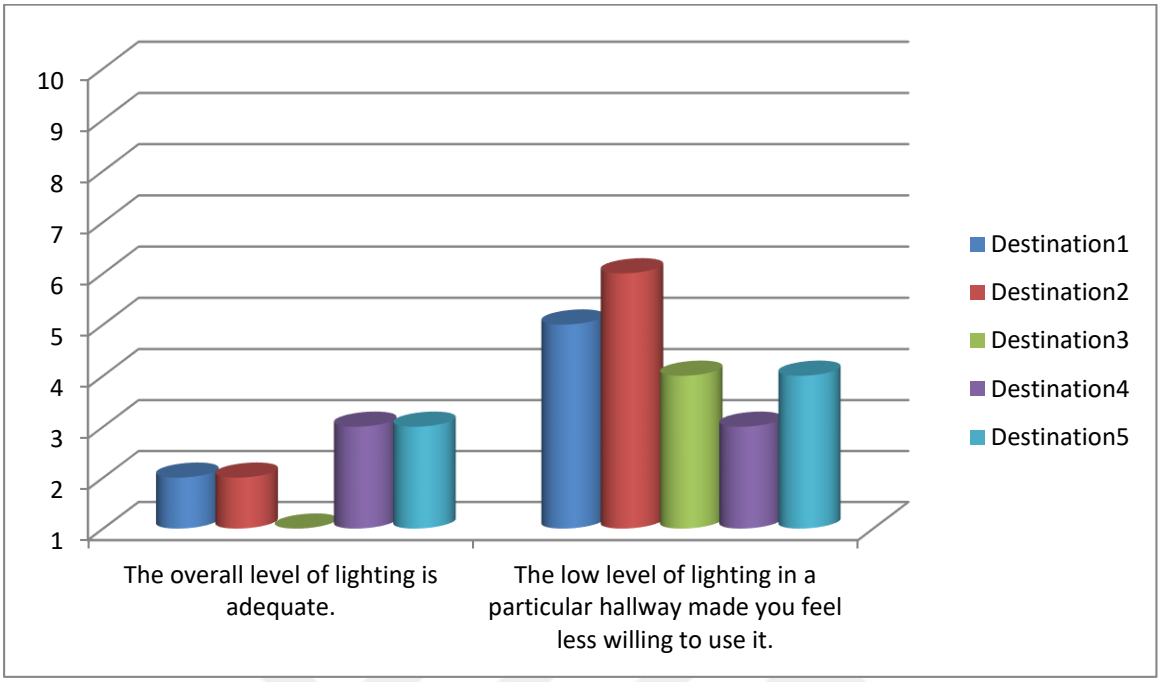
From the responses to question 6, responses concerning the details of signs in the shopping center showed similar feelings among all destination groups. More than half of all respondents felt that the size, font, and location of the signs were all good , 65% checked "signs were of an appropriate/useful size", 80% checked "the font used on the signs is easily legible", and 70% checked "most signs are located in useful places." (Table 4.10).

Table 4.10 : Responses to survey question 6.



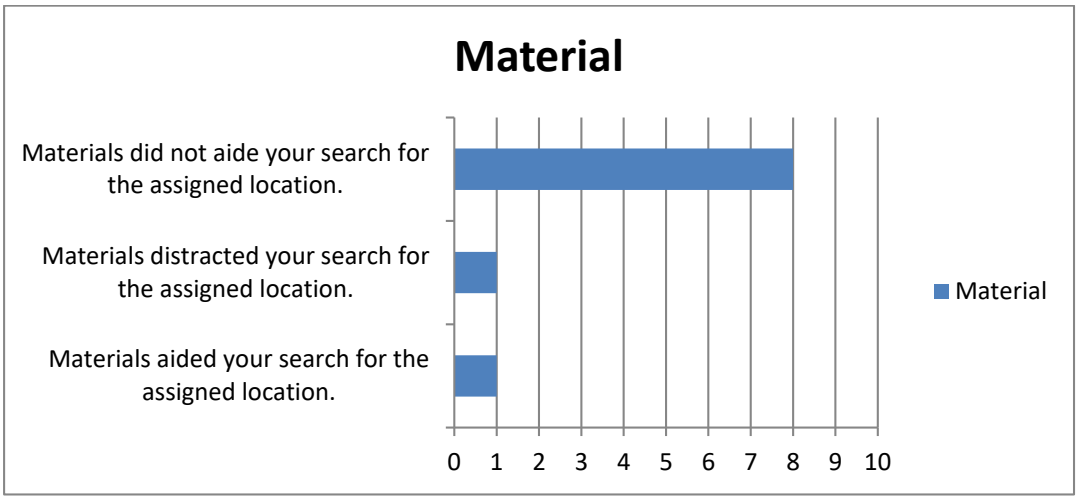
From the responses to question 7, more than 50% of participants responded that the low level of lighting in a particular hallway made them feel less willing to use it.

Table 4.11 : Study participants' responses to survey question 7 :In regard to lighting in the shopping mall please check all items you agree with.



From the responses to question 8, 80% of participants from all destination groups responded that the materials used in surfaces did not aid or detract from their search for the assigned location. This obviously signifies that materials are not a problem area.

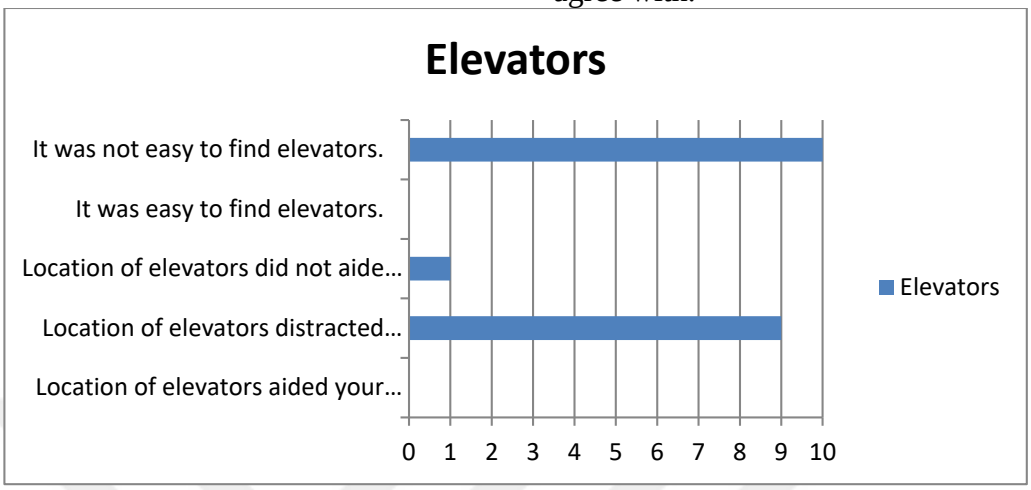
Table 4.12 : Study participants' responses to survey question 8 :In regard to materials used in surfaces in the shopping mall please check all items you agree with.



From the responses to question 9, 90% of participants from all destination groups responded that location of elevators distracted their search for the assigned location. Also 100% of participants from all destination groups responded that it was not easy

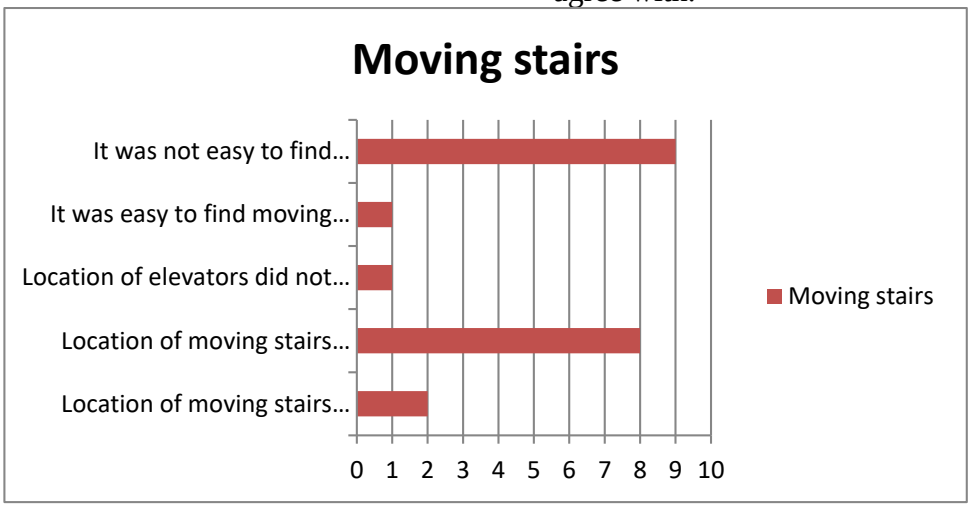
to find elevators. This obviously signifies that the location of elevators is not legible and easily accessable.

Table 4.13 : Study participants' responses to survey question 9 : In regard to location of elevators in the shopping mall please check all items you agree with.



From the responses to question 10, 80% of participants from all destination groups responded that location of moving stairs distracted their search for the assigned location. Also 90% of participants from all destination groups responded that it was not easy to find moving stairs. This obviously signifies that the location of moving stairs is not legible and easily accessable.

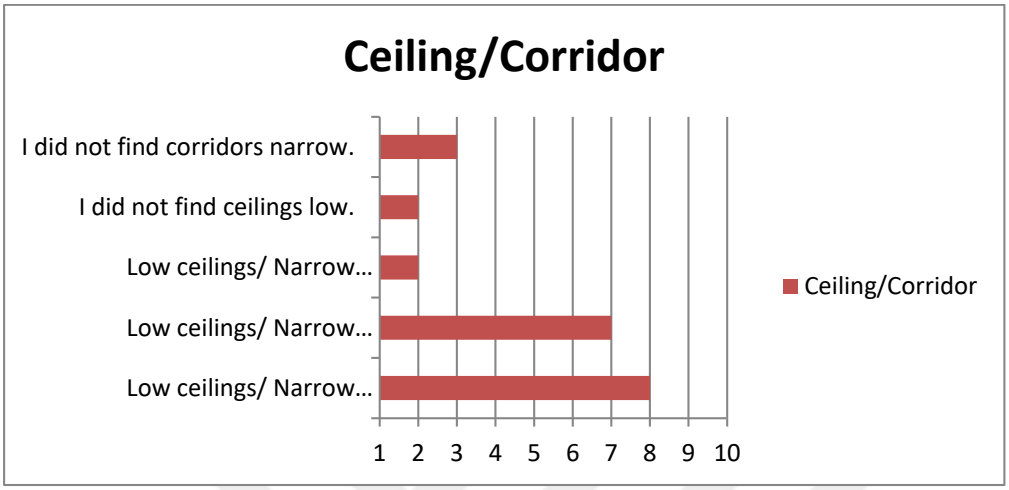
Table 4.14 : Study participants' responses to survey question 10 : In regard to location of moving stairs in the shopping mall please check all items you agree with.



This question's responses showed that the low ceilings and narrow hallways aid or detract them from their task. Approximately 70% of participants responded that low ceilings and narrow hallways distracted their search for the assigned location, while

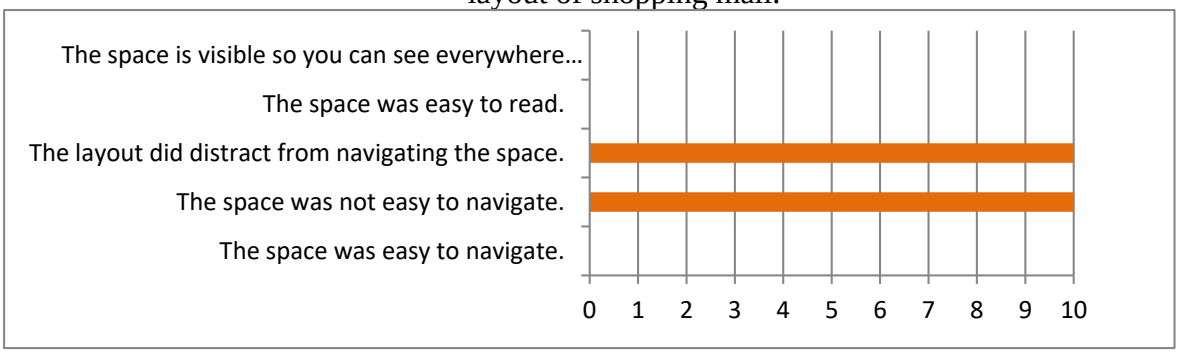
80% of them responded that low ceilings and narrow hallways aided their search for their assigned destination negatively.

Table 4.15 : Study participants' responses to survey question 11. In regard to Low ceilings/ Narrow corridors in the shopping mall please check all items you agree with.



From the responses to question 12, 100% of participants from all destination groups responded that the space was not easy to navigate, also 100% of participants from all destination groups responded that layout distracted them from navigating the space. According to the responses participants do not find the space visible, so you can see everywhere from the point you stand.This obviously signifies that this shopping center is not legiable and there is no space hierarchy (Table 4.16).

Table 4.16 : Study participants' responses to survey question 12. In regard to space layout of shopping mall.



4.4 Visibility Graph Analaysis

All the floor plans of zorlu shopping center were analyzed by space syntax program to check visibility. Figure (4.11) illustrates the visibility graph analysis of the metro floor. In the next step to obtain the relationship between all points of the system, a visibility graph analysis, which is based on connectivity, is prepared. The range of colors from red to blue are shown in the map (Figure 4.11), the red lines show high visibility value of the area and means that the number of the points or lines which intersect directly at the given point is high. Blue colors refer to the low visibility values. The warmer color, the more high visibility value, the less warm color the less visibility value. It can be seen that metro floor has high visibility values. Table (4.17) indicates the minumum, maximum and mean visibility values of metro floor.

Figure 4.11 : Visibility graph analysis of metro floor.

Table 4.17 : Visibility key values of metro floor.

Visibility key values	
Minimum value	9
Maximum value	201
Average value	161.2
Count point	538

In bogaz floor it can be seen (Figure4.12) that visibility has low values. Table (4.18) indicates the minumum, maximum and mean visibility values of bogaz floor.

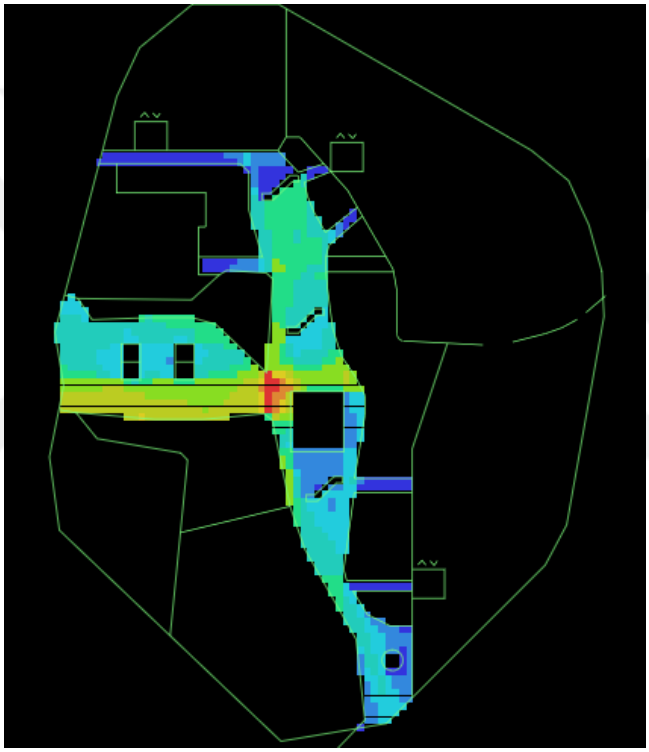


Figure 4.12 : Visibility graph analysis of bogaz floor.

Table 4.18 : Visibility key values of bogaz floor.

Visibility key values	
Minimum value	11
Maximum value	503
Average value	186.76
Count point	1076

In meydan floor it can be seen that (Figure4.13) visibility has high and low values in different zones. Table (4.19) indicates the minumum, maximum and mean visibility values of meydan floor.

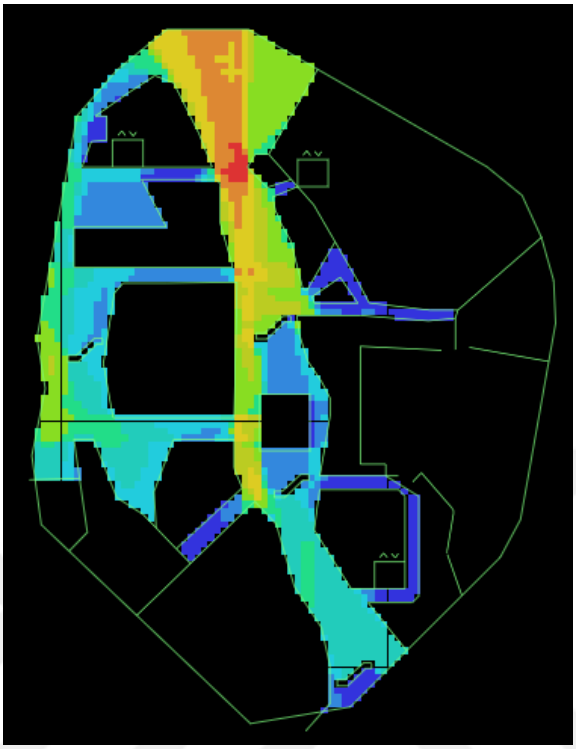


Figure 4.13 : Visibility graph analysis of meydan floor.

Table 4.19 : Visibility key values of meydan floor.

Viibility key values	
Minimum value	21
Maximum value	629
Average value	286.7
Count point	1977

In bogaz kopru it can be seen that (Figure4.14) visibility has average values. Table (4.20) indicates the minumum, maximum and mean visibility values of kopru floor.

Table 4.20 : Visibility key values of kopru floor.

Visibility key values	
Minimum value	8
Maximum value	343
Average value	171
Count point	1120

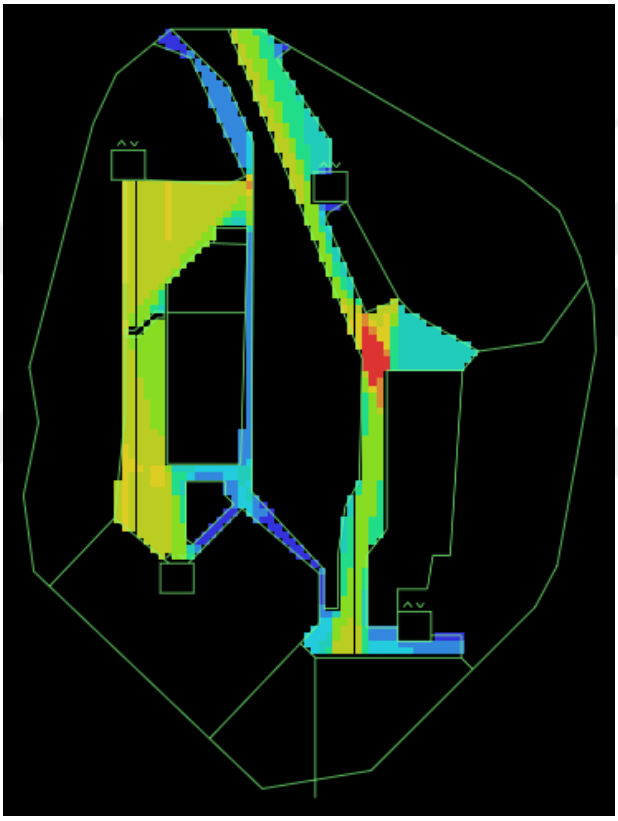


Figure 4.14 : Visibility graph analysis of kopru floor.

5. CONCLUSION

Designing a legible environment attach a lot of importance during the mass development of cities, which make the environments more complex. Thus, "understanding the characteristics of the environment that contribute to legibility is very important, particularly for newcomers, and has potential to inform the future of design and planning for a better living and working environment" (Nasar, 1994 cited in Yixiang, 2007, p.227).

This study's primary focus was the case study involving Zorlu center shopping mall. The results of the case study were able to aid the researcher in answering the research questions posed in chapter 1. The first question, "which elements of a shopping center environment do effect users wayfinding behavior when they are navigating in it?" was also answered by the study. Participants relied heavily on signage, but did note that other interior elements contributed to helping them find their destination. Signs were both the most helpful and the most detracting elements analyzed by the study. Participants seemed to find the existing signage helpful, but the sign system as a whole detracted from their experience because it was lacking in some areas. Most confusion for participants came from not seeing a helpful sign or having to guess which level their assigned destination was on because they did not know.

The second question, "How does legibility and space hierarchy effect wayfinding in shopping centers?" was also answered by the study. Relied to questions 11 and 12, participants had problems knowing where they are and where they are heading to. All narrow and angeld hallways in Zorlu center make it more confusing to navigate. The effects of legibility have been shown recently in the field of advertising (Chebat et al., 2003; Lowrey, 1998): low legibility demands more cognitive efforts from the reader and affects negatively the wayfinding process in built environment.

The third question, "how does the built environment of a multi-story shopping center affect wayfinding?" proved to be the most important in understanding the particular wayfinding issues found in the shoping center.

Participants in the wayfinding analysis study commented that the existing signs were helpful, but they needed more to tell them what was on the other levels. There are some small signs with a list of departments on each floor near stairs and elevators, but most participants did not notice them. Some participants also commented on a need for maps. On the other hand location of moving stairs and elevators seemed to be confusing.

Wayfinding is an important issue in the management of shopping malls so wayfinding deserves more attention from the shopping mall managers, since it directly affects the nonmonetary costs of shopping.

This study looked at five specific locations within Zorlu center shopping mall. Future studies looking to improve the shopping mall should look at other locations as well. The participant phase of the study would not necessarily need to be repeated, but Passini's notation method and structural framework could be consulted for the other locations within the building.

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APPENDICES

APPENDIX A
WAYFINDING ANALYSIS OF ZORLU SHOPPING MALL
Instructions:
 Please answer all of the questions below
 Please ask if you have any questions
 Please write your comments

Demographics:
1. What is your age?
 0-17
 18-24
 25-40
 41-65
 Over 65 years

2. What is your gender?
 Male
 Female

3. How many times you have been to Zorlu?
 0
 1-3
 4-9
 +10

4. How many time in a month do you come to Zorlu?
 1
 2
 3
 4
 5

DESTINATION:

1. **How difficult was the location to find?**

- Very difficult
- Difficult
- Average
- Easy
- Very easy
- ---

2. Approximately how many wrong turns did you make before finding the assigned locations?

- 0
- 1-2
- 3-4
- 5-6
- Other
- ---

3. Check all the items that used to help you find your way to the assigned location.

- Maps
- Signs
- Lighting
- Changes in flooring
- Guessing
- Landmarks and artworks
- Other (please write)
- ---

4. Check all items that you found distracting or confusing in the shopping mall.

- Signage
- Lighting
- Materials
- Location of elevators
- Location of moving stairs
- Low ceilings/ Narrow corridors
- Space layout of the shopping mall
- Other (please write)
- ---

5. Check all items that you found helpful in the shopping mall.

- Signage
- Lighting

□ Materilas
□ Location of elevators
□ Location of moving stairs
□ Low ceilings/ Narrow corridors
□ Space layout of the shopping mall
□ Other (please write)
□ ----------
---

6. In regard to signs in the shopping mall please check all items you agree with.

□ The color scheme is effective.
□ The color scheme is distracting.
□ Signs were of an appropriate useful size.
□ The font used on the signs is easily legible.
□ Most signs are located in useful places.
□ ----------
---

7. In regard to lighting in the shopping mall please check all items you agree with.

□ The overall level of lighting is adequate.
□ The low level of lighting in a particular hallway made you feel less willing to use it.
□ ----------
---

8. In regard to materials used in surfaces in the shopping mall please check all items you agree with.

□ Materials aided your search for the assigned location.
□ Materials distracted your search for the assigned location.
□ Materials did not aide your search for the assigned location.
□ ----------
---

9. In regard to location of elevators in the shopping mall please check all items you agree with.

□ Location of elevators aided your search for the assigned location.
□ Location of elevators distracted your search for the assigned location.
□ Location of elevators did not aide your search for the assigned location.
□ It was easy to find elevators.
□ It was not easy to find elevators.
□ ----------
---

10. In regard to location of moving stairs in the shopping mall please check all items you agree with.

□ Location of moving stairs aided your search for the assigned location.
□ Location of moving stairs distracted your search for the assigned location.

□ Location of moving stairs did not aide your search for the assigned location.

 It was easy to find the moving stairs.
 It was not easy to find moving stairs.
 ----

11. In regard to Low ceilings/ Narrow corridors in the shopping mall please check all items you agree with

 Low ceilings/ Narrow corridors aided your search for the assigned location negatively.
 Low ceilings/ Narrow corridors distracted your search for the assigned location.
 Low ceilings/ Narrow corridors did not aide your search for the assigned location.
 I did not find ceilings low.
 I did not find corridors narrow.
 ----

12. In regard to space layout of shopping mall please check all items you agree with

 The space was easy to navigate.
 The space was not easy to navigate.
 The layout did distract from navigating the space.
 The space was easy to read.
 The space is visible so you

APPENDIX B: Wayfinding task report for destination 1, familiar participant

Metro to Paşabahçe:

Metrodan çiktim zorluya girdim. Buraya çok geldim ama tam aklimda değil. Hatirladiğim kadariyla en ust katta paşabahçe. Yurumeye başliyorum. Meydana çikmamin en kolay yolu asansor. Hemen karşimdaki asansorle. Yurumeye başliyorum. Asansor nerde kaldi çok yakindi girişe. Neyse yok yuruyorum. Nerdeyse katin sonuna geldim. Vazgeçtim asansordan. Yuruyen merdiven ile meydana çiktim. Prada solumda. Ordaki arada asansor var sanirim. Yokmuş geri donuyorum. Vakkoya kadar geldim şukurler olsun buldum asansoru. Yukari çiktim. Ve paşabaçe.

APPENDIX C: Wayfinding task report for destination 1, non familiar participant

Metro to Paşabahçe:

Non familiar.Girişteki info deskten nasil gitmem gerektiğini sordum.hemen ordaki Yuruyen merdiven ile iki kat yukari çiktim.apple mağazasina doğru yurumeye başladim. Meydana çikan yuruyen merdivenleri gordum. Oraya doğru devam ettim. Merdivenlerden bahçeye doğru çiktim. İnfodakinin yol tarifini unuttum. Yurumeye başladim. Sanirim yanliş yoldayim. Giriş e geldim. Tekrar meydana doğru geri donuyorum. Asansor kullanacam. Bir kat aşağıya indim. You are here mapdan mağaza katina baktim. İki kat daha çikmam lazim. Ayni asansor ile yukari çiktim tekrar. Zanzibar var yanimda. Tam katşimda goruyorum mağazayi. Yurumeye devam ediyorum. Burdayim.

APPENDIX D: Wayfinding task report for destination 2, familiar participant

Otopark to Günaydin:

Girdim avmeye otoparkdan. İnfo desk var iki kat yukarda dedi. Yurumeye başladim. Apple den hatirliyorum sanki. Ordan çikicam. Duz yurumeye devam ettim. Yolda. Orda merdiven kullandim. Yanliş geldim. Bitti avm. Sağimda beymen var. İlerde bir info desk var. Sordum. Sağdaki asansorle bir kat çiktim. Daha once hiç buraya gelmemiştim. Açiğa çikmam lazim. Dar bir koridordayim. Çiktim gene karşimda beymen ve arkamda çikiş. Apple mağazasinin camını gordum. Oraya doğru yurudum. Hatirladim şimdi az ilerden sol yapacam. Bir sağ ve geldim.

APPENDIX E: Wayfinding task report for destination 2, non familiar participant

Otopark to Günaydın:

Otoparkatn yukari çiktim. Mapdan baktim. Yemek kati bir kat yukarida. Merdiven ile çiktim. Yurumeye başladim. Robert coffe dan sağa girdim. Hemen yaninda. Hayir yanliş bu kofteci. Tekrar bakiyorum. Bir kat daha çikmam lazim. Geri donuyorum geldiğim yoldan. Ayni merdiven ile yukari çikaca . Orda merdiven yok. Tekrar geri fonuyorum. Appleden sonra bir merdiven gordum. Yukari çiktim. Bulamiyacam burayi. Birine sordum. Bilmiyorum dedi. Tekrar kat plani ariyorum. Bulamadim. Bir dar koridor gordum. Yoğunluk var. Ordan girdim. Bir dondurmaci var ona sordum. Duz git sol yap gorursun dedi. Burdayim.

APPENDIX F: Wayfinding task report for destination 3, familiar participant

Levazim to sinema:

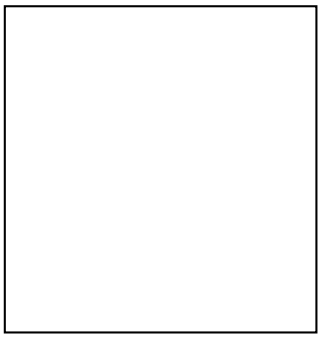
Merdivenlerden çiktim. Meydan açık havadayim. Yuruyen merdivenle aşağıya inmem lazim. Diğer başta sinema. Sona kadar yuruyup ordan inecem. Açık hava daha iyi. Avm içini sevmiyorum. İki kat indim sinema karşimda.

APPENDIX G: Wayfinding task report for destination 3, non familiar participant

Levazim to sinema:

Yuruyen merdivenle çiktim. Appleden aşağı doğru gidiyorum. Bir kat indim. Yuruyorum. Birine sordum duz git dedi. Yuruyorum. Onumu gormuyorum ki bakiyim nerde. Biraz daha yurudum. İşaretde goruyorum ilerde işareti var. Yurumeye devam. Merdivenlerden indim. Burda sinema.

CURRICULUM VITAE



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