(MASTER THESIS)

ANALYSIS OF WAYFINDING STRATEGIES AND COGNITIVE MAPPING DIFFERENCES: CASE STUDY OF AEGEAN UNIVERSITY POLYCLINICS

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YASAR UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

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This study titled “Analysis of Wayfinding Strategies And Cognitive Mapping Differences: Case Study Of Aegean University Polyclinics” and presented as Master Thesis by Zeynep SEVİNÇ has been evaluated in compliance with the relevant provisions of Y.U. Graduate Education and Training Regulation and Y.U. Institute of Science Education and Training Direction and jury members written below have decided for the defense of this thesis and it has been declared by consensus / majority of votes that the candidate has succeeded in thesis defense examination dated 28.03.2013.

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TEXT OF OATH

I hereby certify with honor that this MSc/Ph.D. thesis titled "**ANALYSIS OF WAYFINDING STRATEGIES AND COGNITIVE MAPPING DIFFERENCES: CASE STUDY OF AEGEAN UNIVERSITY"** was written by me, without aid that would not comply with scientific ethics and academic traditions, that the bibliography I have used is that indicated in this thesis and that appropriate reference has been given whenever necessary.

28/03/2013

Zeynep SEVİNÇ

ÖZET

YÖN BULMA STRATEJİLERİ VE BİLİŞSEL HARİTALANDIRMA FARKLILIKLARI: EGE UNİVERSİTESİ HASTANESİ POLİKLİNLİKLERİ VAKA ÇALIŞMASI

SEVİNÇ, Zeynep

Yüksek Lisans Tezi, İç Mimarlık Bölümü
Tez Danışmanı: Yard. Doc. Dr. Eray BOZKURT
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İnsanlar içine girdikleri binalarda yönlendirilmeye ihtiyaç duyarlar. Yönlendirme sürecinde bir yol seçmek veya rotaya karar vermek zorundadırlar. Bu süreci kolaylaştırmak için alanın zihinsel veya bilişsel bir haritasına ihtiyaç duyulur. Bilişsel Haritalama oluşturmak için binanın tasarımından sorumlu kişinin, farklı tasarım stratejileri geliştirerek planlama aşamasında bu duruma müdahale etmesi gerekmektedir.

Günümüze kadar tasarlanan sağlık binalarında, mimari tasarım yaklaşımları büyük değişikliklere uğramaktadır. Geçmişte yaşanan tecrübeler ve uzmanların görüşleri doğrultusunda iç mekân tasarımının önemi farklı kaynaklarda vurgulanmaktadır. Özellikle "Yön Bulma Stratejileri" ve " Bilişsel Haritalama Sistemi" oluşturulmamış hastanelerde hastalar ve/veya ziyaretçiler bir hedefe ulaşmak için güzergâh boyunca bazı zorluklar yaşayabilirler.

Algıdaki farklı seçicilikten dolayı insanların mekânı ve alt mekânları farklı algılamasında yaşın ve cinsiyetin etkisi bulunmaktadır. Bu veriler doğrultusunda yön bulma sorunları dikkate alınarak, etkili yön bulma elemanlarının kullanımı ve insan ile mekânsal biliş bulma yolu Ege Üniversitesi Poliklinikleri vaka çalışması olarak incelenmiştir.

Anahtar Kelimeler: Yön bulma stratejileri, Bilişsel haritalama, Sağlık binaları, İç mekan, Vaka çalışması.

ABSTRACT

ANALYSIS OF WAYFINDING STRATEGIES AND COGNITIVE MAPPING DIFFERENCES: CASE STUDY OF AEGEAN UNIVERSITY POLYCLINICS

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When people enter a building, they expect to see wayfinding elements, during wayfinding period, they need a guidance to decide which path or route to follow at next stage. To ease this wayfinding period, cognitive or mental map of the space will provide valuable information. During the design stage, the building's designer can improve the cognitive map of the context by developing necessary design strategies.

Since today's architectural design of the healthcare buildings has undergone vast amount of changes, past experiences indicate that interior design is the most crucial factor in the hospital setting. Especially, the hospitals in which no "Wayfinding Strategies" and "Cognitive Mapping System" are set off may cause the patients and/or visitors to experience some difficulties while deciding the route to reach a target location.

Due to different selective of perceptions, people differ in cognition of place and sub places with an impact of age and gender. Wayfinding failures in the building enhance navigational breakdowns. For this purpose, considering the way finding problems, usage of affective wayfinding elements and human spatial cognition is studied within the case study of Aegean University Polyclinics.

Keywords: Wayfinding strategies, Cognitive mapping, Healthcare Buildings, Interior Architecture, Case study

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TABLE OF ABBREVEATION

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A.U.: Aegean University

E.R.: Examination Room

IAQ: Indoor Air Quality

VOC: Volatile Organic Compounds

SNCF: (Société Nationale des Chemins de fer français), French National Railway Corporation

UNESCO: United Nations Educational, Scientific and Cultural Organization

YAH Map: You Are Here Map

B.C.W.: Blue Collar Worker

W.C.W.: White Collar Worker

CHAPTER 1 - CONCEPTUAL FRAMEWORK

This first chapter tries to put the research topic in its setting of the wayfinding behavior and its relation with cognition. This preliminary chapter also introduces the basic research subject, goals, objectives and limitations of the study, as well as its research methods and its scope.

1. Introduction

In today's healthcare design, functionality and aesthetic became more important both for, patients, personnel and for the owner of the institution. One of the concerns that healthcare designers have to overcome is circulation flow. To cope with wayfinding problems they should be informed about importance of wayfinding, its elements and cognitive mapping differences between users.

Wayfinding task and cognitive mapping process are a phenomenal consciousness both emphasizing the skills that have to be developed with and without the aid of assistive technology. Besides the technical differences, cultural, regional, educational and gender differences affect people's perception of space.

Anyone experiencing feeling of disorientation or momentarily being lost occurs because of a wayfinding failure. This failure maybe occurred due to different circumstances (Golledge, 1999). Individuals differ in how they navigate in an environment. People may report a good sense of direction or poor sense of direction according to environment.

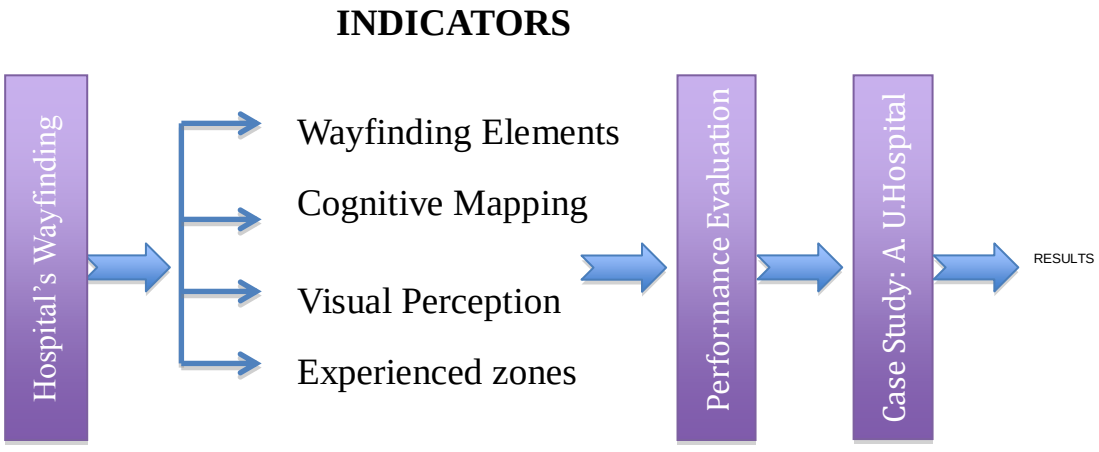
In 1990's regardless of the function and type of the building wayfinding systems were just using simple sign systems. Today, with technological improvements that come with globalization, wayfinding systems became a required criteria. Getting people from one location to another location is becoming more complicated; transportation options are increasing due to improved technology. Importance of wayfinding activities increases in the process of time.

Exploration is a fundamental task to human existence, for thousands of years, humankind needed to be directed to somewhere that they needed to go whether it was a cave, a hole or somewhere safe. This study was conducted to explore wayfinding strategies in indoor healthcare environment and their relationsto the user's knowledge. A person's perception of space, and legibility of the space are results of cognitive maps (Lynch, 1960). Cognitive mapping is perceiving and storing data from experiences, people orient themselves with creating visual mental maps of the environment. While navigating in a building we need to be directed and make some decisions during our route to destination point. Cognition of the space helps for wayfinding.

The aim of this thesis is research relations between wayfinding skills and cognitive mapping styles, to examine the role of cognitive maps in human wayfinding activities that take place in a healthcare environment, especially, to analyze the conditions in obstructed or unobstructed environments. When these fields are deeply investigated pioneers of visual perception; Kevin Lynch's and Romedi Passini's studies are examined in this thesis.

The thesis has a goal to investigate the definition of wayfinding, polyclinic of cognitive mapping, wayfinding elements and identify the important components for cognitive mapping. The solutions were discovered with the chosen case study; Aegean Hospital Polyclinics. *(Figure 1.1)*

Figure 1.1. Thesis flow



In the first part of the thesis, aim of the thesis is explained by giving description of the study. Following introduction, chapter 2 discusses healthcare design approaches; type, shape of the hospital, location, material selection, HVAC, healthcare design and healthcare wayfinding elements.

Chapter 3 introduces analysis of wayfinding behavior and cognitive mapping; they are explained with introducing meanings and examples. This part includes definitions, and stages of wayfinding, international wayfinding examples (Healthcare, Commercial, Museum, Education, Culture) and cognitive mapping strategies; allocentric and egocentric are described as well. Also differences between different age groups and genders are also stated in this chapter.

After informing about wayfinding and cognitive mapping subjects chapter 4 analyses A.U. building and its users according to the criteria explained in chapter 3. Chapter 4 is case study of A.U. polyclinics building, this chapter consists of 2 parts, part one is observations of the building and part two is survey study. Part one starts with observations like current conditions; location and density, also in part one zones in the building: entrance, information areas, corridors, waiting areas was detailed in the architectural analyses of the study. Part two is survey study, aim, method, participants and results of the survey are explained. Survey results obtained from A.U. patients are graphical represented, and the discussions of these results along with decisions are stated in part two.

In order to authenticate the purpose of the study, books and previous theses on wayfinding, cognitive mapping, regulations on healthcare design are studied. Also technical drawings, hospital plans, photographs, websites have been used during study.

The thesis is developed over three research approaches; (1) research on past literature review, (2) on site field survey, and (3) structured interview with Prof. Dr. Mehmet N. TÜREYEN. First approach concentrated on the definition of wayfinding, its origins, stages, elements, problems and decisions. Different circulation paths of different users' connections between buildings and

chronological additions are shown. Historical evolution and differences between the additional and pre-existing buildings are stated. How the connections and circulation are controlled, what design strategies are used, orientation, space analyze topics are mentioned. In the end, design elements, and methods are discussed and explained with examples.

In the second approach, Izmir Aegean University's polyclinics' were taken into the scope of the research. Quantitative data should be taken in to consideration; a research survey was given to first-time and second-time users for analyzing wayfinding and cognitive mapping differences.

Field survey is formulated mainly to determine wayfinding problems in A.U. polyclinics building. Intercept survey was conducted; this is indeed a type of survey in which the present users took full part. The survey was conducted ın the main waiting area to 40 participants (20 male and 20 female) who responded the call favorably. Results of the survey were evaluated according to age and gender differences. Considering the scarcity of resources, results were found to be satisfactory, as the survey was conceived basically as a study for tentative results.

The final approach includes a structured interview with Prof. Dr. Mehmet Nuri TUREYEN, who had designed a new building for A.U. polyclinics in 1987, his building was specifically designed for polyclinics purpose. That building had never been used for that function. The aim of that interview was to determine whether, any design strategies for wayfinding were considered or not. Even though the specialized building was erected, management of the Aegean University kept using the existing insufficient building.

The main entrance of the polyclinics of Aegean hospital is off-centered, after passing through the vestibule you need to choose your route for your destination; however, the main problem occurs at this point, your desired polyclinic destination might not be in the main polyclinics building. Even though there is a "Policlininc" sign on the outside of the building, for instance if you need to go to "Neurology Department" you have to travel around the main polyclinics

building and find the entrance of another additional building for Neurology Department. There are no direct connections between the additional building and the main building.

From 1955 to 1987 there was only one building for all polyclinics and it was meeting the requirements. Due to increasing number of the staff, departments and patients, there was a need of a new building. As a result of this deficiency, TUREYEN's building could be used to meet this requirement. However his buildins had never been in use for polyclinic function. Today, it is the dean building. (Appendix A). Today all polyclinics are located in different buildings, main building is not sufficient to include all polyclinics under the same roof.

In the thesis healthcare buildings especially hospitals are discussed, excluding private hospitals, large or small health care centers, nursing homes and special clinics. Wayfinding elements including, signs, banner, you are here (YAH) maps, tactile boards, and color-coding method are analyzed. Different cognitive mapping strategies, between allocentric and Egocentric mapping styles are discussed. While analyzing the building changes on wayfinding elements in the A.U. polyclinic building till October 2012 analyzed.

CHAPTER 2 – HEALTHCARE DESIGN

Since the human being existed health problems have occurred, due to that, places for patients were required. During medieval ages temples were in use both for religious service and healing places for patients. Religious beliefs were taken apart for treatment hence; first hospitals had been built by churches where monks and nuns were keeping the maintenance (Uzunay, 2011).

According to vast changes in medical world and technology, design of hospitals has changed up-to-today. Plan of a hospital needs to be easy to understand. Considering the fact that people generally visit hospitals for a variety of reasons, design needs to reduce stress, as feeling safe is very important, first impression in hospitals reduces patients' stress (Ergenoglu, 2006).

Healthcare architecture differs from other type of buildings; functional relations between different departments in the complex make the design more complicated for the architect and the supporting team. Applying design tools and methods within the hospital context need a specialized proficiency. While designing the hospital architect should be a talented problem solver, know new medical treatments & procedures, and should be familiar with existing equipment and diseases. Hospitals are complex structures, while designing; function, order, aesthetic and hygiene are important criteria. Today health care buildings are more modern and elaborated as hotels. Design should meet the requirements of patients, patients' families and visitor. To satisfy these needs, the efficient design of healthcare building becomes considerably important. Collaboration with unqualified professionals and lack of communication between the organizer, designer and the user results in wrong applications.

According to Uzunay (2011) there are some phases for designing hospitals. As a result of overcoming these phases, resulting product would be more functional and useful. The phases are; Planning Decisions, Programming, Designing, Application and Use.

Decision Planning: This process includes evaluation and investigation requirements of the site.

Programming: This process programs the number of beds, capacity of departments according to legislations and regulations.

Designing: Designing the building according to the data which is obtained by designers.

Application: Building construction phase.

Use: Using the building after the whole process pattern.

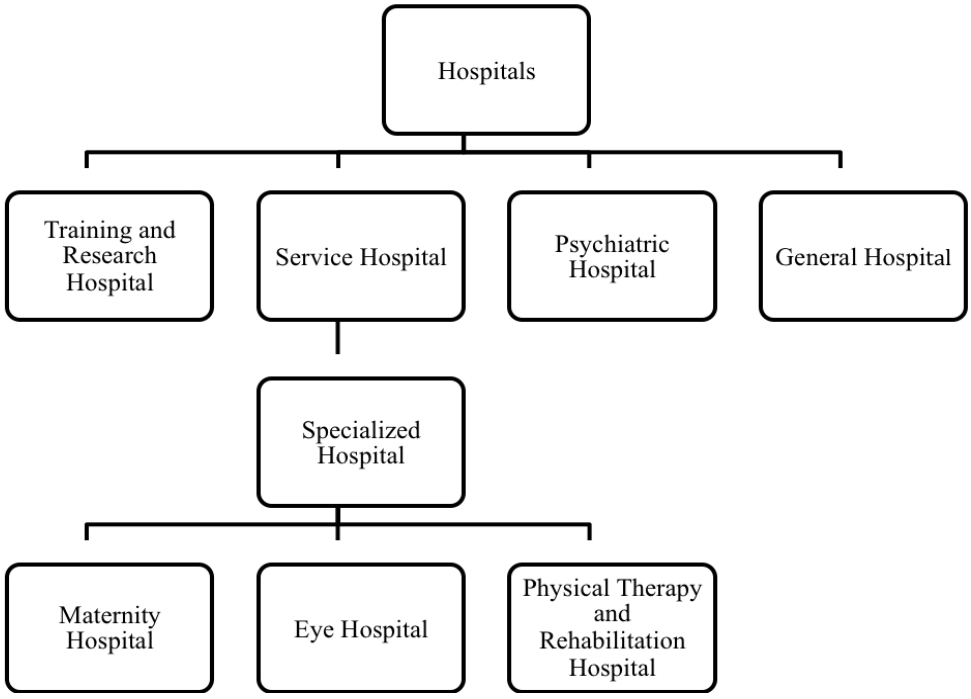
2.1. Healthcare Design Criteria

While designing a hospital there are some factors affecting the design these are, type of the hospital, shape of the building, location, material selection and HVAC.

2.1.1. Type of the Hospital

Hospitals are intensely complex buildings, this affects the design, and while designing a hospital function, aesthetic, and hygiene should be taken in to consideration, besides these, type of the hospital affects the design. Even if it is a State hospital, Private hospital, District hospital, Mental hospital, Maternity hospital, Children hospital, or Specialized (eye, psychology…) hospital, design differs according to the service provided by. *(Figure 2.1)*

Figure 2.1. Types of hospitals (Source: Türkiye Sağlık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu)



Same design cannot be applied to two different types of hospitals. Hospitals are classified according to the given service. Firstly, they are divided in to two main categories: Training and Research hospital and Service hospital. After this classification service hospitals are divided in to three: specialized, Psychiatric and general hospitals. Specialized hospitals are also divided in to three; Maternity, Eye and Physical Therapy and Rehabilitation Hospitals.

For instance design of a children hospital and mental hospital should be different form each other. Each field of study has its own requirements that determine the planning. Each type has its own procedure and design criteria (Türkiye Sağlık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu, 2010).

2.1.2. Shape of the Building

Another criterion that affects the flow of patients in a building is the type of the building, the plan scheme. In Turkey during 1940's "T", "U", "L" plan layouts were practiced. In these plan types polyclinics, laboratories, diagnosis departments and x-ray departments were located at the first floor, and patient care units were at the second floor. Shapes of the windows were square or rectangular. Due to population increase in 1960's plan types of hospitals started to change, number of polyclinics started to rise, footprint of the treatment units enlarged. For this reason small hospitals yield to larger ones. In 1980's instead of vertical structure, horizontal expansion structure began. Starting with the beginning of 1990, number of private hospitals started to increase (Uzunay, 2011).

2.1.3. Location

Before designing a healthcare building location of land is outmost important. According to the earthquake region land information system, investigation on seismic map of the land geological data should be achieved. Since healthcare buildings are heavy-duty public facilities good planned vehicle entrance and exit is necessary. According to Turkiye Saglık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu regulations, there are some criteria for hospital locations:

- Pollution free areas (noise, air and water)
- Reachable via pubic transportation
- Far away from non-healthy, industrial institutions
- Less traffic density
- Enough parking place
- Planned electric, gas, water, drainage infrastructure systems
- Close to other healthcare places

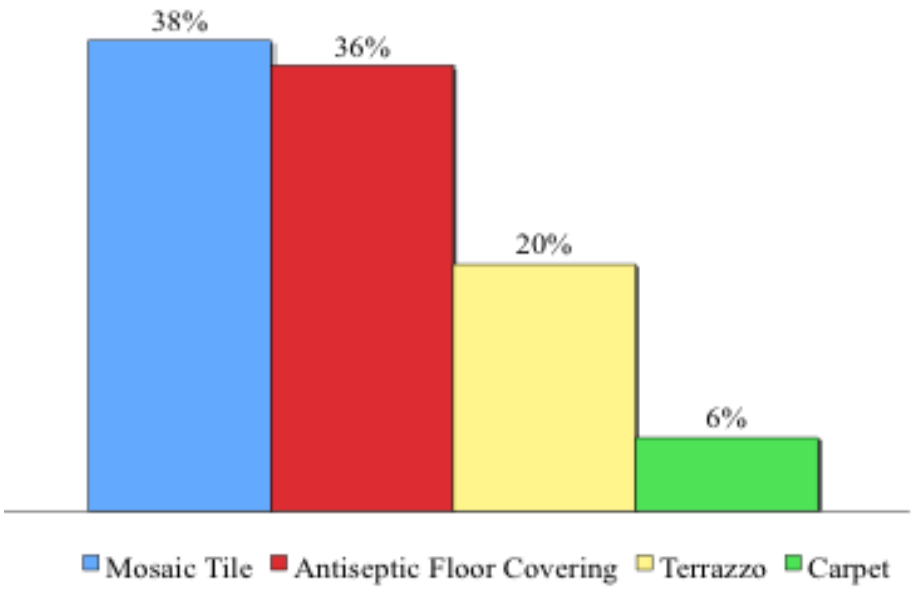
Also, the building should not serve for another function due to sterilization concerns. In the hospital, complex public houses should be available for doctors,

nurses and for technical stuff, if possible a hotel for patients from outside of the city can be located.

2.1.4. Material Selection

Healthcare design needs more than merely standard interior finishing and space organization. Until, recently material selection was always been an overlooked factor for interior design of a healthcare facility. During the design of a healthcare facility architects make decisions over the selection of materials for interior design. Material of the walls, floors, ceilings, finishings, furnitures, isolation materials and equipments should be selected due to some parameters. Certified contractors aware of infection and maintenance concerns are required during the design process (Cook, et al., 2008). Figure 2.2 shows commonly used floor-covering materials in health care facilities.

Figure 2.2. Floor covering types of hospitals (Filiz Şenkal, 2001)



Floor covering material has the largest area in the building, it should be aesthetic, available and affordable.

Finishing materials for different interior spaces can be different from each other. For instance material for the lobby and examination room should be different, for lobby primary criteria is hygiene and durability of the material, but in E.R., finishing material should be seamless and easily cleanable, when parameters change optimum material changes too. Wet areas like, surgery rooms, toilets and laundry rooms should be ceramic tile.

Using non-combustible materials and suitable material is also important for hospital design. Materials emit Volatile Organic Compounds (VOCs) create unhealthy environments in healthcare facilities (Cook et al., 2008). While selecting the materials, VOCs parameter is also utmost important to create a healthy environment for medical patients and staff.

2.1.4. HVAC

Hospital environment is not easy to keep sterile; spread of diseases and infections is a significant concern among professionals. There are several reasons contributing unhealthy environments. Architects and designers are aware of the importance of protecting the patients and employees from the unhealthy breathing air.

There are several factors that decrease indoor air quality (IAQ) these are primarily; mold, bacteria, combustion pollutants and off gassing that emits VOCs.

Environmental Protection Agency has issued that IAQ is one of the most important health problems in healthcare buildings. Carpet, paint, varnishes, floorings, insulations, adhesives, green materials, ventilation systems and particleboard are products that affect IAQ. While designing a health care building considering the facts that affect HVAC and IAQ should be taken in to consideration (Cook, et al., 2008).

2.2. Health Care Design In Turkey

During prehistoric periods, medicine was attached with nerve and spiritual feelings, Turks did not have a specialized health agency. The oldest known studies belong to Sumerians, they were using spiritual emotions for healing; they did not have the concept of a hospital. Whether Turkish hospital architecture structure examined, it can be classified in to two categories: before and after proclamation of the Republic of Turkey. Before proclamation "Darüşşifa" were serving to the public as today's hospitals, also, these structures were places for medical education (Uzunay, 2011).

Following the proclamation of the Republic of Turkey, existing chaos of hospital design did not vanished, an original character and suitable solutions to the era could not be generated at hospital building design during the first years of revolution (Ergenoğlu, 2006). According to Orhan Bolak (1950) hospital buildings in Turkey were very bad at installation and comfort when compared to the examples in West. Bolak also mentions that when Pavilion type and block type of the hospitals were current in west, in Turkey bad imitations were being built. Also after the proclamation old hospital buildings were in use with restorations and additions.

Vast investments bring out increase of the number of private hospitals all over the world and Turkey (Appendix B). Lack of control of the government and the communication between the designer and user brings problems. Healthcare architecture needs specialized education and experience. Turkish architects are executed from healthcare projects via lack of specialized knowledge of healthcare design and principals. Foreign Architecture companies are preferred because of their knowledge and experience in this field.

In Turkey exterior of the building is more important then interior, each space needs to be designed with attention of its special requirements (Seren, 1999). Improving hospital design in Turkey, determination of minimum standards of health care buildings is very important. As well as external appearance of the

building makes it beautiful and useful with its wide corridors, large and spacious rooms, high ceilings and good decoration enhances the quality however, unnecessarily wide spans would increase the distance between departments, slow the service, reduce the work, decrease patient and employee satisfaction and diminish the service quality. Due to these reasons setting some standard would prevent problems related with design and process (Türkiye Sağlık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu, 2010).

While designing hospitals construction, comfort, patients satisfaction, privacy, maintenance and operational costs aim to obtain lowest possible for having effective design in the building, for this aim planimetric design becomes vast important (Kazanasmaz, 2009).

2.3. Healthcare Wayfinding

Hospitals are complex places with different activities taking place; treatment, inspection and healing besides these activities hospitals contain different units within itself; administrative offices, laundry, kitchen cafeterias, storages, technical rooms, mortuary, mechanic rooms and laboratories (Kazanasmaz, 2004). Buildings having complicated circulation systems or where many functions take place at the same time should have a better circulation system designed by a professional. While designing a healthcare facility there are some main concerns such as wayfinding and physical comfort (Carpman and Grant, 1993).

“Spatial complexity is the primary factor that polyclinics spatial perception and that causes the problems of way finding and orientation” (Hidayetoglu vd., 2010). A complex plan scheme worsens the observation and orientation in a place that may result with frustration and undesired feelings. According to some researchers patients and visitors’ stress is a result of both psychological and non-sustaining wayfinding elements. Visitors always feel desperately tired and helpless while circulating. Problems during wayfinding process can be results of the design or the elements that have been deployed. “Problems frequently cited

centered on their excessively long corridors, circuitous routes, labyrinth floor plans, and confusion caused by their monotonous appearance" (Verderber, 2010).

While passing through a long corridor it can be boring and unpleasant. Not able to seeing end of the corridor or not knowing where to exit makes the traveler anxious. For diminishing the feeling of an endless corridor using finishing materials or lighting perpendicular to the axial is a preferable solution. As a result of that cognition of the corridor will be shorter *(Figure 2.3*). According to Kazanasmaz (2004), using some design elements on walls can make the corridor more attractive.

Figure 2.3. Corridor with perpendicular lighting on walls

The primary principle of circulation theory at health care building is to protect the patients and employees. Circulation of a hospital might be critical for some cases, especially for handicaps and elder people.

"Currently, persons with severe visual impairments often require extensive assistance from strangers to travel in unfamiliar areas. Many other types of dis- abilities can prevent people from reading print. In addition to people who are blind or who have low vision, there are many head-injured, autistic, and dyslexic (or even just educationally

impaired) people, along with persons who have had a stroke, who are not able to assimilate printed language even though they can see the page" (Bentzen et al., 1999).

Increasing number of hospitals and patient numbers (Appendix C) underlines the importance of efficient and functional design of circulation areas at healthcare buildings.

Çetik and Oğulata's study in Çukurova University Hospital, deduces solutions on hospitals work flow, inner patient circulation and wayfinding problems. According to their study, there should be special walkways for blind people to enhance the wayfinding behavior, color bands leading to each department to ease the circulation. Banners should show important locations such as laboratories, WC's and exits in both Turkish and English.

Chapter 2 discussed design criteria, approaches of healthcare buildings, and what happened after proclamation of the Republic of Turkey. In chapter 3, relation between wayfinding behavior and cognitive mapping with healthcare design will be explained.

CHAPTER 3 - ANALYSIS OF WAYFINDING BEHAVIOR AND COGNITIVE MAPPING

In the third chapter the concept of wayfinding and cognitive mapping are defined. Following the definitions, elements and hospital wayfinding were described with international examples. Also how wayfinding elements affect cognitive mapping, what are the cognitive mapping strategies were described under main and sub-headings.

3.1. Wayfinding Behaviour

Way finding behavior is using spatial and environmental information to find your way. It also can be defined as communication between places in a building, ability to situate him/her self within the representation without confusion.

3.1.1. Definition of Way Finding

Way is the path we follow between an origin and a destination, if we do not know our way we feel lost and desperate. Wayfinding is to know where you are, where you want to go and knowing the path how you can return to your start point. Disorientation and getting lost are frustrating experiences for users. Wherever people come together in a place to work, study, play, heal or just to communicate they may orient themselves in the existential sense but also wayfinding design provides a guidance to orient.

Best of all, with “Wayfinding” term, all designers and architects have a common language to discuss, care about needs and problems. Kevin Lynch is pioneer of the term of Wayfinding. He defined the meaning, concept, types, problems and solutions of the term “Way-finding is the original function of the environmental image, and the basis on which its emotional association may have been founded” (Lynch, 1960). Image is not just what eyes can see, with the attachment of knowledge it gains meaning and becomes fundamental equipment for living.

"It was proceeded by the notion of spatial orientation, which referred to a person's ability to mentally represent the spatial characteristics of a setting and the ability to situate him or herself within that representation" (Passini, 1996).

Environmental Psychologists, Architects, Planners have been studying on the subject to investigate what is wayfinding is and how the best solution can be achieved. The concept of "way finding" was first used by architect Kevin Lynch in 1960 "The Image of the City", where he referred to maps, street numbers, directional signs and other elements as "way-finding" devices.

"During the 1960s Cold War Period, critics, scholars and designers felt an urgent need to humanize increasingly complex modern urban spaces. The design discipline that evolved in response has been called architectural graphics, signage or sign-system design, environmental graphic design, and wayfinding" (Gibson, 2009).

Travelers used Wayfinding techniques in the past. While traveling over land or sea they used different techniques such as dead reckoning, compass, map, astronomical positioning and nowadays' global positioning devices. In the mean time, traveling form one point to another, there can be obstacles on the path, and main intention is to get over them and not to loose the direction. Vast environments such as; sea, ocean, land, forest, desert, buildings, cities are places where it is easier to feel lost. Wayfinding process is a sequential pattern, there are series of questions people ask to each other or to an employee along the way.

In different types of projects a wayfinding designer is always a need; these are education and culture, hospitality, sports and entertainment, commercial real estate, corporations, retail, health care, government and transportation… "The wayfinding designer is responsible for enhancing how a space – whether public, commercial, or private – is experienced by finding order in chaos without destroying character" (Gibson, 2009).

In this thesis, way finding in buildings and its methods will be discussed with the case study of Aegean University Hospital Clinics. First-time users'

difficulties that they experience through their circulation in the building are discussed.

" First time users need to make a sense of a new environment a complex building layout and sign system can make finding one's way difficult" (Carpman, 1993). When people start to navigate a place for the first time, there are series of decisions to face. For example, a first time visitor enters to an airport, where he/she does not know which entrance is the right one, after reaching one entrance with a feeling of hesitance and excitement he has to decide where to go and how to go.

According to Kim (2001) Hospitals are more liable to changes than other buildings; such as housing, hence they are multifunctional, hospitals including housing, offices, teaching, laboratories, cooking, laundry, cleaning, and more… Consequently, multi functionality makes buildings complicated and difficult to navigate. "The high level of complexity that is a compulsory result of the complex plan schemes worsens the perception and the usage of locations" (Hidayetoglu vb., 2010).

Today facilities which are in need of wayfinding improvements are; Cities, Universities, Concert halls, Shopping malls, Hotels, Healthcare facilities, Hospitals, Museums, Schools, Airports, Parking sites, Libraries, Food courts, Stadiums, Zoos, Office buildings, Arenas, Conference centers, Bazaars, Public parks, and so on. All those environments need special treatments however when they are compared with each other, Healthcare centers and Hospitals need special wayfinding design due to the function they hold.

Buildings having complicated circulation systems or where many functions take place at the same time should have a better circulation system designed by a professional. For a better circulation initially, the problem needs to be clarified and solved, when architectural design and spatial cognition links better circulation systems can be achieved. Problem may lie in spatio-cognitive abilities or in an architecture that only rudimentarily accounts for human spatial cognition

(Hölscher et al.,, 2006). Circulation system is the key to organise element of a building. For creating mental maps people use circulation system availale in the environment.

Circulation systems are like veins of human body, veins have their own pathways and the flow of the blood is promptly. For transferring nutrients and oxygen to the cells, proper blood circulation plays an important part in our being. Through branching veins destination and time is coded, even a little disruption can cause irremeably results. The decision points are the most critical points of the circulation system. The way the architect handles with the circulation problem will determine the efficiency in use of the building. Best circulation is achieved with best ease of way finding.

3.1.2. Different Approaches to Way finding

A phrase or a word can evoke different meanings to each person, many words have slightly varying meanings, or they can be used as different parts of speech. For instance when we ask to kids, "what is world?" answers will alter depending on each kids' world-view and perception of world.

Even though, meaning of way-finding is described in detail by dictionaries, each designer, architect, planner explains and puts it in practice in different ways. Personal perspectives, attitudes, opinions, feelings, beliefs, desires or discoveries affect person's perception.

Way finding is a design issue that needs to be taken in to consideration by designers. "Way finding" may mean different or similar to each designer. Designers and architects have unconsciously practiced wayfinding principles for many years. Now it is named, defined, quantified and practiced by different designers.

In this part pioneers' approaches and statements on wayfinding that are Kevin Lynch's, Romedi Passini's and Paul Arthur's will be explained. These three writers are largely responsible of the popularization of wayfinding term.

Firstly, Kevin Lynch, who is a city planner and urban planner, focuses on making the city more vivid and memorable and meaningful to its visitors. Secondly, architect and environmental psychologist Romedi Passini worked on spatial problem solving in his studies, which he co-authored with Paul Arthur (Wayfinding planner) (Muhlhausen, 2000).

According to Lynch, to create a mental picture there are visual qualities can conveniently be classified in to 5 types of elements. These are; paths, edges, nodes, districts, and landmarks. These elements, along with visual accessibility, are also the design criteria for highly legible and comprehensible environments.

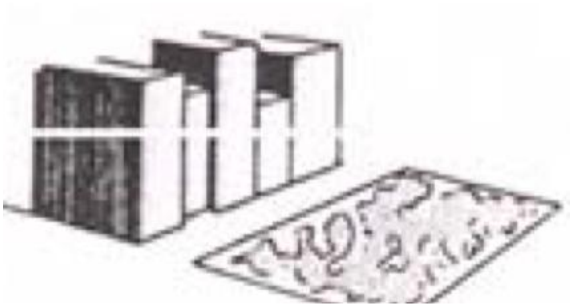
PATHS: Paths are the channels that we pass through, streets sidewalks, railways, canals are the paths that we observe during our trip. Paths are elements for people for their usage for circulation. People observe places while moving through paths (Lynch, 1960). *(Figure 3.1 and 3.2)*

Figure 3.1. Path Example: Kordonboyu, Izmir

Figure 3.2. Kevin Lynch's path sketch
(Source: Lynch, 1960 p.52)

EDGES: Edges are mostly linear elements but not considered as paths such as walls, buildings, and shorelines. Edges can divide districts into parts, and determines where an area, space begins or ends (Lynch, 1960). *(Figure 3.3)*

Figure 3.3. Kevin Lynch's node sketch (Source: Lynch, 1960, p.47)



DISTRICTS: Districts are places divided into meaningful zones for a reason. Each district is memorable in its context, and has its unique texture. There are some physical characteristics helping determine districts from other districts; these are; texture, space detail, form, building type, inhabitants, symbol, topography, use and activity. *(Figure 3.4 and 3.5)*

Figure 3.4. District example: Balcova, Izmir

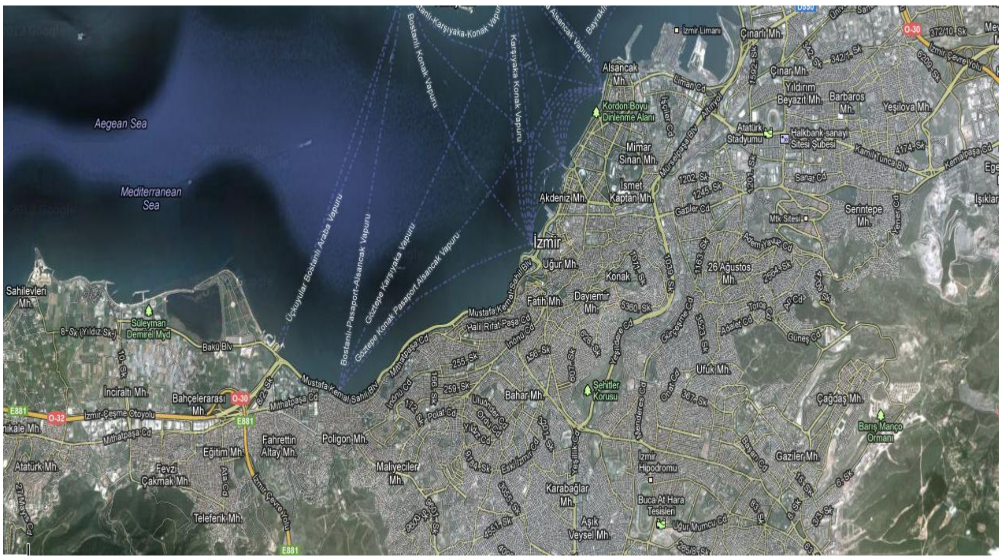
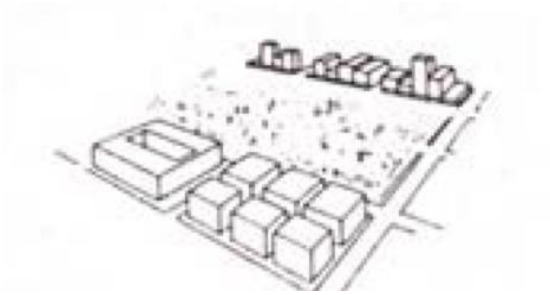


Figure 3.5. Kevin Lynch's District sketch (Source: Lynch, 1960, p.47)



NODES: They gain their importance with their strategically placements. Nodes, which are mostly known and easy to find in an environment, are center of activities. People make decisions at node points in conclusion nodes should contain architectural information to make decisions (Lynch, 1960). *(Figure 3.6 and 3.7)*

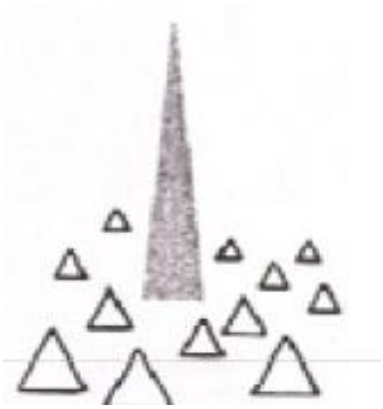
Figure 3.6. Node example: Gündoğdu Meydanı, Izmir

Figure 3.7. Kevin Lynch's node example (Source: Lynch, 1960, p.47)

LANDMARKS: Landmarks are physical elements and their sizes can vary, they direct people to major nodes. When landmarks locate at junctions, it strengthens path decisions (Lynch, 1960). *(Figure 3.8 and 3.9)*

Figure 3.8. Landmark example: Clock Tower, Izmir

Figure 3.9. Kevin Lynch's landmark sketch (source: Lynch, 1960, p.48)



Secure way finding gives its possessors an important sense of emotional security and intensity of human experience (Lynch, 1960). While navigating in building, travelers want to feel safe and secure.

What is seen creates the decision in mind. In respect of Lynch, images soaked into memories and meanings as well as decision-making, remembrances carry weight on way finding. It can be said that, both directional signs, and elements and our memories create a mental map for wayfinding.

When Lynch and Passini are compared it is obvious to see different types of explanations on way finding. According to Passini wayfinding describes a person's both cognitive and behavioral ability to reach spatial destination.

"Way finding decisions are hierarchically structured into plans which not only help to memorize routes in behavioral terms, but help to organize and record environmental information in the form of sequential, route-type representations" (Passini, 1984).

Passini breaks (explains) way finding in to three-stage performances; it starts with a 1) decision making, continuous with 2) Decision Executing and ends

with 3) Information Processing. According to Passini (1984) people engage in decision making when they travel on unfamiliar routes. Each decision is based on environmental information perceived from the settings. Turning right/left, taking the elevator and so on. Decision execution needs to happen at specific points on the route. Lastly Information processing is reaching the goal destination after whole stages.

In 1984 Passini's research findings were published as "Wayfinding in Architecture" (1984) and a book with Paul Aurthur "Wayfinding – People, signs and Architecture" (1992) was published to explain their perspectives on wayfinding.

In a building with a complex organization like in a maze, routes may be blocked with dead ends. Environmental information describes the destination to the possessors with different ways, and with the information may be perceived directly in the settings, some retrieved from previous experiences, or some inferred from a combination of existing information (Passini, 1984).

When Lynch and Passini are compared Lynch describes wayfinding with environmental zones and geometrical shapes, in contrast to Passini. According to Passini wayfinding is formulates an actual plan and implements the plan (Muhlhausen, 2000). Passini's wayfinding behavior has a hierarchically order and can be affected by previous environmental experiences. It is more than environmental zones, it is more about decision making and formulating it through actions.

3.1.3. Stages of Way Finding

If wayfinding action is entitled as a set of actions we can say that it is compound of hierarchy of some subsets. While experiencing an environment during navigation, wayfinding route consists of four stages: Orientation, route decision, route monitoring, and destination recognition (Downs and Stea, 1973). Definition of each stage is described below;

3.1.3.1. Orientation

Orientation: Orientation is a function of the mind involving awareness of three dimensions: time, place and person. By dividing space into smaller parts and using landmarks and signage, it is easy to determine orientation. Landmarks are easy to recognize and used for casual navigation. Landmarks provide strong orientation cues, such as Eiffel Tower is the landmark of Paris, it is not just a tower it is the global icon of Paris. "Landmarks may have different locations relative to a route. A landmark can either be at a decision point, at a route segment between two decision points. In San Antonio, TX, wayfinding is enhanced with color codes and landmarks and signage to make orientation in the downtown easily. *(Figure 3.10)*

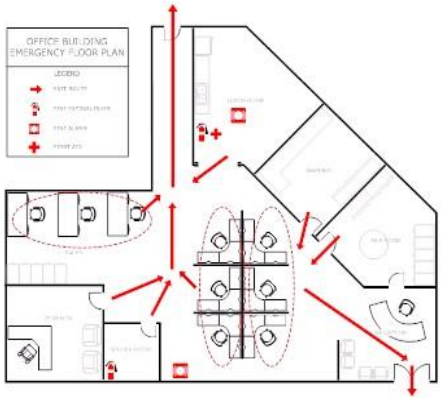
Figure 3.10. Orientation example: San Antonio, TX

3.1.3.2. Route Decision

Route Decision: On the way of destination there may be more than one navigational choice. The number of choices should be minimized to reaching the destination. When there are more than one or more choices, people prefer the shortest route even if it is complex.

"Route following takes place after decisions have been made as to what segments are to be traveled and what turn angels are required to connect different segments" (Golledge, 1999).

Figure 3.11. Route decision example: Evacuation Plan Template



3.1.3.3.Route Monitoring

Route Monitoring: Refers to monitoring the chosen route to confirm that it is leading to the destination. To improve route monitoring, connect locations with paths and decision points such as where to change the way or make a return should be pictured to the user. With improving technology digital route monitoring devices (GPS), digital maps (Google maps) ease wayfinding task.

3.1.3.4. Destination Recognition

Destination recognition refers to recognizing the destination while going to the destination. To improve destination recognition, enclose destinations such that they form dead-ends, or use barriers to disrupt the flow of movement through the space. This process takes pace just before reaching the goal destination.

3.1.4. International Wayfinding Examples

In this part 6 international wayfinding approaches all over the world are selected among different orientation solutions. Also all 6 examples are collected as a result of literature review carried out in chapter 3. They were chosen since they all include different wayfinding elements. Examples are discussed under main topics of location, material, and design.

3.1.4.1. Transport – SNCF - France Railway Station (Digital Screen, Banner, Sign)

Signs at transportation places comprise a menu of different choices to the travelers; it gives multiple options to comfort them. Enhancing independent use of public transit, visitor should be informed when necessary. Railway stations in France are distinguished from others with special attention to visually impaired person.

The SNCF (Société Nationale des Chemins de fer français), French National Railway Corporation is the French's national railway company, it has range of signages for passengers; information points, poster frames, monoliths through to totems. Signs provide identification and directions. (Figure 3.12. and 3.13) Most of it is readily understandable and even translated into English.

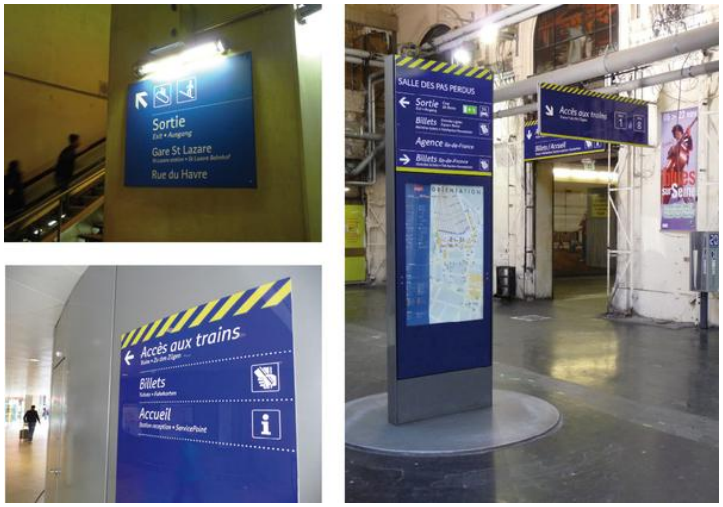
SNCF aims for a new typeface for visually impaired people and ophthalmologists. Designers proceeded multiple readability tests and surveys; as a result of series statistic results Achemine font has been set to satisfy more people. The font since has been in use in France over 800 train stations since 2007 (Wayfinding, 2012).

In SNCF mostly digital boars are chosen since information on boards changes frequently, universal signage system is used for international users. Information boards and banners located on user's route and above eye level to be visible from distant. As material selection durable and easily cleanable materials

are chosen where people can reach and fragile screen boards where people cannot reach.

Figure 3.12. France railway station information points and monoliths, France

Figure 3.13. Poster frames, France



Design Agency	AREP, Bruno Bernard
Creative Director:	AREP, Bruno Bernard
Designer:	AREP, Bruno Bernard
Photography:	AREP
Client:	SNCF
Date:	2007
Location:	France

3.1.4.2. Healthcare – Palo Alto Medical Foundation Camino Medical Group (Pictograms, Tactile Boards, YAH Maps)

The frame of mind of visitors of hospital is often fuelled by stress and anxiety. Unknown terminology and being illiterate make people even more stressed. Comprehensive wayfinding and signing program are designed for Palo Alto Medical foundation to overcome these problems. For each department custom iconography is synchronized. Simple drawings of organs or connotations are used for pictograms. (Figure 3.14) Pictograms facilitate more people to understand.

Also Directory and folding guide brochure strategy was developed to provide an integrated family of signs addressing the needs for navigation (Wayfinding, 2012).

In this example main signage with pictograms for overcoming language barrier, tactile boards for visually impaired patients are used. *(Figure 3.15)*

Figure 3.14. Pictograms for multi-lingual audience

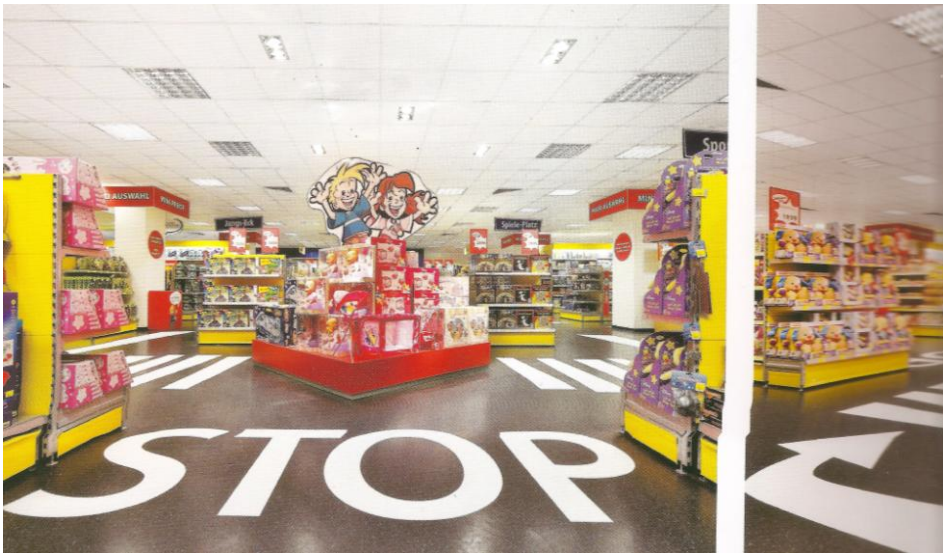
Figure 3.15. Tactile directories

Design Agency	GNU Group
Creative Director:	Dickson A. Keyser
Designer:	Howard Curtis
Photography:	Dickson A.
Client:	Sutter Health
Date:	2007
Location:	Mountain View, CA, USA

3.1.4.3. Commercial – Maxi Joy Shopping (Color Coding, Banners)

Traffic signs guide visitors of Maxi Joy, colorful arrows and signs are used to draw target group's attention. Islands full of good are located at the intersection of paths for taking attention and demonstration. Arrows and letterings on the floors aim to motivate people and to provide fun shopping experience (Wayfinding, 2012). *(Figure 3.16)* Color-coding corridors, corners and beams, ceiling-hang banners, traffic signs on floors are chosen, also primary and secondary colors are used to draw children attention.

Figure 3.16. Views from Maxi Joy shopping center


STOP


Krabbel-Viertel
Puppengasse
GUTSCHEIN
GUTSCHEIN


TESTSTRECKE

Design Agency	Dan Pearlman Markenarchitectur GmbH
Creative Director:	Marcus Fischer
Designer:	Karin Hechinger
Photography:	diephotodesigner.de
Client:	Spiele Max
Date:	2005
Location:	Germany

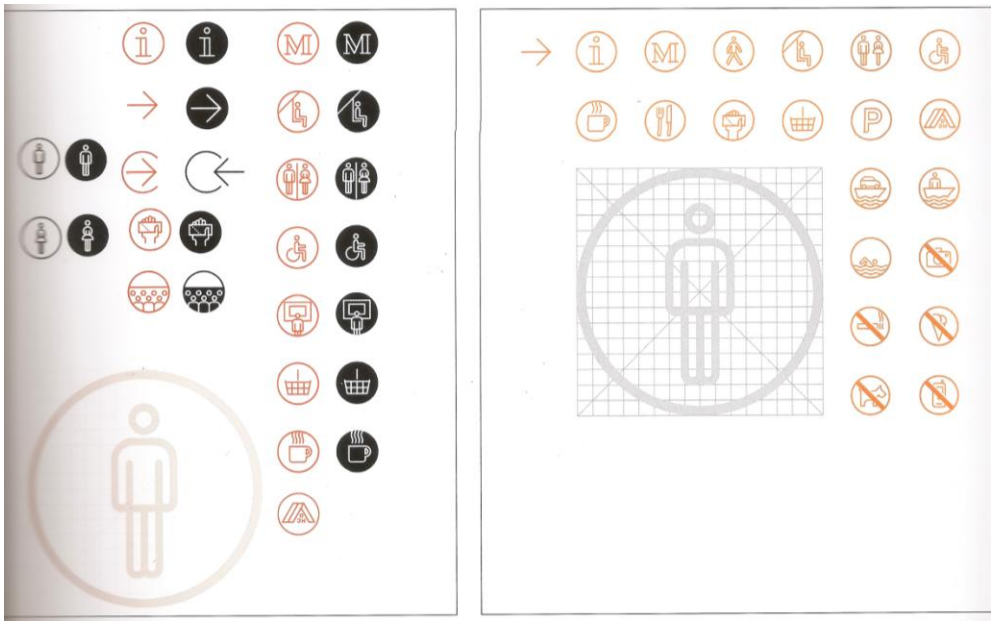
3.1.4.4. Culture – Castles, Palaces and Antiquities in Rhineland – Palatine (Flag, wall mounted Banners, Signages)

There will be a uniform guidance and orientation systems to the visitors of United Nations Educational, Scientific and Cultural Organization (UNESCO) places. World Heritage sites located around the Rhine and Moselle, visitors will be guided through all cultural heritages with these wayfinding elements confirmed by UNESCO. Two firms Adler & Schmidt Kommunikations-Design / Meuser Architekten came up with a new wayfinding system that does away with signage, which distorts the architecture and which uses different kinds of wayfinding elements. The aimed to design wayfinding elements are similar to the primitive ones with using traditional materials; fabric, stone and bronze, and then they are added to these interactive touchscreen systems. They started with designing flags, banners and wall descriptions. (Figure 3.17) Location of the wayfinding elements can be seen from afar after analyzing the landscape. Where more than 2 paths intersect guide signs are situated for guidance (Wayfinding, 2012). Also designers

designed a special signage system for cultural places in Palatine *(Figure 3.18)* (Wayfinding, 2012).

Figure 3.17. Flags and Banners

Figure 3.18 Signage design



Black solid signs with white lettering or orange and/or black hollow signs are designed for Palatine people.

Also, being considered for the blind tactile boards are located at entrance and necessary locations. Since some people are better at Model of the place help people to see the whole complex, be aware of present location and figure out how to find desired location. *(Figure 3.19)*

Figure 3.19 Wayfinding elements

Design Agency	Adler & Schmidt Kommunikations-Design / Meuser Architekten
Photography:	Philipp Meuser, Hans-Peter Schmidt
Client:	Landesbetrieb Liegenschafts – und Baubetreuung (LBB), NL Koblenz
Date:	2006
Location:	65 Landed Property in Rhineland - Palatinate

3.1.4.5. Education – Universities' Wayfinding Hub (Signage, YAH Map, Pictogram)

The wayfinding hub system was developed for Universitys' campus for students or who wants to explore the campus. The hub looks like a bus stop, has a covered resting area with the seat facing the map where one can sit whilst looking to the map (Figure 3.20). The structure consists of 2 parts, first one is two "O" shaped structures that display the route on which it is situated, and second one locates between the two "O" section shape structure and displays all possible routes on the campus. (Figure 3.16) Square designed signage with white lettering on red, yellow and green backgrounds in the hub helps for navigation, gives information about locations of departments, medical center, parking lot and so on. Hubs will color the area where they are situated, and also they are located on the main campus map.

Figure 3.20. Universities' wayfinding hub

Figure 3.21. Signage design for hubs

Design Agency	Linda van Wyk
Creative Director:	Linda van Wyk
Designer:	Linda van Wyk
Architect:	Rohan Eicker
Date:	2008
Location:	Pretoria, South Africa

3.1.4.6. Office – Dow Chemical Company, Houston Office (color Coding, Banners, Signage)

The Dow chemical company decided to make a change to reinforce their prestige in the market, they started to make a change in their corporate office. For having a better first impression, firstly designed the main reception area (Figure 3.22) secondly the whole wayfinding elements in the building. Company is aware of the importance of wayfinding elements.

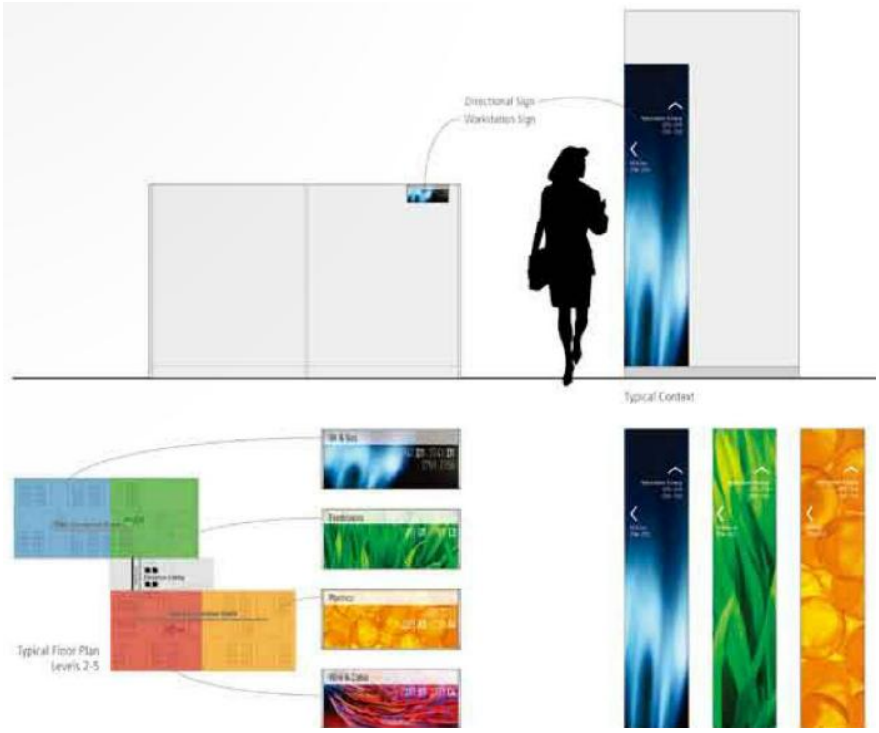
Entrance and corridors are decorated with translucent photographic image murals; images were selected from Dow's "Human Element" campaign. This campaign was based on that the missing element in the periodic table was human element. (Figure 3.23) Therefore, creating a focal point at the entrance works both for the prestige and for enhancing the cognition of the space. Wayfinding

elements in the building are mostly large vertical directional signs with warm colors. Each level coded with different colored signs and banners, also vertical and horizontal banners are located if necessary. (Figure 3.24) Also they color codded all floors and also colorful images are showing the direction ahead; warm photographic images leading to south and cool images leading to north (Wayfinding, 2012).

Figure 3.22. Entrance and reception area of DOW

Figure 3.23. Photographic images on corridors

Figure 3.24. Vertical and horizontal banners



Design Agency	Mayer/Reed
Creative Director:	Michael Reed
Designer:	Debbie Shaw
Photography	Pete Eckert
Date:	2009
Location:	Houston, USA

3.1.5. Elements of Way Finding

Today, designing wayfinding elements become more complicated, improved technology and demand for sustainable solutions made the task complex and broader. There is no single education system for becoming a wayfinding designer. People with backgrounds of various disciplines related with design offer wayfinding design services, who are graphic designers, architectures, interior designers, product designers and communication designers, combined with desire, talent and experience. Workshops and lectures are given in schools to practice and gain experience in this field.

Organization of space and coherence of wayfinding elements affect the perception of the space. Planners should be careful with both internal and external factors while designing a building. “The findings suggest that the process of way-finding is assisted internally by our cognitive maps, action plans (we pre-plan our behavior in the environment) and magnetic compass orientation. External aids to way-finding include maps and virtual-reality environments and pictorial information, from variety in the shape, texture and contours, which help to differentiate landmarks” (Imani and Tabaeian, 2011).

Visual messages are easier to remember and understand they take shorter time to perceive (Ekdi, 2005). There are different hypothesis about perceiving, accepting and storing the visual perception by human brain. Visual elements are observed before the texted elements, because of the fact that, visual elements are helpful for interpreting texts for design of a brand.

“Visual signs are formed from points, lines, or planes, or combinations of these elements. The basic units of point, line and plane become structural elements used to form the shape of a sign or symbol. These shapes can then be combined to create visual message statements and meanings” (Wallschlaeger and Busic-Snyder, 1992). Visual signs are mostly in use with banners for literate people. Since, they cannot read what is written on the banner, they may get the information from the visual message.

A building, is not built for one person, but for great numbers of people with different backgrounds, classes, abilities, educations, genders, ages or for people who are unfamiliar with environment, disability status, language barrier, elderly people, who has low visibility distance or who are navigationally challenged. Instead of just having texted name of the room, department and building, having both the visual image and text improves the visual perception. While designing a sign, logo or a banner for a building having pictogram and written name of the place is preferable.

Design of the visual code and its message to the observer may change the quality of the design. “This image is the result of a two-way process between observer and observed, in which the external physic shape upon which a designer can operate plays a major role” (Lynch, 1960). Visual information; the element assigned to transfer the message to the observers should be convenient for the users of that specific environment. When the connection between the observer and observed breaks down, challenges start to come about. Having essentially rich, strong symbols and vividness of identity affects the layout positively. Both organization and the users benefit the easy navigation, organization aims to create positive first impression, sense of security and wellbeing for the visitors. Faulty descriptor or the location of the descriptor can cause navigation problems, feeling of discomfort in unfamiliar environments. Clear images give important sense of emotional security. Clarity of the route and wayfinding element should start the moment; a patient arrives to the hospital, till the patient leaves the building.

While designing a wayfinding element material selection is also important. Durability, stability, coast, finishing quality and workability of material determines which material to use. Also, indoor or outdoor usage affects the choice of material. Starting with metal, glass, wood and glass are the most common sign materials. Also designer should be careful with material specification for optimum sustainability. Life span of the material, materials’ physical composition and source, the amount of energy expended during manufacturing and transportation are important for green material selection.

Wayfinding elements are classified in four separate categories. Architectural clues, graphic communication, audible communication and tactile communication (Muhlhausen, 2000). There are some ancillary tools for wayfinding, which are mainly signs, YAH Maps, tactile boards, color-coding, banners and audible communications, in this part they will be explained with examples.

Types of these materials;

Metal: Aluminum, stainless steel, bronze, brass.

Glass: Float, low-emissivity, borosilicate, fritted, tempered, laminated.

Wood: Oak, cedar, pine, mahogany, cheery, poplar.

Stone: Granite, limestone, marble, sandstone, slate.

SIGNS

There are four types of signs according to their placements; these are; wall mounted, ceiling mounted, free standing and flag mounted signs. Wall-mounted are generally smaller and mostly locates at eye level. Ceiling mounted is preferred in crowded areas to provide information for major destinations, and so that many people can see the providing information. Freestanding signs are innumerable styles. Flag mounted signs are located at above head level and are useful in large areas (Gibson, 2009). Also purpose of sign may vary, signs can be for identification, information, directional and safety or regulatory, prohibition and advisory (ADAS, 1999). Usage of signs is mostly useful unless the user is literate. Signs need to be easy to follow, see and read.

"Visual signs are formed from points, lines, or planes, or combinations of these elements. The basic units of point, line and plane become structural elements used to form the shape of a sign or symbol these shapes can then be combined to create visual message statements and meanings" (Wallschlaeger and Busic-Snyder, 1992).

Figure 3.25. Wall-mounted sign

Figure 3.26. Ceiling-mounted sign

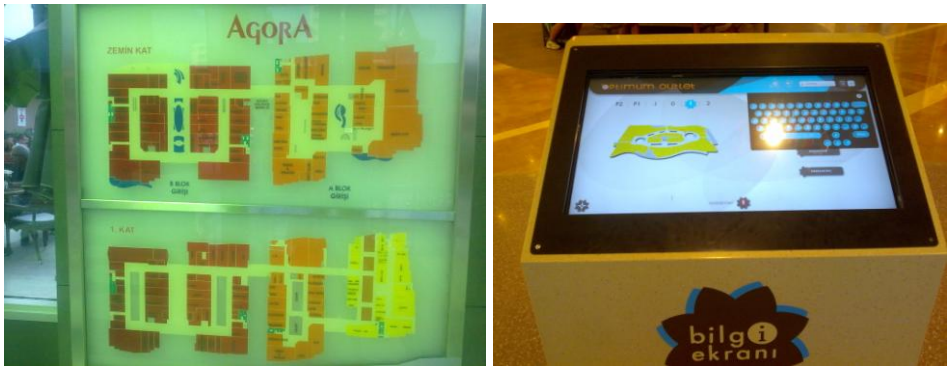
Figure 3.27. Free standing sign

Figure 3.28. Flag-mounted signs

YAH MAPS

Using maps is not appropriate for every user and situation. Some people might not able to extract spatial information from the map. There are some map design principles. Firstly, maps should organize the environment into clear spaces, and show user's position on the map (Figure 3.29). Avoiding unnecessary information, which leads to confusion, and showing organizational elements like, landmarks, corridors, intersections are important principles (Apelt, et al., 2007). Electronic touch-screen directories are spreading in commercial buildings. Mostly interactive touch-screen directories are mostly developed for sighted users (Disability Rights Commission, 2006). Understanding the information on YAH maps requires the ability of creating cognitive mapping.

Figure 3.29. YAH maps, Agora mall, Optimum mall, Izmir



TACTILE BOARD

For visually impaired persons navigation in an environment is very difficult. Tactile wayfinding elements are raised tactile boards, tactile compasses, tactile signs, tactile ground surfaces. In public buildings there are inbuilt wayfinding systems that require installation, including tactile signs in elevators, entrances, in the general circulation areas of facilities (Figure 3.30) (Wayfinding in the Built Environment, 2004). In healthcare facilities department or polyclinic's name, doctor's name and door number should be tactile for visually impaired patients even if an ophthalmology polyclinic exists in the complex, tactile communication should be mandatory.

Figure 3.30. Tactile door number

COLOR-CODING

Using color as a wayfinding tool requires special expertise. Combination of colors is important for memorable design solution. While selecting colors designer needs to know how colors match together and which color is best for desired polyclinic. The simplest color-coding strategies define distinct areas, departments or zones within a building (Figure 3.31). Colors can also create awareness, identity for the facility and place recognition for the user. Color-coding help people visualize how to navigate in complicated spaces (Gibson, 2009).

Figure 3.31. Color-coding, Agora mall, Izmir

"True enough, we need an environment which is not simply well organized, but poetic and symbolic as well" (Lynch, 1960). Simply organized place without necessary wayfinding elements may result with lack of pleasantness, Also, when wayfinding elements are not consistently presented, users hardly find their route.

Human movement does not need a guide to navigate. Using the guides around us is optional we use them when we need them. Way finding criteria are not constrains. There are multiple wayfinding elements in buildings, and preferences are changing due to age, education, disability and education.

AUDIBLE COMMUNICATIONS

Wayfinding problem is a universal issue that all over the world architects and designers should take cognizance of. Regrettably, it is more considered important abroad. People can hear and those who have hearing – imprecation, always have communication barriers. With the help of sign language, communication has been enhanced. Nevertheless, still it is not easy to understand to the core; with the help of audible communication devices visually impaired people will be able to navigate in a building without any assistance.

Audible communication elements should consist of short, straight and simple message to the user. Audio should be repeated and provide reference points like "You are entering the foyer of the building", " Information desks forward 3 meters" or "Lifts three meters forward, then turn right" (Apelt, et al., 2007).

"True enough, we need an environment which is not simply well organized, but poetic and symbolic as well" (Lynch, 1960). Simply organized place without necessary wayfinding elements may result with lack of pleasantness, also, when wayfinding elements are not consistently presented, users hardly find their route.

Human movement does not need a guide to navigate using the guides around us are optional we use them when we need them. Way finding criteria are

not constrains. There are multiple wayfinding elements in buildings preferences are changing due to age, education, disability and education.

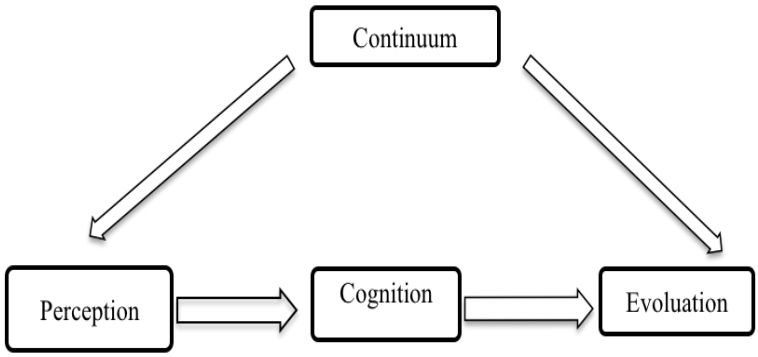
3.2. Cognitive Mapping

Cognitive psychology studies are the way of thinking, perceiving, remembering, reasoning and storing the data from people's experience. It is the study of intelligence and mind. The way we perceive affects the way we selectively attend to some spaces or objects. Human brain creates a mental map for navigating. Visual images play a big role on people imagination. "Pictorial representations capture visual and spatial information in a much more usable form than lengthy verbal descriptions" (Thagard, 2005).

Kevin Lynch argues that people in urban situations orient themselves by means of mental maps. A clear mental map of the urban environment is needed to counter the always-looming fear of disorientation. A legible mental map gives people an important sense of emotional security.

Detection of the environment shows a continuity of knowledge and evaluation of the process. According to Rapoport after perceiving the environment, cognition process starts, brain codes the environment into hippocampus, for navigating in the building evaluations from what was perceived creates a mental map and we decide our way according to the mental map (Figure 3.32) (Rapoport, 1977).

Figure 3.32. Rapoport's cognitive perception evaluation scheme (Rapoport, 1977)



3.2.1. Definition of Cognitive Mapping

Cognitive mapping encodes the environmental information to determine the present location. Familiarity of the environmental information, which assists spatial decision, helps the development of cognitive mapping, human capacity for recognition. Cognitive mapping has been studied in different fields such as archeology, geography, landscape, architecture, and landscape architecture, in briefly every field that uses maps as a tool.

We may need to create maps in any time of our lives. Ability of creating cognitive maps is very important during our daily life. Everyday behaviors such as; walking to your office, giving driving directions to a cab driver or helping a lost stranger, all would be impossible without some form of cognitive mapping (Down and Stea, 2005).

Cognitive map firstly defined by Psychiatrist Edward Chace Tolman (1928). He conducted experiments on rats in a maze and proved that Cognitive theory learning can be achieved with or without a goal and also can be motivated by a

reward. A reinforcer improves the motivation and enhances performance. If there is an aim for doing something, this is called “Purposive Behaviorism”.

When we set a goal, like a specific building, learning starts at the first step. During our daily life when we walk, run, drive unconsciously, we learn location of various buildings, streets, there is no obvious reward to reach, this is called latent learning. Tolman, had such experiments with rats in a maze and proved that even during latent learning a cognitive map develops in mind and this map helps for way finding when required.

Way finding and cognitive mapping are inseparable and most humans carry many cognitive maps in their head at any one time. The cognitive map is a person’s internal spatial representation of points, lines, areas, and surfaces that are learned, experienced, and recorded in quantitative and qualitative forms serving to spatially orient the way finder (Golledge, 1999).

“The way-finding problems may arise as a result of insufficient visually memorable cues to aid the building of an effective “environmental image” or cognitive map” (Imani, and Tabaeian, 2011).

3.2.2. Cognitive Mapping Strategies

During 1970’s Cognitive mapping navigation strategies are classified into two categories by researchers; Sequential Egocentric (route based) strategy and allocentric (map based) strategy. Both strategies develop a spatial map, internal image in the region of the brain called hippocampus. For understanding which method was in use, reports of participants are the documents for distinguishing the strategy. Whether a participant reports that he have noticed environmental landmarks or he pays attention to environmental factors than considering himself as primary in the context, this means; he used allocentric mapping strategy, or if he considers himself the primary element and pays attention to his movements in the environment it means he used egocentric mapping strategy.

Aloocentric and Egocentric are results of functioning of different parts of human brain. Different parts of brain plays a role in spatial processing, the hippocampus in the medial temporal lobe of the brain affects allocentric spatial processing whereas other parts, parietal cortex and caudate nucleus affects egocentric spatial processing (Marguire et al, 1998).

Information from virtual environment that participants observe defines the result as Ego-or allocentric.

In Imani and Tabaeian's study (2011) they conducted a survey to fifty participants from two gender groups, they were asked to draw sketch maps after visiting historical region in Isfahan "Haj Mohammad". Their sketch technique was analyzed in three ways. Also results show the cognitive mapping strategy differences (allocentric and egocentric) between two genders.

- The frequency of landmarks, paths and notes: This technique gives information about people's internal image of the environment.

- Accurate placement of the 8 target buildings seen on the tour: Determines the level of environmental perception.

- The complexity of the map: Shows intelligibility of environment.

At the end of the sketch survey there were some errors and differences in maps. Participants' cognitive maps were incomplete, distorted, disproportioned and participants' may augment their maps. There were differences between cognitive maps because of familiarity and gender difference.

Sketch maps of people who were familiar with the environment were more detailed and accurate. Besides, women's sketch maps seem to focus on landmarks and districts, in contrast to men's. Men preferred global references, such as compass points or the position of the sun. Women reported using local preferences such as sequences of left and right turns and landmarks. Also men seem to be better at navigation better than women (Imani and Tabaeian, 2011).

"One of the biggest difficulties is that the sketch maps of different individuals will vary not only because their cognitive maps differ but also as a consequence of variation in drawing ability, the perspective from which the map has been drawn, the scale and the type of map (spatial or sequential)" (Imani and Tabaeian, 2011).

Also in Hölscher's (2006) study, who are familiar with the building performed better better performance and they reached their goal more quickly, where unfamiliar participants needed to search more to orients themselves more towards wayfinding elemenents.

Results show that role of familiarity, gender and age factors affect cognition ability. To summarize, familiarity of space ease wayfinding task and women's cognitive mapping strategy is more egocentric, in contrast to that men's are allocentric. Also allocentric-mapping strategy changes due to ageing.

3.2.2.1. Allocentric Mapping Strategy

Allocentric navigation strategy is world centered and based on environmental clues. Things surround human, shape cognitive maps in the brain. In this strategy built environment is the main clue for navigation (Bullens, et al., 2010).

" In Particular, an allocentric coding would be favored when individuals are aware of the relationship between their body and the surrounding environment and when the spatial array is regular" (Iachini, 2009).

Rodgers's study (2012) studies on allocentric mapping strategy with different age groups and results show that allocentric strategy decreased with ageing. "An allocentric strategy – also known as a cognitive map or place strategy – relies on a frame of reference external to the individual, based, for example, on using a cognitive map with external reference points" (Rodgers, et al., 2012).

3.2.2.2. Egocentric Mapping Strategy

Egocentric means having one's body position as a reference point, Sequences of body turn. Egocentric frames of reference are determined by the position of the viewer in space and egocentric spatial representations maintain the viewing perspective. "An egocentric strategy - sometimes called response or route strategy – is a strategy in which an individual remembers directions or a route based on a frame of reference centered on the individual, independent of absolute position" (Rodgers, et al., 2012). Egocentric mapping strategy is based on self-motion information observed during navigation process. Egocentric mapping strategy can be defined as object location memory and egocentric processes are self motion information, the viewpoint of the movement is viewpoint-depended (Burgess, 2006).

Experiments performed by Chen, Chang and Wen-Te Chang results (2009) show that by using 2 types of tasks (YAH Map and Signage) argued that in the weightless virtual environment guide sign method is more affective than You-Are-Here (YAH) map. Generally, men show better wayfinding performance than women, but with a support system. Women prefer signages and men prefer YAH Maps. Scientifically, women are better at egocentric (route) type of spatial knowledge, contrast to Men who are better at allocentric (survey) type of spatial strategy. This show that using YAH maps is a result of using allocentric-mapping strategy and when user prefers using signages this means that user is mapping the environment in egocentric strategy. *(Figure 3.33)*

Figure 3.33. Results of experiments by Chen, Chang and Wen-Te Chang

	MEN	**WOMEN**
Spatial Strategy	Allocentric	Egocentric
Support System	Guide Signs	YAH Map
		

As a result of the previous studies, while designing wayfinding elements within the building using both guide signs and YAH map would be more efficient for usage of both genders and different age groups.

CHAPTER 4 - A CASE STUDY OF AEGEAN UNIVERSITY POLYCLINICS BUILDING

Chapter 4 analyses case study of A.U. Polyclinic building, location of polyclinics, patient density and patient ratio between polyclinics are stated. Case study is examined in order to examine wayfinding problems in A.U. Polyclinics' building and suggest solutions. Also in Chapter 4 survey results are graphically explained referring information on cognitive mapping and wayfinding behavior in chapter 3.

4.1. Observations of Aegean University Policlinincs Building

Reasons for going to Polyclinics are diagnoses, recovery and healing; none of them are pleasant intentions. If the design of the hospital is not functional being a patient or being a visitor becomes reluctant. A.U. polyclinics have a well-planned layout however; same thing cannot be said for its usage. In practice, getting lost, not knowing where you are and not knowing which direction you come from are some problems that a visitor might experience. In this building creating a clear mental map becomes a difficult task.

A.U. Polyclinic building is selected for the case study since its outstanding wayfinding problems and easy accessibility of the building in Izmir. Difficulty of creating a clear mental map, finding the right way in the building is a very difficult task.

A.U. is the first state University in city of Izmir, It was founded in 20th May 1955 in Bornova. It started education before Dokuz Eylül University with two faculties; Medicine and Agriculture in 198 with the academic programs of Medicine and Agriculture in 1982. It was the only state university in Izmir. On 5th November 1955 Medicine education has started with a ceremony (http://ege.edu.tr/, 3 September, 2012).

Bornova campus of A.U. is convenient for both intercity and intracity transportation, campus is located at the crossroads of Ankara, Istanbul and

Manisa. There are various means of transportation; metro and bus stops for patients, stuff coming from suburbs or other part of the city, shared taxis from districts of Izmir, bus terminal, which enables the access from other cities.

Practice and theoretical lectures of Medicine school are located in the A.U. hospital, settlement of the university is open planned, there are no declared border lines of the campus, several entrances allows ease of transportation.

4.1.1. Current Conditions

Placements and patient density of polyclinics affect users directly. Each polyclinic has its own needs; for placement issues some need to be next to each other, on the contrary, some should be away from each other. For instance mammography and radiology have to be adjacent but they have to be built under ground with bullet-proof material (Özel Hastaneler Yönetmeliği, 2009).

Also, density of the polyclinics should be taken into consideration too while designing the building. Since crowd makes people nervous, two high-density polyclinics sharing the same waiting might cause problems. Locating high-density polyclinics away from each other might be a problem solving decision. In this part of the thesis; placement, density and elements of the polyclinics are examined considering cognitive mapping strategies.

4.1.1.1. Location of Polyclinics in the Building

In Aegean University, polyclinics are distributed in different buildings. The main building called “Main Polyclinic Building” does not have enough capacity for containing all polyclinics together. Some polyclinics are located in the same building nevertheless some are in adjacent buildings. See appendix E for location of polyclinics in main building. *(Figure 4.1)*

Polyclinics in adjacent buildings are;

Chest Diseases
Neurosurgery
Oncology
Gastroenterology
Nuclear Medicine
Cardiology
Cardiovascular Surgery Polyclinics

Figure 4.1. Relationship between the main building and other polyclinics.

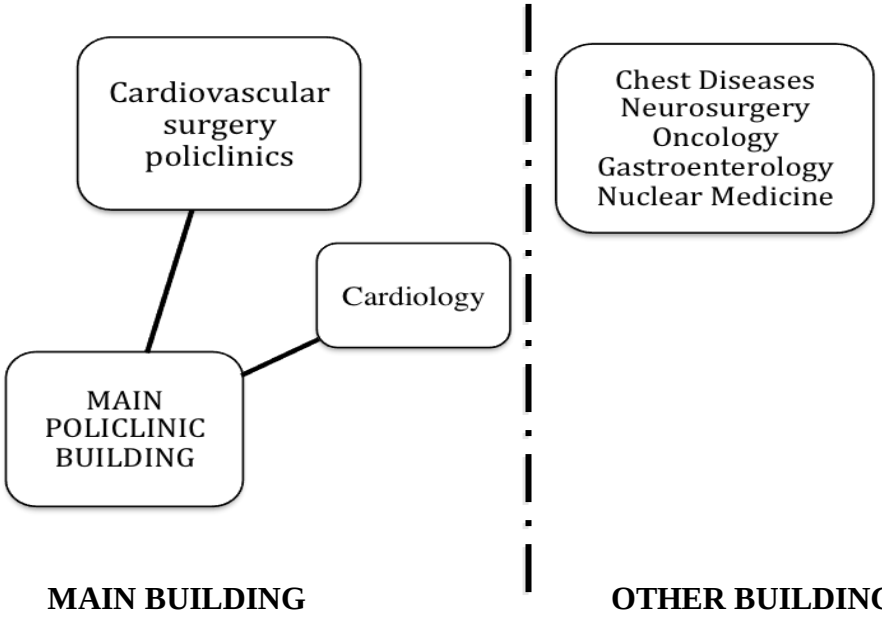


Figure 4.1. shows that if a patient comes to Oncology polyclinic he has to know it before entering the main building that there is not any connection, from main entrance to the desired polyclinic, otherwise realizing and finding the way back will be a waste of time.

4.1.1.2. Density of Polyclinics in the Building

Patients, visitors, administrative staff, Medical staff etc, are all users of a hospital building. The duration of time they spend depends on their purpose; a visitor might spend 1 to 2 hours besides a doctor spends 8 hours in the same building. In this thesis Aegean University Polyclinics patients and their

attendances' cognition, navigation problems are studied. Location of polyclinics especially high-density polyclinics becomes remarkable for navigation issue. In figure 4.2 patient densities of the Polyclinics are shown by month. According to the table, in 2011 January (87315), March (93224), May (88397) and June (87619), December (92576) months (with asterix) were heavily populated than other months. After observing mostly populated months, precautions during these months can be taken, for instance; increasing seating number or maintaining supportive staff to help people in the building for navigation and accelerating procedures.

Figure 4.2. Aegean University patient density by months - 2011 (Source: Information was received from general directorate of curative services under ministry of health by Prof. Dr. Mehmet Bülent Özkan)

AEGEAN UNIVERSITY PATIENT DENSITY BY MONTHS - 2011		
Months	**First time User**	**Total User**
January	**13142**	**87315***
February	**11125**	**79468**
March	**12997**	**93224***
April	**11470**	**83137**
May	**11944**	**88397***
June	**11782**	**87619***
July	**11606**	**72797**
August	**10962**	**68858**
September	**11729**	**82510**
October	**11765**	**84720**
November	**10980**	**79952**
December	**12854**	**92576***

Figure 4.3. Aegean University patient density by months - 2011, Data from figure 4.2. are graphically shown.

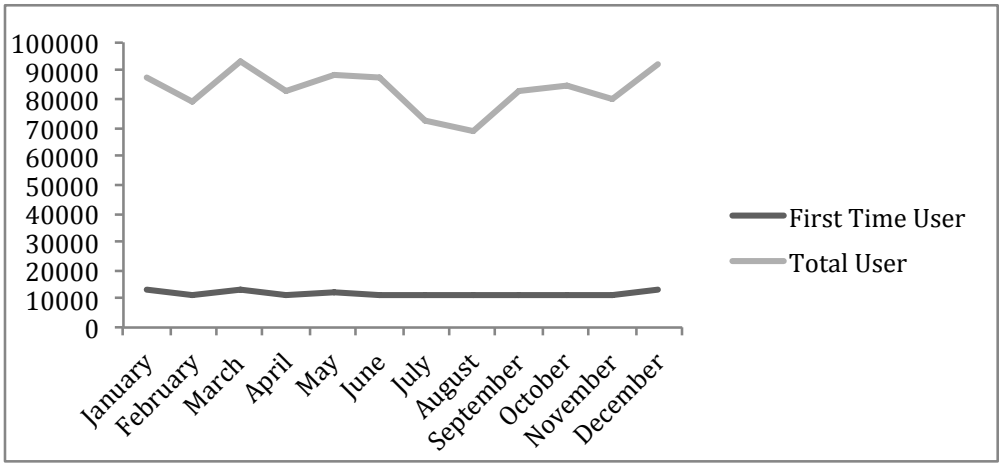


Figure 4.3. shows that ratio of first time user per months does not show too much variation. However, total user number (first time user and previous user number) varies by months.

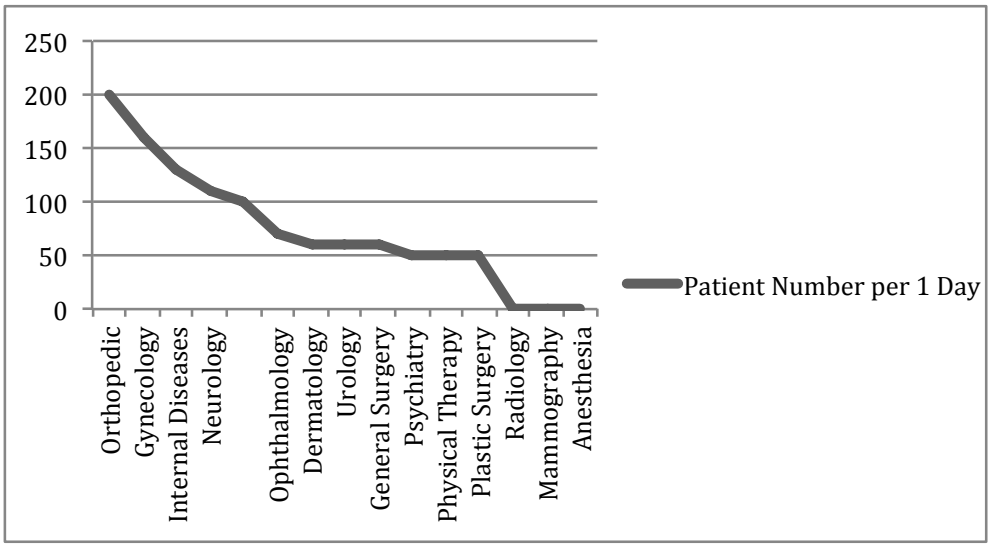
The number of patients admitted to the hospital changes according to the polyclinic, some polyclinics are demanded more. Hospital regulation has determined maximum number of patients for each polyclinic per day. Since appointments are provided from Internet, it is easier to control patient number and timing.

When patients arrive at the polyclinic on the appointment time, waiting duration decreases; therefore, the number of patients at the waiting area is lessens, Figure 4.4 shows maximum number of each polyclinic per day.

Figure 4.4. Patient number per 1 day of each polyclinic.

Name of the Polyclinics	**Patient number per 1 day**
Orthopedic	**200**
Gynecology	**160**
Internal Diseases	**130**
Neurology	**110**
Otorhinolaryngology	**100**
Ophthalmology	**70**
Dermatology	**60**
Urology	**60**
General Surgery	**60**
Psychiatry	**50**
Physical Therapy	**50**
Plastic Surgery	**50**
Radiology	**N/A**
Mammography	**N/A**
Anesthesia	**N/A**

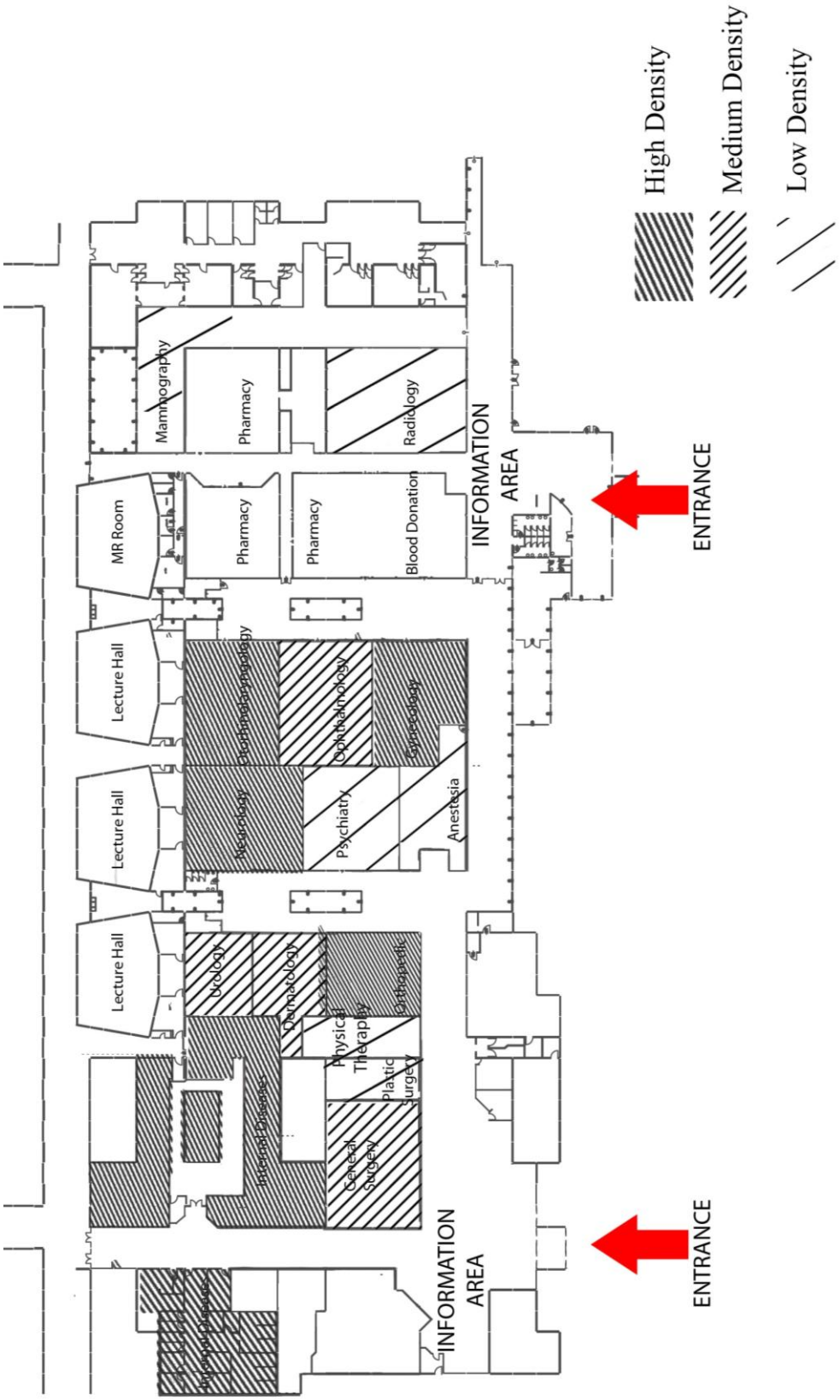
Figure 4.5. Patient number per 1 day of each polyclinic. Data from Figure 4.4 graphically shown



Orthopedic and Gynecology are high-density polyclinics Radiology Mammography and Anesthesia polyclinics do not work by appointments. They receive patients in case of a surgical operation happens in A.U..

In figure 4.6 patient densities in the building are shown with color-coding. Red boxes are high-density polyclinics. These are Orthopedics, Gynecology, Internal Diseases, Neurology and Otorhinolaryngology (from 100 to 200 patient). In the orange boxes Ophthalmology, Dermatology, Urology, General Surgery (from 50 to 100 patient). Psychiatry, Physical Therapy, Plastic Surgery, Radiology, Mammography and Anesthesia are shown in blue boxes (From 0 to 50 patients).

Figure 4.6. Density of polyclinics shown with colors. (by Zeynep Sevinç)

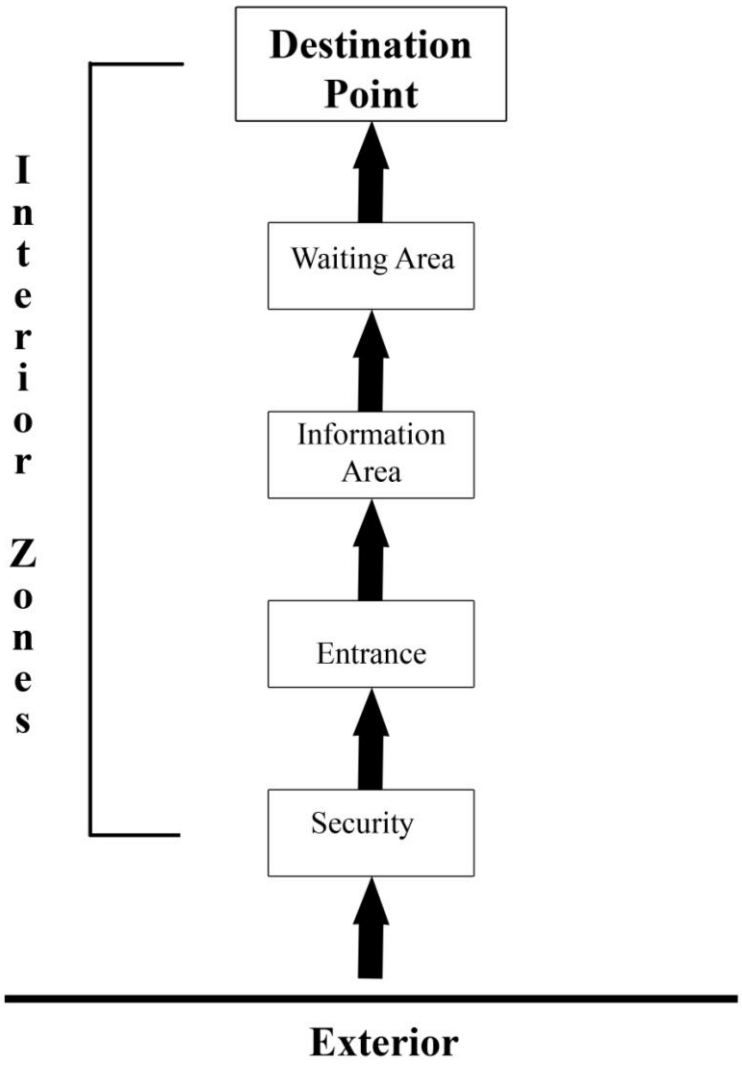


4.1.2. Elements of the A.U. Building

In this part, zones on the route from transportation point to destination point are stated and described. On the path what is seen shape spatial orientation. During the route zones are shown in the figure 4.7. Starting with transportation point and continues by security, entrance, information area, waiting area and ends with destination point.

Transforming the information to an action, a decision needs to be executed. After entering the building for gathering the information the zones are shown at figure 4.7.

Figure 4.7. Experienced zones



4.1.2.1. Entrance

Entrance of building starts from its exterior, location and position aids direction to the building. Entrance plays a big role in shaping visitors first and lasting impression of the facility. While designing hospital entrances there are some parameters for the designer; location of directories, focal points, material, lighting, accessibility and so on.

By help of urban design and landscape paths leading to entrance should be clear, readable, safe and equitable for visitors. Considering drivers, relation between the building and parking lot should not break off. There should be an emergency entrance and its path should not intersect with other entrances. Directional elements, name of the building plays an essential part in informing for wheelchair users and wheeled beds ramps.

Figure 4.8. Map view of A.U. (Source: Google Maps)

Figure 4.9. (a) Monumental gateway of A.U. (b) Traffic circle node (c) Road to polyclinics (d) Road to polyclinics (Pictures by Zeynep Sevinç)

In figure 4.9. (a) monumental gateway is a freestanding roadside signage that communicate the name of the university to passengers or visitors. Name, logo of the University is visible for way finding issues. The logotype is an abstraction until the visitor enters the driveway, then the full A.U. logotype becomes visible. The structure consists of a core and 2 adjoining wings, core is a central box serving to two sides for security, and between the columns two passing roads enable entrance and exit. After passing through the gate, path leads to a traffic circle node where all roads intersect, (Figure 4.9. (b)) at the node, there is a statue of Ataturk in the middle, as a reference point. Traffic circle is a controlled intersection of 5 angled roads. There is only one road leading the visitors to the entrance of polyclinics however before the traffic circle there is not any signage giving that information. Unless a first time visitor asks the security or has a company, finding the entrance of polyclinics at the first time is very difficult. In

figure 4.9 (c) and 4.9 (d) path leading to the polyclinics is shown, still there is not any signage confirming route decision.

4.1.2.2. Information Areas

Information desks in A.U. Polyclinics building are central four-sided communication boxes, which serve to every user. There are two information areas in the polyclinic building and they are positioned at the nodes where more than 3 corridors intersect (Figure 4.10). Working Staff guide patients about directions and procedures. Both information areas are located between four columns. Internationally recognized " i " sign is used as a source of information on both information boxes.

Apart from all wayfinding elements signs, YAH maps, color code etc. information desks are the most remarkable ones and it is easier to communicate with the staff working in the information desk. Location of the Info desk should be visible from a wide perspective.

Figure 4.10. Locations of information areas (by Zeynep Sevinç)

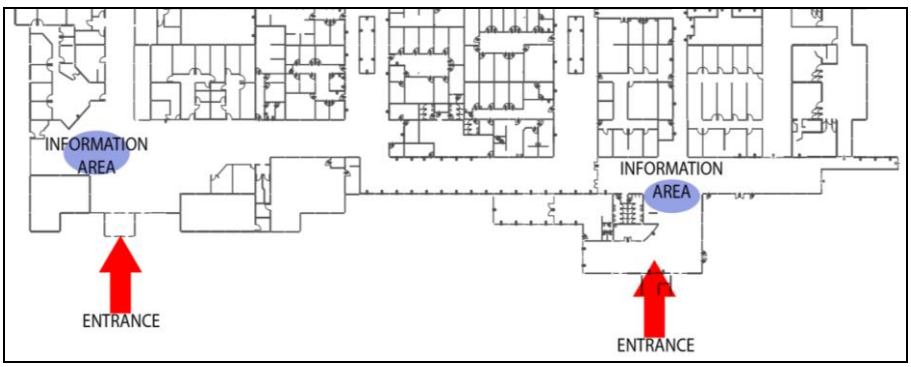


Figure 4.11. (a) Information area1 (b) Information area 2 (Pictures by Zeynep Sevinç)

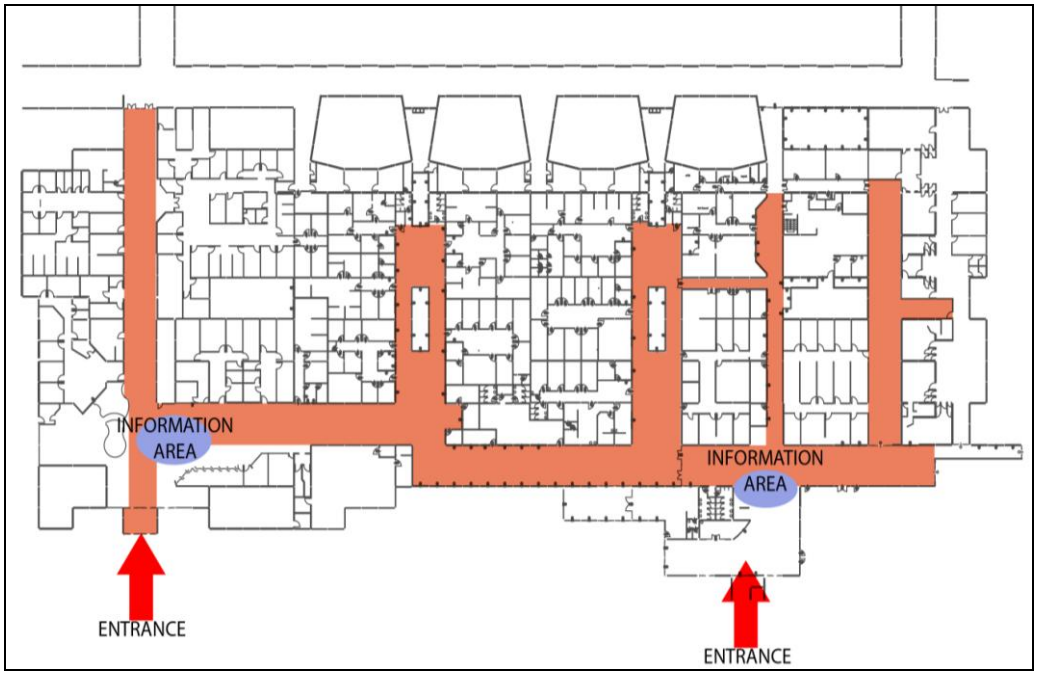
In figure 4.11 (a) there is a clock mounted on the column facing to the cafeteria, size of the clock and visibility distance is argumentative. There is a digital YAH map located in front of information desk, facing to the entrance door (Figure 4.11. (b)). In both pictures there is an information area facing to the entrance, when patients enter from the vestibule the first thing they see is an information area where they can get information.

4.1.2.3. Corridors

In a building, connections between the units are provided by horizontal or vertical circulation elements. Depending on the type of the building corridors can connect buildings or departments to each other. Material of the corridors should be easily cleanable, durable, non-slippery and non-combustible.

In A.U. polyclinics building there is not any elevation difference between the units, so only vertical circulation is required. Due to vertical circulation elements, areas need special isolation and sterilization, and doors can be used as a separator.

Figure 4.12. Corridors of A.U. polyclinics (by Zeynep Sevinç)



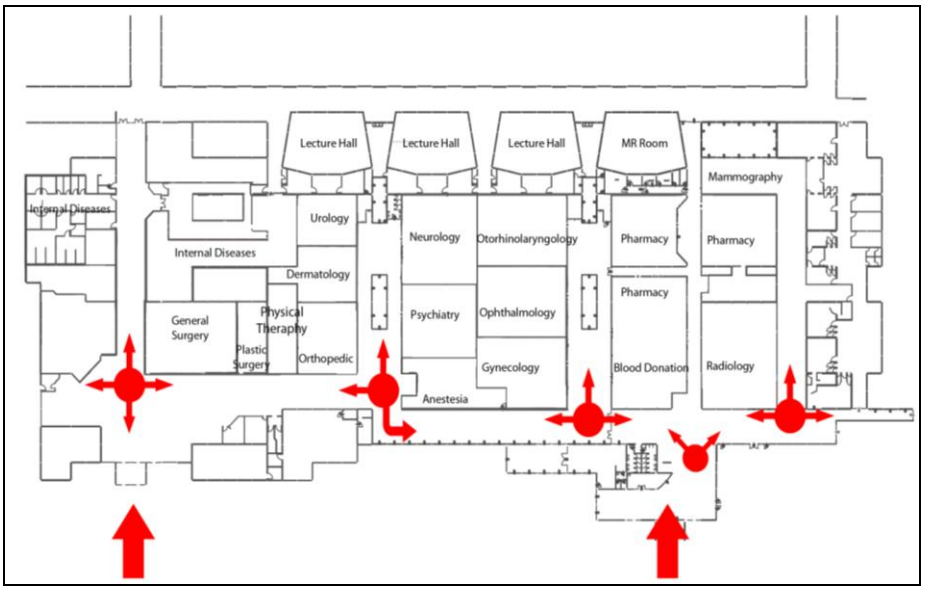
All corridors in A.U. Polyclinics are perpendicular or parallel to each other. Width of the corridors is of utmost importance, considering that if the sun light impinges to one direction 10meters in maximum, the width of one side of the corridor should be extended. *(Figure 4.12)*

Corridor width standards in a Hospital (Hastanaler Yonetmeliği,)

1. Patient Care Corridor 2.25 m
2. Main Corridors 3.00 m
3. Surgical Corridor 2.25 m
4. Intensive Care Service Corridor 2.30 m
5. Corridor in front of the Elevator 4.70 m

In A.U. polyclinics width of the corridors are between 6 to 9 meters, because corridors are also areas for waiting. Sky windows are located in the middle of corridors.

Figure 4.13. Node points of A.U. polyclinics (by Zeynep Sevinç)



After entering the building there are multiple node points to be chosen by the visitors.

Orienting oneself in this building by means of mental maps becomes more complicated at each step. Acquiring clear mental maps and recording environmental information might be difficult at each node since there is not any remarkable difference in the layout. Guide points could be situated in node points where the path offers a choice of more than one direction.

4.1.2.4. Waiting Areas

Waiting areas of the healthcare facilities are characterized by a high state of anxiety and emotional tension and a perception of dilated time. Also waiting areas support socialization between users and between users and operators.

In Aegean Hospital polyclinics there are two types of waiting areas; main waiting areas on the corridors and inner waiting areas inside the specific polyclinics area (Figure 4.14). Main waiting areas on the corridors have an effect on disruption and characterization of pathways, and they also serve as an

extension of functional areas in a more defined way. Inner waiting areas are assistive to reduce patient density that occurs on the corridors.

While analyzing the plan of the building, similarity of spaces is obvious, square meter of waiting areas are the same but densities are different. This shows that each polyclinic's waiting area should be different from each other. Occasionally there can be increase in the number of people at waiting areas owing to epidemic illnesses or seasonal variations; however, there are not any precautions for these circumstances.

There are some criteria in waiting areas of hospitals; it should be wide and spacious, bright and comfortable. Criteria on performance of perception should be determined by difference on physical comfort levels (Başkaya, 2003).

Natural lighting plays an important role to eliminate inconvenient feeling, which results from long waiting time. Figure 4.16 shows waiting seats around inner courtyard which takes advantage of natural lighting but court yards are neglected.

Figure 4.14. Waiting areas of A.U. polyclinics (by Zeynep Sevinç)

Figure 4.15. (a) Inner waiting area (b) Main waiting area (Pictures by Zeynep Sevinç)

Figure 4.16. Waiting seats around inner courtyard (Picture by Zeynep Sevinç)

4.1.3. Wayfinding Elements In A.U. Polyclinics Building

In A.U. Polyclinics building there are multiple wayfinding elements which are in use; there are banners signage, YAH maps, digital screens and information desks.

There are multiple strategies that can help for way finding in healthcare buildings. Symbols and signage are the best ways to break the language barriers, thus there can be visitors or patients from other countries. The most common way to navigate at hospitals are signs. The message should be intuitive, and the placement of signage needs to be right and proper. Signs at A.U. polyclinics are in use with banners, and each banner has a pictogram located on the left side. *(Figure 4.17)*

Figure 4.17. Banners with signage (Pictures by Zeynep Sevinç)

"The architectural path analysis in way finding, "node theory" and "graph theory", are considered as an extent of circuit theories" (Ünlü et al., 2007).

When we feel lost or disoriented, maps are useful to find your way or to learn a new environment, maps provide spatial information about the environment quickly. YAH maps are different from regular maps since you can see your location within the environment, the surrounding and required information. So, they are used as wayfinding elements in public buildings (Marquez et al., 2004).

Figure 4.18. (a) (b) YAH maps of A.U. (Pictures by Zeynep Sevinç)

In A.U. digital YAH maps are located at the both entrances by the information desks. Instead of asking “which way to go” to the information area, visitor may choose to look up his way from the YAH map (Figure 17. (a)). There is a panel and there are buttons on the panel which are assigned to each polyclinic. After pressing the required polyclinic’s button (Figure 17. (b)). The path from present location to the polyclinic becomes highlighted and visitor can find his way via YAH maps.

In the waiting areas there is a digital screen above each polyclinics’ door for patients to follow appointment queue. Name of the Polyclinic and Doctor, queue number and name of the patient appears on the screen. Usage of digital screen provides an engaging and stimulating environment (Figure 4.19). This screen is helpful for literate people, as it has audible feature, like pronouncing the names and queue numbers so that blind people could easily be navigated and find their polyclinic easier.

Figure 4.19. Digital screens. (Pictures by Zeynep Sevinç)

Another wayfinding element in A.U. building is information desks; during observations and survey mostly used element is information desks. Since they are the first visible wayfinding elements and does not require literacy, ability to understand a map or a pictogram, it is the most preferred wayfinding element.

Figure 4.20. Information desk in A.U. (Picture by Zeynep Sevinç)

In A.U. there is not any wayfinding element for visually impaired patients, there could be relieved floor paths or tactile directories, and audible communications could have been used for patients.

4.1.4. Changes In Last Six Month (Till October 2012)

During observations for thesis, some changes about wayfinding happened related to navigation and wayfinding. Firstly, besides the main entrances' information desk another information desk was built at a critical point in the building where there used to be only a YAH map. *(Figure 4.21)*

Figure 4.21. New Information desk (Picture by Zeynep Sevinç)

Secondly Information desk 1's location was changed, it was against the entrance and at the intersection of 4 corridors but now desk is closer to the cafeteria and the only wayfinding elements on the corridors are banners. Its previous location was in a critical node point where most patients were confused to choose their way and it was more visible from all four corridors. *(Figure 4.22 a and b)*

Figure 4.22. (a) New Location of information desk 1 (Picture by Zeynep Sevinç)

Figure 4.22. (b) New Location of information desk 1 (Picture by Zeynep Sevinç)

For having enough clearance around the information desk inner garden near the cafeteria was removed. *(Figure 4.23 a, b and c)*

Figure 4.23. (a) Previous inner garden (Pictures by Zeynep Sevinç)

Figure 4.23. (b) During removal (Pictures by Zeynep Sevinç)

Figure 4.23. (c) After removal (Pictures by Zeynep Sevinç)

Lastly another digital YAH map was placed in front of the second information desk, even though the first digital YAH map is not preferred by most of the users, a niche was built for a second YAH map. *(Figure 4.24)*

Figure 4.24. New YAH map (Picture by Zeynep Sevinç)

Case analyses of A.U. study show that wayfinding elements in the building are insufficient and audible, tactile and additional wayfinding elements are needed. Redundant wayfinding interventions which were made in last six months are no need to such as adding a new YAH maps facing second entrance door and changing location of the first information area. Due to determine wayfinding problems and solutions in A.U. a survey was assessed in this chapter.

4.2. Survey

To provide significant results a survey conducted in this study. Conducting in A.U. polyclinic with 40 participants is a more difficult procedure more than asking questions. A survey is a step-by-step procedure, combination of related tasks. See appendix D for survey both in English and Turkish.

4.2.1. Method

There are multiple survey methods for administrating a survey; in this qualitative research, intercept survey method is used. The interviewer intercepts visitors as they move and asks them to take part in a survey. There are three types of intercept surveys these are; on-board surveys, roadside surveys and at activity point surveys. This survey took place at the activity point, in the Aegean hospital polyclinics, the interviewer waits for patients pass by and picks one.

In this survey, results were expressed in numeric terms that can be analyzed by statistical methods; in qualitative research method observations can be directly classified into numerical variables. For having statistical results SPSS (Statistical Package for the Social Sciences) program is used, SPSS enables data collection.

SPSS is generally used in social science by researchers, survey companies, organizations, and others. Before the actual survey, a pilot survey is conducted to 15 people. A questionnaire was prepared and pre-tested, in order to identify and correct any problems in wording.

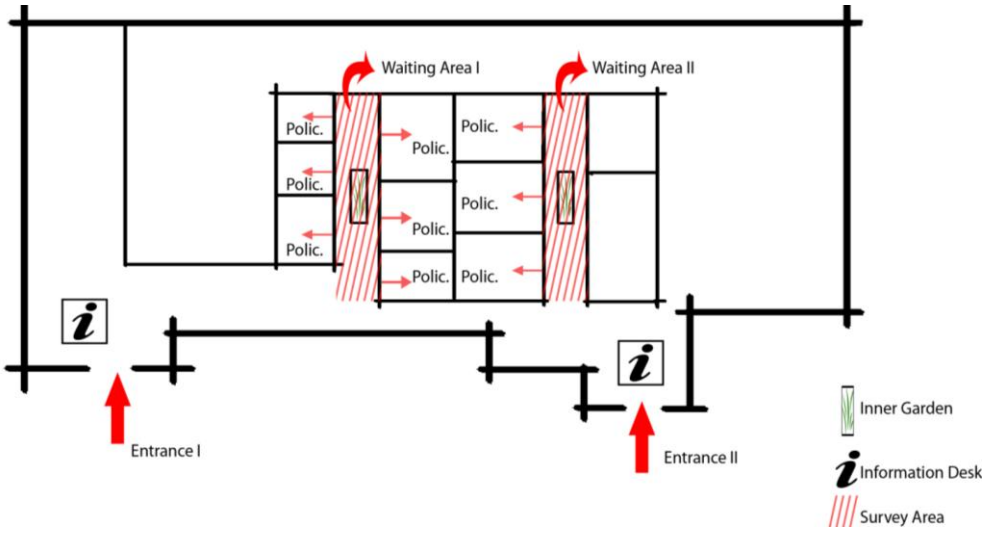
4.2.2. Participant

The aim of the survey and task were first briefly explained to participants, Participants (20 Males and 20 Females) were recruited for the wayfinding experiment. Participants were among patients of Aegean University hospitals Polyclinics, with age ranging from 12- 69 years with the ratio of 37,22 ages. After answering multiple-choice questions, they were asked to sketch their route from the entrance to the destination point. No time constrains were imposed during the

survey. The full experiment lasted approximately 5 -7 minutes for each participant. This experiment took place 4 hour period between 10:00 am -12:00 pm to 13:30 pm – 15:30 pm on Friday. In order to enable better communication with each participant, the study was carried out one by one. Before starting the survey briefly information about the study was given and their permission was asked. Survey took place at two different waiting areas, which are similar to each other; however the number of the polyclinics servings to the waiting areas were different (Figure 4.25). All participants had entered the building from entrance 1 or entrance 2, through their route from the entrance door to destination point, areas they observed were the same. They all observed;

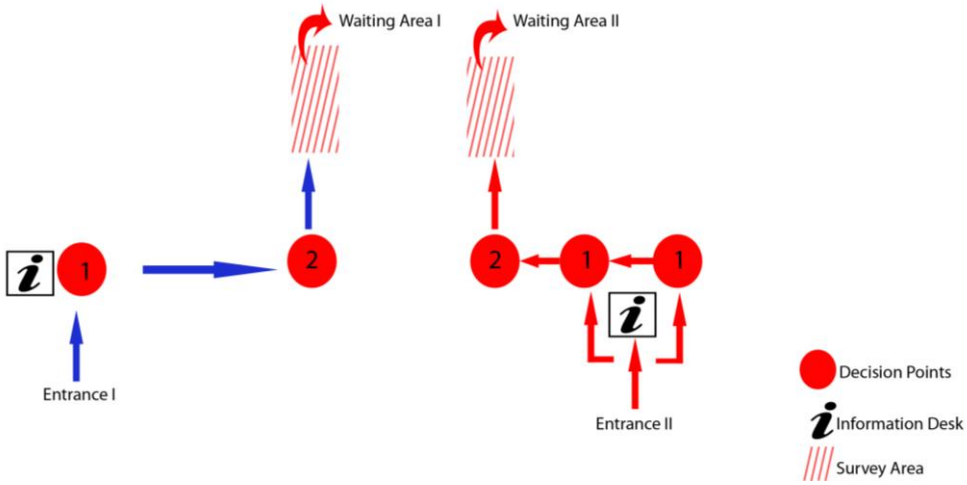
- Information desk
- Several wayfinding elements
- Inner garden
- 2 decision points

Figure 4.25. Survey area, entrance, information area, and inner garden. (by Zeynep Sevinç)



Square meter of both waiting areas are the same. However there are four polyclinics using waiting area I and 3 polyclinics using waiting area II. Figure 4.1. shows entrance I and entrance II, Information areas, waiting areas and inner gardens. Both waiting areas contain an inner garden within themselves.

Figure 4.26. Option 1; Paths to the waiting areas (by Zeynep Sevinç)



When a visitor enters to the building from entrance 1 or 2 before finding the destination waiting area each participant have to pass 2 decision points, decision points are shown with red circles. When the visitor enters the building from closer entrance to the projected waiting area, the path is shown with arrows in Figure 4.26.

Figure 4.27. Option 2; Paths to the waiting areas (by Zeynep Sevinç)

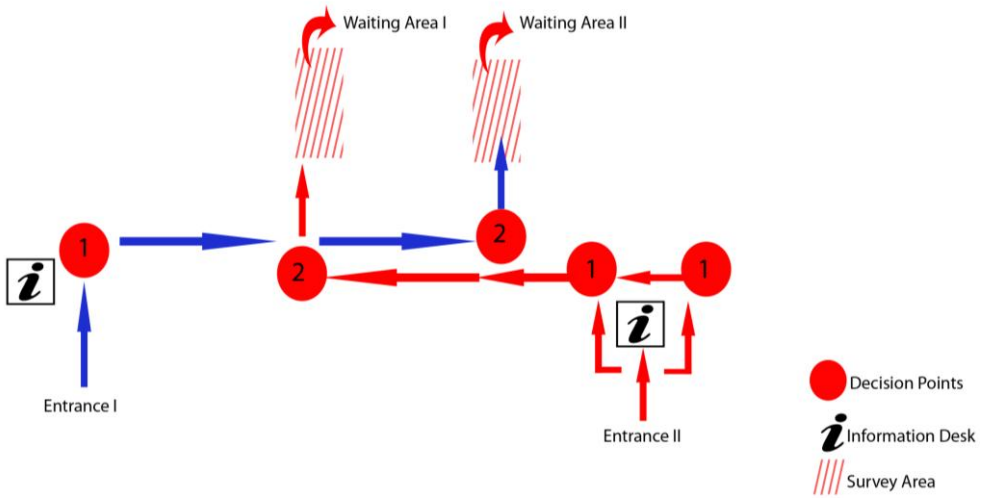


Figure 4. 26 and 4. 27. shows that no matter from which entrance the participant enters to the building, in both cases he should pass through 2 decision points, one information desk, one inner garden and several wayfinding elements.

4.2.2. Aim

Survey starts with asking general information to the participants to warm up such as; age, gender, education and occupation. Having analyses depending on these criteria provides comparable results. Previous navigation strategy studies used these categories for grouping and comparing attendances result. Results were compared according to age and gender differences.

Age: As people get older, they differ from each other according to the age. Age differences in navigation strategy have been demonstrated with multiple studies; including Morris water maze, nested T-maze and circular platform maze by Barnes (1980). Results show that reliable age differences polyclinic navigation and spatial learning tasks. In the survey attendances are grouped of 1-10, 11-20, 21-30, 31-40, 41-50, 51-60, 61-70, and studied and results show that cognition of space decreases with ageing.

Gender: Experiments report that gender difference is related with spatial orientation ability. According to the results, males are more likely to use cardinal directions for navigation than males. (Sholl, et al., 2000). According to the research on "Dynamic spatial performance: sex and educational differences", results show that despite the same level of education dynamic spatial performance is still higher in males.

After gathering information about participants in the second part attendants were asked to respond to the following yes-no and open-ended questions starting with; Question 1) Have you ever come to the polyclinics of Aegean University before? The aim of this question was to learn whether the user was a first time user or not and investigate role of familiarity with wayfinding ability. Question 2) Two different pictures were shown to the participants, a) YAH map and b) Signage, their preference was asked to figure out which guide sign they would prefer to use in case they get lost in a building. how do wayfinding elements affect polyclinic cognitive mapping. *(Figure 4.28)*

Figure 4.28. “Question 2: Which Wayfinding element would you prefer for navigating in a building?”

a) YAH Map

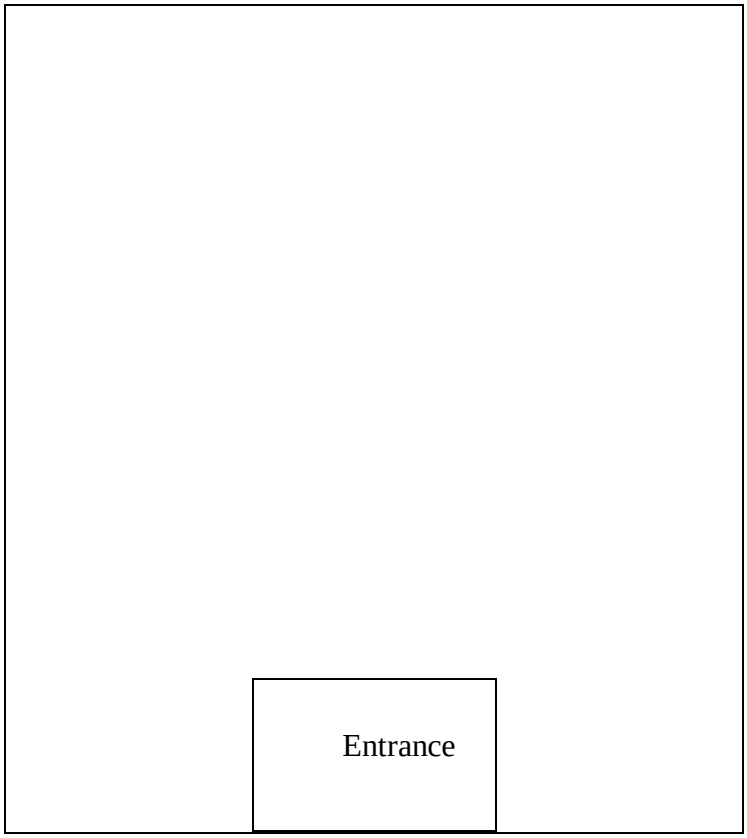
b) Signage

Question 3) What you do when you get lost in a building? This question was asked to determine what people do when they have the feeling of lost or disorientation.

At the last part of the survey, participants were asked to draw sketches of their route to analyze their cognitive mapping style and how they perceive their surroundings. On sketch paper there was a box located at the lower part of the paper say “entrance” on it. This box was given to have unity of sketches and to observe whether participants used the given box and limited area. *(Figure 4.29)*

Their sketch technique results show the cognitive mapping strategy differences (allocentric and egocentric) and accuracy of the sketches between different age groups and two genders.

Figure 4.29. Sketch layout



The sketches were analyzed with 3 interior architects and classified into groups of;

• Does the participant show any zones that they have passed through their journey to their destination?

• Does the participant show his route by using arrows or lines indicating corridors?

• Complexity / accuracy of sketches.

While analyzing the sketches the frequency of landmarks, paths and notes, complexity of the map and accurate placement of the polyclinics, information desks, signs, cafeteria seen on the tour were taken into account to determine the level of environmental perception.

4.2.3. Results

Survey was conducted to 20 men and 20 women total of 40 participants. Introductory questions, age, gender, education, and occupation were asked to warm up and get some information. These results gave us information on participants' profiles. As it was mentioned warm up questions, 1 yes-no question, 1 closed-ended question and 1 open ended question were asked. At the end sketch problem asked, in results part analyses of all these questions were explained in an order.

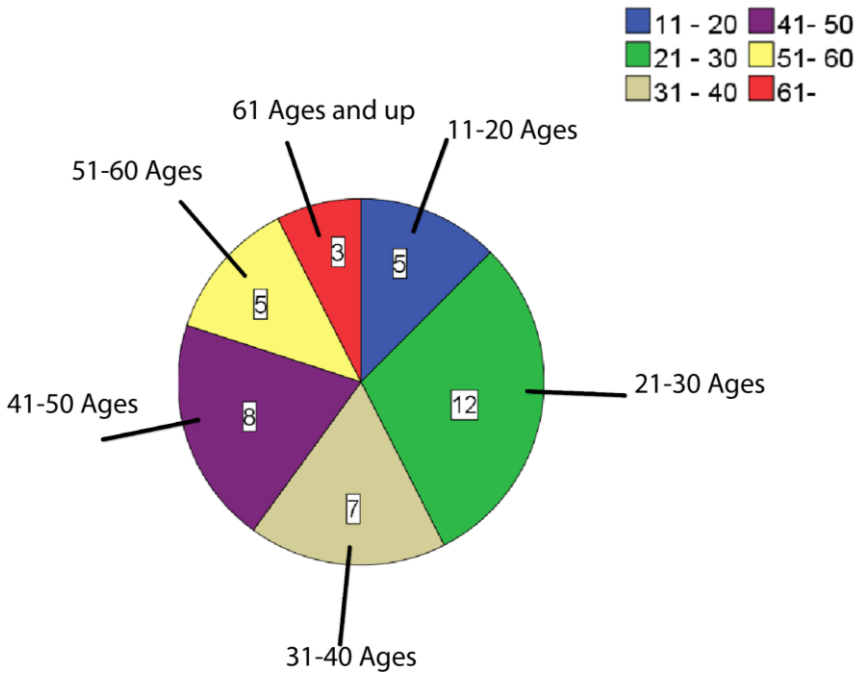
- AGE

Since, intercept survey method was used, first 40 (20 men and 20 women) people in the waiting area attended to the survey without any limitation, so frequency of ages are not same in all age groups. Age percentages are shown in figure 4.30 results show that 12 participants between 21-30 ages are with the highest percentage (30 %), and 3 participants over 61 age are the lowest percentage which is 7,5 %. *(Figure 4.30), (Figure 4.31)*

Figure 4.30. Percentages of age groups

Age Groups	Frequency	Percent	Valid Percent	Cumulative Percent
11 - 20	5	12,5 %	12,5 %	12,5
21 - 30	12	30,0 %	30,0 %	42,5
31 - 40	7	17,5 %	17,5 %	60,0
41- 50	8	20,0 %	20,0 %	80,0
51- 60	5	12,5%	12,5%	92,5
61-	3	7,5%	7,5%	100,0
Total	40	100,0%	100,0%	

Figure 4.31. Age frequency of participants with pie chart



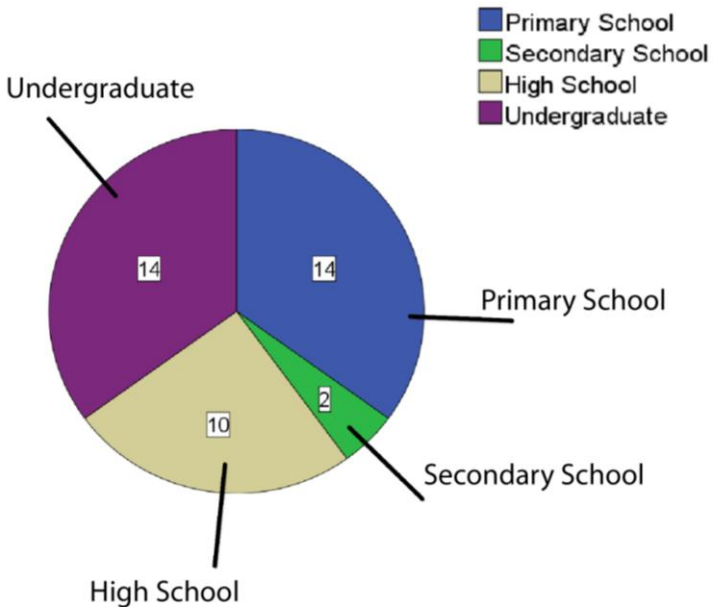
- EDUCATION

Attendances are classified into Turkey's education system levels, these are starting with primary school, secondary school, high school, undergraduate, graduate and doctorate. According to results participants with primary school and undergraduate level were both 35 percentages each. Also, 10 people with a substantial degree were high school education level (25 %) and only 2 participants' level was secondary school. *(Figure 4.32), (Figure. 4.33)*

Figure 4.32. Percentages of age groups

Education Level	Frequency	Percent	Valid Percent	Cumulative Percent
Primary School	14	35,0 %	35,0 %	35,0
Secondary School	2	5,0 %	5,0 %	40,0
High School	10	25,0 %	25,0 %	65,0
Undergraduate	14	35,0 %	35,0 %	100,0
Total	40	100,0 %	100,0 %	

Figure 4.33. Education level of participants with pie chart



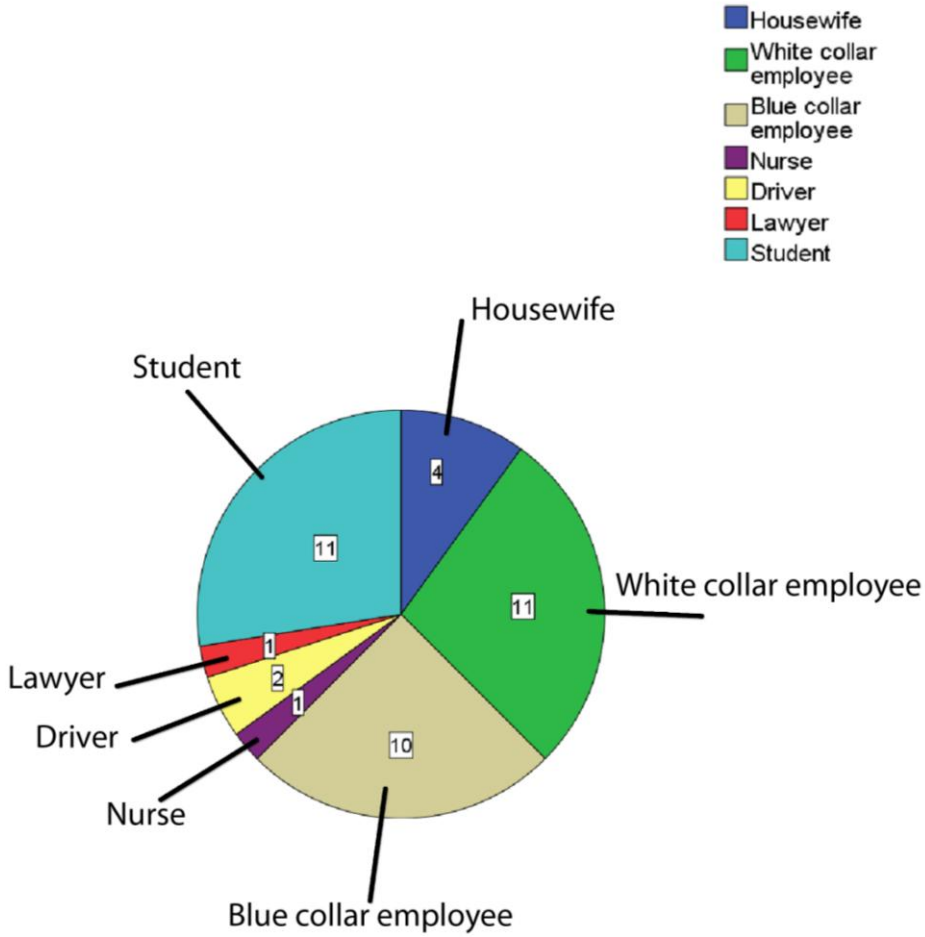
- OCCUPANCY

Occupations of participants of this survey are classified in to groups of housewife, white-collar worker (W.C.W), blue-collar worker (B.C.W.), nurse, driver, lawyer and student (Figure 4.34), (Figure 4.35). People who perform administrative or managerial works are defined as W.C.W. and whose job requires manual labor are included in the B.C.W. group.

Figure 4.34. Percentages of age groups

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Housewife	4	10,0 %	10,0 %	10,0
White collar worker	11	27,5 %	27,5 %	37,5
Blue collar worker	10	25,0 %	25,0 %	62,5
Nurse	1	2,5 %	2,5 %	65,0
Driver	2	5,0 %	5,0 %	70,0
Lawyer	1	2,5 %	2,5 %	72,5
Student	11	27,5 %	27,5 %	100,0
Total	40	100,0 %	100,0 %	

Figure 4.35. Percentages of age groups with pie chart



QUESTION 1

After warm up questions, following with question 1 “Have you ever come to the polyclinics of Aegean University before?” Asked to determine the familiarity of both genders with the building. 14 men and 11 women were first time users of the building, as it was mentioned before being unfamiliar with the environment polyclinics cognition negatively and makes people feel nervous.

Figure 4.36. Result of question 1

	Men	**Women**	**Total**	**Percentage**
First time user	14	11	25	% 62.5
Not a first time user	6	9	15	%37.5
Total	20	20	40	%100

Survey results show that % 62.5 total participants, %70 percent of men and %55 of women were first time users.

According to Hölscher's (2006) study, as mentioned in chapter 3 people who are familiar with environment perform beter performance on wayfinding, according to question 1 results women should be better then men.

QUESTION 2

In question 2 pictures of YAH Map and signage were shown and attendances' preference asked. Results of the question are analyzed according to gender and age differences and results are graphically shown in figure 4.37 (a) and (b).

Figure 4.37. (a) Gender comparison of question 2

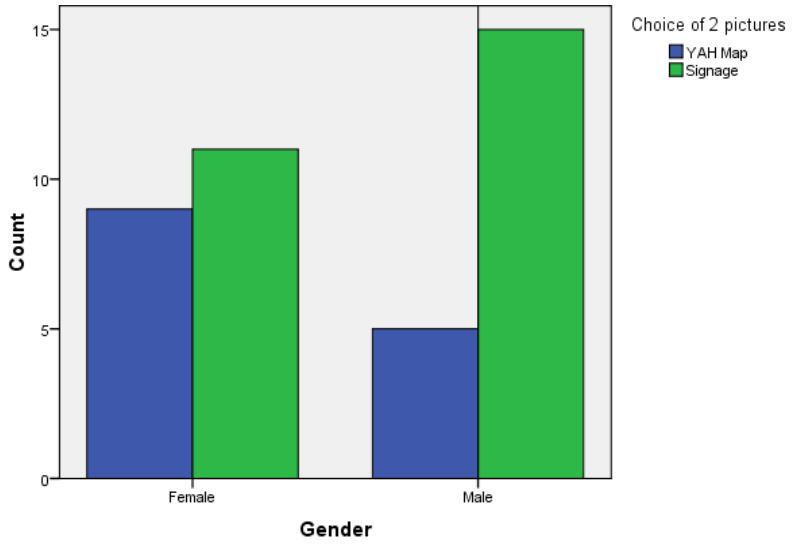
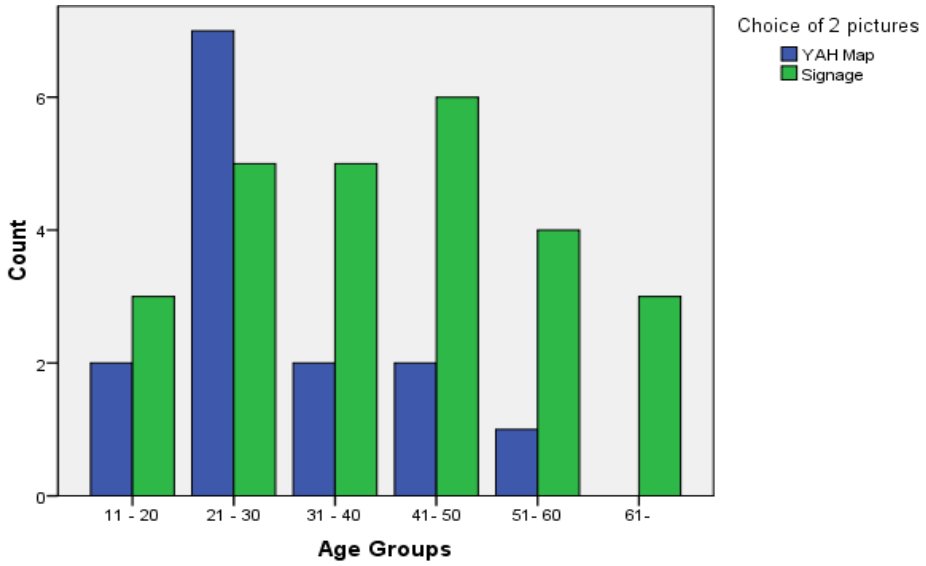


Figure 4.37 (a) shows that total both genders' preference of signage is higher than YAH maps. 9 Women and 5 men prefer YAH maps, According to the survey the results shows that notwithstanding of gender and education lever preference of signage is always higher than YAH maps.

As experiments performed by Chen, Chang and Wen-Te Chang show that preference of signage were higher than YAH maps and women prefer signage wayfinding elements since they are more tentative to egocentric mapping strategy. Survey results of A.U. are consistent with their results.

Figure 4.37. (b) Age comparison of question 2



In figure 4.37 (b) is comparison of age groups to question 2. Besides 21-30 age groups, all ages prefer signage instead of YAH maps. This can be result of generation differences. People over 20, are assumed to have graduated from high school and education disciple might shape mapping process.

QUESTION 3

In question 3 participants' preference of wayfinding elements were asked to learn which wayfinding element is more useful for users.

Figure 4.38. (a) Gender comparison of question 3

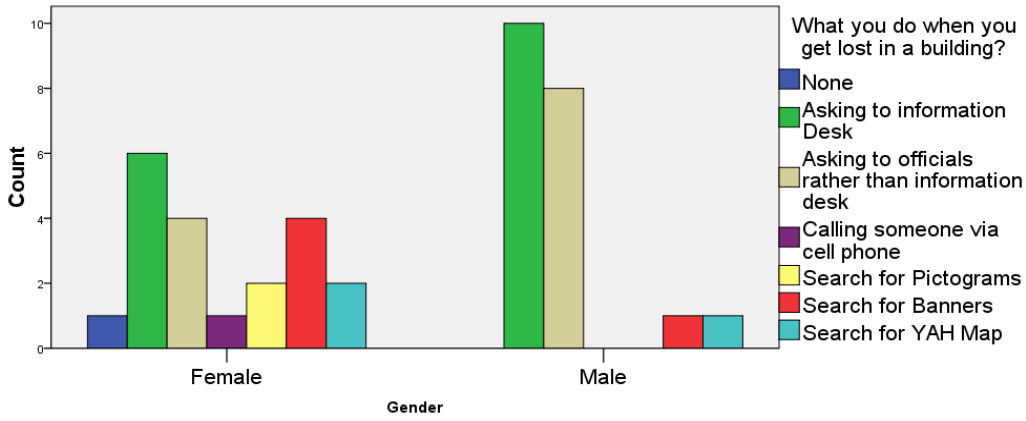
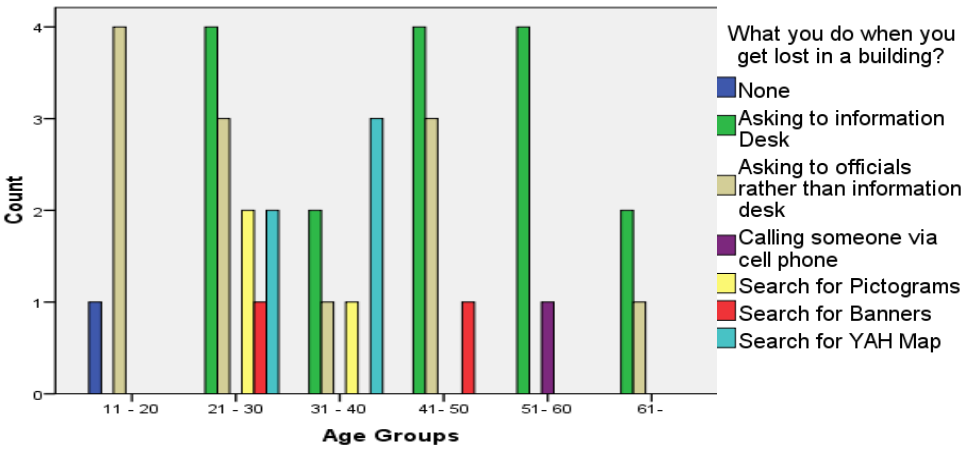


Figure 4.38 (a), when two genders are compared, female participants have various choices. Also some women prefer calling someone via cell phone. This can be a stimulation of using cellphone as a navigation tool in the future.

Figure 4.38. (b) Age comparison of question 3



In Figure 4.38 (b) There are two answers which are obvious in all age groups, when people get lost they mostly prefer asking to a information desk and

asking to oofficials rather than information desk. Both answers show that people prefer asking to someone in the building to using graphical wayfinding elements in the building.

SKETCH QUESTION

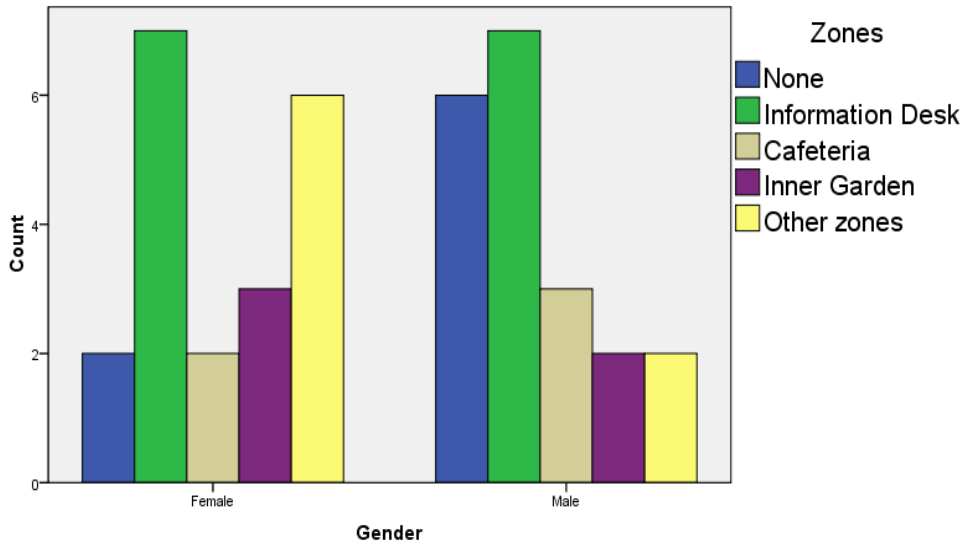
After analyzing questions, in sketch part of the survey participants were asked to draw their route to the waiting area where survey was conducted. Sketch results were analyzed with 3 interior architects to be more reliable. A first criterion was “does the participant show any zones that they have passed through their journey to their destination?” This question asked whether people pay attention to any wayfinding elements or which zones are more affective during latent learning.

In sketches both genders show information desks mostly. So this can be a result of information desks’ locations being suitable and meeting with its aim. In sketches female participants show other zones more than male participants this can be a result of female’s perceiving surrounding environment in a multi particulate way *(Figure 4.40 (a))*. Contrast to female participants, male participants go towards directly to the targeted destination, so in their sketches they did not show any zones or wayfinding elements. As it was mentioned in chapter 3 this shows that latent learning occurs while trying to reach their desired location. *(Figure 4.39)*

Figure 4.39. “ Results from sketches; does the participant show any zones?”

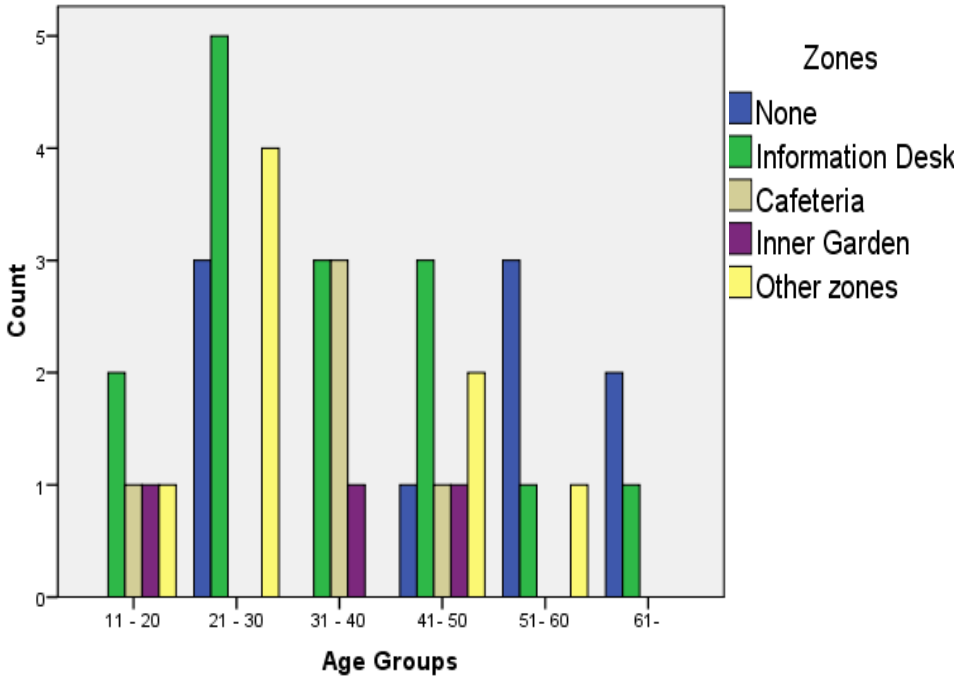
	Female		**Male**	
Zones	**Frequency**	**Percent**	**Frequency**	**Percent**
None	2	**10 %**	6	**30 %**
Information Desk	7	**35 %**	7	**35 %**
Cafeteria	2	**10 %**	3	**15 %**
Inner Garden	3	**15 %**	2	**10 %**
Other Zones	6	**30 %**	2	**10 %**
Total	20	100 %	20	**100 %**

Figure 4.40. (a) Gender comparison of latent learning



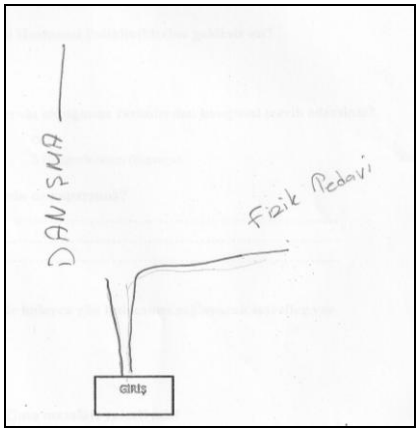
Both genders showed alinner garden, cafetearis, information desk, other zones (blood donation, elevator, seating, wheelchair area…)

Figure 4.40. (b) Age comparison of latent learning

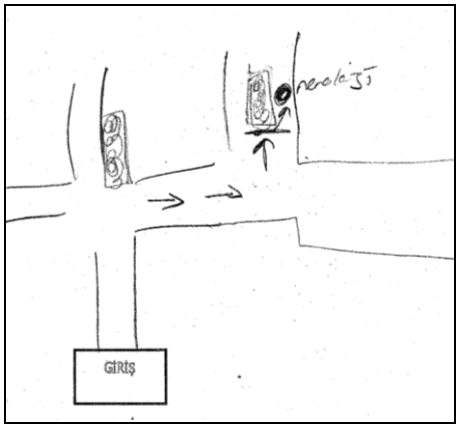


All age groups show information desk in their sketches, cafeteria, inner garden and other zones were also shown. *(Figure 4.40.(b))*

Figure 4.41. Sketches of some women participants showing zones

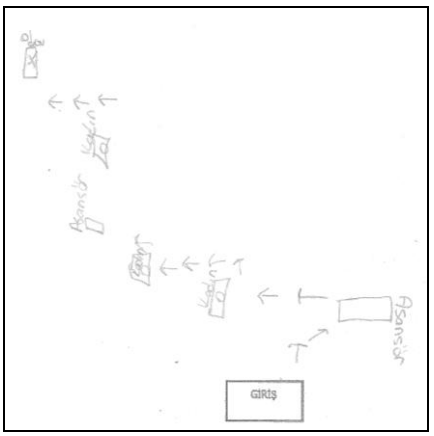


Information Desk and a Polyclinic



Inner Garden and a Polyclinic

Cafeteria, and a Polyclinic

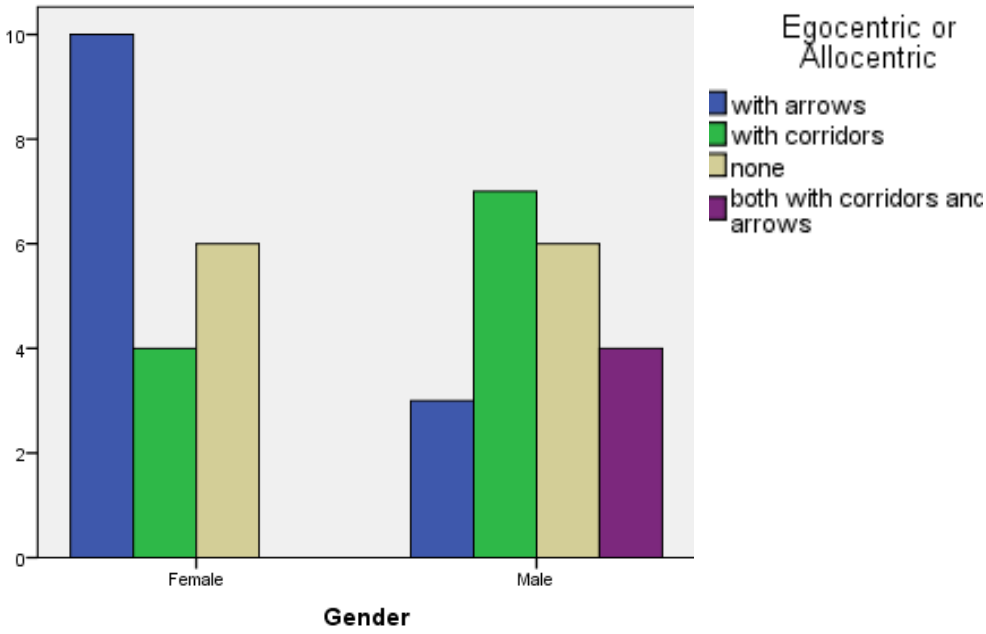


Elevator, and Information desk

Sketches above are examples of female participants showing other zones and common point is that they all use “entrance” box as start point.

While analyzing sketches another criterion was evaluating according to showing the route with different types of styles. Some participants showed the route with arrows, some with corridors, some both and some participants did not use and route descriptor, this is due to differences on cognition of space.

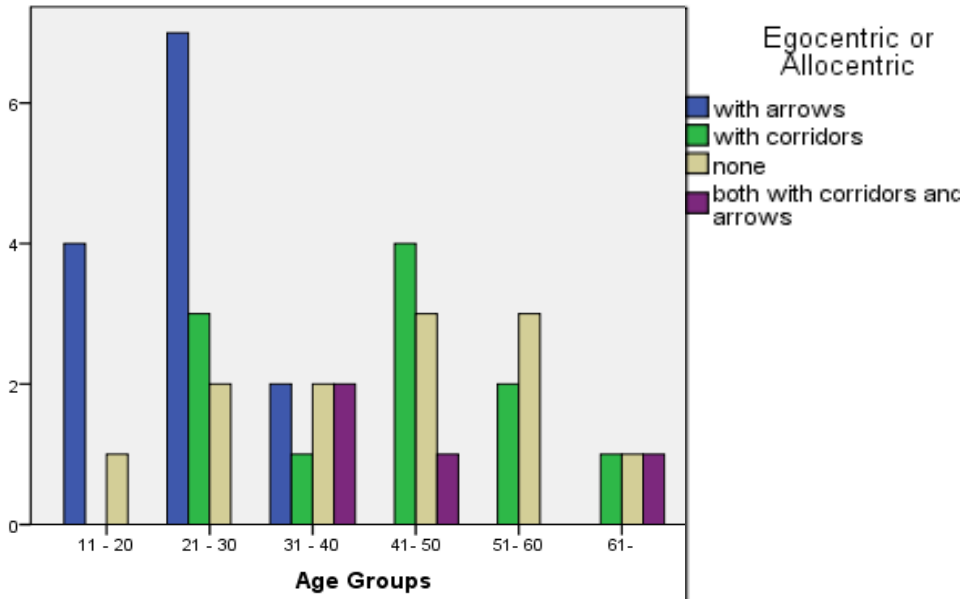
Figure 4.42. Gender comparison of route description



In figure 4.42. shows that female participants mostly prefer showing their route with arrows rather than corridors. This is result of having their body positions as a reference point while navigating. As it is evident from literature reviewed in chapter 3, experiments performed by Chen, Chan and We-te Chang women are better at egocentric type of spatial knowledge, so, they showed their route with arrows.

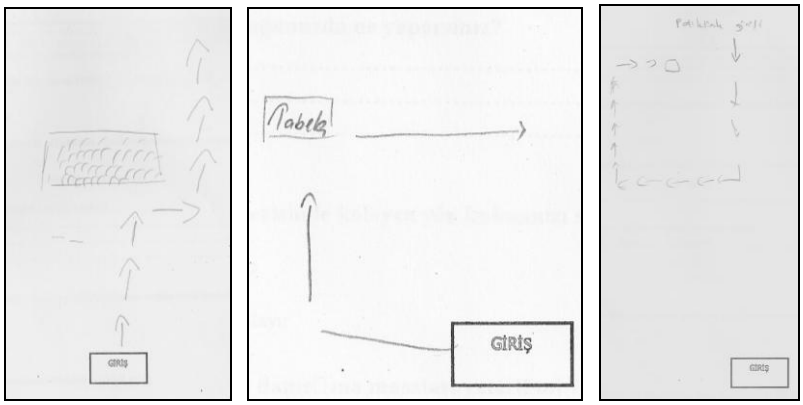
Sketch maps provide a way to externalize the cognitive maps; both male and female participants show their route by arrows, with corridors or did not use any route descriptor. Only male participants show their both route and corridors with arrows. That can be a result that men can think both allocentric and egocentric.

Figure 4.43. Age comparison of route description



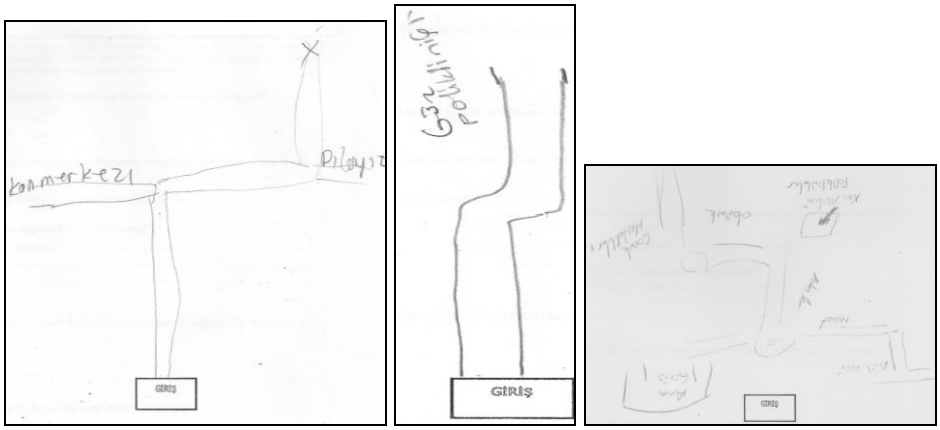
When age groups are compared younger participants mostly prefer using arrows then showing corridors at their sketches. The survey aims to investigate, during navigation how egocentric and allocentric oriented support modes interact with wayfinding strategy. According to Rodgers's study (2012) on allocentric mapping strategy with different age groups, allocentric strategy was decreasing with ageing, in contrast to Rodgers's results there is not obvious decrease at allocentric mapping strategy in this survey.

Figure 4.44. Sketches of some women participants showing their route



In figure 4.44. there are some sketches of women participants with arrow usage. As it was mentioned women are better at egocentric mapping strategy and survey results match up with literature review study.

Figure 4.45. Sketches of some men participants showing their route



Men are more prone to think allocentric in an environment, they focus on the destination point and do not pay attention of their body turns, also they do not specify their actions with arrows (going ahead & turning corner…). Males preferred navigation strategies that use more global referances, contrast to that females use local references such as location of landmarks and squences of their body turns (Imani, and Tabaeian, 2011).

Lastly, sketches were classified whether they are accurate or not for instance in some sketches cognitive maps were incomplete and distorted some peeople have left out node points and key locations in the building. Some mapps were disoriented, and disproportioned. Accuracy of sketches is compared according to gender and age differences. (Figure 4.46 (a) and (b))

Figure 4.46. (a) Gender comparison of accuracy of sketches

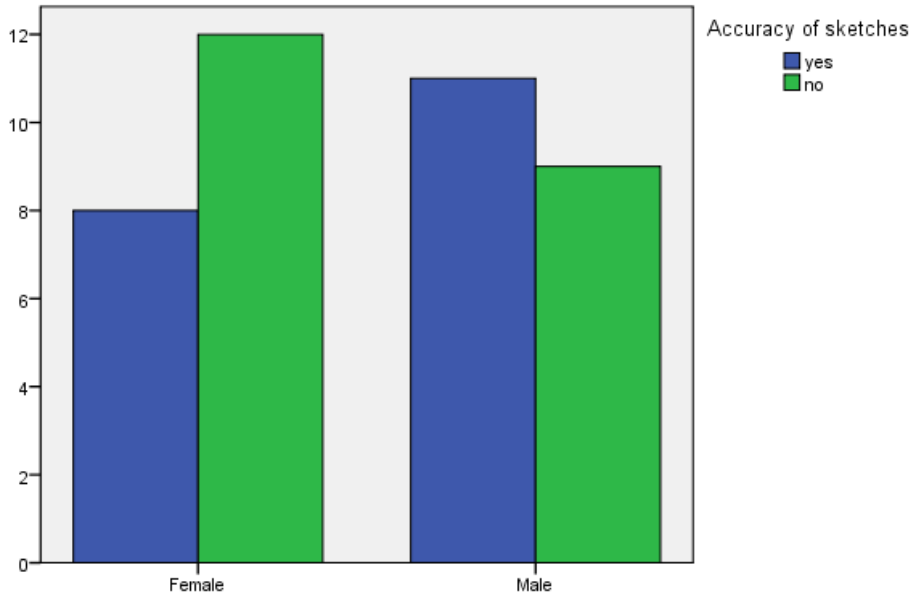
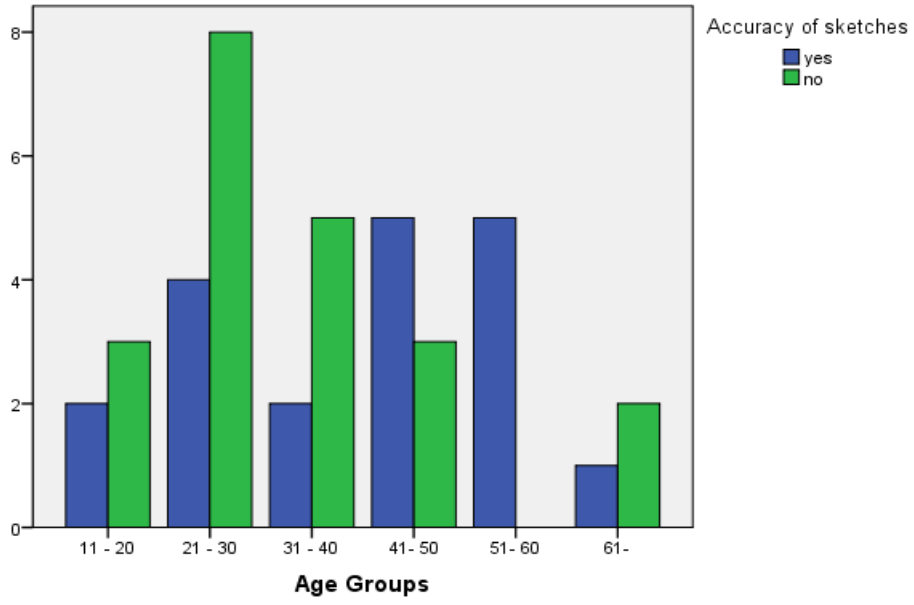


Figure 4.46. (b) Age comparison of accuracy of sketches



When accuracy of sketches are evaluated accordingly to age groups participants whose age are between 21-30 accuracy rate decreases. According to Imani and Tabaeian's results men are better at explaning the route with sketch then women. (Figure 4.47 (a) and (b))

Figure 4.47. (a) Female sketches

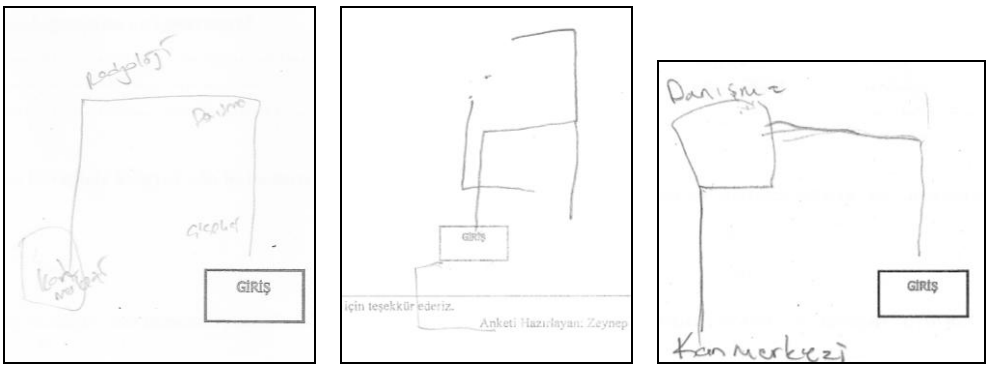
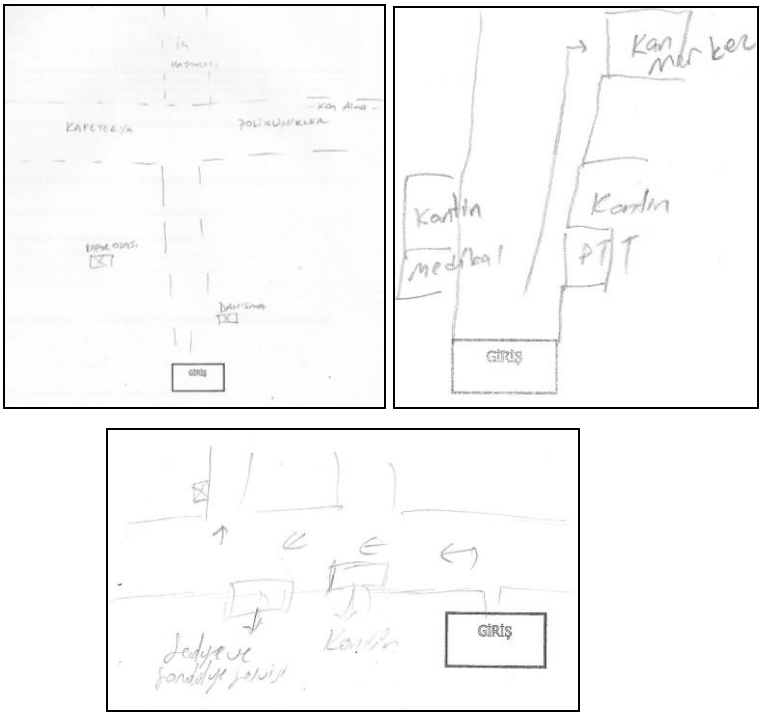


Figure 4.47. (b) Male sketches



After analyzing case study and survey results, in chapter 5 reasons and general overview of the study concluded.

CHAPTER 5 – CONCLUSION

In this stud the relationship between wayfinding skills and cognitive mapping styles in healthcare buildings studied. In depth analysis of prior studies reveal several important achievements. During 1960's, Kevin Lynch and Romedi Passini performed pioneering studies on environmental perception and cognition in urban planning, and their study along with following researches brought up new fields for architects to consider: wayfinding elements and cognitive mapping strategies in buildings.

Considering the fact that ineffective design elements in the building has a significant negative impact on patients, visitors, and staff members, it is crucial to understand the importance of wayfinding elements and their effect on cognition of space.

While designing a healthcare building there are certain criteria that should be taken into consideration, which include, but not limited to; type of the hospital, shape of the building, location, material selection, patient density and location of departments in the building. In this context we designed a case study to analyze flow of patients and location of zones and wayfinding elements to analyze patients' navigation ability in healthcare buildings. Aegean University polyclinic building was chosen as the location of our study due to its location and complex settlement. It is also important to note that, each zones in healthcare buildings has its own features to be taken into consideration.

Review of prior studies showed us a significant relationship between wayfinding elements and cognitive mapping. Following studies further elaborated this relationship in significant aspects such as; the role of each wayfinding element for different profiles and users, and the decision of its material, location, texture and form. While analyzing international wayfinding usage in different type of public buildings, each complex should use optimum wayfinding elements matching with its own activity and character. Furthermore, another study indicates

that environment differences between cognitive mapping strategies generally arise as a result of familiarity, gender and age differences.

In our study, we performed a survey among 40 (20 male and 20 female) patients, and inquired about usability of wayfinding elements in the building and their perception of space.

Our survey results indicate that, differences between individuals' age and genders cause differences among visual perceptions. Our results also showed that men were generally better at navigating. Male samples preferred wayfinding strategies like signages more than female participants and they reported route strategies more relying on local preferences like left and right turns, landmarks and "You are Here" (YAH) maps. Furthermore, while female participants were going to their destination, they perform "latent learning" during the path, and they include other areas such as cafeterias, inner gardens and other polyclinics on their mental maps.

This study describes wayfinding and cognitive mapping styles and the individual differences between people's maps; especially affect of wayfinding behavior on cognition is researched. Furthermore, the importance of cooperation between wayfinding designers, architects and cognitive scientist should be considered for having further effective and higher quality circulation flows in buildings.

The conclusion of this study also brings forth some essential and interesting possible avenues for future research. When its viewed from a more comprehensive perspective in healthcare buildings, there are several factors to be considered; i.e. selection of wayfinding elements should match with type of the hospital and users' disability level, location of polyclinics can be arranged due to density levels, and location of information areas should be located on node points.

Insights gained from this research should be of interest to practicing designers wishing to generate innovative solutions on wayfinding strategies and aiming to promote cognitive mapping styles for future projects. These problems in design are very important tasks for designers and they have to pay attention to them while designing building especially healthcare buildings.

BIBLIOGRAPHY

ADAS. 1999. "Good Sign Practices" ADAS in association with E. Collis, Eye Catch Signs Ltd Nova Scotia, Canada, and I. Peterson, http://www.construction-innovation.info/indexa6db.html?id=1097 (Erişim tarihi: 4 Şubat 2013)

Apelt, R., Crawford, J. and Hogan, D., 2007, CRC, Wayfinding Design Guidelines, Construction Innovation Building Our Future, Australia, 54p.

Aydin, D., 2009, Hastane Mimarisi Ilkeler ve Ölçütleri, Mimarlar Odası Konya Şubesi, Entegre Matbaacılık, İstanbul.

Başkaya, A., Yıldırım, K., and Muslu, M. S., Poliklinik Bekleme Alanlarında Fonksiyonel ve Algı - Davranışsal Kalite: Ankara, İbni Sina Hastanesi Polikliniği, *Gazi Üniversitesi Müh. Mim. Fak. Dergisi*, 20(1): 53-68

Bentzen, B. L., William F. Myers, C., and Myers, L., 1999, Wayfinding System for Transportation Services: Remote Infrared Audible Signage for Transit Stations, Surface Transit, and Intersections . *Transportation Research Record*, 1671:19-26p.

Bolak, O., 1950, Hastanelerimiz: Eski Zamanlardan Bugüne Kadar Yapılan Hastanelerımız Tarihi ve Mimari Etüdü, İstanbul Maatbacılık, İstanbul.

Bullens, J., Igloi, K., Berthoz, A., Postma, A., and Rondi-Reig, L., 2010, Developmental Time Course of the Acquisition of Sequential Egocentric and Allocentric Navigation Strategies. *Journal of Experimental Child Psychology* , 107: 337-350p.

Burgess, N., 2006, Spatila Memory: How Egocentric and Allocentric Combine, *TRENDS in Cognitive Sciences*, 10(12): 551-557p.

BIBLIOGRAPHY (cont.)

Carpman, J. R., and Grant, M. A., 1993, 'Design That Cares: Planning Health Facilities for Patients and Visitors', 2nd.ed, American Hospital Publishing, 328p.

Chen. C.H., Chang, W.C., and Chang, W.T., 2009, Gender differences in relation to wayfinding strategies, navigational support design, and wayfinding task difficulty, *Journal of Environmental Psychology*, 29: 220-226

Cook, K., Harght, P., and Chang, J., 2008, Building Material Selection and Air Quality in Healthcare Design: A Survey of the Design and Construction Industry, PLEA 25th Conference on Passive and Low Energy Architecture, (unpublished)

Çetik, M. O., ve Oğulata, S.N., "Hastane Hizmet Birimleri Arasında İş akışının Ergonomik Açıdan Düzenlenmesi",
http://sbu.saglik.gov.tr/Ekutuphane/kitaplar/m17. (Erişim tarihi 23 Kasım, 2012)

Disability Rights Commission. 2006. 24 July 2007. "Annual Report and Accounts 2006-2007"
http://www.officialdocuments.gov.uk/document/hc0607/hc08/0864/0864.pdf
(Erişim tarihi: 8 Şubat)

Downs, M. R., and Stea, D., 1973, Cognitive Maps and Spatial Behavior, in image and environment, Aldine Publishing Company, 439p.

Ege Universitesi, "Ege Universitesi Hastanesi". http://egehastane.ege.edu.tr/ (Erişim tarihi: 20 Temmuz, 2012)

Ergenoğlu, S., 2006, Sağlik Kurumlarinin Iyileştiren Hastane Anlayişi ve akreditasyon bağlaminda tasarimi ve değerlendirilmesi, Doktora Tezi, Yıldız Teknik Üniversitesi Fen Bilimleri Enstitüsü, 245s. (unpublished)

BIBLIOGRAPHY (cont.)

Ekdi, B., 2005, Marka Imaji Yaratma ve Yerleştirme, T.C. Ankara Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim Dalı , 213p. (unpublished)

Gibson, D., 2009, Wayfinding Handbook: Information Design for Public Places, Princeton Architectural Press, New York, 4: 145p.

Golledge, R. G., 1999,Wayfinding Behavior cognitive mapping and other spatial processes, 1-46, Human Wayfinding and Cognitive Maps, R. G. Golledge (Ed.), Wayfinding Behaviour. Baltimore, Maryland: The John Hopkins University Press, Maryland, 371p.

Hidayetoğlu, M. L., Yıldırım, K., and Çağatay, K., 2010, The Effects of Training and Spatial Experience on the Perception of the Interior of Buildings with a High Level of Complexity, *Scientific Research and Essays* , V (5):428-439p.

Hölscher, C., Meilinger, T., Vrachliotis, G., Brosamle, M., and Knauff, M., 2006, Up the down staircase: Wayfinding Strategies in Multi-Level Buildings. *Journal of Environmental Psychology*, 26: 284-299p.

Iachini, T, Ruotolo, F., and Ruggiero, G., 2009, The effects of familiarity and gender on spatial representation, *Journal of Environmental Psychology*, 29: 227-234 p.

Imani, F., and Tabaeian, M., 2012, Recreating mental image with the aid of cognitive maps and its role in environmental perception, *Social and Behavioral Sciences*, 32: 53-62p.

Kazanasmaz, T., 2004, Sağlık Yapılarında Yönbulma Tasarımı, Modern Hastene Yönetimi, Nisan – Mayıs – Haziran, 8(2): 42-46s.

BIBLIOGRAPHY (cont.)

Kazanasmaz, T., 2009, Hasta Bakım ve Tedavi Ünitelerinin Verimli Tasarlanması, YTÜ Arch. Fac. E-Journal 3(3): 297-309

Kim, D., 2001, Specialized Knowledge Roles and the Professional Status of Healthcare Architects, Texas University, 85-110p.

Lynch, K., 1960, The Image of the City, The Massachusetts Institute of Technology Press, London,181p.

Marguire, E. A., Burgess, N., Donnett, J. G., Frackowiak, R., Frith, C. D., and O'Keefe, J., 1998, Knowing where and getting there: a human navigation network. Science , 280: 921-924p.

Marquez, J. J., Oman, C. M., and Liu, A.M., 2004, You-Are-Here Maps for International Space Station: Approach and Guidelines, Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, 7p (unpublished).

Muhlhausen, J. 2000. "Wayfinding is not signage: signage plays an important part of wayfinding, but there's more", http://www.signweb.com/index.php/channel/6/id/1433/ (Erisim Tarihi 6 Kasim 2012)

Özel Hastaneler Yönetmeliği, "Özel Hastaneler Yönetmeliği", 2009, http://www.mevzuat.adalet.gov.tr/html/20981.html 109s.

Passini, R., 1984, Spatial Representations, a Way Finding Perspective, *Journal of Environmental Psychology* , IV (2): 153 – 164p.

Passini, R., 1996, Wayfinding design: Logic, Application and Some Thoughts on Universality, *Design Studies* , 17: 319-331p.

BIBLIOGRAPHY (cont.)

Rapoport, A., 1977, Human Aspects of Urban Form: Towards a Man-Environment Approach to Urban Form and Design, Pergamon Press, New York, 438p.

Rodgers, K. M., Sindone III A. J., and Moffat, D.S., 2012, Effects of age on navigation strategy, Wayne state Universuty, Dtroit, MI, USA, *Neurobiology of Ageing* 33: 202-222p.

Russel, J. A., 1980, A Circumplex Model of affect. *Journal of Personality and Social Psychology* , 39 (6): 1161-1178.

Seren, B., 1999, Saglik ve Mimarlik, Archiscope , 5: 105p.

Sholl, M.J., Acacio, J.C., Makar, R.O., and Leon, C., 2000, The Relation of Sex and Sense of Direction to Spatial Orientation in an Unfamiliar Environment, Journal of Environmental Psychology, 26: 17-28.

Şenkal, F., 2001, Sağlık Yapılarının Kullanılmasında Dikkat Edilecek Hususlar, *Yapı Dergisi*, Sayı 240, 50p.

Thagard, P. 2005. "Cognitive Science", The Stanford Encyclopedia of Philisophy (Fall 2012 Edition), Edward, N. Z. (ed), http://plato.stanford.edu/entries/cognitive-science/, (Erişim tarihi: 10 Temmuz)

Türkiye Sağlık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu, 2010, 180s.

Uzunay, S., 2011, Hastane Yapilarinin Planlanmasi ve Hastanelerde Sirkulasyon, Yüksek Lisans Tezi, Haliç Üniversitesi Fen Bilimleri Enstitüsü, 118s. (unpublished)

BIBLIOGRAPHY (cont.)

Ünlü, Alper., Edgü, Erincik., Ülken G., ve Apak, S., 2008, Acil durumlarda hastane sirkülasyon sistemlerinin performansi icin bir model, ITU Dergisi, 99-109s.

Verderber, S., 2010, Innovations in Hospital Architecture, U.S.A: Taylor & Francis Group, New York, 131p.

Wallschlaeger, C., and Busic-Snyder, C., 1992, Basic Visual Concepts and Principals for Artists, Architects, and Designers, Wm.C.Brown Publisher, Dubuque, 544p.

Wayfinding, 2012, Graphic Design Group, Design Media Publishing Limited, 504p.

Way-finding in the Built Environment, 2004.November 2004, "CRC Construction Innovation Building Our Future" Australia, November 2004 http://www.hpw.qld.gov.au/SiteCollectionDocuments/WayfindingBuiltEnvironment.pdf (Erişim tarihi: 13 Aralık).

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- Microsoft Office Programları : İleri Seviyede
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- Cinema 4D : İyi Seviyede
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APPENDIX

Appendix A.

On 13th of August 2012, interview with Prof. Dr. Mehmet. Nuri TÜREYEN, architect of the polyclinics building for Aegean Hospital, was made. According to the interview; on 1987 Management of A.U. required a new building from TÜREYEN, because existing polyclinic building was not adequate. TÜREYEN, Hüsamettin ÖZKAYMAKÇI and Hikmet GÖKMEN planned a new building in the direction of sequential meetings with Dean of the faculty, Rector and Assistant to rector. The building they had designed and built was meeting all requirements of the management. However, their building was not constructed on spoken area and had was never in use for assigned function. Instead of using the building for polyclinics, after construction, management decided to use it for Deanery. (Figure A. 1), (Figure A. 2)

Also spaces for required function is no longer available for use, for instance; Areas which had designed for polyclinics were converted into offices with divisions, entrances were closed with stack of boxes (Figure A. 3) or locked. (Figure A. 4)

Figure A.1.

Figure A. 2.

Figure A.3. Entrance, out of use

Figure: A. 4. Locked entrance

Besides after the changes in the building, also interventions before and during construction stage had happened. At the beginning on the construction plan layout, location of the building appeared on a different area. Also there are vast changes on major elements on the facade; Fire escape towers are different from what they were designed. Design of the entrance was changed; locations of the way finding elements were dislocated.

In respect of circulation TÜREYEN says; while designing 18 polyclinics how patients would enter to the building, what they would see first, how they would navigate and how they would leave the building was important. Unfamiliar users, patients, parents, and families used polyclinics as well as familiar users so circulation ın the building should be easy. While designing the entrances, ease of circulation and accessibility matters horizontal and vertical circulation was programmed with determination for vertical circulation; stairs and elevators were located on corridors, in case of natural disasters and fire tower stairs on both sides were planned for evacuation. Polycarbonate skylights above corridors would provide natural lighting

Each polyclinic block consists of a core, including a waiting area; nurse desk, archive and a registration desk, the average patient number and waiting time were considered to design of each core. Around the cores examination rooms were located. Also each examination room was connected to the central hall by sub corridors. So corridors provide connection between each polyclinics and examination rooms. Polycarbonate skylights above corridors would provide natural lighting.

Figure A. 5. Entrance Floor Plan

Figure A.6. First Floor Plan

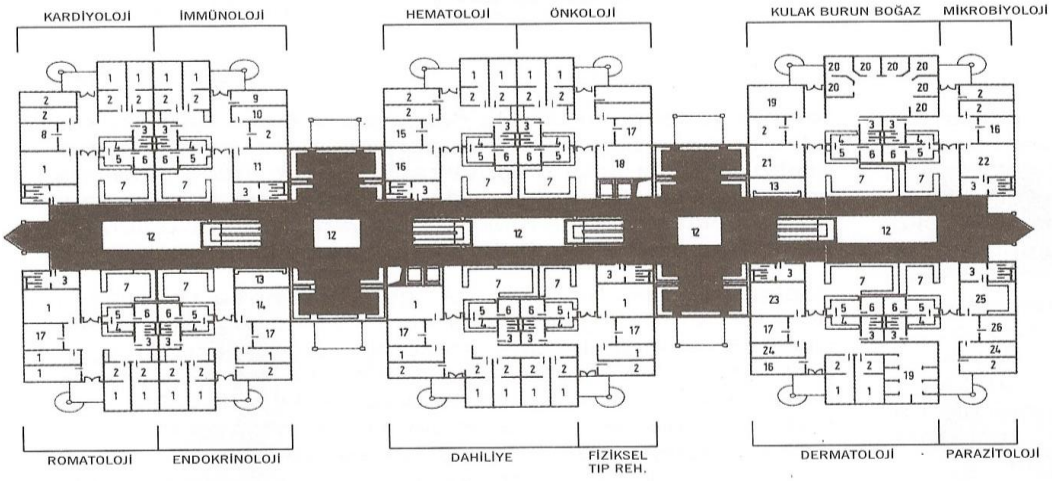
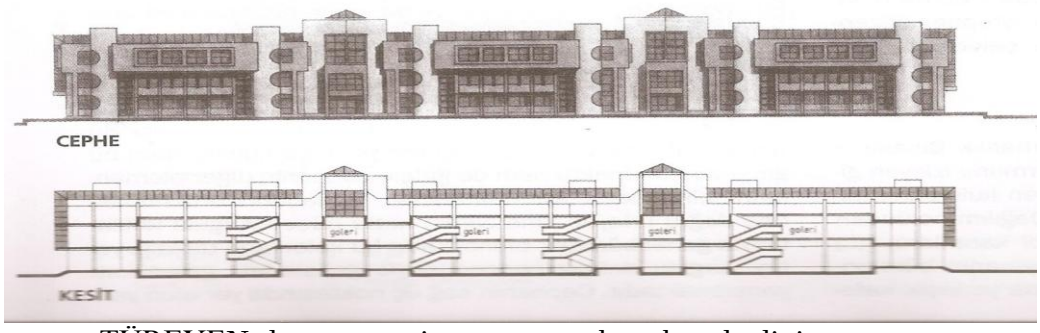


Figure A. 7. Facade and Section



TÜREYEN draws attention to; even though polyclinics were not enough during construction time of the new building, today how they can fit. Due to increasing population complications will start to happen, problems will arise. He points that if the building they designed were in service as polyclinics, the project would have been unique and all the polyclinics would have been under same roof, not apart from each other like today.

Appendix B. Distribution of hospitals by provinces in Turkey 2000-2010

2010					
	Total	Ministry of Health	University	Private	Public
	1397	843	62	489	3
ADANA	**25**	12	2	11	0
ADIYAMAN	**8**	8	0	0	0
AFYON	**20**	16	1	3	0
AĞRI	**9**	7	0	2	0
AMASYA	**6**	6	0	0	0
ANKARA	**72**	34	9	28	1
ANTALYA	**40**	14	2	24	0
ARTVİN	**8**	8	0	0	0
AYDIN	**16**	11	1	4	0
BALIKESİR	**26**	20	1	5	0
BİLECİK	**6**	6	0	0	0
BİNGÖL	**7**	6	0	1	0
BİTLİS	**8**	7	0	1	0
BOLU	**12**	8	1	3	0
BURDUR	**7**	6	0	1	0
BURSA	**33**	21	1	11	0
ÇANAKKALE	**13**	10	1	2	0
ÇANKIRI	**9**	8	0	1	0
ÇORUM	**16**	14	0	2	0
DENİZLİ	**22**	14	1	7	0
DİYARBAKIR	**21**	13	1	7	0
EDİRNE	**11**	6	1	4	0
ELAZIĞ	**11**	7	1	3	0
ERZİNCAN	**11**	10	0	1	0
ERZURUM	**23**	21	1	1	0

ESKİŞEHİR	**17**	9	2	6	0
GAZİANTEP	**21**	10	1	10	0
GİRESUN	**14**	12	0	2	0
GÜMÜŞHANE	**6**	6	0	0	0
HAKKARİ	**3**	3	0	0	0
HATAY	**21**	11	1	9	0
ISPARTA	**17**	11	1	5	0
MERSİN	**23**	12	1	10	0
İSTANBUL	**217**	52	10	154	1
İZMİR	**52**	29	3	19	1
KARS	**6**	5	1	0	0
KASTAMONU	**18**	15	0	3	0
KAYSERİ	**29**	15	1	13	0
KIRKLARELİ	**8**	5	0	3	0
KIRŞEHİR	**6**	5	0	1	0
KOCAELİ	**22**	10	1	11	0
KONYA	**37**	22	3	12	0
KÜTAHYA	**12**	9	1	2	0
MALATYA	**19**	9	1	9	0
MANİSA	**26**	18	1	7	0
KAHRAMANMARAŞ	**19**	12	1	6	0
MARDİN	**12**	10	0	2	0
MUĞLA	**21**	11	0	10	0
MUŞ	**8**	7	0	1	0
NEVŞEHİR	**6**	3	0	3	0
NİĞDE	**8**	7	0	1	0
ORDU	**18**	13	0	5	0
RİZE	**7**	6	0	1	0
SAKARYA	**19**	13	0	6	0
SAMSUN	**26**	18	1	7	0

SİİRT	**9**	6	0	3	0
SİNOP	**6**	6	0	0	0
SİVAS	**20**	18	1	1	0
TEKİRDAĞ	**17**	9	0	8	0
TOKAT	**16**	14	1	1	0
TRABZON	**21**	17	1	3	0
TUNCELİ	**5**	5	0	0	0
ŞANLIURFA	**17**	14	1	2	0
UŞAK	**8**	6	0	2	0
VAN	**18**	12	1	5	0
YOZGAT	**16**	15	0	1	0
ZONGULDAK	**11**	8	1	2	0
AKSARAY	**12**	9	0	3	0
BAYBURT	**1**	1	0	0	0
KARAMAN	**5**	3	0	2	0
KIRIKKALE	**7**	6	1	0	0
BATMAN	**11**	5	0	6	0
ŞIRNAK	**5**	5	0	0	0
BARTIN	**3**	3	0	0	0
ARDAHAN	**3**	3	0	0	0
IĞDIR	**4**	3	0	1	0
YALOVA	**4**	2	0	2	0
KARABÜK	**6**	5	0	1	0
KİLİS	**1**	1	0	0	0
OSMANİYE	**9**	4	0	5	0
DÜZCE	**4**	2	1	1	0

2009					
	Total	Ministry of Health	University	Private	Public
	1347	834	59	450	4
ADANA	**24**	12	2	10	0
ADIYAMAN	**8**	8	0	0	0
AFYON	**19**	15	1	3	0
AĞRI	**10**	8	0	2	0
AMASYA	**5**	5	0	0	0
ANKARA	**69**	33	9	26	1
ANTALYA	**37**	14	2	21	0
ARTVİN	**8**	8	0	0	0
AYDIN	**16**	11	1	4	0
BALIKESİR	**24**	20	0	4	0
BİLECİK	**6**	6	0	0	0
BİNGÖL	**7**	6	0	1	0
BİTLİS	**7**	7	0	0	0
BOLU	**11**	8	1	2	0
BURDUR	**7**	6	0	1	0
BURSA	**32**	21	1	10	0
ÇANAKKALE	**13**	10	1	2	0
ÇANKIRI	**9**	8	0	1	0
ÇORUM	**16**	14	0	2	0
DENİZLİ	**22**	14	1	7	0
DİYARBAKIR	**22**	15	1	6	0
EDİRNE	**11**	6	1	4	0
ELAZIĞ	**11**	7	1	3	0
ERZİNCAN	**9**	9	0	0	0
ERZURUM	**24**	22	1	1	0
ESKİŞEHİR	**14**	8	2	4	0
GAZİANTEP	**19**	10	1	8	0

GİRESUN	**14**	12	0	2	0
GÜMÜŞHANE	**6**	6	0	0	0
HAKKARİ	**3**	3	0	0	0
HATAY	**21**	11	1	9	0
ISPARTA	**17**	11	1	5	0
MERSİN	**20**	11	1	8	0
İSTANBUL	**213**	52	9	150	0
İZMİR	**51**	29	3	18	0
KARS	**6**	5	1	0	0
KASTAMONU	**17**	15	0	2	0
KAYSERİ	**27**	13	1	13	0
KIRKLARELİ	**8**	5	0	3	0
KIRŞEHİR	**7**	6	0	1	0
KOCAELİ	**21**	10	1	10	0
KONYA	**35**	22	2	11	0
KÜTAHYA	**12**	10	1	1	0
MALATYA	**18**	9	1	8	0
MANİSA	**23**	17	1	5	0
KAHRAMANMARAŞ	**17**	10	1	6	0
MARDİN	**11**	10	0	1	0
MUĞLA	**21**	11	0	10	0
MUŞ	**8**	7	0	1	0
NEVŞEHİR	**6**	3	0	3	0
NİĞDE	**8**	7	0	1	0
ORDU	**17**	13	0	4	0
RİZE	**8**	7	0	1	0
SAKARYA	**18**	12	0	6	0
SAMSUN	**23**	16	1	6	0
SİİRT	**9**	6	0	3	0
SİNOP	**6**	6	0	0	0

SİVAS	**20**	18	1	1	0
TEKİRDAĞ	**14**	8	0	6	0
TOKAT	**15**	13	1	1	0
TRABZON	**20**	17	1	2	0
TUNCELİ	**5**	5	0	0	0
ŞANLIURFA	**17**	14	1	2	0
UŞAK	**7**	5	0	2	0
VAN	**17**	12	1	4	0
YOZGAT	**16**	15	0	1	0
ZONGULDAK	**12**	9	1	2	0
AKSARAY	**12**	9	0	3	0
BAYBURT	**1**	1	0	0	0
KARAMAN	**3**	3	0	0	0
KIRIKKALE	**8**	7	1	0	0
BATMAN	**11**	5	0	6	0
ŞIRNAK	**5**	5	0	0	0
BARTIN	**3**	3	0	0	0
ARDAHAN	**3**	3	0	0	0
IĞDIR	**4**	3	0	1	0
YALOVA	**4**	2	0	2	0
KARABÜK	**5**	4	0	1	0
KİLİS	**1**	1	0	0	0
OSMANİYE	**9**	4	0	5	0
DÜZCE	**4**	2	1	1	0

2008					
	Total	Ministry of Health	University	Private	Public
	1308	847	57	400	4
ADANA	**21**	12	2	7	0
ADIYAMAN	**8**	8	0	0	0
AFYON	**19**	15	1	3	0
AĞRI	**10**	8	0	2	0
AMASYA	**6**	6	0	0	0
ANKARA	**66**	32	9	24	1
ANTALYA	**33**	14	2	17	0
ARTVİN	**8**	8	0	0	0
AYDIN	**17**	12	1	4	0
BALIKESİR	**24**	21	0	3	0
BİLECİK	**6**	6	0	0	0
BİNGÖL	**7**	6	0	1	0
BİTLİS	**8**	8	0	0	0
BOLU	**10**	8	1	1	0
BURDUR	**8**	7	0	1	0
BURSA	**31**	21	1	9	0
ÇANAKKALE	**11**	10	0	1	0
ÇANKIRI	**9**	8	0	1	0
ÇORUM	**14**	13	0	1	0
DENİZLİ	**22**	14	1	7	0
DİYARBAKIR	**20**	13	1	6	0
EDİRNE	**12**	8	1	3	0
ELAZIĞ	**12**	8	1	3	0
ERZİNCAN	**9**	9	0	0	0
ERZURUM	**19**	17	1	1	0
ESKİŞEHİR	**14**	9	2	3	0
GAZİANTEP	**19**	10	1	8	0

GİRESUN	**12**	12	0	0	0
GÜMÜŞHANE	**6**	6	0	0	0
HAKKARİ	**3**	3	0	0	0
HATAY	**20**	11	1	8	0
ISPARTA	**17**	12	1	4	0
MERSİN	**19**	12	1	6	0
İSTANBUL	**206**	53	9	142	2
İZMİR	**47**	26	3	17	1
KARS	**6**	6	0	0	0
KASTAMONU	**17**	15	0	2	0
KAYSERİ	**26**	13	1	12	0
KIRKLARELİ	**7**	5	0	2	0
KIRŞEHİR	**6**	6	0	0	0
KOCAELİ	**21**	10	1	10	0
KONYA	**32**	21	2	9	0
KÜTAHYA	**13**	11	1	1	0
MALATYA	**18**	10	1	7	0
MANİSA	**25**	19	1	5	0
KAHRAMANMARAŞ	**13**	9	1	3	0
MARDİN	**10**	10	0	0	0
MUĞLA	**19**	11	0	8	0
MUŞ	**7**	7	0	0	0
NEVŞEHİR	**7**	4	0	3	0
NİĞDE	**8**	7	0	1	0
ORDU	**15**	13	0	2	0
RİZE	**8**	7	0	1	0
SAKARYA	**18**	12	0	6	0
SAMSUN	**22**	17	1	4	0
SİİRT	**9**	6	0	3	0
SİNOP	**6**	6	0	0	0

SİVAS	**20**	18	1	1	0
TEKİRDAĞ	**16**	9	0	7	0
TOKAT	**16**	14	1	1	0
TRABZON	**20**	17	1	2	0
TUNCELİ	**5**	5	0	0	0
ŞANLIURFA	**16**	13	1	2	0
UŞAK	**7**	5	0	2	0
VAN	**17**	12	1	4	0
YOZGAT	**16**	15	0	1	0
ZONGULDAK	**11**	9	1	1	0
AKSARAY	**12**	9	0	3	0
BAYBURT	**1**	1	0	0	0
KARAMAN	**4**	4	0	0	0
KIRIKKALE	**8**	7	1	0	0
BATMAN	**11**	6	0	5	0
ŞIRNAK	**5**	5	0	0	0
BARTIN	**4**	4	0	0	0
ARDAHAN	**3**	3	0	0	0
IĞDIR	**5**	4	0	1	0
YALOVA	**4**	2	0	2	0
KARABÜK	**7**	6	0	1	0
KİLİS	**1**	1	0	0	0
OSMANİYE	**9**	5	0	4	0
DÜZCE	**4**	2	1	1	0

2007					
	Total	Ministry of Health	University	Private	Public
	1275	848	56	365	0
ADANA	**20**	13	2	5	0
ADIYAMAN	**8**	8	0	0	0
AFYON	**20**	16	1	3	0
AĞRI	**9**	8	0	1	0
AMASYA	**6**	6	0	0	0
ANKARA	**69**	35	10	21	0
ANTALYA	**34**	15	2	17	0
ARTVİN	**8**	8	0	0	0
AYDIN	**13**	10	1	2	2
BALIKESİR	**24**	21	0	3	1
BİLECİK	**6**	6	0	0	0
BİNGÖL	**6**	6	0	0	0
BİTLİS	**8**	8	0	0	0
BOLU	**10**	8	1	1	0
BURDUR	**8**	7	0	1	0
BURSA	**31**	22	1	8	0
ÇANAKKALE	**11**	10	0	1	0
ÇANKIRI	**9**	8	0	1	0
ÇORUM	**16**	15	0	1	0
DENİZLİ	**21**	14	1	6	0
DİYARBAKIR	**18**	11	1	6	0
EDİRNE	**12**	8	1	3	0
ELAZIĞ	**12**	9	1	2	0
ERZİNCAN	**9**	9	0	0	0
ERZURUM	**16**	14	1	1	0
ESKİŞEHİR	**14**	9	2	3	0
GAZİANTEP	**18**	10	1	7	0

GİRESUN	**13**	13	0	0	0
GÜMÜŞHANE	**6**	6	0	0	0
HAKKARİ	**3**	3	0	0	0
HATAY	**16**	10	1	5	0
ISPARTA	**16**	12	1	3	0
MERSİN	**18**	12	1	5	0
İSTANBUL	**200**	52	7	139	2
İZMİR	**47**	26	3	17	1
KARS	**6**	6	0	0	0
KASTAMONU	**17**	15	0	2	0
KAYSERİ	**26**	13	1	12	0
KIRKLARELİ	**7**	6	0	1	0
KIRŞEHİR	**6**	6	0	0	0
KOCAELİ	**22**	11	1	10	0
KONYA	**34**	22	2	10	0
KÜTAHYA	**12**	11	1	0	0
MALATYA	**16**	10	1	5	0
MANİSA	**24**	19	1	4	0
KAHRAMANMARAŞ	**13**	9	1	3	0
MARDİN	**10**	10	0	0	0
MUĞLA	**19**	11	0	8	0
MUŞ	**6**	6	0	0	0
NEVŞEHİR	**7**	5	0	2	0
NİĞDE	**8**	7	0	1	0
ORDU	**14**	13	0	1	0
RİZE	**8**	7	0	1	0
SAKARYA	**17**	12	0	5	0
SAMSUN	**20**	16	1	3	0
SİİRT	**8**	6	0	2	0
SİNOP	**6**	6	0	0	0

SİVAS	**20**	18	1	1	0
TEKİRDAĞ	**15**	9	0	6	0
TOKAT	**15**	13	1	1	0
TRABZON	**19**	16	1	2	0
TUNCELİ	**5**	5	0	0	0
ŞANLIURFA	**15**	13	1	1	0
UŞAK	**6**	5	0	1	0
VAN	**15**	11	1	3	0
YOZGAT	**13**	12	0	1	0
ZONGULDAK	**10**	8	1	1	0
AKSARAY	**13**	10	0	3	0
BAYBURT	**1**	1	0	0	0
KARAMAN	**5**	5	0	0	0
KIRIKKALE	**8**	7	1	0	0
BATMAN	**11**	6	0	5	0
ŞIRNAK	**5**	5	0	0	0
BARTIN	**4**	4	0	0	0
ARDAHAN	**3**	3	0	0	0
IĞDIR	**5**	4	0	1	0
YALOVA	**3**	2	0	1	0
KARABÜK	**7**	6	0	1	0
KİLİS	**3**	3	0	0	0
OSMANİYE	**9**	5	0	4	0
DÜZCE	**4**	2	1	1	0

2000					
	Total	Ministry of Health	University	Private	Public
	1183	861	42	261	19
ADANA	**23**	13	2	8	0
ADIYAMAN	**10**	10	0	0	0
AFYON	**18**	17	0	1	0
AĞRI	**7**	7	0	0	0
AMASYA	**8**	8	0	0	0
ANKARA	**57**	30	8	14	5
ANTALYA	**25**	15	1	9	0
ARTVİN	**10**	10	0	0	0
AYDIN	**15**	9	1	5	0
BALIKESİR	**26**	23	0	3	0
BİLECİK	**6**	6	0	0	0
BİNGÖL	**6**	6	0	0	0
BİTLİS	**7**	7	0	0	0
BOLU	**13**	11	1	1	0
BURDUR	**8**	8	0	0	0
BURSA	**28**	22	1	5	0
ÇANAKKALE	**13**	12	0	1	0
ÇANKIRI	**8**	8	0	0	0
ÇORUM	**14**	13	0	1	0
DENİZLİ	**18**	15	1	2	0
DİYARBAKIR	**17**	14	1	2	0
EDİRNE	**11**	8	1	2	0
ELAZIĞ	**11**	9	1	1	0
ERZİNCAN	**9**	9	0	0	0
ERZURUM	**21**	19	1	1	0
ESKİŞEHİR	**12**	8	2	1	1
GAZİANTEP	**14**	8	1	5	0
GİRESUN	**16**	16	0	0	0
GÜMÜŞHANE	**4**	4	0	0	0
HAKKARİ	**4**	4	0	0	0
HATAY	**16**	12	0	4	0
ISPARTA	**17**	16	1	0	0
MERSİN	**16**	10	1	5	0
İSTANBUL	**186**	43	5	132	6
İZMİR	**48**	29	3	14	2
KARS	**6**	6	0	0	0
KASTAMONU	**22**	21	0	1	0
KAYSERİ	**19**	13	1	5	0
KIRKLARELİ	**11**	10	0	1	0
KIRŞEHİR	**7**	7	0	0	0
KOCAELİ	**14**	8	1	3	2

KONYA	**31**	25	1	3	2
KÜTAHYA	**14**	14	0	0	0
MALATYA	**10**	8	1	1	0
MANİSA	**26**	22	1	3	0
KAHRAMANMARAŞ	**10**	8	0	2	0
MARDİN	**5**	5	0	0	0
MUĞLA	**19**	12	0	7	0
MUŞ	**5**	5	0	0	0
NEVŞEHİR	**11**	10	0	1	0
NİĞDE	**8**	8	0	0	0
ORDU	**15**	14	0	1	0
RİZE	**9**	9	0	0	0
SAKARYA	**15**	11	0	4	0
SAMSUN	**19**	16	1	2	0
SİİRT	**4**	4	0	0	0
SİNOP	**7**	7	0	0	0
SİVAS	**18**	16	1	0	1
TEKİRDAĞ	**12**	9	0	3	0
TOKAT	**12**	12	0	0	0
TRABZON	**14**	12	1	1	0
TUNCELİ	**7**	7	0	0	0
ŞANLIURFA	**14**	12	1	1	0
UŞAK	**8**	7	0	1	0
VAN	**10**	9	1	0	0
YOZGAT	**11**	11	0	0	0
ZONGULDAK	**9**	9	0	0	0
AKSARAY	**11**	9	0	2	0
BAYBURT	**1**	1	0	0	0
KARAMAN	**2**	2	0	0	0
KIRIKKALE	**5**	5	0	0	0
BATMAN	**4**	3	0	1	0
ŞIRNAK	**6**	6	0	0	0
BARTIN	**5**	5	0	0	0
ARDAHAN	**4**	4	0	0	0
IĞDIR	**1**	1	0	0	0
YALOVA	**1**	1	0	0	0
KARABÜK	**7**	6	0	1	0
KİLİS	**1**	1	0	0	0
OSMANİYE	**4**	4	0	0	0
DÜZCE	**7**	7	0	0	0

Source: Ministry of Health

Note. (1) Number of hospitals in 2000-2010 periods is given.

Source: Information was received from General Directorate of Curative Services under Ministry of Health.
(2) Hospitals of other public institutions and local governmental offices are covered.

Appendix C. Number of beds in public and private inpatient institutions 1967-2010

Year	Total	Attached to the Ministry of Health	Attached to other Ministries and Official Institutions	University	Municipality	Social Insurance	Private
1967	**59 173**	41 272	2 884	2 442	2 467	6 456	3 652
1968	**64 966**	44 270	2 908	4 415	1 773	7 968	3 632
1969	**69 224**	45 565	3 082	5 723	2 235	9 046	3 573
1970	**71 486**	47 270	3 143	4 404	2 320	10 455	3 894
1971	**74 556**	47 985	2 958	4 643	2 365	12 148	4 457
1972	**77 372**	49 961	3 020	4 643	2 370	12 724	4 654
1973	**81 075**	52 360	3 051	5 598	2 370	12 990	4 706
1974	**83 458**	52 514	3 007	6 816	2 370	13 621	5 130
1975	**81 264**	52 499	2 761	7 004	2 464	12 756	3 780
1976	**82 945**	53 320	3 203	7 004	2 370	13 886	3 162
1977	**83 036**	54 319	3 152	7 671	2 750	12 007	3 137
1978	**86 526**	54 294	3 347	8 954	2 795	14 095	3 041
1979	**96 752**	56 155	3 779	12 819	2 329	17 820	3 850
1980	**99 117**	57 076	3 725	13 501	2 539	18 408	3 868
1981	**97 765**	57 321	3 439	13 816	2 645	16 516	4 028
1982	**96 138**	58 283	2 687	12 993	740	17 365	4 070
1983	**99 396**	59 783	2 935	13 803	976	17 352	4 547
1984	**100 496**	60 483	2 862	13 803	928	17 713	4 707
1985	**103 918**	62 603	3 048	14 653	920	17 820	4 874
1986	**107 152**	64 803	3 042	15 272	920	18 220	4 895
1987	**111 135**	65 448	2 974	17 749	1 160	18 597	5 207
1988	**112 248**	66 428	2 899	17 749	1 160	19 305	4 707
1989	**116 061**	68 258	2 926	17 749	1 160	20 129	5 839
1990	**120 738**	71 258	2 926	18 068	1 160	21 096	6 230

1991	**123 706**	72 513	2 991	18 298	1 160	22 174	6 570
1992	**126 611**	74 078	2 977	18 298	1 160	22 962	7 136
1993	**131 874**	76 063	2 877	19 009	1 160	25 041	7 724
1994	**134 665**	77 753	2 779	19 852	1 160	25 196	7 925
1995	**136 072**	76 991	2 779	20 811	1 160	25.397	8 934
1996	**139 919**	78 347	2 897	22 056	1 218	25 359	10 042
1997	**144 984**	80 297	2 897	23 383	1 218	25 934	11 255
1998	**148 987**	82 032	2 897	23 828	1 273	26 279	12 678
1999	**153 465**	84 022	2 897	24 094	1 313	27 062	14 077
2000	**134 950**	69 089	1 486	23 838	1 130	27 245	12 162
2001	**140 710**	71 624	1 599	25 296	1 133	29 221	11 837
2002	**143 871**	72 988	1 313	26 341	1 136	29 706	12 387
2003	**146 375**	74 669	1 118	26 619	1 140	29 912	12 917
2004	**153 901**	78 595	460	28 025	1 140	33 010	12 671
2005	**158 729**	113 766	918	29 014	1 155	-	13 876
2006	**166 951**	119 328	808	31 193	983	-	14 639
2007	**170 291**	120 228	789	30 978	899	-	17 397
2008	**172 165**	119 310	910	29 912	1 095	-	20 938
2009	**179 649**	122 354	910	30 112	1 095	-	25 178
2010	**184 050**	119 891	-	35 001	1 095	-	28 063

Source: Ministry of Health

Note. Military hospitals are excluded.

(1) Includes hospitals which are responsible for providing all kinds of medical services and also includes maternity and infant home, mental and neurological hospital, tuberculosis hospital, oncology hospital and health centers.

(2) Includes hospitals owned by individuals, foreigner's minorities and associations.

(3) In the approval 927 dated 14 February 2005, which was issued by Ministry of Health, as Social Insurance Institution was assigned to Ministry of Health, statistical data are included in the data of Ministry of Health.

(4) Active beds are used for the years 2000 and later

Appendix D. Survey both in English and Turkish

Aegean University Polyclinics - Survey

Yaşar University - Architecture Faculty – Department of Interior Architecture – Graduate Program

AGE:	
GENDER:	
EDUCATION:	
OCCUPATION:	
CITY:	

Not: This survey is prepared for scientific researches. In the survey there are no any personal questions are asked, therefore research results will be used only for scientifically.

1) Have you ever come to the polyclinics of Aegean University before?

○ Yes ○ No

2) Which picture would you prefer for navigating in a building?

○ 1st picture (YAH map) ○ 2nd picture (Signage)

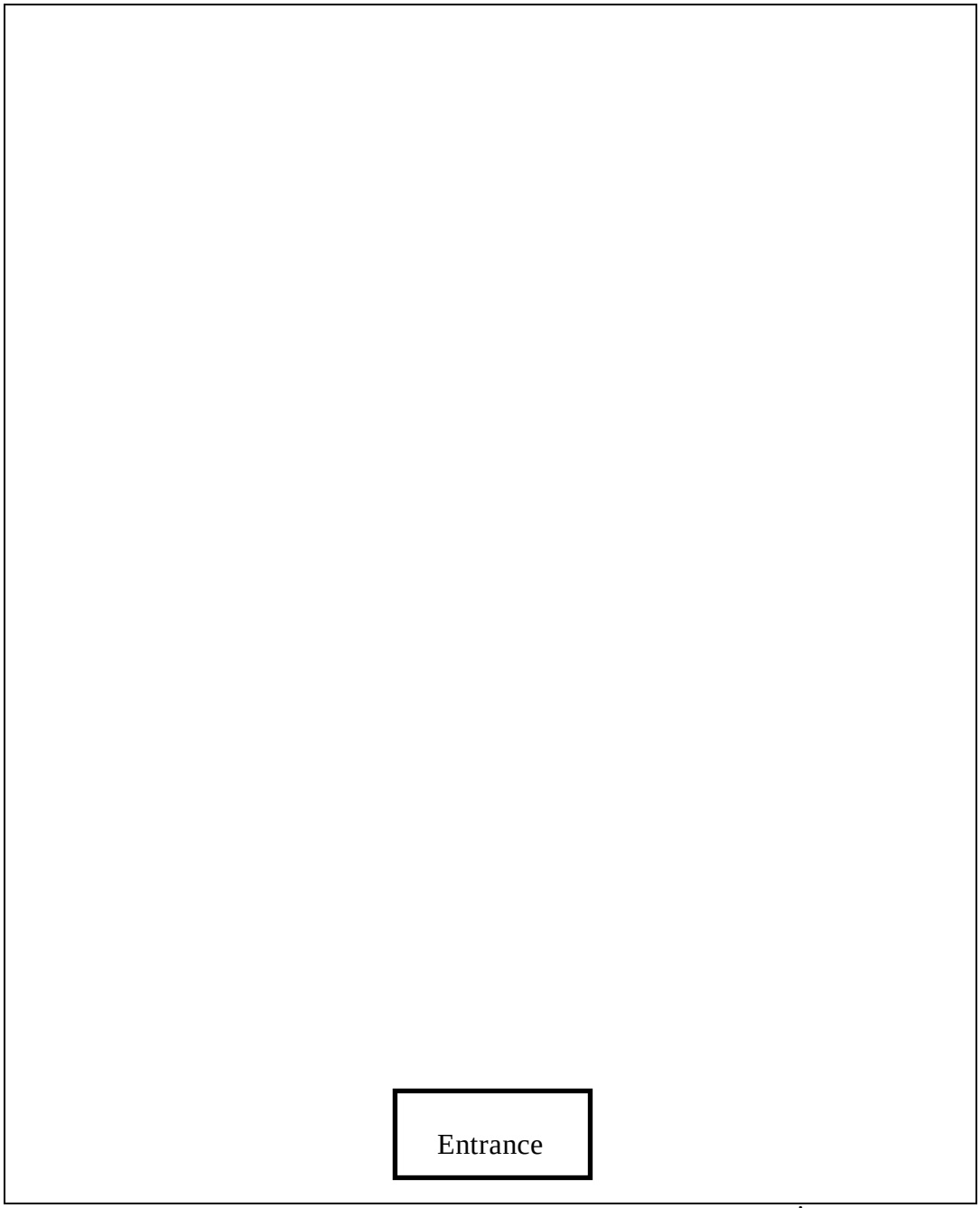
3) What you do when you get lost in a building?

……..

……..

……

WOULD YOU SKETCH YOUR ROUTE FOR COMING HERE WITH USING THE GIVEN “ENTRANCE” BOX



Thank you for attending our survey. Prepared by Zeynep SEVİNÇ

Ege Üniversitesi Poliklinikleri - Anket Çalışması

Yaşar Universitesi Mimarlık Fakültesi - Iç Mimarlık Bölümü Yüksek Lisans Programı

YAŞ:	
CİNSİYET:	
EĞİTİM:	
MESLEK:	
ŞEHIR:	

Not: Bu anket bilimsel araştırma amaçlı hazırlanmıştır. Ankette kimlik bilgilerinize yönelik "ÖZEL" sorular sorulmamıştır. Sadece görüşlerinize başvurulmak istenmiştir. Dolayısıyla, araştırma sonuçları sadece bilimsel amaçlı olarak kullanılacaktır.

1) Daha önce Ege Universitesi Hastanesi Polikliniklerine geldiniz mi?

○ Evet ○ Hayır

2) Yönünüzü bulmak için görmüş olduğunuz resimlerden hangisini tercih edersiniz?

○ 1 Numaralı resim (YAH map) ○ 2 Numaralı resim (Signage)

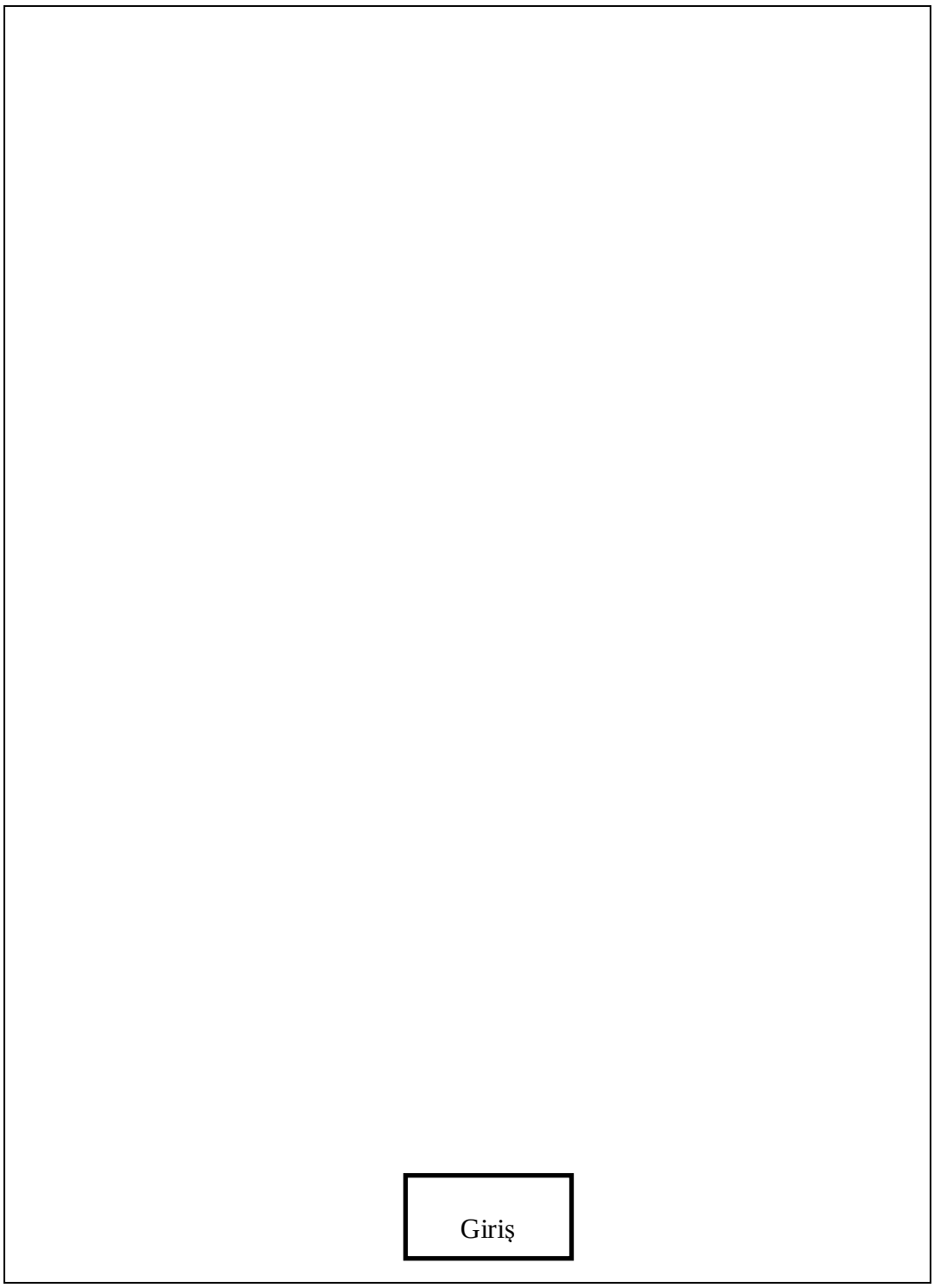
3) Bir binada kaybolduğunuzda ne yaparsınız?

…….....

…….....

…….....

GİRİS KAPISINI GÖSTEREREK BURAYA GELENE KADAR NERELERDEN GEÇTİĞİNİZİ ÇİZEREK ANLATIR MISINIZ?



Anketimize katıldığınız için teşekkür ederiz. Anketi Hazırlayan: Zeynep SEVİNÇ

Appendix E: Plan of the A.U. Polyclinics building, Scale 1/200