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SPATIAL FACTORS AFFECTING WAYFINDING AND ORIENTATION IN A
SHOPPING MALL

A THESIS

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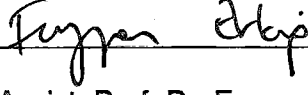
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF FINE ARTS

By

Güler Ufuk Doğu

June, 1997

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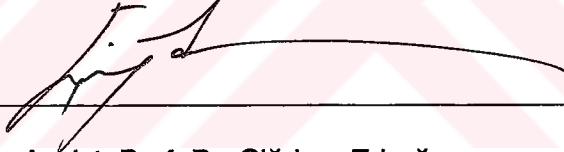
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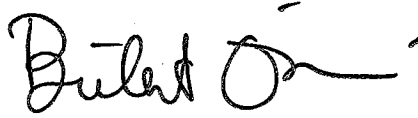
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ABSTRACT

SPATIAL FACTORS AFFECTING WAYFINDING AND ORIENTATION IN A SHOPPING MALL

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M.F.A. in Interior Architecture and Environmental Design

Supervisor: Assist. Prof. Dr. Feyzan Erkip

June, 1997

The aim of this thesis is to study the main factors which affect the wayfinding and orientation of individuals in a shopping mall and explain how their behaviors are influenced by these factors. The spatial and individual factors and their properties are defined. Among the spatial factors, shape and dimensions, light and color, building configuration, visual accessibility, circulation systems, and signage are considered. Age, gender, occupation, disability, individual psychology and purpose(s) are analyzed as individual factors. Also, the relation between the shopping activity and wayfinding are discussed. The profile of a sample from the Turkish society is tried to be clarified through their wayfinding behaviors during shopping. Properties of a shopping mall is defined from the point of wayfinding, and a case study is conducted in Karum Shopping Center, Ankara.

Keywords: Wayfinding and orientation, wayfinding in shopping, shopping mall, means of wayfinding.

ÖZET

BİR ALIŞVERİŞ MERKEZİNDE YOL BULMA VE YÖN TAYİNİNİ ETKİLEYEN MEKANSAL ETKENLER

Güler Ufuk Doğu

İç Mimarlık ve Çevre Tasarımı Bölümü Yüksek Lisans Çalışması

Danışman: Yrd. Doç. Dr. Feyzan Erkip

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Bu tezin amacı bir alışveriş merkezindeki yol bulma ve yön tayinini etkileyen temel faktörleri incelemek ve bu faktörlerin bireylerin davranışları üzerindeki etkilerini açıklamaktır. Mekansal ve kişisel etkenler ve nitelikleri tanımlanmıştır. Mekansal etkenler arasında biçim ve boyutlar, ışık ve renk, bina yapısı, görsel erişilebilirlik, dolaşım sistemleri ve işaret sistemleri dikkate alınmıştır. Yaş, cinsiyet, meslek, engellilik, kişisel psikoloji ve amaçlar, kişisel etkenler olarak değerlendirilmiştir. Türk toplumundan bir kesimin alışveriş sırasında gösterdikleri yol ve yön bulma davranışları açıklanmaya çalışılmıştır. Bu amaçla bir alışveriş merkezinin nitelikleri yol ve yön bulma açısından tanımlanmış ve Ankara'da, Karum Alışveriş Merkezinde bir alan araştırması yürütülmüştür.

Anahtar Kelimeler: Yol bulma ve yön tayini, alışverişte yol bulma, alışveriş merkezi, yol bulma yöntemleri.

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I would like to dedicate this work to my grandmother and grandfather, Trkan and Sedat Suverir.

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SPATIAL FACTORS AFFECTING WAYFINDING AND ORIENTATION IN A SHOPPING MALL

1. INTRODUCTION

Designers are liable of designing spaces in respect to their prospective users. It is their responsibility to enable users to understand where they are and how they can reach or use the services provided; people feel disoriented when they do not have or cannot develop a plan to reach their destination. Thus, designers must be aware that wayfinding is an important criterion which makes a space design appealing or not. Amenities provided for people who do not know how to reach them are bound to be disfavored. We receive information from the environment all through our lives, and this affects our behaviors physically and psychologically as the brain and body give reactions to stimuli from the environment. The acquisition of spatial knowledge in large-scale environments is of interest to both environmental and cognitive psychologists. Environmental psychologists view this learning process as an important aspect of a person's multidimensional relationship with his or her surroundings, both physical and artificial (Golledge, 1987; Evans and Garling, 1991; cited in Magliano et al., 1995). From this perspective, environmental learning is of instrumental value in purposeful activity (Canter, 1991; cited in Magliano et al., 1995). It is worthwhile noting that it is

purposeful in both a specific, immediate sense and a general, latent sense. The former refers to instances in which the traveler's goal is to reach a specific destination under constraints such as time, distances, or energy efficiency. The latter refers to instances in which the traveler's goal is literally to acquire spatial knowledge for subsequent use (Magliano et al., 1995).

With these concerns in mind, the aim of this thesis is to determine the spatial factors and how they affect our wayfinding and orientation in a specific environment, namely in a shopping mall.

In the second chapter wayfinding and orientation will be discussed from two point of views: the importance of wayfinding and orientation and factors affecting wayfinding and orientation. In the first part of the chapter, perception, cognition and cognitive mapping are examined, then, personal control in public spaces and the legibility and familiarity of spaces will be discussed as these are important issues in understanding wayfinding and orientation. The second part of the chapter discusses the spatial and individual factors which affect wayfinding and orientation; and the relation between wayfinding and human behavior is discussed.

In the third chapter the impact of wayfinding on the shopping activity is discussed. Shopping is discussed as a human activity and is considered in two parts:

shopping with a specific intention and shopping as a leisure activity. The second part of this chapter determines and discusses the means of wayfinding in a shopping mall.

The fourth chapter consists of a case study on wayfinding in the Karum shopping mall in Ankara. In this case study the factors affecting wayfinding and orientation of people in their specific settlement are studied and discussed.



2. WAYFINDING AND ORIENTATION

Wayfinding is the ability to learn and remember a route through the environment (Blades, 1991; cited in Kitchin, 1994) with the overall goal being able to relocate from one place to another in large-scale space (Gluck, 1991; cited in Kitchin, 1994). Spatial orientation refers to the process by which a person knows where he or she is relative to something else (Garling and Golledge, 1989; cited in Peponis et al., 1990). Both wayfinding and orientation use high level cognitive processes.

Wayfinding is the term that refers to a rather narrow concern: that is, how well people are able to find their way to their particular destination without delay or undue anxiety (Peponis et al., 1990).

Wayfinding was the term introduced to describe the process of reaching a destination, whether in a familiar or unfamiliar environment, and it is best defined as spatial problem solving. Within this framework, wayfinding comprises three specific but interrelated processes:

- 1) Decision making and the development of a plan action.
- 2) Decision execution, which transforms the plan into appropriate behavior at the right place in space.

3) Information processing understood in its generic sense as comprising environmental perception and cognition, which in turn, are responsible for the information basis of the two-related processes (Arthur and Passini, 1992:25).

Spatial orientation has been defined in various terms but all refer in one way or another to a person's ability to determine his or her location in a setting (Arthur and Passini, 1992). According to Passini (1984), spatial orientation and wayfinding subsume an ensemble of complex mental processes. They allow people an idea of surrounding space, of their positions in that space, and they allow purposeful movement within that space. People must reach a great number of destinations during a typical day, and they are normally aware of their positions in the surrounding space and in the larger environmental context. Not only are people quiet efficient at these movements, but they execute them often in an automatic or semiautomatic fashion. When everything works according to plan, the mental operations required will pass unnoticed.

However, the state of being disorientated, of being confused about one's position in a surrounding space and the actions necessary to get out of it, is a deeply felt experience (Passini, 1984). Disorientation is a problem that has preoccupied mankind in the past and as the built environment has grown in size and

complexity, it has intensified. Disorientation can provoke frustration and stress and may have disastrous consequences. Lynch explains that to get lost is a rare occurrence but

let the mishap of disorientation occur and the sense of anxiety and even terror that accompanies it reveals to us how closely it is linked to our well-being. The very word "lost" in our language means much more than simple geographical uncertainty: it carries a tone of alter disaster (1960:4).

The experience of disorientation, especially if it occurs frequently, might be expected to heighten anxiety about performing wayfinding tasks which may be called spatial anxiety (Lawton, 1994). Buildings are often difficult for wayfinding under normal conditions, but very particular and often critical wayfinding problems occur when buildings have to be urgently evacuated as in case of fire (Passini, 1984).

To sum up wayfinding design has a major impact on all users of the built environment by;

- 1) affecting their emotional state, including their feelings about the setting and its tenants.
- 2) having a functional impact which is measurable in terms of efficiency and monetary value.

3) involving accessibility and public safety (Arthur and Passini, 1992, p.11).

2.1. Importance of Wayfinding and Orientation

Wayfinding and orientation are means of achieving goals such as reaching a destination, aim or purpose in our everyday lives. If not for the ability of wayfinding, we would not be able to travel from one room to the another without the help of someone else. Apart from helping one to localize his or herself in space, wayfinding and orientation help the individual maintain his or her safety and therefore peace of mind. When one does not have an idea of the space he or she is in, problems occur such as confusion, anxiety, stress etc. that may lead to hazardous results. Wayfinding problems have been shown to cause negative emotional, psychological reactions in individuals. In shopping centers, wayfinding problems which range from shoppers not being able to find the stores they seek, to becoming lost and disoriented in the mall are not simply minor irritations or inconveniences. On the contrary, there is substantial evidence that they can be negative and stressful experiences for many people (e.g. Zimring, 1981, and Nelson-Shulman, 1983-1984, cited in Yoo, 1991). Shumaker and Reizenstein (1982, cited in Yoo, 1991), indicated that wayfinding induced stress can result in increased blood pressure, headaches, fatigue, and may even cause individuals to feel helpless.

2.1.1. Perception, Cognition and Cognitive Mapping

Perception is the initial gathering of information by the sense modalities of the human body, and is the major guide enabling one to understand the environment (Gifford, 1987). It is important to the viewers to associate the meanings, forms and spaces with each other, in order to define a grammar that can be used to create meaningful architectural components (Jules, 1974). Therefore human perception plays an important role to understand the perceptual significance and influence of space and form in design. Jules (1974) points out three elements that stand out in our ability to sense and understand an architectural environment, these are sight, balance, and touch by which senses tend to corroborate perceptions of the physical environment.

It is important to understand specifically how the eye and brain working together affect our conceptualization of the environment in which we live and what this implies in terms of architectural design. The visual field is the area in which objects are visually perceived. The visual field is limited to our ability to perceive characteristics of the environment. The eye perceives light; we perceive motion, brightness, color, and form. In daily life our eyes direct our attention to various significant objects within our visual field during the process of scanning and glancing (Jules, 1974).

Environmental perception is based on this process of scanning and glancing.

Objects or messages are focused upon for a short period of time. The image thus obtained is held in a short-term visual (iconic) memory which has a limited retention capacity. The limited capacity of this short-term visual memory has a marked impact on the graphics, in particular, on the presentation of written messages. Studies have shown that only a small number of written items (generally three at most on signs and maps), can be read in a glance (Arthur and Passini, 1992). If more than three items are presented, they should be grouped into packages not exceeding that desired limit. The wayfinding person will then be able to read the message in a few glances (Arthur and Passini, 1992).

Form is the most dominant aspect of architecture to be perceived (Jules, 1974). As we scan horizontally more than vertically, elements located on the horizontal band of vision are perceived easier. According to Jules (1974), at times we may seek something which is represented by a symbol or sign, and such information is usually displayed above the horizon line and we have learned to look for it there.

Certain theories of perception suggest that a person's perceptual/cognitive systems extract dimensional information from the stimulus display, and that it is used when judgments of similarity are required (Ward et. al, 1981).

Cognition is the processing of the information gathered by perception through storing, organizing, and recalling them (Gifford, 1987). Lang (1987) states that there is a strong correlation between activity systems and the cognitive images people have of the physical environment. Distortions in imagery do reflect and/or affect the perceptions people have of such things as the location of shops, parks and other facilities. The perception of the distance of facilities is also affected by such things as the geometry of paths. "Navigation through any complex architectural environment cannot depend wholly upon direct visual perception - which is localized - but requires a more abstract understanding of the way which local parts are interrelated into a whole pattern" (Peponis et al. 1990:559).

The representation people have of their surrounding environment, also called an image or a cognitive map, is the psychological concept that underlies the notion of "spatial orientation". A "cognitive map" is a mental construct of an environment which cannot be seen from one single vantage point alone. It has to be composed from a series of individual vistas. Cognitive mapping is therefore a mental structuring process that integrates into a whole that has been perceived in parts (Arthur and Passini, 1992).

From a cognitive perspective, spatial orientation is based on the ability to form a cognitive map. You are considered spatially oriented if you have an adequate

cognitive map of the surrounding setting and are able to situate yourself within that representation. This conceptualization of spatial orientation has not only generated a great deal of research on cognitive maps, their nature, their composition, their evolution through a life span, but it has also proven useful in exploring some of the spatial characteristics that facilitate cognitive mapping (Arthur and Passini, 1992).

Spatial cognition concerns the way we acquire, organize, store, and recall information about location, distances, and arrangements in the physical environment. It involves spatial problem solving, navigation, trying to make sense of a street system, being lost, selecting and rejecting wayfinding information that may help or mislead, and interacting with the everyday three dimensional environment (Gifford, 1987:30).

Spatial Cognition is also defined as “the knowledge and internal or cognitive representation of the structure, entities, and relations of space; in other words, the internalized reflection and reconstruction of space in thought” (Hart and Moore, 1973; cited in Kitchin, 1994:1).

Environmental Cognition refers to

the awareness, impressions, information, images, and beliefs that people have about environments. It implies not only that individuals and groups have information and images about the existence of these environments and of their constituent elements, but also that they have impressions about their character, function, dynamics, and structural interrelatedness,

and that they imbue them with meaning, significance, and mythical-symbolic properties (Moore and Golledge, 1976; cited in Kitchin, 1994:1).

According to Kitchin (1994), cognitive mapping can be thought of as a marriage between spatial and environmental cognition.

Spatial orientation and wayfinding cannot be explained by a special innate sixth sense, nor by any acquired sense of direction. Instead, mental or cognitive processes have to be assumed that are capable of organizing perceived parts of the environment into a map-like ensemble respecting certain geometric properties. Spatial orientation could, therefore, be described as a person's ability to mentally determine his position within a representation of the environment made possible by cognitive maps. Passini (1984) proposes that spatial orientation or the semantically more appropriate term of wayfinding can be defined as cognitive processes comprising three distinct abilities: a cognitive-mapping or information-generating ability that allows us to understand the world around us; a decision-making ability that allows us to plan actions and to structure them into an overall plan; and a decision-executing ability that transforms decisions into behavioral actions. Both decision-making and decision-executing are based on information generated by cognitive mapping. Therefore, it would be appropriate to define and discuss what cognitive mapping is.

Cognitive Mapping is "...a process composed of a series of psychological transformations by which an individual acquires, stores, recalls and decodes information about the relative locations and attributes of the phenomena in his everyday spatial environment" (Downs and Stea, 1973a, cited in Kitchin, 1994:1). Kitchin (1994) states that cognitive maps suspend impressions, thoughts, feelings and ideas until, for some reason, consciously or unconsciously, the mind solicits, changes, and often distorts or manipulates its contents for some immediate purpose. In this way cognitive maps (images) allow us to bridge time, by using past experiences to understand present and future situations. He adds, that cognitive maps are not just a set of mental structures denoting relative position, they contain attributive values and meanings. As Wood and Beck (1989, cited in Kitchen) explain, the cognitive map is not independent of meaning, of role, of function, of need, of end, and of purpose. This distinction leads to the conclusion that a cognitive map includes knowledge about places as well as knowledge consisting of spatial relationships (Kaplan, 1976, cited in Evans et al., 1980) and that cognitive maps involve the integration of "images, information, and attitudes about the environment" (Spencer and Blades, 1986, cited in Kitchin, 1994). In a real world setting the observer is an interactive part of the environment, not a passive observer of stimulus objects. The environment surrounds the observer and is viewed from multiple vantage points as it is explored (Evans et. al, 1980). In addition, Evans et. al (1980) state that a good cognitive map facilitates movement

through the actual physical setting represented by the cognitive schemata of that space.

According to Sanoff (1991), there is a distinction between knowledge about places and about spatial relationships. Spatial knowledge consists of knowledge of routes and of the locations of key environmental features. Therefore, a cognitive map is a mental construct that directs the selection of immediately available information in the environment (Neisser, 1976). A cognitive map influences and is influenced by the information in the environment. Thus, there is a mutual dependency between direct perception of the properties of the environment which cannot be directly perceived. Cognitive maps are acquired predominantly through the direct experience of walking from one place to another. A resulting knowledge is gained about spatial relationships, places, and about where spatial knowledge consists of knowing routes and locations of important places. A cognitive map, then, is related to spatial orientation, navigation, and recognition. (Sanoff, 1991).

According to Moore and Golledge (cited in Arthur and Passini 1992), two aspects of environmental cognition can be distinguished:

1. The knowledge people have about the given components of a setting; such as the buildings they remember in a cityscape.

2. The understanding of the spatial characteristics of a setting; which has already been described as a cognitive map.

Moeser (1988) also states that throughout the cognitive mapping literature there is the assumption that a person's mapping system of the environment automatically develops into a more complex representation as that person gains experience traversing that environment. Generally it is assumed that the person initially forms simple landmark and/or route maps but as he or she continues to traverse the physical space these mental representations develop into more complex survey maps.

Psychologists such as Hart and Moore (1973) and Piaget et al. (1960) have argued that there are three stages in acquiring spatial knowledge of the environment (cited in Evans et al., 1981). The first stage consists of structuring a cognitive representation of a few stable landmarks from the person's unique experiences. This is followed by a "route map" that connects these separate landmarks into a chain of paths and connected items. The final stage in cognitive map development is represented by a "survey map" which represents a configuration of routes and objects into a gestalt pattern and includes knowledge of distances that have never actually been traversed (Moeser, 1988).

According to Evans and the colleagues (1981);

landmarks function as initial anchor points in environmental learning. And, human beings initially learn the relative position of landmarks in space. Exact landmark location emerges as a function of increasing path interconnection among the initial anchor points. As more routes are filled in between these points, the exact locus of each point is fine tuned, since fewer alternative loci are possible given the dual constraints of interlandmark position and spatial relationships with the emerging path network (103).

In his seminal work on environmental cognition, *The Image of the City*, Kevin Lynch (1960) reasoned that cognitive maps of cities function primarily as orientation aids and reflect basic elements of the physical city form. His research suggests five key features that comprise cognitive maps of urban settings: paths (see Fig. 2.1.), path intersections (nodes) (see Fig. 2.2.), landmarks (see Fig. 2.3.), districts (see Fig. 2.4.), and boundaries (edges) (see Fig. 2.5.).

Passini (1984, cited in Carr et al., 1992) fits Lynch's city scale into building scale: paths defined by Lynch as "channels along which the observer customarily, occasionally, or potentially moves" are exemplified as corridors, promenades, walks on galleries, to be equivalent at the building scale. Landmarks are "a type of point-reference, ...a rather simply defined physical object..." (Lynch, 1960). Passini (1984) adds this definition "a clearly remembered and well localized element in space". Examples are particular shops, bars, cinemas, information booths, sculptures, and structural decorative elements. Nodes are the strategic spots in a

city into which an observer can enter, and are the intensive foci to and from which he is traveling (Lynch, 1960). In buildings, the equivalent points may be important circulation intersections, halls, and indoor squares. "Edges are linear elements not used or considered as paths by the observer...edges may be barriers" (Lynch, 1960). Passini exemplifies doors as edges which represent points where the barrier is broken. Districts described as "medium to large sections of the city, conceived as having two-dimensional extent...which are recognizable as having some common, identified character"(Lynch, 1960) are related to a public shopping zone, an office zone, although "district" is mentioned as a semantically poor descriptor by Passini (1984).



Figure 2.1 . Paths. *Creating Architectural Theory*. Lang, J., 1987:72.

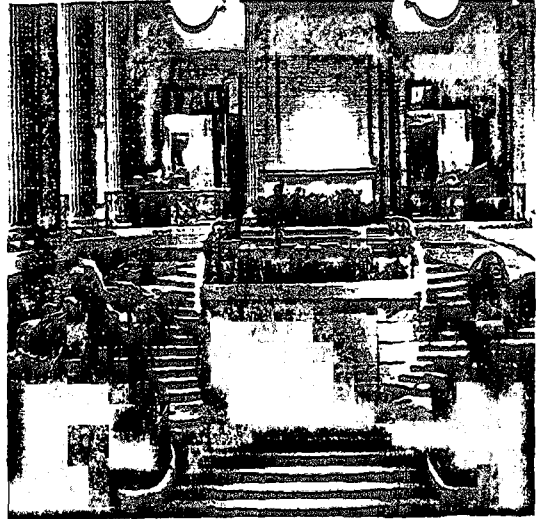
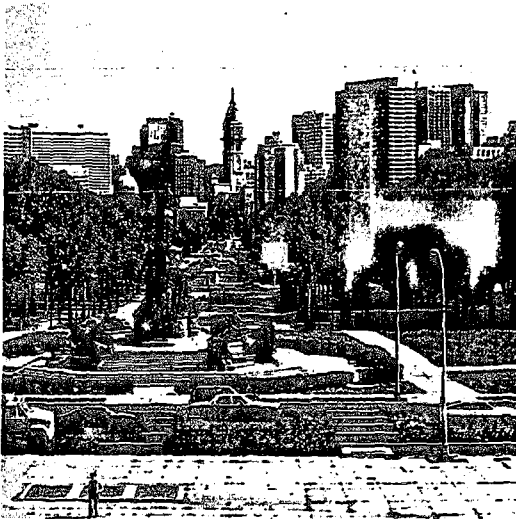


Figure 2.2. Nodes. *Creating Architectural Theory*. Lang, J., 1987:73.

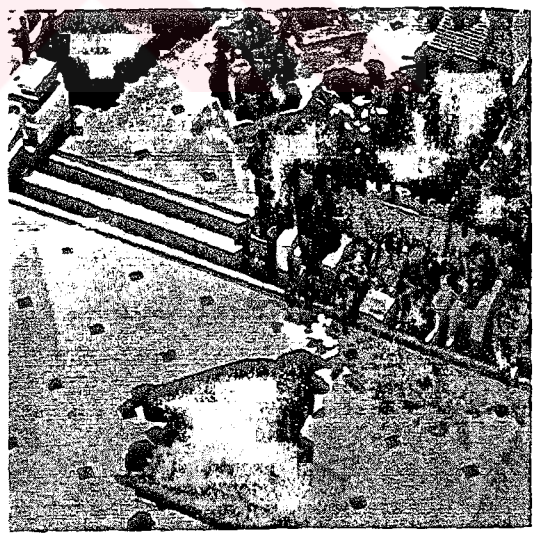
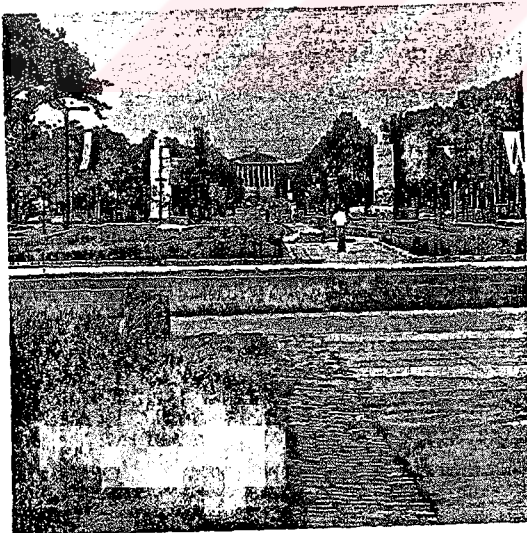


Figure 2.3. Landmarks. *Creating Architectural Theory*. Lang, J., 1987:73.



Figure 2.4. Districts. *Creating Architectural Theory*. Lang, J., 1987:74.

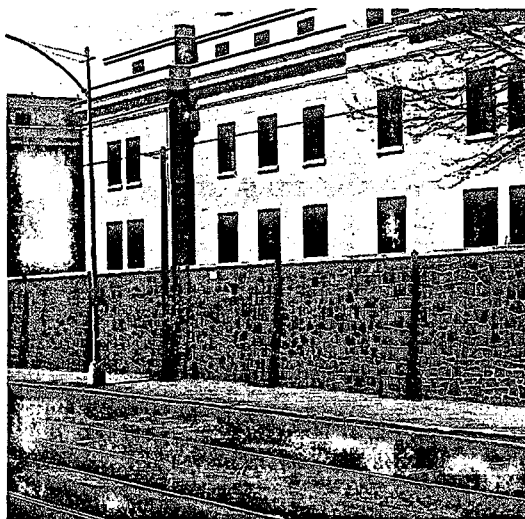
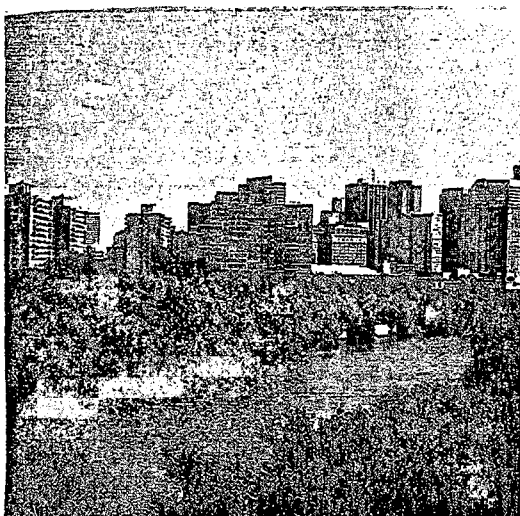


Figure 2.5. Edges. *Creating Architectural Theory*. Lang, J., 1987:75.

Lynch (1960) pointed out that depending on people's familiarity with an urban context, many different things at many different scales could function as landmark references, from tall buildings to architectural details. Weisman (1987) also suggested that many different things may qualify as landmarks, in the context of complex buildings, from their visual characteristics to their distinctiveness or their functional importance (cited in Peponis et al., 1990). Also, Evans (1980) states that clear evidence indicates that various physical features of settings such as landmark placement and street grid configurations affect setting knowledge.

Lynch (1960) describes landmarks as external points of reference from the observer that possess some distinct form that contrasts with background information. Districts are medium-sized subsections of the city that one may enter and feel "inside of".

The memorability of landmarks may be enhanced by certain physical features such as size, shape, and functional uniqueness. From the cognitive theory point of view, the landmark seems to refer to a particular way of organizing, anchoring, or remembering information with reference to discrete points as distinct from the more abstract properties of relational patterns (Peponis et al., 1990). Landmarks in interior spaces help orientation (Acredolo, 1977; Acredolo et al., 1975; cited in Peponis et al., 1990). Designers and architects are making increasing use of landmarks as part of integrated wayfinding systems for a wide variety of new

projects, from underground pedestrian walkways to airports, hospitals, and college buildings. Generally speaking, landmarks perform two principle wayfinding functions:

- 1) They help visitors to get their bearings, as Eiffel Tower does in Paris, for example.
- 2) They help staff to provide directions to visitors.

Landmarks have very real and effective uses, and they can virtually anything from a distinctive exterior structure to an interior drinking fountain. Their wayfinding usefulness is enhanced in interior spaces particularly when, as is so often the case, the space is relatively bland or uniform. The placing of physical objects to act as landmarks within buildings creates an invaluable wayfinding tool (Arthur and Passini, 1992).

Cognitive maps utilizes these five spatial elements at one degree or another. As a result, cognitive maps serve to increase personal control over space which is dealt with in the following section.

2.1.2. Personal Control, Safety and Accessibility in Public Spaces

Psychologists have embraced the idea that providing choices gives “personal control” to the individual, and that personal control is necessary to well-being (*cf.* Averill, 1973; Burger, 1989, cited in Veitch and Gifford, 1996). The pervasive view is that when personal control is lacking, feelings of powerlessness and unhappiness and decreased task performance will follow. Similarly, many environmental psychologists and designers hold that the provision of choices in the physical environment will lead to desirable outcomes (Gifford, 1987). Barnes (1981, cited in Veitch and Gifford, 1996) argued that providing choices in the physical environment is one means of preventing the detrimental effects seen in situations where control does not exist. He distinguished between ‘perceived freedom’ and ‘perceived control’: perceived freedom is the recognition that one has alternatives in the physical environment from which to choose, and perceived control is the perception that one’s choices determine outcomes. He associated perceived control with a desire for certainty, to be able to predict the outcome of a particular choice accurately and concluded that providing choices in the physical environment is generally desirable: experience with perceived freedom will lead to perceived control, in which one can anticipate the likely outcome of a particular choice, making it more likely that one will obtain the desired outcome (cited in Veitch and Gifford, 1996).

Averill (1973, cited in Veitch and Gifford, 1996) defined 3 types of personal control.

Decisional control offers the opportunity to choose between courses of action.

Cognitive control exists in "the way in which an event is interpreted, appraised, and incorporated into a cognitive set" (Cornelius and Averill, 1980, cited in Veitch and

Gifford, 1996). This type of control is closest to what is commonly termed

"perceived control". Behavioral control, according to Averill (1973, cited in Veitch

and Gifford, 1996), exists when a response is available to the individual that might

influence a threatening event.

Altman and Zube (1989, cited in Carr et al., 1992) state that user control of public

space emerges from psychological and political theory and environmental design

research as an essential ingredient for the success of urban places. Public spaces

are participatory landscapes. Through human action, visual involvement, and the

attachment of values, people are directly involved in public spaces. People claim

places through their feelings and actions. The direct or symbolic human

involvement invites an examination of control as a critical element of the values

attached to urban spaces. An ingredient of meaning is the concept of control or

people's ability to directly influence their own use and experience of a place. Carr

and Lynch (1981, cited in Altman and Zube, 1989) argue that user satisfaction is

determined largely by one's ability to control one's experience of the place.

The desirability of perceived control in a variety of situations has been found to be a prerequisite for a positive experience for some people (Burger and Cooper, 1979; Dougherty, 1988; cited in Gifford, 1987). Langer (1983, cited in Gifford, 1987) has conceptualized control to mean "mindful process of mastering". In person-environment studies, personal control has been found to be an important mediating variable in reducing stress and the perception of crowding (Baldassare, 1979; Saegert, Macintosh and West, 1975; cited in Gifford, 1987). Lynch (1981, cited in Gifford, 1987) suggests that the environmental "fit" of a person and the environment is enhanced by the ability of a person to directly control or modify his or her environment. When the ability to control the environment is reduced or eliminated, as in the case of an over crowded apartment or noisy office environment, negative experiences such as stress or social withdrawal increase.

Lynch (1981, cited in Gifford, 1987) also suggests that spatial control 'or its absence' has strong psychological consequences such as contributing to anxiety, satisfaction, and pride. He proposes five forms of spatial control: presence, use and action, appropriation, modification, and disposition. Presence is the right of access to a place; use and action involve one's ability to use a space.

Appropriation allows users to claim ownership, either symbolic or real, of a site.

Modification is the right to change a space to facilitate use. Disposition is the ability

to transfer one's use and ownership of a public place to someone else. Together these spatial rights provide a conceptual definition of control in public space.

Control is the ability of an individual or group to gain access to, utilize, influence, gain ownership over, and attach meaning to a public place (Carr et al., 1992).

There are several control issues of concern to public-space users, designers and managers. They include the growing privatization of public space by corporations and building owners, the increasing use of public spaces by the homeless and other disenfranchised groups and the role of user ownership and accessibility in satisfactory relationships with public space. Public space has become home for many people. Although there have always been homeless people in public spaces in cities, the homeless are populating in increasing numbers (Carr et al., 1992).

The ability of people to change or modify a public space is also important. There are several ways users directly personalize public environments. Personalization has qualitative dimensions that communicate messages of caring or neglect, access of restriction, and safety or fear. Access is an important prerequisite to realizing many other dimensions of public-space quality. For a space to be well used it must be accessible (Lynch, 1981; cited in Gifford, 1987). Access is also essential if people are going to be able to attach meaning to a public place.

Information has to be picked up; it also has to be interpreted. Seeing a door, a person has to understand its basic function, that of communicating to another space, and he might also have to decide whether that particular door is intended for the public or only for private use. The interpretation is facilitated by a number of design cues the person has learned to associate with private or public doors. The act of interpreting the meaning as to accessibility also applies to space itself (Passini, 1984). "Territories are spaces that individuals or groups claim as their own and over which they exercise control. In order not to intrude, a person has to pick up often subtle cues indicating the degree of personalization of the space. Private and semi-private territories not only limit access, they also prescribe behaviors, and a misinterpretation can easily lead to antagonistic exchanges" (Passini, 1984: 109).

Ownership is a direct form of spatial control. As sense of ownership increases, owner responsibility and concern for the quality of the environment often increases. To feel safe and secure in a space is also a prerequisite for space use (Stuart and McKenzie, 1978, cited in Passini, 1984). Safety is a critical issue for the elderly and children in public spaces. An ability to feel a sense of control over a space, to be able to see in, to escape easily, or to gain assistance in times of crisis are examples of how a place can be made to feel more secure.

seen the same way. The perception of an exit is often limited to the actual doors and most of the time they are all seen at short range. Exits are important when people are leaving a setting (Arthur and Passini, 1992).

Stress can be caused by the perception of danger, by time constraints, and by uncertainty. The only cause of stress that can be reduced is uncertainty.

Uncertainty about the person's safety is reduced by keeping people informed of the nature and location of the danger. Uncertainty about escape can be reduced by providing the necessary wayfinding information. Information is the best means of lessening stress (Arthur and Passini, 1992).

...In terms of emergency wayfinding, information is the answer. It can reduce anxiety, and it can reduce the effects of overload. Finally, information can lead to more efficient escape behavior. We do not need more information, we do however, need information that is more accurate and relevant to wayfinding. The prime insurance for public safety is good wayfinding design (Arthur and Passini, 1992:81).

The notion of a specific emergency exit, used only in situations of danger, should be seriously questioned. Requirements for exit routes are regulated by national fire-codes. A setting is safer if it is well understood by the users and if they can easily get around in it. Should an exit be barred by fire or smoke, the users will

generally be able to figure out alternative routes in buildings they know (Arthur and Passini, 1992).

The overall knowledge people have about the spatial characteristics of the setting with its entrances and exits will probably be their most valuable information. If the setting is well understood by the users 'that is, if they have a clear cognitive map, they will not only have all the decision' making information at their disposal, they will also be able to develop alternative options should a particular exit turn out to be barred by hazards (Arthur and Passini, 1992).

Exits also have to be used in emergency conditions. In emergency situations people move towards the familiar, while fire exits, if they are reserved just for emergencies, tend not to be used. This finding has far-reaching consequences for the design of these emergency exits. People's behavior in a fire can easily be interpreted in terms of wayfinding. Moving towards the familiar is nothing other than applying a decision plan that has already been worked out and proven successful. In a stressful situation, the person is not inclined to experiment with the unknown. The unknown is a synonym for risk. Moving towards the familiar is psychologically comforting and sometimes even justified. The narrow little passage of many fire escapes does not leave many alternative for escape and the door at

the end just might be locked. The sight of fire doors, which cannot be opened from the outside, is not always very reassuring (Arthur and Passini, 1992).

According to Pile (1988) public interiors are accessible to a large range of users and include highly visible, even spectacular spaces serve their purpose as well as to create pleasant, exciting and memorable spaces. However, Sanders (1985) claims that some buildings are not “welcoming” to everyone and many people could not realize that they are open to public (cited in Parlar, 1993).

Parlar (1993) points out that these controls and their effects on public use are significant mostly in the United States; but the problem is that these controls are not being used for the sake of the urban space but for private benefits due to the laws of private property rights give owners considerable control over both the access to and the use of interior places as long as they conform to zoning and building codes. Changes in public life are transforming the design and management of public spaces. Existing spaces have become more controlled by owners, managers, and designers. Who uses spaces become a primary concern of private-space managers, with design and management being used in favor of affluent users and against less desirable users such as teenagers, the elderly, and the homeless (Altman and Zube, 1989).

Among the criteria which define the success of an interior public space, access is an important figure to achieve continuity in the exterior and interior environments. Doors that are necessary for climate control provide the means also for access control (Parlar, 1993). The goal of public control of the environment is to make favorable differences in the lives of the public (Jackson, 1984; cited in Altman and Zube, 1989). Public control affects how the environment is used, perceived and valued. Control is a mechanism by which people come to attach meaning - both negative and positive - to public places. Concepts such as environmental meaning or one's connectedness to a place have been advanced as an important dimension of good public spaces (Carr et al., 1992). The attachment of meaning to a public space can occur at several different levels. For example, human connectedness to a place can be at the individual level. Meaning can also be attached by a group to a public space, such as teenagers or an ethnic group. Meaning can also be at a national level. Another aspect of the attachment of meaning to a public space is through direct involvement in the designing or building of a place. Direct involvement of users in the construction and maintenance of a place also may enhance meaning or attachment to a public place (Carr et al., 1992).

When, the control over space is analyzed, physical and psychological handicaps should also be considered. Fortunately, the term "accessibility" has become

synonymous with barrier-free design and evokes images of wheelchairs and ramps. Doors, for example, can be too heavy to be opened by a person in a wheelchair, ramps can be too steep, elevator buttons too high, spaces too narrow to turn around it (Passini, 1984). The built environment is responsible not only for physical but also psychological barriers. These also affect accessibility but are much less known. For example, many people fear underground parking garages. Quite apart from the fear of getting lost or of being mugged, wayfinding problems posed by certain buildings may be just too much for sections of the population to cope with. For the problem of wayfinding may be insoluble within acceptable limits of risk and energy investment (Arthur and Passini, 1994).

2.1.3. Legibility and Familiarity

The ability to effectively find one's way into, through, and out of a building is clearly a prerequisite for the satisfaction of other, higher level goals. Thus, the "legibility" of an environment - the extent to which it facilitates the process of wayfinding - may have significant behavioral consequences (Weisman, 1981).

Lynch's (1960) concept of "legibility" has had profound influence on the fields of planning and architecture. Legibility is "the ease with which it's (the city's) parts can be recognized into a coherent pattern" (Lynch, 1960:3). He also hypothesized

hypothesized that distinct, easily visible landmarks and clearly bounded city districts would enhance legibility which also make cognitive mapping easier.

At the urban scale, "landmarks" that are distinctive in size, color, or form, are functionally unique, or frequently used are more easily remembered (Appleyard, 1970,1976; cited in Evans, 1980). Furthermore, building designs with greater visual differentiation among various subsections and with more regular floor plans are more easily remembered by adults (Weisman, 1979; cited in Evans, 1980).

Color coding of building interiors also enhances legibility. For example, individuals who learned the interior of an unfamiliar building that had been color coded, performed better on actual wayfinding tasks in the building, floor plan recall and recognition tasks, and target sighting tasks than did persons who learned the building interior without the color coding (Evans, 1980).

It is possible to identify difficulties related to a person's information processing capacities concerning architectural elements and space, such as difficulties of obtaining and particularly of understanding information. Although the architecture and the spatial configuration of a building generate the wayfinding support system in that they contain the information necessary to solve the problem. Certain places lend themselves better to extracting and comprehending the relevant information. This quality is referred to as a "legibility" factor as mentioned before. A place that

facilitates the obtaining and understanding of environmental information will have a high legibility factor.

The graphic conception of signs, the choice of lettering, the contrast created by black, white, and colored elements, the size of signs, their position and illumination, all these factors contribute to the legibility and to the relative ease of finding information (Passini, 1984). Environmental communication affects cognitive mapping. The legibility of key architectural elements (such as entrances, circulation both horizontal and vertical, major landmarks) is a prerequisite to understanding the spatial organization. It is obviously not enough to have a clear spatial organization, if it is not understood. The principle of the organization has to be communicated to the wayfinding users (Arthur and Passini, 1992).

Typically, visitors trying to make use of the information displayed for their benefit may encounter one of the two major flaws:

- 1) The information may not be legible in that it is obstructed, badly placed, too small, blurred, garbled, or tactually too mushy to be perceived.
- 2) The information may not be readable in that it can be perceived but cannot be understood.

The advantages and disadvantages of information systems will be discussed in Section 3.3. in detail. Legibility and readability in complex settings can also be affected by a state of mind often described as general confusion, which is brought by information overload. This phenomenon of information processing can be averted by design interventions that help the user to find the relevant information (Arthur and Passini, 1992).

The legibility of the architectural environment has been found to affect the usefulness of a wide range of building types and to impact many user groups with effects that go beyond mere ease of use. Warner and Kaminoff (1983, cited in Yoo, 1991) found that legibility in a correctional center significantly reduced user confusion, anger, perceived crowding, and overall emotional discomfort. On the other hand, Berkeley (1973), Dixon (1968), and McKean (1972) report that anger, hostility, and indignation resulted when users were faced with "illegible" public buildings (cited in Yoo, 1991). Weisman (1981) suggests that the degree of architectural legibility can affect goal satisfaction, sense of control, and safety for the institutionalized elderly.

There have been studies designed to examine various effects of building familiarity in conjunction with other variables. Garling et al. (1983) found that accuracy in

locating building targets was positively correlated with familiarity and with free viewing access (cited in Moeser, 1988).

One obvious and potentially powerful influence upon wayfinding behavior may be the degree of familiarity an individual has with a given setting. If increased familiarity is sufficient to overcome any initial difficulties in orientation, then efforts might simply be diffused toward increasing the knowledge level of naive users of a setting. If on the contrary, familiarity alone does not explain disorientation, then other factors, such as visual/spatial features of the environment, ought to be considered (Weisman, 1981).

Not much appears to be known about what factors facilitate orientation in buildings, although common sense suggests a number of possibilities. Familiarity with a building is almost certainly a factor, but to what degree orientation is facilitated and how important this factor is relative to other factors are questions that need to be answered.

When we move about in a familiar environment we seldom experience disorientation. We also seem to be able to learn new spatial facts with little difficulty. This may be the case in an unfamiliar environment too if we possess a legible map and are skilled at using it. These familiar examples may indicate that

the acquisition of a cognitive map by direct observations is an automated process not requiring cognitive resources to any great extent (see Fig. 2.6.).

Recognition would seem to serve an important role for orientation. Recognition of places is not possible unless the environment is to some extent familiar. Maps, sign posting, and other media may, however, play an important role for orientation in unfamiliar environments. The use of media in such cases is likely to involve recognition processes. Familiar examples are recognition of places specified by path descriptions, translating symbols in maps to the environment, and so forth (Garling et al., 1985).

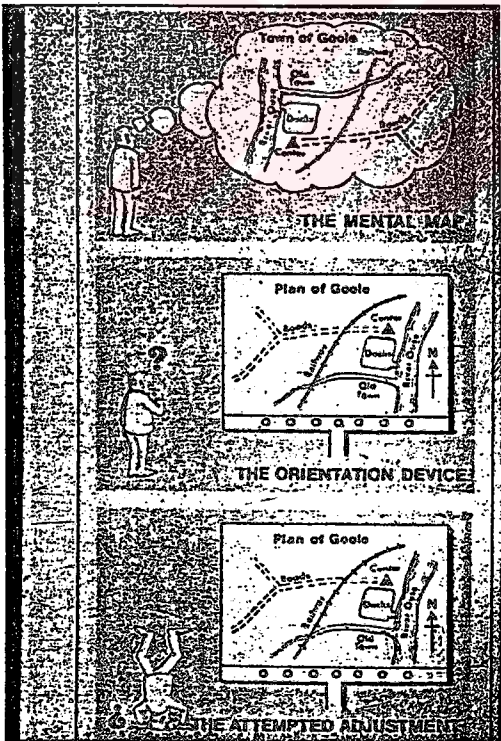


Figure 2.6. A Cognitive Map.

2.2. Factors Affecting Wayfinding and Orientation

The relation between wayfinding and human behavior may be seen as an outcome of wayfinding and orientation which makes influencing factors more prominent.

Two main factors affecting wayfinding and orientation may be distinguished as,

- 1. Spatial Factors**

- 2. Individual Factors**

People rely on numerous types of environmental information to find their way within buildings. Weisman (1981) developed four groups of environmental variables thought to influence wayfinding: (a) visual access to familiar cues or landmarks within or exterior to a building; (b) the degree of architectural differentiation between different areas of a building that can aid recall and orientation; (c) the use of signs and room numbers to provide identification or directional information; and (d) plan configuration, which can influence the ease with which one can comprehend the overall layout of the building.

2.2.1. Spatial Factors

The factors within a space that affect our wayfinding abilities are the shape and dimensions of that space; the colors within the space, how it is illuminated and the forms are emphasized; the building configuration and visual accessibility; the circulation paths; and the signage system.

People finding their way in complex settings will try to understand what the setting contains and how it is organized. In order to form a mental map of the setting, they have to identify things to map. Among the basic building blocks of cognitive mapping are spatial entities. People can only map these spatial entities if they are distinct, if they have an identity that distinguishes them from surrounding spaces (Arthur and Passini, 1992:85).

Similarly, decision making can only be sustained if destinations and intermediate sub-destinations have an identity distinguishing them from other places. The same applies to decision execution. A place has to be recognized before a decision can be transformed to behavior. Distinctiveness giving places their identity is, thus a major requirement for wayfinding. This can be achieved by the form and volume of the space that defines architectural and decorative elements and by the use of finishes, light, colors, and graphics (Arthur and Passini, 1992: 85).

2.2.1.1. Shape and Dimensions

The length, width, height, and also the shape of a space is important such that the viewer perceives the space by these qualities. According to Jules (1974) space is considered basically as volume, in which neutral space forms the inside static volume with its center of gravity centered on itself. This volume which is called space has to be in interaction with other volumes to be able to form an environment. He describes the first step of manipulation on this volume as creating links with the surrounding environment. This is done with openings such as doors and windows on the planes. The location, size, shape, and number of openings play a role upon the personality of the place, by enhancing or diminishing the relationship with the environment; and the form of a space plays an important role in the way one perceives the spaces and influences the manner in which activities take place (Prak, 1968). The size of spaces is due to their height. Therefore, scale and proportion gain importance. Scale is used to discuss the size of a space relative to the size of something else. And, proportion is a mathematical relationship of length, width, and height of spaces. According to Prak (1968), form of spaces is due to proportion, size, angularity, regularity, plasticity, and isolation of these spaces. Proportion is the classification of forms according to their relations of length to width, and width to height. If for example, a space is too long or too high, the viewer will be unable to perceive the space as a whole, at least

perceive it with perceptual distortions, and thus, feel uncomfortable, furthermore disoriented. The shape is important in that it may hide spaces behind corners, etc. such factors create illegible spaces which increase disorientation and wayfinding difficulties. It is assumed that most architectural settings, as with larger scale environments, are too extensive to be perceived in their entirety from any one location; it is necessary that information regarding specific locations, and the spatial relationships among locations, be stored in one's head.

Evans, Smith, and Ezdek (1982, cited in Peponis et al., 1990) report that the ability of people to recall a building and its location in an urban context depends on a wide range of factors including shape, the number of persons moving around the building (i.e. crowd), the degree of physical maintenance and height.

2.2.1.2. Light and Color

Light is important as vision is dependent on adequate light level. The requirements in this respect increase with aging and reduced eyesight. Some people suffer from temporary blinding caused by strong light contrasts, when moving from light to dark, and dark to light. It is therefore important to keep a constant level of illumination throughout the setting and to avoid glare by controlling the direction of light (Paşşini and Arthur, 1992). The illumination of spaces according to their

function and importance may enhance the recognition, allowing easier wayfinding.

The usage of skylights in buildings allow a means of solar orientation as well as natural daylighting. Evans and the colleagues (1980) found many errors in wayfinding behavior in a building in which the walls were painted in a monochromatic beige, but significantly fewer errors in the same building when various sections of the walls were painted in distinct colors. Therefore as Evans and the colleagues (1980) explored, to use a color-coding system may be a good approach.

Lang (1987) states that color helps to differentiate between elements in a setting and / or between settings themselves. To make the seeing of objects easier they can be of contrasting color to their backgrounds. Large brightly colored areas, on the other hand, fatigue the eye and can produce after-images, especially when there is variation in the brightness of the surfaces of the environment. Strongly contrasting colors do, however, attract the eye but too many eyecatchers are confusing.

Two emotional states which are directly conditioned by expectations are security and insecurity. It is common knowledge that the unfamiliar breeds fear; we are afraid of the dark at least partly because it is inherently informationless. In designing lighting which is intended to engender a feeling of security, the

expectations of the users must always be one of the most important inputs to the design process. It is indicated that where there is fear of crime, every shadow is perceived as potentially threatening (Passini, 1984).

2.2.1.3. Building Configuration and Visual Accessibility

As mentioned above, it is assumed that most architectural settings, as with larger scale environments, are too extensive to be perceived in their entirety from any one location. Thus, it is hypothesized that such visual /spatial variables as type(s) of signage provided, the ability to see through or out of a setting, the extent to which one location looks "different" from others, and the overall plan or layout of a setting may all impact wayfinding behavior (Peponis et al. 1990, p. 190).

Beaumont, Gray, Moore, and Robinson (1984) interviewed building users and found that floor plan layout was equal in importance to other architectural features, such as signage (cited in O'Neil, 1991).

The overall plan configuration of a building and particularly the ease and accuracy with which one can build a mental image of it, may have some considerable impact upon wayfinding behavior. Thus, McKean suggests that they are "a reflection of the incomprehensibility of the complex" (1972; cited in O'Neil, 1991). Several environmental researchers (Appleyard, 1970; De Jonge, 1962; Lynch, 1960; cited

in Peponis et al., 1990) have suggested much the same with respect to urban scale settings. Specifically, they have invoked the Gestalt psychology laws of perceptual organization and "good form" in characterizing spatial relationships most readily represented in an individual's cognitive map. Among those qualities of "good form" seen as relevant are symmetry, regularity, and continuity (Canter, 1974; cited in O'Neil, 1991).

In respect to wayfinding, the form of a building's volume is particularly instructive. It provides the users with cues about the internal organization and the circulation system. The circulation is of course the key organizing force of a layout; it is also the space in which people move and in which they have to find their way. Thus it is this space that we try to understand and it is in this space that we have to make our wayfinding decisions (Arthur and Passini, 1992).

It has been mentioned before that people rely on numerous types of environmental information to find their way within buildings and on plan configuration, which can influence the ease with which one can comprehend the overall layout of the building. Related to floor plan configuration, research suggests that the quantity and complexity of relations between choice points (Hiller et al., 1984; Peponis et al., 1990) such as hallway intersections in buildings, may influence wayfinding (cited in O'Neil, 1991).

Of these variables, a number of studies suggest that the complexity of floor plan configuration is a primary influence on wayfinding performance. Weisman (1981) found that students reported being lost less frequently in university buildings whose floor plans were judged "simpler" and more "legible". This effect remained even for people who were very familiar with the buildings. Bronzaft and Dobrow (1984, cited in O'Neil, 1991) suggest that simplicity and regularity of floor plans aids people in learning about the layout of a space. O'Neil (1991) found that with even incremental increases in floor plan complexity, people have significantly greater problems understanding spatial layout, and reduced wayfinding performance. In the context of a shopping center, Galper (1987, cited in Yoo, 1991) notes that "inability to see from one end of the mall to the other, ... and the presence of landscaping or architectural features blocking the view of major destinations can contribute to wayfinding problems in these settings" (69).

O'Neil (1991), suggests that complexity of floor plan form negatively influences wayfinding performance. Weisman (1981) found that the most serious disorientation problems occurred in buildings judged as being the most complex and difficult to describe. He found that floor-plan complexity was able to account for 56 per cent of the variance in wayfinding difficulty (Moeser, 1988). Peponis and the colleagues (1990), argue that the structural properties of building layout help to throw new light on wayfinding performance. They suggest that after relatively brief

relatively brief exposure to a building, people tend to consistently direct themselves toward the spaces from which the rest of the building is more easily accessible. Thus they seem to acquire an understanding of configurational properties rather than merely relying on landmarks, signs, or other cues (Peponis et al., 1990).

Peponis et. al (1990) also state that configuration refers to the way in which spaces are related to one another, not only pairwise but also with respect to the overall pattern that they constitute. In other words, configuration is about the overall pattern that emerges from pairwise connections rather than elements or single connections taken by themselves. As people get to know a layout as a relational pattern, they also build expectations of probabilities of encounter. Configuration is a concept that may refer to both the pattern of built space and to some spatial effect upon the pattern of use (Peponis et al, 1990). Garling et al. (1983, cited in Moeser, 1988) found that subjects with restricted visual access had difficulty in locating building targets.

The main assumption behind floor plans is that they convey information about the layout of a building that cannot be mentally represented until the building is repeatedly traversed. Or until the individual traversing the paths gets familiar with the built environment. In the words of Garling and the colleagues (1983): "If floor

plans are satisfactory in their primary function, they should facilitate improvement of orientation in a building. They should furthermore do so when it is more needed, that is, when the visual access to the building layout is poor" (143).

The difficulty of a wayfinding task is affected by two major physical factors: the layout of the setting and the quality of the environmental communication. The layout is defined by its spatial content, its form, its organization, and its circulation. Environmental communication includes all of the architectural, audible, and graphic expressions that provide the essential information for wayfinding (Arthur and Passini, 1992).

2.2.1.4. Circulation Systems:

The results of studies (e.g. Appleyard, 1970; Lynch, 1960; cited in Moeser, 1988) suggested that most people first establish a mental representation of familiar path routes, then position landmarks, boundaries and districts in relation to these paths. Thus the urban planners stressed that path structures were the most critical features in the initial learning of the physical environment.

The form of the circulation system may be more or less visible to the users of a setting. Buildings organized around an open well have the advantage of providing

the users with a visual and sometimes auditory access to the form of the circulation system (Arthur and Passini, 1992). The architectural expression of the circulation system makes for a building that is much easier to understand. Among the most difficult settings to understand are those underground, including parking garages, subway stations, shopping malls and multifunctional urban complexes.

Building form can express the spatial organization of the setting and the linking circulation system. The fully articulated building tells us everything about its internal central organization. Clearly, a person perceiving a well-articulated building is in possession of valuable wayfinding information. The perceived spatial organization serves as a framework for building a cognitive map and for integrating information that will be obtained inside (Arthur and Passini, 1992). The form of the circulation system in a building should be perceivable to the occupants.

Architectural expression of the system makes easier understanding of the building.

The phases of spatial planning and forming a layout in a building is: identification of spatial units and zones. All these reflected to the setting will give strong wayfinding information to the user. Perception of the main circulation system of a building is highly increased if the system is reflected to the exterior form of the building. That may be the reason of why people have difficulty of spatial orientation in underground buildings.

The perception, use and accessibility of the tracks used to reach a desired destination is a very important need for the occupants of a building. The articulation of paths must help to indicate the direction of movement, to understand the configuration of the circulation system, and to indicate whether the destination is accessible or not. The main spatial features that define paths are guiding structures at the sides, above or below a path, or a combination of these. By using color, material and texture differences in these features, creating special illumination, providing visual impact by structural and decorative elements of walls, columns, ceilings and floors, the path may be emphasized. Perception of a path being private or public, may also be indicated by these features (Arthur and Passini, 1992:132) .

Paths that provide vertical access, such as elevators, escalators and stairs must be considered strongly within the spatial layout in the building. They should be perceived clearly, architecturally expressed and visible. They should not be hidden and underestimated. They can be strong architectural features and there is absolutely no reason why it should be necessary to install signs leading to them (Arthur and Passini, 1992).

Some settings where the paths are perceived as a distinct geometric form does not seem to exist, the wayfinder will seek distinct anchor points at certain places along the path especially at the intersection points of paths. Architectural features and landmarks should be provided at certain segments of the route and at the intersections of routes to help the occupant. In settings where the system is based

on an organized geometric principle, the principle has to be perceived by the occupants, in order to be useful for wayfinding. If the form is not perceived, a directory or map should be provided. In symmetrical settings, the circulation system may be easily understood, but there may be an orientation problem, so architectural features to help the users distinguish one side from another should be provided.

2.2.1.5. Signage

Wayfinding design is basically a set of tools, devised to help people reach their destination in an unfamiliar environment. With the emergence of large, public spaces which are above the perception scale of human, the need for such solutions has increased greatly. It is evident that people have certain difficulties in perceiving and understanding such environments, not because they are ignorant or stupid, but because the environments are complicated (Sims, 1991).

Signs communicate environmental information, they tell the viewer what is where and, when they refer to an event, signs may also specify when and how likely it is to occur. Almost all the difficulties a person may experience in wayfinding have their source in some phase of processing this environmental information. The problems with finding relevant information in public settings like hospitals,

shopping complexes or schools etc. at the urban scale are common impediments to efficient wayfinding. The information can be ambiguous or incomplete, requiring particular effort of interpretation. Even if the information is obtained and the message is understood, the wayfinding person is not necessarily safe. Part of the information might be forgotten when it comes to be reused after a certain lapse of time (Passini, 1984).

Information can be obtained from various wayfinding support systems such as information booths, signs, maps, as well as the architectural and spatial characteristics of a setting (Passini, 1984).

Most efforts cope with the issue of people's getting lost, and to prevent them from getting lost, have relied on putting up signs. It is well known and fairly universally acknowledged that putting up signs is one of those efforts that somehow has to be complied with, but the rewards for which can, on occasion, be doubtful. People can often be as lost with the signs, as they are without them and for a variety of reasons such as the following:

- 1) The signs are there, but people can not see them because they were too small.

- 2) The sign is big enough for its message to be seen, but it makes no sense; people could see it, but not read or understand it.
- 3) Because the sign is poorly located, people can not find them.
- 4) Because people expect the signs to be unreliable, they ignore them, preferring to ask questions instead (Arthur and Passini, 1992).

Signage is commonly employed to compensate for the complex floor plan layouts of settings such as subways, hospitals, and large buildings. These are environments in which wayfinding is a chronic problem.

Best (1970, cited in O'Neil, 1991) found that signage placed at decision points in buildings improved wayfinding performance. Corlett, Manenica, and Bishop (1972) applied Best's (1970) principles for signage placement to the renovation of a signage system in a university building, and found that people took significantly less time to find their destinations after the signs were simplified and moved to decision points (cited in O'Neil, 1991). Wener and Kaminoff (1983, cited in O'Neil, 1991) found that the addition of signage to a visitor's reception area in a correctional facility reduced visitor stress and significantly improved visitor wayfinding performance.

Overall, people make fewer wrong turns in settings with signage than in those without. O'Neil's (1991) findings suggest that graphic and textual signage may be applied to optimize different aspects of wayfinding depending on the needs of the facility. Various aspects of wayfinding performance are influenced differently depending on the combination of architectural cues available.

The implication for design is to redirect our attention from an exclusive focus on local characteristics, such as signs and landmarks, to one that also considers the overall structure of the building. As buildings get larger and more complex, it becomes increasingly difficult to provide adequate wayfinding simply with signs and other cues if the suggested pattern of movement ignores the ways people use and understand configuration. Peponis et al. (1990) suggest that wayfinding, assisted by proper signage and proper considerations of functional and organizational parameters, will seem natural rather than forced when important facilities and key points, such as the entrance, are carefully positioned with respect to the integration core and when the latter is carefully designed.

Information, in particular graphic information, has to be designed for normal environmental perceptions which consists of the scanning and glancing process. People tend to ignore information displays that are not designed appropriately, or

to walk away from such displays after spending a minimum of time in futile search (Arthur and Passini, 1992).

Passini (1984) distinguishes signs as directional and reassurance signs.

1) Directional Signs are the most common process description. They typically designate a place, an object, or an event in form of a name, symbol, or a pictograph and an arrow. A process description is composed of a coherent ensemble of directional signs positioned on a path to a destination. Such a description of location is the equivalent of a decision plan spaced along a path, with each directional sign corresponding to a decision that leads directly or indirectly to a behavioral action.

2) Reassurance Signs are the signs which to provide the environmental information needed to make wayfinding decisions. Some signs address themselves to the post-decision phase, when they act as checkpoints. The form in which a message on a sign is being presented, that is verbal, pictorial, or symbolic, is perhaps the most common method of classification.

One of the environment's most striking characteristics is complexity. The wayfinding person cannot take in everything, but must select that which is useful,

in other words, that which is relevant to the decision - making process (Arthur and Passini, 1992). The capacity to process information naturally has a limit that may vary according to the individual, to his disposition at a particular time, and to the perceptual channels involved. Conditions of stimulation exceeding processing capacities are referred to as "stimulation overloads". Excessive stimulation can inhibit information processing (Passini, 1984).

If signs are provided, the information they try to convey should surely be presented so as to facilitate easy detection. As mentioned in the previous sections, glances are of very short duration. Attached to a glance is a short-term visual memory. This memory, which has been referred to as an iconic memory in the previous sections, may last for a few seconds. For the information to be retained, it has to be coded into a memory of longer duration, and that is where the problems occur (Passini, 1984).

A common source of confusion while solving a wayfinding problem is introduced by the message a sign tries to convey. Two message-related obstacles can readily be identified: when it is not clear to whom a message is not fully understandable; and when an additional meaning, not intended by the sign, is evoked by the interpreting person (Passini, 1984).

2.2.2. Individual Factors

The ability to maintain orientation within the spatial environment varies widely between individuals. One possible explanation for these differences is that individuals focus on different types of information about the environment as they engage in wayfinding (Lawton, 1996). Environmental cognition researchers have distinguished between two types of environmental knowledge: configurational knowledge, or understanding of the spatial relationships among locations; and knowledge of places and the routes that connect them (Evans, 1980; Golledge, 1987). Configurational knowledge allows the navigator to localize places that are not perceptually available, which may then serve as reference points in determining one's position in the environment (Garling et al., 1985). Magliano et al. (1995) state that configurational knowledge is often regarded as a multidimensional representation of spatial relations involving a set of distinctive environmental features. Evans (1980) explains that the few gender or class/cultural differences found in environmental knowledge may be explained by individuals' daily activity patterns. Individuals with the greatest extent of daily range of activities have greater and more accurate knowledge of their environments.

2.2.2.1. Age

In an extension of Piaget's route-modeling experiment, an intersection of age and construction experience suggested that with greater experience the age differences diminished significantly (Evans, 1980). The higher levels of orientation strategy and lower levels of anxiety reported by older subjects may result from greater experience in wayfinding with age. The only age-related change in gender differences in Lawton's study (1994), was obtained for the orientation strategy, with a larger difference between older men and women than among younger subjects. Although both men and women reported increased use of the orientation strategy with age, this increase was sharper for men than women (Lawton, 1994).

Elderly consumers tend to have more limited and more localized images of the retail environment than younger consumers, possibly because of the constraints imposed by decreasing physical competency, diminished mobility, and decreased disposable income (Walmsky and Lewis, 1993; cited in Lawton, 1994). Age and family size were found to be important in a study to the extent that the over sixties and the families with more children had a more limited information field than the rest of the population (Lawton, 1994).

2.2.2.2. Gender

It is of interest to determine whether gender differences occur in wayfinding behavior. Popular stereotype holds that men are superior to women in navigational ability. A meta-analysis of the research on abstract spatial tasks (Linn and Petersen, 1985; cited in Lawton, 1996) indicates that consistent gender differences favoring men in two types of spatial ability: mental rotation and spatial perception (perception of the relationship between an object and the gravitational horizontal or vertical, often against a background of distracting information). A study by Bryant (1982, cited in Lawton, 1994), found that men gave higher self-ratings of sense of direction than women and were more accurate in pointing to unseen locations. In the study of outdoor wayfinding strategies and spatial anxiety by Lawton (1994), men were more likely than women to report using the outdoor orientation strategy, whereas women were more likely to report using the outdoor route strategy. Route knowledge is defined to involve the learning of a sequence of instructions, about how to get from one location to the next. Route knowledge consists of linear-order representations involving a series of associations between distinctive environmental features and movement patterns which link them (Magliano, 1995). Survey knowledge involves a cognitive map of the environment that integrates routes into a Gestalt-like network of relationships between locations, and to report higher levels of spatial anxiety of women than men

(Lawton, 1994). Additionally, some studies (e.g. Curtis et al., 1981; Bryant, 1982; Golledge, 1993; cited in Lawton, 1994) have found a relationship between gender and directional knowledge, with the males showing higher accuracy than females. In Lawton's study (1996), gender was found to be one type of individual difference associated with wayfinding strategy, pointing accuracy, and spatial anxiety. Men reported higher use of the indoor orientation strategy, whereas women reported higher reliance on the indoor route strategy with higher levels of spatial anxiety. Also, the results of this study (1994) showed men to be more accurate than women in pointing to unseen landmarks in a building. Most research on sex differences in spatial cognition found few differences until adolescence, with a slight male advantage emerging (Maccoby and Jacklin, 1974, cited in Baxter, 1987). Orleans and Schmidt (1972, cited in Baxter, 1987) found that males constructed sketch maps using base map coordinates that were provided, whereas women used their own home as a fixed referent system and largely ignored the abstract coordinates provided. Appleyard (1976, cited in Evans, 1980) also found that men drew slightly more accurate and extensive city maps than did women, which he attributed to greater travel and explore in the city. Evans (1980) states that the few gender or class/cultural differences found in the environmental knowledge may be explained by individuals' daily activity patterns. Lawton (1996) also notes that explanations of gender differences in spatial behavior have included biological factors.

The smaller gender difference in orientation strategy in younger subjects may be the result of changing gender roles, with more equal opportunity for men and women to engage in way-finding activities and /or a diminishing influence of the stereotype that man have superior wayfinding ability compared to women. (Lawton, 1994).

Bauer (1992, cited in Lawton, 1994) reported that women were better at learning a figure of 8 maze when required to travel in the same direction on all trials than when required to start at opposite points on alternating trials; men, on the other hand, were better at learning the maze in the two-way condition than in the one-way condition. The differential performance of men and women in the one-way and two-way conditions suggest that they were using different strategies to negotiate the maze. Men were found to be more likely than women to report using an orientation strategy of wayfinding, wherein one's own position is tracked in relation to geographical reference points. Women were more likely than men to report using a route strategy, with the focus on learning the features of a specific route, particularly those features where a change in direction is required.

More recent findings, however, suggested that high spatial ability leads to greater participation in spatial activities through self-selection, rather than vice-versa (Newcombe and Dubas, 1992, cited in Lawton, 1994). The study found that

women are more likely than men to report anxiety about navigation. Environmental disorientation has obvious negative practical consequences, such as missed appointments and unnecessarily traveled long travel routes (Zimring, 1981; cited in Lawton, 1994).

Individuals with greatest extent of daily range of travel have greater and more accurate knowledge of their environments. This notion may be adapted to the building scale in that the more a building is traveled, the more easier it will become to memorize the spaces and their interrelations.

2.2.2.3. Life - Style and Occupation

Findings suggest that the degree of class and culture effects on wayfinding and orientation depends on the country, the people's traditions, lifestyle etc. Evans (1980) indicates that several studies indicate class differences in environmental cognition that may result from differential setting exposure. Orleans (1973, cited in Evans, 1980) discovered that an upper-class, professional group drew much broader, more accurate maps of Los Angeles than both middle- and lower-class respondents, whose maps were restricted and accurate only for their immediate environment. Lower-class respondents for a study in Venezuela, due to their daily travel route for work, showed higher levels of accurate and detailed knowledge

about the city whereas, upper-class respondents showed accuracy only for the interrelationships of the main districts. Class and cultural differences in the environmental cognition may reflect different cognitive styles. Alternatively, they may simply be explained by environmental experience, particularly affected by extent of setting exposure and number of travels made.

One other factor is that women undertake the majority of shopping trips and yet their gender role renders them relatively immobile for a variety of reasons such as:

1. Family role-playing often denies women access to cars,
2. Gender-related tasks restrict the time which women have available for access to shops,
3. The conditions under which they are often forced to travel (e.g. with young children) lessens the willingness of many women to travel (Walmsky and Lewis, 1993, cited in Magliano, 1995).

Numerous jobs, including the ones in the fields of transportation, public utilities, and emergency services, have acquisition of environmental knowledge for subsequent use as a preparatory component. Life-changing events, such as economically motivated changes in residence or loss of sensory or motor abilities, can lead to situations in which individuals must learn to orient in unfamiliar

surroundings. Under these and similar circumstances, constraints on the process of acquiring environmental knowledge can have direct implications for economic well-being and overall quality of life (Magliano, 1995).

2.2.2.4. Disability

Research and personal observation show that wayfinding difficulties are magnified for the handicapped population. Wheelchair users often have to take tortuous routes and use alternative accesses. What may be a surmountable wayfinding difficulty for the able-bodied user may become an impossible for one who is handicapped (Arthur and Passini, 1992).

With increased accessibility of public buildings to the disabled population, new questions of safety emerge. If one advocates a macro-approach to access, then it follows that settings should be designed to standards that allow easy escape for everyone. Of course, we have to make some special provisions so that all the people in a building can be adequately warned of an emergency and have the information at their disposal that will enable them to make 'and execute' appropriate wayfinding decisions (Arthur and Passini, 1992).

The aim is to improve the lifestyle of the physically and mentally handicapped to the point where they can 'travel safely, comfortably, gracefully, and independently' (Foulke, 1983; cited in Kitchin, 1994). Although it is not the focus of this study, one should note the importance of this factor in wayfinding and orientation (Complex settings, even if they are well designed in terms of wayfinding and have the necessary provisions for the disabled population, still need a plan for evacuation).

2.2.2.5. Individual Psychology and Purpose

This section includes persons who, by reason of their psychological state, may experience difficulties in processing environmental information and making appropriate wayfinding decisions besides those directly related to vision, hearing, or literacy (Arthur and Passini, 1992). "People who are visiting public buildings by reason of being unemployed or having their taxes straightened out may be more likely to be distracted or distressed by their anger, confusion, or apprehension. A particularly important issue is possible situational impairment as a result of stress, as it might be experienced when facing danger or when having to evacuate a setting during emergency" (Arthur and Passini, 1992:67).

Lunneborg (1982, cited in Baxter, 1987) has found that in a survey of everyday spatial activities (abilities), females rate themselves poorer than do men. Her data

were collected by ratings on a 10 point scale and in general, both males and females rate themselves better than average (the midpoint) in six activities: finding one's way around, learning to use new equipment, assembling do it yourself objects, arranging things in a balanced space-efficient manner, picturing a construction result, interpreting graphs, charts, etc.), but the proportion of men who rate themselves above the middle is 10 to 20 per cent higher than women. (Baxter, 1987). This may be used as an explanation in that individual psychology is affected by gender differences with men performing better or having a higher self-esteem. Moeser and Reardon (1986, cited in Moeser, 1988) have discovered that wayfinding difficulties can produce high levels of anxiety - anxiety that could interfere with the performance of people. The frustrations and stress we are subjected to in just getting around the built environment are bad enough in themselves without having to put up with getting lost in it as well.

Personality affects the persons tastes and hence the choice of where to go, where to shop, where to window-shop, where to browse, eat, etc. For example, an introvert person may find weekdays during which malls tend to be less crowded more convenient in order not to be disturbed by other strollers and/or shoppers; whereas an extrovert may prefer weekends in order to be with friends and perhaps meet new people.

To ask the question "How does purposeful activity affect wayfinding?" is crucial at this point. If a person has a purpose, this means that he or she has constraints; he or she is searching for a specific information in the environmental information being gathered. The individual hassles through loads of information trying to pick out the correct, necessary message. As the individual is picking up cues in order to find his or her way, he or she is also traveling among many other information in the forms of utility signs, commercials, advertisements, logos, and graphics etc.

Work in environmental psychology by Garling (1989) and the colleagues (1984) indicate that (a) the type and amount of spatial knowledge acquired by means of experience in an urban setting varies as a function of the traveler's prior knowledge of an area, mode of transportation, and reasons for travel, and (b) route selection typically accommodates time constraints, overall distance covered, and ease of access (cited in Magliano et al., 1995).

The experiment of Magliano et al. (1995) provides support for the position that the acquisition of different types of spatial knowledge can serve as goals for a traveler and that this type of goal constrains the spatial learning process.

Depending on the aim and type of activity performed, the time people spend on their activities differentiate from each other. Time is an important factor in our

wayfinding abilities. If, for example, one has an appointment arranged at a specific time in a building he or she is attending for the first time, that person will be stressed and in a hurry trying to reach the unknown destination. Limited time may bring out anxiousness and mistakes an individual would not normally make.

2.2.3. The Relation Between Wayfinding and Human Behavior

The two factors "Wayfinding" and "Human Behavior" are interrelated with each other as human behavior simultaneously differs according to the environment; therefore, when confronted with a problem, the human being will react accordingly. Wayfinding and orientation are problems we face daily, it is important to understand this relation in order to design spaces in this respect and to ease or eliminate - if possible - potential problems.

As stated in section 2.1.1., the general belief is that cognitive mapping explains and leads not only to the understanding of spatial behavior, but the cognitive map is a mental construct that actually influences behavior, and by examining a whole range of spatial products we can understand spatial decision making and subsequent behavior (Kitchin, 1994). Lynch (1976, cited in Passini, 1984) explains that people's behavior in the large-scale environments can be explained more completely through recourse to internal, subjective factors than by more traditional

external, “objective” factors, and that behavior is mediated by the image (cognitive map) of the environment.

The activities we perform affect our wayfinding abilities. If, for example, we are confronted with an emergency we would naturally feel stress, anxiety, fear, etc. and probably lose our sense of direction, feel disoriented, even in a space we might know quite well. Thus, the space quality is very important to enable people to understand where they are, and how they can reach their destination; or in case of emergency reach a safe area.

Passini (1984) states that in order to understand what people do, one has to understand what people know or, more precisely, what they believe they know. Lynch (1960) emphasized that clear images of an environment, contribute to a person's efficient functioning, in particular to his wayfinding performances. Arthur and Passini (1992) state that activities (in our case the shopping activity) and the atmosphere created by people's behavior can create a form of distinctiveness. Although this may be a strong factor to which people are sensitive, it has the disadvantage of not being permanent - of disappearing with the flow of the key occupants. In the following chapter, a specific activity - shopping - is related to wayfinding and orientation.

3. THE SHOPPING ACTIVITY AND WAYFINDING

Central to the issue of wayfinding in shopping centers is the idea that it is at the core of decisions which direct the shopper's movements through the mall space as he or she goes about "finding items" to shop for or purchase. In other words, wayfinding is the common and fundamental task which all shoppers must undertake across and within the shopping center (Yoo, 1991). No matter what the reason for visiting a center, whether it be to shop at a particular shop, to shop for a certain item, or just to browse without any intention of making a purchase, the individual will be faced in each case with wayfinding decisions relating to his or her movement through the center (Yoo, 1991). While it may seem that many of these decisions occur almost automatically and with little thought, the shopper really is constantly involved in a process of making decisions, and solving wayfinding problems. The shopper looking for a particular item may visit several stores during the shopping trip, and these stores may be scattered throughout the mall. The shopper visiting a particular store, on the other hand, may walk through no more of the mall than is required to get to that particular store (Yoo, 1991). Acknowledging the wayfinding that is an inevitable and fundamental component of the process of shopping, one may then propose: "the greater the ease with which decision making and movement through the mall take place, the more enjoyable the shopping trip will be, the greater the probability of making purchase will be, and the

more profitable the trip will be for the mall, and individual merchants" (Yoo, 1991:39). With all reasons of shopping at a shopping mall, and for all resulting patterns of movements through the mall, shoppers are faced with numerous decisions that will guide and determine the spatial extent of the shopping trip.

Black (1960; cited in Altman and Zube, 1989) defines public interiors as "designed for a large number of amorphous people". According to her, they require approval for their success and must continually be adjusted to meet their changing tastes and technical standards. In addition, not only should these spaces meet aesthetical requirements but should also establish much more important matters such as improving means of wayfinding.

Public spaces reflect ourselves, our larger culture, our private beliefs, and public values (Berman, 1986; cited in Altman and Zube, 1989). Public space is the common ground where civility and our collective sense of what may be called "publicness" are developed and expressed. One of the most predominant forms of current public-space behavior can be characterized as recreational shopping. The evening or weekend spent shopping in the mall or downtown marketplace is part of public life. Private developers have been quick to understand this consumer-oriented leisure activity by providing ample opportunities for food, performers, and benches. Public amenities and a highly articulated physical environment are used

to support the browsing, and buying behavior of recreational shopping (Altman and Zube, 1989; cited in Carr et al., 1992).

The first defining character of a mall is that it is an enclosed aggregation more or less isolated from the larger environment. Secondly, within its boundaries, everything from temperature to merchant displays are rigorously controlled in ways that sustain an ersatz world of fantastic images and displays...malls are not just places to buy goods, but one of the main sites of the intentionally produced simulations that constitute a new dream-like order of commercial reality as the promise of wish fulfillment in this new "hyper-reality" of spectacular images and fantastic gratifications. Thirdly, malls as dream-like fantasies are unabashed contradictions of time, place and subjectivity that exist as much in imagination as in reality (Shields, 1992:49).

The term "consumer spatial behavior" refers to both the processes by which shoppers choose which shops and shopping centers to visit, and their actual travel patterns (Walmsky and Lewis, 1993; cited in Lawton, 1994).

It is well known that our feelings about a shopping mall or other such commercial facility are colored in large-measure by how well or how easily we get around in it...Proprietors of department stores used to design around the concept of actually confusing the shoppers on the assumption that if they could keep people on the premises longer, they would buy more merchandise. Developers today are discovering that good wayfinding practice is a positive marketing benefit (Arthur and Passini, 1992:9).

As mentioned before, designers are liable of designing spaces in respect to their prospective users, and it is of their responsibility to enable users to understand where they are and how they can reach or use the services provided. Designers must consider wayfinding as an important criterion which enhances the design of a space. Whatever the function of the space is, designers should make the necessary arrangements accordingly.

3.1. Shopping as a Human Activity

Bucklin (1967, cited in Shields, 1992) distinguished between (1) "full search" involving visits to many stores, (2) "directed search" where some comparisons are warranted, especially in relation to price, but full search is not worthwhile, and (3) "casual search" where information is gained in a non-purposeful manner. Moreover, the type of searching undertaken can be influenced by the type of good required: a consumer may treat the purchase of a costly item as an exercise in problem solving that warrants extensive searching but may adopt "routinized response behavior" in relation to more familiar items, particularly those items whose purchase can be undertaken on multi-purpose (e.g. non-retail) trips (Howard and Sheth, 1969; Walmsky and Lewis, 1993; cited in Lawton, 1994).

3.1.1. Shopping with a Specific Intention (Purposeful Activity)

Shopping activity with a specific intention is when you have the need or desire to purchase certain goods. This may be related to the nature of the purchased good and may indicate the time and financial constraints of the shopping person.

Whatever the reason is, at this point the individual has basic requirements from the environment: to provide certain environmental information (e.g. signage, visual accessibility) in order to reach the necessary destination, provide safe and clear spaces (with clear routes and paths) leading to this destination, ease of access. In this situation, requirements from the environment should be immediately satisfied.

3.1.2. Shopping as a Leisure Activity

Being a shopper was used to be assumed to be synonymous with being a purchaser. Yet, often shopping does not involve purchase, which is merely one event which may or may not culminate the shopping process. For example, one may simply look or browse; goods on display invite the touch. Shopping, in this second usage, refers to a recent process, a social practice of exploration and sightseeing akin to tourism. This process may take the form of an extended period of browsing, perhaps in more than a dozen stores, legitimized by an insignificant

purchase, or even that faintly frustrated feeling of unfilled desire. This activity takes on leisure forms as window-shopping and browsing (Shields, 1992).

Shopping is not just a functional activity. Consumption has become a communal activity, even a form of solidarity. Thus there is frustration with shopping centers and department stores and reactions to their failure to deliver on promises of an experience of social centrality. Consumption, an ambivalent and multi-faceted activity, takes on more and more social functions as a form of sociality (Shields, 1992).

In this case, the character of wayfinding is expected to be different than purposeful shopping. Easiness of wayfinding might be replaced with an adventurous process. Still, it is important to maintain the balance between the easy and adventurous wayfinding process. A bad example that may be given to the notion of balance between the easiness and adventurousness is a commercial center in Montreal mentioned by Arthur and Passini (1992),

A few years ago an architect friend, who was working with a large citizen group in Montreal, asked his audience what they considered to be the worst building in the city. Everybody seemed to agree that the worst building was a recent commercial center which had been published in respected architectural journals and which was generally held in high esteem by the profession. This commercial center was quite appealing. It

was constructed in a series of interior terraces with a number of stairs connecting levels at different heights. Compared to other commercial centers, it was of superior aesthetic quality. Why was it the worst building, my friend asked in surprise? Because, they said, it is almost impossible to find your way around in it. The center turned out not to be a commercial success. Many people refused to enter the building. In order to save the venture, the management decided to invest in a massive "signage" project. No one could quibble about the graphic design. But it still did not work. The problem was clearly architectural, and the building was eventually torn down (16).

3.2. Means of Wayfinding in a Shopping Mall

Passini (1980) found that some people navigating in a large commercial complex relied heavily on the spatial properties of the setting, such as the clarity of the organization of the building, whereas others relied more strongly on signs. Another study found four major reasons for wayfinding difficulties reported by visitors to a large office building: lack of a receptionist to give directions, problems with interior design (e.g. too many doors), problems with signs, and difficulty in locating the building and its main entry (Beaumont et al., 1984; cited in Lawton, 1996).

It seems natural that spaces that are not simply more integrated but, that are also more populated may appear more attractive to novice searchers simply because

they offer more opportunities for asking information and more reassurance that help is available should any problem arise (Peponis et al, 1990).

A shopping mall is a good example to observe the role of crowding on wayfinding and orientation. The influence of crowding may also be negative as well as positive as stated above. Following sections analyze the means of achieving wayfinding and orientation in such high-density environments. At least one study has reported that the presence of other people was one of the "cues" followed by subjects in the navigation through a building (Beaumont et al, 1984; cited in Lawton, 1996). Evans and the colleagues (1982) have reported a similar finding concerning the effect of denser use upon the identification of buildings as landmarks in the urban context (Peponis et al, 1990). The provision of adequate environmental information is furthermore a crucial design issue. Signs, maps, verbal descriptions, as well as architectural and urban space can be seen as information support systems to wayfinding (Passini, 1984).

In certain complex settings such as the shopping malls, the selection of information could be more difficult. This is particularly true if wayfinders are bombarded with stimulation of all sorts and if at the same time, they must plow through this excess to find relevant information. In such cases, a condition of overload could develop in which people reduce their intake of information as an

ultimate coping device. The result is that even if they are looking at the relevant information, they are not able to process it.

In the following sections, various means of wayfinding in a shopping mall are examined.

3.2.1. Directories

Consistency in the design of information displays will help a wayfinding person's search indicating what to look for. The form that the information takes, the material used, and the graphics are all contributing elements. An information display should be able to be identified before it can actually be read (Arthur and Passini). Deasy (1985) states that sufficient space in front of directories should be allowed so that people could study the information without blocking the traffic.

When building directories form part of a particular wayfinding system, they are generally, and properly, associated with maps. Too often, however, they compound wayfinding difficulties instead of helping to solve them. They may, for example, be constructed as towers with much of their information high above people's heads. Building directories, despite their misnomer, generally provide

visitors exclusively with orientation information concerning the names of tenants and the floor levels where they will be found (Arthur and Passini, 1992).

3.2.2. You-Are-Here Maps

Levine (1982), and Levine, Marchon, and Hanley (1984) found that the orientation of You-are-here maps (see Fig. 3.1.) significantly influenced the ability of people to successfully complete wayfinding tasks.

In general terms, the situation is as follows: (1) a person has a cognitive map with an orientation that, in relation to his or her body, is fixed and specifiable, (2) some information about his or her location in the terrain is provided, and (3) the map may be aligned with the terrain, contraligned, or generally misaligned. A real-world situation in which these circumstances occur is with you-are-here (Y-A-H) maps (Levine et al., 1984).

Most fixed maps indicate the position of the user by the you-are-here sign. The minimal information needed to establish a one-to-one relation to the real setting is therefore one other reference in the form of a point or a direction (Passini, 1984). Levine (1982) discusses three means by which additional reference can be given: by identifying and labeling an important element or landmark in the setting and on

the map, such as a supermarket in a shopping center; by choosing the map's location so as to accentuate the asymmetrical relation of the viewer's position (You-Are-Here symbol) and the surrounding spatial configuration; and by introducing a bi-part "You-Are-Here" symbol showing the positions of map and the viewer.

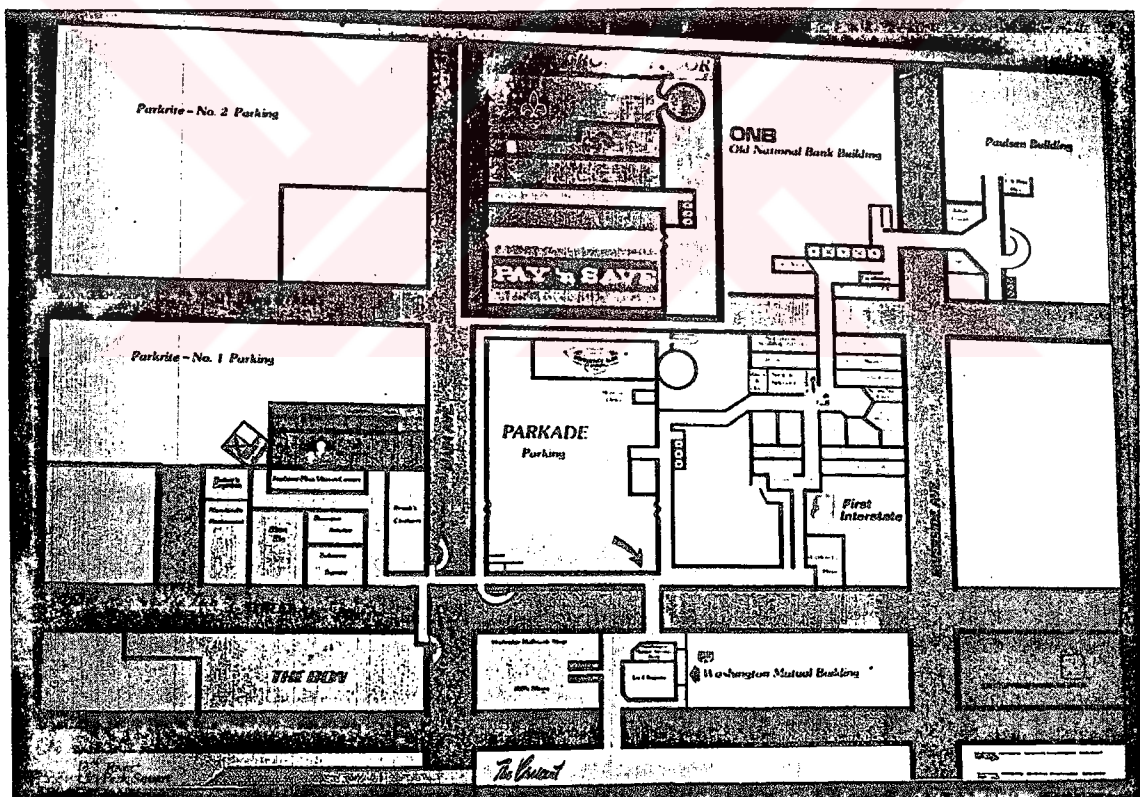


Figure 3.1. A Typical You - Are - Here Map. *Environmental Psychology: Principles and Practice*. Gifford, R., 1987:106.

A theory of spatial problem solving led to the prediction that the ease of use of You-Are-Here maps would depend upon where they were placed in relation to the terrain (Levine et al., 1984). Levine et al. (1984), have reached the result that aligned maps are easier to use than misaligned maps (see Fig. 3.2.). While one is commonly advised in wayfinding to align one's map with the terrain, and vertical maps have orientation, and that this orientation is psychologically equivalent to the orientation of the map when laid flat. When the (vertical) map is aligned, then the upper part of the map corresponds to the area forward in the terrain (Levine et al., 1984). The general applied conclusion is that Y-A-H maps should be placed so that they are aligned with the terrain. The identical map should not, for example, be used on opposite sides of a hallway because if one is aligned then, the other will be contraligned.

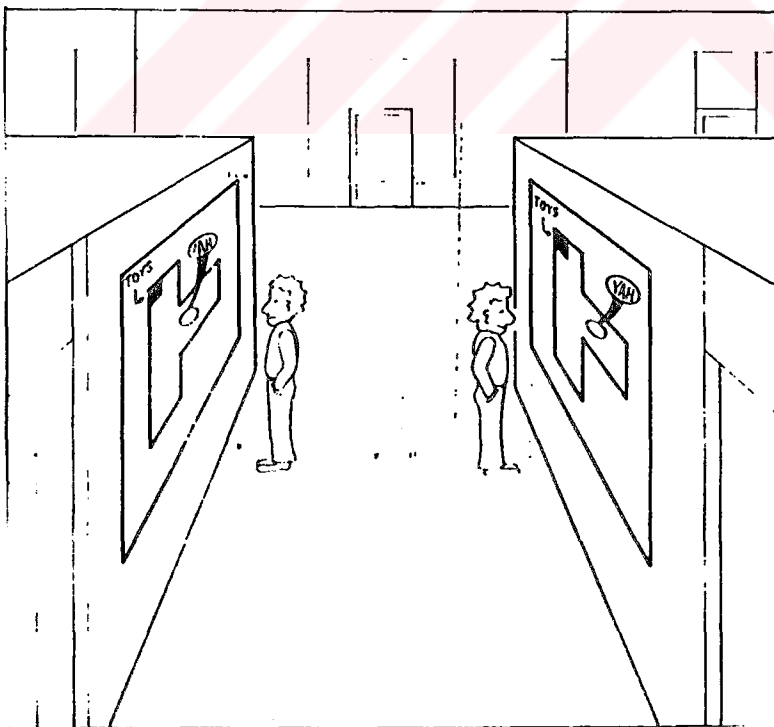


Figure 3.2. Two identical Maps Showing Contralignment and Alignment. "The Placement and Misplacement of You - Are - Here Maps". *Environment and Behavior*. 16.2., Levine et al. 1984:57.

3.2.3. Emergency and Utility Signs

People who get into buildings also have to get out of them - sometimes fast. As settings grow larger and more complex, emergency evacuation becomes a key problem, and wayfinding becomes a matter of life and death (Arthur and Passini, 1992). There is a large body of research on how people behave when confronted with the dangers of fire and other emergencies. Two areas link this issue to wayfinding: the design and signage (see Fig. 3.3.) of exit routes and the general quality of wayfinding design of a setting.



Figure 3.3. A Typical Emergency Sign.

Panic is not usually part of wayfinding behavior in emergencies. However, stress is, and stress does affect performance in one of two ways. Depending on the context and the level of stress, stress can either reduce or improve performances. If stress leads to a high level of anxiety, the effect always tends to be negative. Worrying also consumes energy. Psychological and cognitive resources have to be allocated to deal with anxiety, and these resources are therefore not available for wayfinding (Arthur and Passini, 1992).

Hazards such as fires are not the only situations in which people hurry to reach certain or uncertain destinations. The need of making an urgent telephone call, search for a drinking fountain, or necessity of using the lavatories, are all important reasons to expect a good signage system that will ease wayfinding problems and save time and energy.

3.2.4. Information desks

A considerable amount of people rely on the information received from information desks (see Fig. 3.4.). Thus, the existence of an information desk may contribute to the wayfinding and orientation efficiency of naive searchers (Arthur and Passini, 1992). Deasy (1985) states that a building entrance should provide specific information aids; and that nothing is quite as effective in helping and explaining as

another human being. With another human being, we are able to look as well as listen, to raise questions and ask for clarifications. A receptionist should be located near the entrance and immediately adjacent to the mainstream of the traffic. Deasy (1985) also adds that if it is not possible or reasonable to provide a receptionist, an information center should be provided to serve the same purpose. All information centers should share these characteristics: location near the entrance with a high visibility; contain a well lighted directory; provide a "Y-A-H" map oriented correctly and well illuminated.



Figure 3.4. A View of an Information Desk in Karum.

4. A CASE STUDY ON WAYFINDING IN A SHOPPING MALL: KARUM

4.1. Description and Aim of the Study:

The aim of this study is to do an empirical research about the importance and sufficiency of the spatial factors affecting wayfinding and orientation in the Karum shopping mall. Every individual uses a variety of spatial factors in order to find his or her way in the environment. These spatial factors which people rely on differ from one individual to another. Factors such as age, gender, occupation, individual psychology, familiarity with the environment etc. have been found in various studies (Weisman, 1981; Peponis et al., 1990; O'Neill, 1991; etc.) to affect the way people find their way and orient themselves in the environment. The spatial factors people are affected by in their wayfinding performance and orientation are light and color, shape and dimensions, circulation paths, floor plan complexity and the signage used in the space.

Therefore, the necessary importance should be given and accordingly adjustments, if possible, should be made in order to create better environments for individuals. After all, purpose of a good design should be to comfort it's users under various conditions.

In this study, the spatial factors affecting people's wayfinding and orientation in a shopping mall were determined and measured in a particular setting, Karum. The most appropriate setting to measure these spatial factors was found to be Karum, a shopping mall in downtown Ankara (see Fig. 4.1.). This is because Karum is one of the most used settings in Ankara, and the users are heterogeneous; people of various gender, age, occupancies etc. visit the setting. One other reason for most people to use Karum is that this mall is considered as a landmark in Ankara, and because it is localized in central Ankara, it has an easy access. The research study in the shopping mall Karum was conducted during weekends allowing an observation of high-density population over the respondents, as high-density was taken as an independent variable.



Figure 4.1. Exterior View of Karum Shopping Center.

4.2. Methodology of the Case Study

4.2.1. Sampling

The questionnaire was handed out to 77 female, and 76 male respondents at the setting of Karum. The quota sampling was applied for the selection of subjects according to the gender differences. It was assumed that quota sampling covering both sexes equally would provide the opportunity to evaluate at least one of the important factors in wayfinding and orientation. These respondents were informed about the purpose of this study. As gender is taken as an important factor affecting wayfinding and orientation among the others, gender was also marked for later evaluation. The questionnaire was given to users of the setting who were adults over the age of thirty. The respondents were interviewed only during weekends. The intention of this was not to find out the effect of crowding on the respondents; because high-density is considered as the general situation of shopping malls, it was thought to be more appropriate to conduct the study during weekends. All respondents were interviewed within the setting, and were asked the questions separately from each other in order to prevent a probable bias.

4.2.2. Research Method: Questionnaire

The questionnaire asked, consists of three phases, all with multiple choices (Three scale) (see Appendix A). The questionnaire format was a combination of Weisman's study (1981) utilized to gather self-report data on participant's wayfinding behavior and perceptions in a specific setting; and Lawton's study (1996) in which self-reported strategies for indoor wayfinding were identified. Not all the questions were taken exactly the same, some were replaced by more suitable forms of questions according to the Turkish society. The reason of handing out questionnaires to the respondents was because by this way, all respondents would be treated equally, and it would be easier to control and observe the groups. Besides the questionnaires, the respondents were free to express their thoughts about the setting and also other buildings about which they had comments. The first phase of the questionnaire is about indoor orientation and asks questions about the frequency of use, the last time the building was visited, the approximate area browsed, and questions related to the legibility of the building. These questions related to the legibility of the shopping mall ask about the respondent's knowledge of his or her direction (orientation) within the building, memory of the direction of the entrance he or she used, the knowledge of the relation of the interior and the exterior, self-esteem in directing a stranger to a destination within the building etc.

The second phase consists of questions related to indoor route; this phase is divided into two sub-divisions. The first part asks questions related to general issues, such as how useful signs directing people to different parts of buildings are, how helpful You-Are-Here maps are, the usefulness of door numbers and information desks in their opinion. The second part asks if these factors asked generally are present or not, and/or if they are sufficient or not in Karum.

The third phase of the questionnaire measured the attention of the respondents. Again this phase was divided into two parts, the first measuring the attention of the respondents to factors: symmetry, regularity, the intersection degree of corridors, the memory of landmarks, and lighting systems generally in all buildings, and the second measuring if these factors existed, and/or if they were found sufficient or not in Karum.

Finally, in the last phase the respondents are asked to perform a pointing task. At this phase, the respondents pointed the direction of a shop, store etc. among a list of names which were randomly asked to them after assuring their familiarity.

4.3. Analysis and Results

In the first phase of the questionnaire approximately half of the respondents reported to visit the setting occasionally (see Table 4.1.). Among these respondents, around 30 % of the females and 25 % of the males reported to visit the setting regularly.

Table 4.1. Frequency of Visit.

Frequency of Visit	Total %	Female %	Male %
Regularly	27.6	31.2	24
Occasionally	56.8	63.6	50
Rarely / First	15.6	5.2	26

Over 60 % of the visitors reported to have been in all or almost all of the building, and interestingly, more men than women reported to have been in all or almost all of the building (see Table 4.2.).

Table 4.2. Total Area Visited.

Total Area Visited	Total %	Female %	Male %
A Few Shops	15	17	13
A Specific Floor	23.5	26	21
All / Almost All	61.5	57	66

Almost half of the participants reported to know the direction they were facing whenever they turned a corner. Over 70 % of the visitors reported always to keep in mind the entrance they came in from. Around 9 % of the participants reported always to think about their place in the building in terms of directions such as east, west, etc. whereas over 50 % reported never to think of their direction in terms of such directions. Around 10 % of the visitors reported that it was always difficult for them to understand the direction they faced within the building, whereas, almost 70 % reported never to have such a difficulty. Over 70 % of the respondents said that they never became lost in the building; whereas, 15 % of the females and interestingly 25 % of the males reported to become momentarily disoriented. The building was found easy from wayfinding point of view by over 60 % of the

respondents. In addition, almost 35 % of the respondents reported that they would be confident of the directions they would give a stranger to this building.

In the second phase, around 70 % of the participants stated that clearly visible signs pointing the way to different sections of the building would be generally useful to them in wayfinding (see Table 4.3.). In the second part of this question, 40 % of the participants reported that signage was sufficient in Karum (see Fig. 4.2.), more men than women found the signage insufficient.

Table 4.3. Signage.

Clearly Visible Signs Are Useful To Me	Total %	Female %	Male %
Always	71	70	72,4
Sometimes	21	24,8	17,1
Never	8	5,2	10,5
Signage In Karum			
Are Sufficient	40	39	41
Are Insufficient	48	46,7	49
Do Not Exist	12	14,3	10



Figure 4.2. Interior View of Karum Shopping Center Showing Signage.

Almost 70 % of the participants stated that You-Are-Here maps were always useful to them. Of these, 40 % of the females and 25 % of the males found the existing You-Are-Here map sufficient. Almost half of the respondents stated that a You-Are-Here map did not exist in Karum (see Table 4.4.). 50 % of the respondents stated that someone to show them directions would always be useful. The existing information desk was found sufficient by almost half of the respondents. On the other hand 17 % reported that such a person did not exist to show them directions.

Table 4.4. You-Are-Here Maps.

You-Are-Here Maps Are Useful To Me	Total %	Female %	Male %
Always	68,7	68,8	68,5
Sometimes	18,7	18,1	19,7
Never	12,6	13,1	11,8
You-Are-Here Maps Are			
Sufficient	32	39,1	25,00
Insufficient	21	16,8	25,00
Do Not Exist	47	44,1	50,00

In the third part of the questionnaire, around 50 % of the respondents reported to pay attention if symmetry or regularity existed in the building layout; and 20 % of them reported never to pay attention if symmetry or regularity existed in the building layout. Over 70 % of the respondents stated that symmetry and / or regularity did not exist in Karum's layout (see Appendix B for the Layout Plans).

41 % of the female and 30 % of the male respondents reported that they always paid attention if all corridors intersected with right angles to each other (see Table 4.5.).

Table 4.5. Angels of Corridors.

I Notice if All Corridors Intersect with Right Angles	Total %	Female %	Male %
Always	36,2	41,5	30,6
Sometimes	18,8	17	20,7
Never	45	41,5	48,7
All Corridors In Karum Intersect With Right Angels			
They Do	55,2	52,5	58
They Do Not	19,2	23,5	16
I Do Not Know	25,6	24	26

Half of the respondents stated that all the corridors in Karum intersected with right angles to each other. On the other hand over 77 % of the respondents stated that they always paid attention to "landmarks" in buildings, and a very low percentage reported not to pay attention to the "landmarks" in buildings (see Table 4.6.).

Table 4.6. Landmarks.

I Notice Landmarks	Total %	Female %	Male %
Always	77,2	78,00	76,30
Sometimes	15	15,60	14,50
Never	7,8	6,50	9,20
Landmarks in Karum			
Do Exist	70	74	65,4
Do Not Exist	23	18,2	28
I Do Not Know	7	7,8	6,6

Around 70 % reported that a landmark existed in Karum; on the other hand, 15 % of the females and 30 % of the males reported that such a landmark did not exist in Karum. In the last question, almost 70 % of the female, and 40 % of the male respondents reported they always noticed changes in the lighting system of buildings, whereas, over 10 % of the females and 20 % of the males reported never to notice such changes in the lighting system. Finally, almost 50 % of the female respondents and 30 % of the male respondents reported that such differences existed in the lighting system of Karum shopping mall (see Fig. 4.3.), whereas, above 20 % of the respondents reported that there were no changes in the lighting system of Karum.

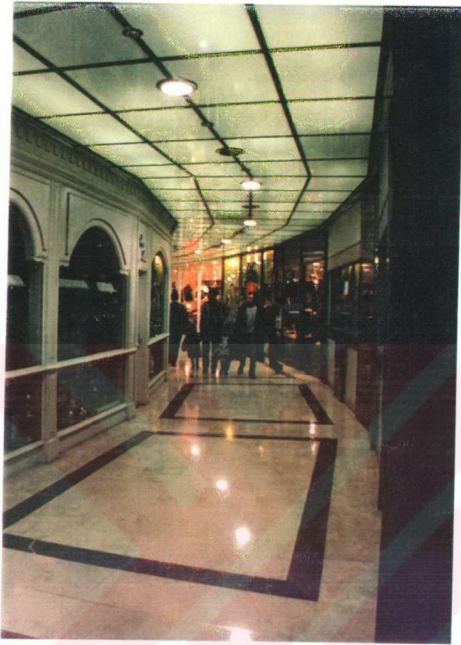


Figure 4.3. Interior view of Karum Shopping Center Showing the Lighting System.

Finally, in the last part of the questionnaire the respondents were given a pointing task where they were asked to point out an outfit, pastry shop, or bank etc. The participants were asked to point a shop etc. which they could not see from where they were given the pointing task. The answers of the respondents were marked as "Correct", "Incorrect", "Close"; and as "Sure", "Unsure" (see Table 4.7.).

Table 4.7. Pointing Accuracy.

Pointing Accuracy	Total %	Female %	Male %
Correct	63,4	64,4	62,5
Incorrect	13,2	17,8	8,4
Close	23,4	17,8	29,1
Sure	57,7	57,1	58,4
Not Sure	42,3	42,9	41,6

Over 60 % of the respondents performed the pointing task correctly. 20 % of the females, and distinctively, 8% of the males performed incorrect pointing tasks. Around 20 % of the female and 30 % of the male respondents performed close pointing tasks. Over half of the respondents were sure in their pointing tasks; there was no significance between the self confidences of the female respondents and the male respondents.

4.4. Discussion

As mentioned before, some items in this case study were partially taken from Lawton's study (1996). The findings of this research suggest that the Turkish society has different indoor wayfinding strategies than the college students which Lawton identified in her study. The results in Lawton's study showed that men were more accurate than women in pointing to unseen landmarks in a building, on the contrary, the current results reveal that 'although not significantly' women were more accurate than men in their pointing task. Consistent with Lawton's findings, men were found to be more confident in their pointing tasks.

The results convey that most visitors visit Karum occasionally and have browsed all or almost all of the sight. A close percentage of both men and women reported to have visited here occasionally, and browsed all or almost all of the mall. When it comes to the signage of the mall, findings reveal that a large amount of respondents did not notice the signage; and a significant amount of these participants found the signage insufficient. Although You-Are-Here maps were found to be useful by most respondents; it was stated by most of them that such maps did not exist in Karum. On the contrary, maps of each floor with a small indication of the place the visitor is situated according to the plan exists at the

entrance floor, on an information booth (see Fig. 4.4.). But it is obvious that it is too small to be noticed by most of the visitors.



Figure 4.4. Interior View of Karum Shopping Center Showing the Information Booth.

More than half of the respondents in both sexes stated that all corridors in Karum intersect with each other with right angles. Indoor landmarks were found to be noticed by a high range of respondents; again regardless of gender, most respondents regarded to the cafe area (see Fig. 4.5.) on the entrance floor as a "landmark", but few spoke of the small fountain (see Fig. 4.6.) located in the center of this area.



Figure 4.5. Interior View of Karum Shopping Center Showing the Cafe Area.



Figure 4.6. Interior View of Karum Shopping Center Showing the Fountain.

In the final part of the questionnaire the results suggest that women, have performed slightly more accurate pointing tasks than did men at the site. Yet again, a significant amount of women performed incorrect pointing tasks than did men, because more men performed close pointing tasks than did women. Men were slightly more confident in their pointing tasks than were women.

To sum it up, although most people 'regardless of gender' state that they always pay attention to the items mentioned in the questionnaire, they do not notice most of these factors in Karum. There may be several reasons for this: the factors mentioned such as signage, floor plan configuration or lighting etc. may be insufficient, may not exist in the sight, may be carelessly placed; the necessary importance may not be given to these factors, or these factors may not be emphasized enough to be noticed.

During the questionnaires, a high percentage of the respondents found the layout of the shops and stores facing the central gallery legible, and stated that Karum was an easy setting to achieve wayfinding and orientation because it was small and had a central open space allowing high visual perception of the whole space.

Albeit, when it came to the back corridors (see Fig. 4.7.) which take a considerable amount of space and lead to many shops facing to them, the respondents stated that they hesitated or avoided giving directions of shops in these, and reported them to be complex and poor identity-wise.

Also, familiarity was found to be a factor which affects the wayfinding ability of the visitors. Respondents reported that the more they visited the site, the more familiar they became with it. And therefore they found their way and/or the shops, stores etc. they were looking for easier in Karum. High rate of pointing accuracy may be an indication of familiarity with the site. However, this relation needs to be analyzed further.



Figure 4.7. Interior View of Karum Shopping Center Showing the Back Corridors.

5. CONCLUSION

In this study, the spatial factors affecting the wayfinding performance and orientation of human beings at a shopping mall were analyzed. These spatial factors were taken as shape and dimensions, light and color, building configuration and visual accessibility, circulation paths, and signage; also the individual factors: age, gender, occupation, ability and disability, and individual psychology and purpose were taken into consideration as they are also important factors influencing our wayfinding behavior according to the literature review and research study conducted. It was also mentioned that these factors are interrelated with each other.

The relation between wayfinding and the shopping activity was studied taking shopping as a human activity displayed and best observed in shopping malls. This shopping activity was considered to take either the form of shopping with a specific intention, or shopping as a leisure activity and was discussed accordingly. Physical factors such as the directories, You-Are-Here maps, utility signs, emergency signs and information desks are influential on our wayfinding performance as well as spatial and individual factors. These factors were also studied and discussed through a case study which was conducted in the shopping mall Karum in downtown Ankara.

As supported by the literature survey, Sufficiency or insufficiency of spatial factors were found to have significant effects on the wayfinding and orientation of individuals. Shape and dimensions, building configuration and visual accessibility, circulation paths, and signage were important aspects influencing people significantly in the shopping mall. The results were found to be inconsistent in the gender differences with the previous studies in the literature except for the one item in the last part of the questionnaire which gave a slight superiority to men; more men performed "close" pointing accuracy than did women. Although not very significantly, women were found to be more accurate than men in pointing tasks.

The behaviors and needs of individuals in a shopping mall, differ according to a variety of reasons which have been discussed in the study. Among these reasons, the cultural norms and traditions may also be influential. It is supported by previous studies (e.g. Lawton, 1996) that experiential factors (e.g. greater opportunities for boys than girls to engage in activities that help to develop directional skills) may be included in explanations of gender differences in spatial behavior; perhaps women are encouraged to shop at the early stages of their lives and therefore get more acquainted with such areas, whereas men get the opportunity to develop their skills at exterior performances (e.g. driving). The attitude in raising children differ from one culture to another, and the accessibility of different gender groups may be limited according to their culture. Actually this could be considered as an

important factor explaining the Turkish society's wayfinding performance letting women to be superior in the pointing task. Today, the shopping activity has become closely connected with the leisure activities in Turkey, giving women an opportunity to take a break from their daily routines, and this lets them become more familiar with the spaces they use most.

As a result, it may be said that certain aspects of interior space design and individual characteristics such as: space design quality, signage, landmarks, floor plan configuration, maps, familiarity; and also preferences, likes and dislikes, habits etc. all add up to maintain a means of wayfinding and orientation. Thus, in order to provide a healthy and successful milieu to all users, importance should be given to the notion of space quality also from the wayfinding point of view. The issue of wayfinding should be taken into consideration in the early steps of design.

The purpose of this study was to determine the factors which influence the wayfinding performance of individuals and their behaviors in the spatial environment. The continuous interaction between the human being and the man-made environment brings many requirements that need to be fulfilled. Achieving good wayfinding solutions is just one of these many requirements, but still needs further research and improvement especially in Turkey.

There are many aspects of this research that need further investigation. First of all, the effect of factors such as occupation, disability, age, and purpose which are mentioned in section 2.2.1. could be investigated for a broader perspective in order to improve the findings of such a study. Secondly, it is reported in Lawton's study (1996) that people switch wayfinding strategies as they gain familiarity with a particular environment; this also supports the notion that familiarity influences people's wayfinding performance. The correlation between familiarity and wayfinding requires further research. This relationship could be investigated through a particular research conducted with also newcomers as well as the familiar users. Thirdly, this study was conducted only during weekends; the population and density differences between the weekdays and weekends and their effects on the individuals could be studied. Also, two or more shopping malls could be compared with each other. Finally, this study could be conducted within a different spatial context. For example, there are spaces such as hospitals, that require much more care and wayfinding which becomes vital; or as in metro stations where time is more important and limited. Thus, the activity patterns and requirements should be carefully analyzed in order to improve the design of wayfinding.

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APPENDIX A

The Questionnaire Form

KARUM

FEMALE ☐

MALE ☐

PART 1:

1. How often do you visit this building?

Regularly ☐

Sometimes ☐

Rarely ☐

2. When was the last time you visited this building?

Less than a week ☐

Between a week and a month ☐

More than a month ☐

3. Usually, how much of the building do you get around in each visit?

A few shops ☐

A certain floor ☐

All or almost all ☐

4. Every time I turn a corner, I know which direction I am facing.

Always ☐

Sometimes ☐

Never ☐

5. I know which direction I am facing within the building, without thinking about it.

Always ☐

Sometimes ☐

Never ☐

6. I keep in mind which direction of the building I entered from.

Always ☐

Sometimes ☐

Never ☐

7. I think about my location within the building (North, South, East, West).

Always ☐

Sometimes ☐

Never ☐

8. It is difficult for me to understand the direction I am facing in the building.

Always ☐

Sometimes ☐

Never ☐

9. I can imagine what is outside the building in the direction I am facing within the building.

Always ☐

Sometimes ☐

Never ☐

10. What is the most "lost" you have ever become in this building?

Never ☐

Just momentarily disoriented ☐

Totally lost ☐

11. How do you find this building in terms of "wayfinding"?

Easy ☐

Medium ☐

Difficult ☐

12. How confident would you be in giving directions to a person who is a stranger to this building?

Very confident ☐

Medium ☐

Not at all confident ☐

PART 2:

1. Signs pointing paths that go to different parts of the building that can be easily perceived are useful to me.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

Do not exist ☐

2. A You-Are-Here map showing my location within the building with an arrow is useful to me.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

Do not exist ☐

3. Signs showing different parts of the building and clearly written door numbers are useful to me.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

Do not exist ☐

4. The presence of someone to give directions is useful to me.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

Do not exist ☐

PART 3:

1. I notice if there is symmetry or a certain system in the building configuration.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

I do not know ☐

2. I notice if all corridors intersect with acute angles or not.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

I do not know ☐

3. I notice if all corridors are organized according to a certain system or not.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

I do not know ☐

4. I pay attention to "Landmarks".

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Sufficient ☐

Insufficient ☐

I do not know ☐

5. I pay attention to the changes in the lighting system.

A. Generally:

Always ☐

Sometimes ☐

Never ☐

B. In Karum:

Yes ☐

No ☐

I do not know ☐

PART 4:

Correct ☐

Sure ☐

Incorrect ☐

Not sure ☐

Close ☐

APPENDIX B FLOOR PLANS OF KARUM SHOPPING MALL

