

PROSPECT-REFUGE THEORY REVISITED: A SEARCH  
FOR SAFETY IN DYNAMIC PUBLIC SPACES  
WITH A REFERENCE TO DESIGN

by

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ABSTRACT

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Prospect-refuge theory (Appleton 1975) is based on habitat theory (Darwin 1958) which states that the ability to see (prospect) but not be seen (refuge) is basic to many biological needs. According to Appleton, the ability to see without being seen increases perceived safety which increases the esthetic pleasure experienced in the environment. Wekerle and Egan (1991) state that the perception of safety is necessary for feelings of enjoyment and comfort in urban open space. Appleton's hypothesized factors—prospect and refuge—are known to affect people's perception of how safe an environment appears to be. This thesis studies perception of safety in dynamic public spaces by observing commuters at a chosen rapid transit railway station in North Texas, Park

Lane, as they opt for ideal design conditions that successfully offer them refuge or prospect.

Step one of the study consists of observations of commuter behaviors during peak hours and at off-peak hours at a selected station. Step two of the study consists of return questionnaires distributed to commuters at the same station. The questionnaire analyzes commuters' preference for chosen prospect-refuge design features at the station which enhance the feeling of safety during peak hour and off-peak hour wait periods.

This study applies Appleton's theory to a dynamic public space, thereby examining landscape design options which affect comfort and the perception of safety for users of certain dynamic public spaces.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Habitat Theory

‘Habitat theory’, initially proposed by Darwin (1958) asserts that the relationship between a human being and the perceived environment is basically the same as the relationship of a creature to its habitat. In other words, it is about the ability of a place to satisfy biological needs of human beings. Appleton (1975) gives the habitat theory an aesthetic dimension by stating that satisfaction, experienced in the contemplation of landscape, stems from the spontaneous perception of landscape features which, in their shapes, colors, spatial arrangements and other visible attributes act as sign stimuli indicative of environmental conditions favorable or unfavorable to survival. The theory begins by identifying environmental perception as a key to all adaptive behavior.

Appleton (1975) argues that individuals within each species of animal, including Homo sapiens, are motivated to perceive their surroundings in such a way that environmental information is acquired and stored in a form in which it can be efficiently and quickly retrieved when needed in order to ensure survival. Men and women, in short, perceive their environment much the same way as other animals perceive their habitat, and to this idea he gives the name “habitat theory.” He explains how some of the aspects that we perceive are likely to be needed more immediately than others, particularly those that relate to self-preservation from sudden, unexpected danger.

Because the sort of knowledge that permits rapid strategic adjustments is so immediately important, we need to pay particular attention to it, and nature ensures that we do so by providing us with a powerful craving to satisfy our curiosity first and foremost about our environment as a theater for survival. The first is the opportunity to keep open the channels by which we receive environmental information (All the senses are involved, but in considering “landscape” we are naturally most concerned with the sense of sight and therefore can be justified in using the word “seeing” to describe this process). The second is the opportunity to achieve concealment, and this gives us the twin bases of our simple classification of “prospect” and “refuge” (Appleton, 1975). Appleton opines that the area in which prospect-refuge theory has made the greatest impact is in landscape architecture.

The idea that there is a link between human evolution and aesthetics is explored by several researchers in the past twenty years [(Appleton, 1975, 1984); (Orians, 1980); (Balling and Falk, 1982) ;( Kaplan and Kaplan, 1989); (Kellert and Wilson, 1993)]. Among these works we find two of the most discussed theories in landscape preference studies, the prospect-refuge theory by Appleton (1975) and the framework for prediction of preference by Kaplan and Kaplan [(Kaplan, 1975, 1987); (Kaplan and Kaplan, 1982a, 1989)]. This research throws light on how prospect-refuge theory fosters preference for certain design features at a chosen urban dynamic public space.

## 1.2 Prospect-refuge theory

Prospect-refuge theory, initially proposed by Appleton (1975, p. 63), expands on Lorenz's (1964) phrase "to see without being seen" as a primitive human behavior. It reduces the scope of the habitat theory and provides a kind of reaction to the environment by implying a behavior which automatically exploits the advantages latent in a creature's surroundings. According to Robinson's account of the theory (1954, p. 54), it is based on the continuing influence of humankind's pre-agricultural relationship to its habitat. The habitat is described as not only a landscape where food needed to be hunted, gathered, or grown in small gardens but also one where dangerous predators roamed. In these circumstances, an enclosure such as a cave is said to offer refuge while a commanding viewpoint is said to allow danger to be anticipated or food to be identified. Because of this, an enclosed space is said to promote feelings of safety and relaxation whereas a prospect is said to be stimulating and exciting. This theory explores the basic animal behavior of hunting and escaping still prevalent in human beings. 'The hunter' or 'the hunted', it is in the creature's interest to ensure that he can see his quarry or predator, as the case may be, without being seen (Lorenz, 1954). The achievement of these conditions becomes a first objective which presents a chance for the achievement of the second, to catch or to escape.

The theory of prospect and refuge is used as an ecologically based theory to provide a potentially valuable framework for several researches conducted since then, especially those involving safety from crime in public spaces, such as urban greenways (Luymes and Tamminga, 1995). Appleton's evolutionary theory focuses on the

primitive origins of contemporary environmental perception and preferences (1984). Therefore, by definition it does not specifically deal with crime as a hazard; but for modern city-dwellers, the analogy between predation and crime is close enough to make the theory relevant.

It is found that prospect and refuge affect people's perception of how safe an environment appears to be (Luymes and Tamminga, 1995). Prospect and refuge provide the spatial and geographical mechanisms by which humans maximize their security and seek places that allow them to see their surroundings clearly, without being seen (Appleton, 1975; 1984). In the study, a suggested typology of prospect and refuge is put forward to allow the identification of prospect and refuge opportunities, through analysis of the spatial attributes of the environment (Appleton, 1975, p. 88, 102). Prospect-refuge theory is useful for designers because it is a reminder of how experiences are created when spaces are designed. Although it is a theory developed mainly by reference to rural and natural landscapes, the theory can also be applied to complex urban spaces created by buildings, topography and vegetation (Robinson, 1954, p. 54). Thus, principles derived from prospect and refuge prove to be useful in the analysis of landscapes (Appleton, 1984). This research applies the same principles in the analysis of an urban landscape.

### 1.3 Crime and safety in the urban environment

Recent studies indicate that personal safety is a crucial factor of lifestyle options, and crime is said to be one of the main problems threatening the quality of

urban life (Newport, 2002; Noll, 2000; Park, Curtice, Thomson, Jarvis and Bromley, 2001). Studies suggest that actual personal safety may differ from the perceived personal safety, but in terms of behavior constraints, it is perceived danger that influences behavior. This causes people to avoid places that they associate with personal risk. (Keane, 1998; Riger and Gordon, 1981). Thus perception of danger in any urban public space plays an important part in human interaction with the environment.

Gardiner (1976, 1978) found that the physical environment plays a role in criminal activity by influencing how and by whom a space is being used; there is a connection between the organization of the environment and the opportunity for crime. Crimes against individuals also occur most often in places where the chance of being seen is low (Newman, 1980). Many studies analyze links between different physical features of the urban environment and perceived danger (Fisher and Nasar, 1992; Herzog and Kutzli, 2002; Nasar and Jones, 1997; Newman and Franck, 1982). Thus, it is acknowledged that physical features and spatial organization of an urban environment are associated with perception of safety.

The response to environmental features is said to have important planning implications. For example, research suggests that planning decisions should take into account both the factors that reduce the occurrence of crime in given environments and the psychological factors related to the perception of safety or danger (Loewen, Steele, Suedfeld, 1993). Appleton's theory uses an experiential and strategic approach that is sensitive to perceptions of personal safety, to explain human environmental preferences (Appleton, 1975, 1984). Thus, the experience and strategy of the theory helps designers

understand the perceived level of safety prevalent in human beings with respect to their immediate environment.

According to Nasar (2000), characteristics providing prospect and escape are to be considered at the early stage of the design of so called 'hot spots of fear'. Some examples of 'hot spots' include parking garages, parking places, subways, public parks, and public transportation stops (p. 190). Thus, it is seen that urban spaces dominate the so called 'hot spots'. Thus, it is important to study prospect and refuge while designing urban public spaces.

Since Dallas is said to be the Texas metropolitan area that most closely resembles US metropolitan areas as a whole (Bureau of the Census, 1986), Dallas was chosen as the city for survey. Public transit stations are one of the major areas where waiting behavior takes place on a regular basis and one of the most important dynamic urban public spaces where perception of safety and safety play a major role (Nasar, 2000, p. 190). One of the most used public transportation systems in the North Texas area is the Dallas Area Rapid Transit (DART) light rail system. This research tests if the theory of prospect and refuge applies at a DART transit station, and studies the perceptions of safety prevalent in commuters using the system by studying their waiting behavior with relation to certain prospect and refuge symbols identified at the station.

#### 1.4 Hypothesis

Started in June 1996, the extensive network of DART Rail and bus services moves more than 200,000 passengers per day across a geographic service area of 700-

square-miles. The system connects thirteen cities and thirty-five transit stations in and around Dallas ([www.DART.org](http://www.DART.org)). The system wide ridership for DART rail for the financial year 2004 along a fixed route was 16.5 million passenger trips. Statistics show that the average weekday ridership in the same year was 52,571, and the weekend ridership totaled 21,537. Public safety is an issue of concern in dynamic urban public spaces such as transit stations. This thesis studies how Appleton's theory impacts waiting behavior of commuters during peak hours and off-peak hours at Park Lane station, one of the DART railway stations in North Dallas. Park Lane transit station is selected because it is similar in terms of design features to most of the DART stations. The latest statistics show that the number of passengers boarding a train at Park Lane station on an average weekday is reportedly 2100, and the number of users of the station is 4200. This average is calculated every six months for a thirteen month period. This study tests commuters' perception of safety and their search for ideal design conditions which offer them comfort during the wait for the train at the station.

### 1.5 Primary and secondary research questions

The primary research questions involved in this study are as follows:

1. Do commuters seek prospect or refuge during the waiting period at peak hours at a selected DART transit station?
2. Do commuters seek prospect or refuge during the waiting period at non-peak hours at a selected DART transit station?

The secondary research questions that this study seeks to find answers to are:

- a) During peak hours, where are commuters most comfortable while waiting at the station?
- b) During non-peak hours, where are commuters most comfortable while waiting at the station?
- c) Is there a difference in the perception of preference for prospect or refuge between daytime and nighttime?
- d) Do the perceptions of prospect and refuge vary according to gender?
- e) Does weather affect perceptions of prospect and refuge during the waiting period?
- f) What landscape architectural features increase the perception of safety for commuters?
- g) What landscape architectural features reduce the perception of safety for commuters?

### 1.6 Study Purpose and Objective

Prospect-refuge theory is used as a framework for several researches in a variety of settings studying its relation with crime. Several of these studies are carried out in public settings like college campuses and parkways (Nasar and Fisher, 1993; Luymes and Tamminga, 1995). There are hardly any carried out at a public transportation station. One of the objectives of this study is to test the application of prospect and refuge at a selected mass transit station, an urban dynamic space used widely by people who spend much of their time in wait for trains. This research examines which of these two factors-prospect or refuge- affects commuters' waiting behavior to a greater extent

at the selected transit station. The results from this study help to assess the perception of safety among commuters. Further, this study identifies the factors which increase or decrease the feeling of safety at the selected transit station with reference to certain prospect and refuge design features, and it translates these preferences into criteria which can be applied in designing mass transit stations in the future.

### 1.7 Definition of terms

Prospect-refuge theory: Prospect-refuge theory refers to the primitive and adaptive behavior still prevalent in human beings, namely, “to see without being seen”. (Appleton, 1975).

Dynamic public spaces: Public spaces characterized by continuous change, activity or progress. In this context, the word refers to spaces which continuously undergo change in the rate of activity during different times of the day or night.

Peak hour: Peak hour refers to crucial hours of the day, such as work hours, when a large amount of people commute to and from places. With reference to North Dallas work timings, and commuter flow, peak hour traffic occurs between eight and ten in the morning and between four and six in the evening.

Non-peak hour: Non-peak hour refers to times of the day other than peak hours when there are not many people commuting to and from places. With reference to North Dallas work timings, it refers to any time of the day or night other than the peak hours mentioned above.

Peak hour commuter flow: The relative level of crowding at a station when there are more commuters at a selected station because of peak hour time.

Off-peak hour commuter flow: The relative level of crowding at a station when there is relatively lesser number of commuters at the selected station because of off-peak hours, resulting in a sparsely crowded station.

### 1.8 Limitation of the study

This research studies commuters' waiting behavior at a selected station with reference to the prevalent design conditions at the same station. Selection of station is based on design conditions which are representative of most public transit stations in North Dallas so that results obtained for preference for prospect-refuge and for safety perception are applicable to public transit stations in general. Hence perception of safety is measured with respect to certain common design features which are prevalent to a greater extent in a majority of the stations. Design criteria would be set based on responses and preferences for certain design features and symbolism which can be generalized in lieu of the factors, prospect and refuge. There are a few exceptions to this generalization with respect to station design, and these are not taken into consideration.

Earlier studies on crime state that the fear of crime is higher for people who have been previously victimized, especially personal victimization (Skogan, 1986). This study, however, does not consider the previous experiences with crime of the participant commuters. This limits the scope of the study in terms of the personal information

received from the return questionnaires since the psychological reasons involved with regards to perception of safety with respect to each individual participant are not explored.

Another factor which is considered in most studies of safety is the amount of surveillance at chosen sites. This study does not take into consideration this factor and limits itself to studying human preference for design conditions with reference to prospect and refuge. Thus, people's opinion about surveillance at the chosen site is not taken into consideration.

There are many more demographic factors which are bound to affect people's perception of safety and their answers to the questionnaire such as cultural background, ethnicity, their housing environment and income level. This study does not consider those and restricts itself to studying perception of safety of commuters with reference to their age, gender, timings of the day and the frequency with which they use the public space in consideration.

Last, but not the least, this research intends to study the safety perception of commuters on the assumption that the participants are potential victims and not potential offenders. Literature cites that sometimes prospect and refuge features, especially refuge is often favored by offenders. However, this research is intended only to study perception of safety of a harmless commuter while waiting for the train at a station.

### 1.9 Overview of the study

As stated earlier, this research aims to study how the theory of prospect and refuge applies to commuters' waiting behavior at a mass transit light rail station in North Dallas. Chapter 2 reviews Appleton's theory of prospect and refuge from previous literature. Chapter 3 deals with the methods of finding data and analyzing the same which are used in this research. Chapter 4 analyzes the results from the participant observation and questionnaire survey conducted for this study. Chapter 5 summarizes the conclusions derived from the analysis, relates it with reference to the beliefs expressed in previous literature and explains certain aspects that could serve as criteria to be considered in the process of design keeping in mind prospect and refuge, perception of safety and interaction with the environment. This chapter also highlights the future prospects of this research.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Primitive human behavior and the environment

‘Habitat theory’, proposed by Darwin (1858) is one of the first theories which correlate human behavior and the environment. It explains that humans interact with the environment, much in the same way as animals do with their habitat. He points out that the theory of natural selection operates on mental as well as physical abilities. A mental ability with a clear evolutionary advantage is the ability to distinguish, quickly and accurately, environments that are safe from environments that are dangerous. Boissy (1995, p. 166) explains the Darwinian mainstream of behavioral ecology, which is based on the concept of evolutionary adaptations and points out that fear has definite survival value in wild animals. Defensive reactions are said to increase the chances of individual survival (by fight or flight, for instance). In nature, the most important threats of injury that an individual encounters during its lifetime is said to come from predators and attackers.

Dewey (1958) explains that man not only inherits the physical sense-organs from his forebears but also similarities in patterns of behavior. In Dewey’s words:

“ I do not see any way of accounting for the multiplicity of experiences of this kind...except on a basis that there are stirred into activity resonances of dispositions acquired in primitive relationships of the living being to its surroundings, and irrecoverable in distinct or intellectual consciousness.” (Dewey, 1958 edition, p. 29)

This proves that there are behavioral as well as anatomical characteristics which are capable of being genetically transmitted, and secondly that some such characteristics

may have a role to play in relating the individual creature to his environment. We now explore some of the animal behavior which involves interaction of the animal with the environment.

Scott (1958, p. 58) explains that shelter-seeking is an extremely common phenomenon which clearly involves the animal in a very close relationship with the environment. Scott defines shelter-seeking thus:

“The tendency to seek out optimum environmental conditions and to avoid dangerous and injurious ones is found in almost all animals and may be called shelter-seeking.” (1958, p. 15)

Further, Scott states that any animal which can move at all and can discriminate between different parts of its environment will show some shelter-seeking behavior (1958, p. 59). Investigatory or exploratory behavior is of particular significance because this is the form of behavior on which the successful selection of places which afford the optimum conditions for other forms of behavior largely depends. Tinbergen’s studies on animal instincts with relation to the environment convince us that numerous details of behavior are ‘adaptive’, that is, they play a part in the relations between the animal and his environment. (1969 edition, p. 13) He is one of the few researchers to recognize the amazingly high degree of adaptiveness to be found in numerous behavioral characteristics. Shelter-seeking, investigatory, exploratory and adaptive behaviors are commonly observed in humans too. Thus, by studying animal behavior, we get better clues to our understanding of how evolution has come to be.

The Encyclopedia Britannica (1969 edition, vol.3, p. 395) states how behavior is closely related to function. Four primitive kinds of behavior having obvious and

adaptive results are listed: ingestive behavior, including eating and drinking; shelter seeking; sexual behavior; and investigatory or exploratory behavior. In addition to these, certain types of behavior are found chiefly in more complex animals, including man. These are said to include agonistic behavior, including fighting and escape behavior; allelomimetic behavior or mutual imitation, which include the co-ordinated movements of flocks and herds; care giving or epimeletic behavior; and care seeking or et-epimeletic behavior. All these behavioral characteristics are also found in humans.

Another behavior that is termed as a primitive behavior which is still prevalent in humans is defense behavior. Defense behavior tells what the territory is for those animals without a clearly visible boundary, such as a wall or fence (Ashcraft and Schefflen, 1976, p. 164). A defensive maneuver might include simply an attempt to maintain affixed distance; that is, on threat of an intrusion, an animal or person may simply back off, relinquishing a piece of ground but continuing to maintain a particular distance of space between the intruder and defender. It is assumed that if territory is conceived of as a behavioral space, then the maneuver can be interpreted as a successful defense of interpersonal distance, of a space not a piece of ground. Thus, territoriality, proxemics and defense behavior are interlinked in a way.

Appleton (1990) states how the whole concept of evolutionary change implies that some characteristics are replaced by others, while some are retained, and in order fully to understand what something has changed into, it is needed also to know what it has changed out of. He expresses his concern about the origins of our responses to landscape as encountered through direct interaction with it and thence through its

representation in the arts and identifies the most important difference between our own percept and that of other creatures, namely, the vastly greater complexity and potential of the human brain. Darwin (1887, p. 89) points out that the theory of natural selection operates on mental as well as physical abilities. A mental ability with a clear evolutionary advantage is the ability to distinguish, quickly and accurately, environments that are safe from environments that are dangerous. Hediger (1955, p. 39) notes that the most important function of an animal in an environment is simply not being killed. Consequently, he states that it is important to maintain constant watchfulness and constant awareness of locations of regions relative to oneself from which one can be attacked or to which one can move to safety. Thus, two abilities with obvious effects on safety are the ability to move and the ability to perceive.

Lorenz (1964 edition, p. 181) explains ethological approach and the concept of “range of vision” thus:

“It is early one Sunday morning at the beginning of March, when Easter is already in the air, and we are taking a walk in the forest whose wooded slopes of tall beeches can be equaled in beauty by few and surpassed by none. We approach a forest glade. The tall smooth trunks of the beeches soon give place to the Hornbeam which are dotted from top to bottom with pale green foliage. We now tread slowly and more carefully. Before we break through the last bushes and out of cover on to the free expanse of the meadow, we do what all wild animals and all good naturalists, wild boars, leopards, hunters and zoologists would do under similar circumstances: we reconnoiter, seeking, before we leave our cover, to gain from it the advantage which it can offer alike to hunter and hunted-namely to see without being seen.”

Thus, range of vision has a relationship to safety and perception of safety. The more one can see of potential enemies and the lesser one is seen, chances of survival are further enhanced. (Hediger, 1955, p. 39). Appleton (1975) proposed the prospect-refuge

theory based on this concept of seeing without being seen. This behavior is observed not only in predators or prey; it seems to be a common phenomenon observed in creatures seeking shelter as well. A creature seeking shelter, however seeks to escape from the threat, not of an animate pursuer, but of an inanimate hazard, such as the wind or the rain or the excessive heat of the sun, but it very frequently happens that a place which will serve the function of providing shelter from the elements, will also provide concealment from the hunter (Appleton, 1975). This thesis studies how prospect-refuge theory is still a part of human behavior; one of the many primitive ones which have been passed on from animal ancestors. Thus it is explained by Appleton in his theory that this theory also induces shelter-seeking from the natural elements. Taking this portion into account, this research also studies the effects of weather on the preference for prospect or refuge prevalent in humans.

Appleton (1980) explains that the perception of environmental symbols is commonly followed by certain kinds of behavioral adjustment which can frequently be seen to have some survival value. There are many kinds of primitive survival behavior in which some kind of symbolism plays a central role, ranging from courtship display to scent-marking or display of territoriality. But the symbolism which is of most concern in the present context is that which regulates the association between an individual organism and its natural habitat. At its most general level, natural selection favors mechanisms which induce the individual members of a species to frequent those types of environment which best suit their life-styles. Whatever such mechanisms are called they are said to be capable of establishing an attractive bond between creature and

place. Thus, the in-built mechanism of prospect-refuge is one such that establishes the bond between man and the environment.

## 2.2 Prospect-refuge theory concepts

Appleton (1975) defines prospect as an unimpeded opportunity to see and refuge as an opportunity for the creature to hide. He clarifies components of landscape according to these two simple principles of prospect and refuge. The desire to see without being seen is identified as something conducive to, but more limited than, the desire to satisfy all biological needs. Prospect-refuge theory postulates that, because the ability to see without being seen is an intermediate step in the satisfaction of many biological needs, the capacity of an environment to ensure the achievement of this becomes a more immediate source of aesthetic satisfaction. Appleton explains how a landscape which affords both a good opportunity to see and a good opportunity to hide is aesthetically more satisfying than one which affords neither, but again weakness in prospect or in refuge may be compensated for by strength in the other. In short, 'prospect' and 'refuge' do not constitute a dichotomy or 'dualism'. Neither are they to be considered as opposites. Thus prospect is to do with perceiving, with obtaining information, particularly visual information, refuge with hiding, sheltering or seeking protection. Another concept defined by Appleton, the concept of hazard implies the proximity of something which threatens, menaces or disturbs our equilibrium; at another level, in terms of our behavioral response, the symbolism of hazard prompts

evasive action, like hiding, escaping or eliminating the source of danger. (Appleton, 1990, p. 26).

Appleton (1975) explains the variables involved in the experience of landscape. He states that the strategic value of a landscape, whether natural or man-made, is related to the arrangement of objects which combine to provide collectively the two kinds of opportunity of prospect and refuge, and when this strategic value ceases to be essential to survival it continues to be apprehended aesthetically (p. 67). The number of possible arrangements of prospects and refuges which are capable of inducing aesthetic satisfaction is obviously infinite. However, the potential variety of aesthetic experiences which can be derived from the contemplation of landscape can be achieved in many ways, but principally by varying the following factors according to him:

- i) the objects employed to symbolize prospects and refuges,
- ii) the manner and intensity with which they symbolize them,
- iii) the spatial arrangement of the symbols,
- iv) the equilibrium of prospect and refuge symbols, and
- v) the physical media by which such an arrangement is communicated to the observer (p. 67).

These factors prove useful while studying a landscape with regard to how factors of prospect and refuge influence the space in question. These help distinguish objects in the landscape which are strong prospect symbols from those which are strong refuge symbols, thus allowing inference of whether the landscape is prospect-dominant or refuge-dominant. The arrangement of the symbols helps decipher the composition of

the landscape as a whole. Appleton also states that when prospect and refuge are prevalent in the landscape, whether in equilibrium or in varying proportions, individuals display a preference or antipathy for either prospect or refuge, by displaying their affinity or dislike towards the symbols. This preference or antipathy in individuals for prospect-refuge symbols is studied in this research with reference to a chosen site. The fifth factor stated above defines variations in the physical media by which the details of a landscape are communicated to the observer. These are variations affecting the passage of light. Light is said to be the one fundamental requirement for the realization of any prospect. This aspect provides enlightenment on how nighttime or darkness is likely to make a difference in the preference for prospect or refuge.

The perception of symbolic material is very similar to reading a picture according to Gombrich (1963). This includes identification of those features, objects or situations which are conducive to seeing and those which are conducive to not being seen, always keeping in mind that any one such feature, object or situation may combine both attributes in an infinite variety of degrees (Appleton, 1975). Any feature, object or situation which directly facilitates observation or indirectly suggests an opportunity to extend the field of vision fits into the category of the prospect. Any feature which actually affords, or symbolically suggests, an opportunity to hide or to shelter fits into the category of a refuge (Appleton, 1975). The key to finding such symbols, he suggests is to look to the system of natural symbolism which is central to the process by which creatures are enabled to establish favorable relationships with their natural habitats. If environmental perception is an essential prelude to environmental

adaptation it is of the utmost importance that the perceiving organism shall be able to act on the signals given by these symbolic objects (Appleton, 1990, p. 24). This method of identification is used to study a specific site with respect to the existing design features on the site by classifying them into prospect or refuge symbols based on their form and functional characteristics. Since some features or objects are said to possess characteristics of both prospect and refuge, it must be noted that these features serve as both prospect and refuge symbols. Such existing features on the site are excluded from selection for the study. Thus, only features which possess clear characteristics of prospect or refuge are selected, and commuters' preference for such features is studied.

In a later publication, Appleton explains the need for a coordinating system in landscape as the reason for proposing the prospect-refuge theory (Appleton, 1980). The prospect-refuge theory explains preference for particular environments in terms of environmental adaptation. It serves as a preference predictor tool in landscape architecture thus:

1. The concept of "aesthetic value", which traditionally has been associated more closely with the arts, is approached on the assumption that it is also susceptible to examination by the methodology of the sciences (Appleton, 1980).
2. It lays great emphasis on the need to elicit evidential support from as wide a range of human experience as possible, supported by the arts, sciences and the everyday experience.
3. It attempts to reduce the concepts that emerge out of this complexity to a relatively simple form, almost a "formula".

4. It simplifies itself to the extent of being available as a potential explanatory model for the use of anyone interested in applying it in any particular area of investigation or in any particular method or technique.

Certain terms and definitions are established by Appleton (1975) which also assist in identifying a feature as a prospect or refuge symbol.

#### *2.2.1 Terms and definitions used in relation to prospect and refuge symbolism*

Appleton defines some of the terms commonly used for symbolizing prospect and refuge. They are:

*Direct prospect:* Views that are directly observed from a point of observation are defined as “direct prospect”. (Appleton, 1975, p. 77)

*Closed Prospect:* A restricted view uninterrupted in the immediate foreground is defined as a closed prospect. Panoramic views and vistas are said to be examples of closed prospects. For example, an avenue which leads up to a small temple backed by a screen of trees or by the side of a hill is termed as a closed prospect by Appleton (1975, p. 80).

*Vantage points:* Vantage-points is said to include all man-made structures which have the effect of providing an observation-point from which an extended field of vision could be achieved. They are examples of prospects, and they are classified as ‘natural’ or secondary. Towers, ‘lookouts’, clearings on forested hills are examples of vantage points (Appleton, 1975, p. 81).

*Vista:* A vista is described as a point which, in terms of prospect symbolism, affords a particular advantage. Vistas are either primary or secondary. Secondary vistas comprise

a very wide range of suggested visual experiences. In the first case, the secondary vista is an extension of the direct prospect in a single direction. Secondary vistas which continue channels of vision which have become slightly bent may be called deflected vistas. The passage of a slightly serpentine road through a forest affords a good example of the deflected vista (Appleton, 1975, p. 82).

*Hazard:* Those threats to a creature's well-being which seem to him to be occasioned by some external incident is defined as a hazard by Appleton (1975, p. 86).

*Enclosure:* A space included within or marked off by boundaries is termed as an enclosure. (Weiner and Simpson, 1991, p. 147). An enclosure is also defined as a layout of surfaces that surrounds the medium in some degree. (Gibson, 1979, p. 34). Though the term enclosure has not been used by Appleton, this is a term which we acquaint ourselves with in literature associated with the main prospect-refuge theory.

*Entrapment:* Entrapment refers to the difficulty a person would have escaping if confronted by a potential offender.

*Physical concealment (blocked prospect):* Physical concealment means a visual occlusion of space big enough to hide a potential offender from which the offender could watch and emerge to attack. Concealment refers to the affordance of the feature from the point of view of a potential offender, whereas blocked prospect refers to the affordance from the point of view of the victim.

*Symbol:* A symbol is defined as something that stands for, represents, or denotes something else, especially a material object representing or taken to represent

something immaterial or abstract, as a being, idea, quality or condition. (Appleton, 1980)

Refuges are mainly differentiated on the basis of the hazard against which they offer protection. Refuges can further be classified as a natural or artificial refuge. The category of artificially constructed refuges of human contrivance contains a vast range of buildings-huts, hovels and other rough shelters, cottages, mansions, castles and cathedrals. Refuges which consist of more than one substance are designated the term 'composite'. (Appleton, 1975) These basic definitions obtained from the literature help in recognizing prospect and refuge features as symbols in the landscape and through observation of human interaction with these natural or man-made symbols which are present in the landscape. Participant observation in this study draws conclusions about human prospect-refuge behavior on the foundation of these principles. In case of this study, the refuge features identified on site are man-made and hence the term refuge refers only to artificial refuge when mentioned with respect to the chosen site.

Exposure to extremes of both heat and cold normally induces irritation, discomfort or pain which leads to shelter-seeking before serious damage is done. The kind of measures a man takes to protect his person against such hazards depends on his ability to observe accurately the patterns of these phenomena and to devise effective defenses to render enough living-space immune from them to keep himself comfortable until the hazard has passed. Thus, Appleton claims that it is possible to observe and identify if shelter or refuge is sought by humans in extremes of weather. These relative

responses to weather conditions are reflected in the two step procedure of conducting this research.

### 2.3 Human interaction with space and its relationship to habitat theory

The complex relationships between people and places have been explored through a variety of disciplines and conceptualized in a number of key concepts such as sense of place (Hay, 1998; Tuan, 1974), place identity (Proshansky, Fabian and Kaminoff, 1983), place attachment (Altman and Low, 1992) and reversal theory (Apter, 1982, 1989). Canter (1977; 1983) defines place as the result of relationships between actions, physical attributes, and conceptions of actions in physical localities. Stokols (1981, p. 398) assigns functional aspects of place a central role in defining that the perceived social field of the place is the totality of functional, motivational, and evaluative meanings conveyed by the physical environment to current or prospective occupants of the place. By linking this to habitat theory, we are able to observe the importance of the primitive idea of the relationship of the creature to its habitat and the similarities that are maintained in concepts through the years with respect to human interaction with the surrounding environment.

Appleton (1990, p. 20) quotes François Jacob (1982, p. 55) thus:

“Living beings can survive, grow, and multiply only through a constant flow of matter, energy and information. It is therefore an absolute necessity for an organism to perceive its environment or, at least, those aspects of its environment that are related to its life requirements ...Obviously, the increase in performance that accompanies evolution requires a refinement of perception, an enrichment of the information received concerning the environment ....In birds and even more so in mammals, the enormous amount of information coming from the environment is sorted out by the brain, which produces a simplified and useful representation of the external world. The

brain functions, not by recording an exact image of the world taken as a metaphysical truth, but by creating its own picture.”

In quoting Jacob, Appleton makes it clear that the process of perception, which is the agency that creates this work of art, is also the master activity on which all survival behavior depends, and that there can be no environmental adaptation without environmental perception. Hall (1966, p. 187) expresses himself by quoting the words of McHarg thus:

“...no species can exist without an environment, no species can exist in an environment of its exclusive creation, no species can survive, save as a non-disruptive member of an ecological community. Every member must adjust to other members of the community and to the environment in order to survive. Man is not excluded from this test.”

Thus, it is gathered that man constantly interacts with his environment, a behavior carried on from ages from our ancestors. These quotes also bring into picture the importance of the perception of our environment.

Proshansky et al. (1983) defines place identity as a sub-structure of the self-identity of the person consisting of, broadly conceived cognitions about the physical world in which the individual lives. These cognitions represent memories, ideas, feelings, attitudes, values, preferences, meanings and conceptions of behavior and experiences which relate to the variety and complexity of physical settings that define the day-to-day existence of every human being. (Proshansky et al., 1983, p. 59). The new social paradigm greatly emphasizes that places are more than geographic settings with definitive physical and textual characteristics; they are fluid, changeable, dynamic contexts of social interaction and memory (Stokowski, 2002). Thus, recent research indicates that the interaction between people and their environment is critical and plays

a characteristic role in how people perceive and etch the identity of the place they most often visit or use. Thus, in order for an environment to be remembered as a preferred one, it is important to consider the preferences of the users of the same environment.

Part of the structure of urban place-identity is a pattern of beliefs, feelings, and expectations regarding public spaces and places and, even more importantly, a dimension of competence relevant to how adequately the individual uses these physical settings as well as the appropriate strategies for successfully navigating through the settings (Proshansky, 1978, p. 167). These strategies are to be developed by the planners in the initial stages of the design itself. Thus, urban planners and designers play a significant role in determining the identity of an urban space.

Carr, Francis, Rivlin and Stone (1992, p. 187) explain the significance of connections with the environment as suggested by Appleyard (1979) and Rapoport (1982) thus:

“People need links to the world, and some are provided by the spaces they inhabit and the activities occurring within these spaces. Public space experiences yield meanings that accrue over time, and if these are positive meanings they will lead to connections that go beyond the immediate experience of a setting.”

In order for space to be legible, particularly in the case of public areas, it must have recognizable cues that are understood by potential users, cues that communicate what kind of place it is and whether they are welcome. Legibility is defined as the ability of a place to communicate first that it is open to the user and then what is possible there, once the user is inside (Carr, Francis, Rivlin and Stone, 1992, p. 188). Thus, it is important that any place be clearly legible and decipherable by the human mind for it efficient use.

Nasar (1994) explains about content and structure of space. Content is thought to have symbolic meanings to an observer, while structure refers to formal aesthetics, such as architectural style, proportion, rhythm, scale, and building form. Nasar (1994) emphasizes, the formal variables enclosure, complexity, and order has emerged as important in human spatial experience. Tversky (2003) explains through her research that mental representations of space are constructions based on elements, the things in space, and the spatial relations among them relative to a reference frame. Thus, this recent concept of sense of place articulates the relationship between people and place and provides a valuable framework with which to explore the relationship between the biophysical environment and the well-being of its inhabitants (Jorgensen and Stedman, 2001; Stedman, 2003). Thus, content and structure of a space are relevant constructs where perception of space and interaction with space are involved.

Social space, according to Lantane and Liu (1996), is defined as follows:

“an intersubjective matrix of psychological distances based on physical and social reality that provides a framework constraining how people are influenced by one another”(Lantane and Liu, 1996, p. 27).

A sub-theory of social space specifically tailored to the interaction between people and their physical environment is either mediated by their representations of the physical space, or directly cued by structural characteristics of the space itself. Evidence within the literature supports the importance of experiential relationships with the environment in shaping perceptions, as images people have of the environment are based on their experience and relationship with it (Oreszczyn and Lane, 2000). Manzo (2003) signifies the importance of our need to learn more about people’s experiences in places in order

to understand the complex and multi-faceted phenomena that comprise our emotional relationships to places. Thus, the extent of people's experiential relationships with the space is comprehended in determining perception of a space.

Relph (1985) explains that there may be a strong affection for particular places (topophilia), but there may be an aversion for other places (topophobia). Chawla (1992) describes the "shadow side" of our relationships with places with the argument that:

"If place forms the circumference of our experience, we are attached to it for better or for worse. Therefore, there is a shadow side....composed of.... frustrating or frightening places." (Chawla, 1992, p. 66).

Research suggests that places where negative experiences occur are as meaningful as places where needs are met and succor is found (Ahrentzen, 1992; Kuribayashi and Tharp, 1998). Thus, the dynamics of safety, threat and belonging explain that an important part of participants' relationships to places stems from issues regarding safety and threat. The active and creative use of space demonstrated by respondents in Manzo's (2003) research provides further evidence for Frederickson and Anderson's (1999) argument that people-place relationships are bi-directional and dynamic. Thus, it is through the uses of places, however typical or creative, that places became important to people. Hence, perception of a place by a user plays a very important role in the effective use of that place.

## 2.4 Perception of safety in urban public space

### *2.4.1 Public space: Ideal characteristics*

Carr, Francis, Rivlin and Stone (1992, p. 19) describe three primary values that guide the development of human perspective. They strongly believe that public spaces should be responsive, democratic, and meaningful. Responsive spaces are described as those that are designed and managed to serve the needs of their users. The primary needs that people seek to satisfy in public space are those for comfort, relaxation, active and passive engagement, and discovery. Democratic spaces protect the rights of user groups. They are accessible to all groups and provide for freedom of action but also for temporary claim and ownership (Carr, Francis, Rivlin and Stone, 1992, p. 19, 20). Meaningful spaces are defined as spaces that allow people to make strong connections between the places, their personal lives, and the larger world. They relate to their physical and social context. These connections may be to one's own history or future, to a valued group, to one's culture or relevant history, to biological and psychological realities, or even to other worlds. A continuously used public space with its many memories helps anchor one's sense of personal continuity in a rapidly changing world (Francis and Hester, 1990). By the buildup of overlapping memories of individual and shared experience, a place becomes sacred to a community (Carr, Francis, Rivlin and Stone, 1992, p. 20). Thus it is important that public spaces are responsive, democratic and meaningful. These are characteristics which increase the value of a place in the minds of its users.

Carr, Francis, Rivlin and Stone (1992, p. 190, 191) jot out some qualities for a space to have meaning:

1. The space is to be comfortable enough to allow an experience with it to occur.
2. Positive meaning is to be created by positive connections to people, connections that create a sense of belonging, of safety, a feeling that personal rights will be protected. In accordance with the words of the same authors, many public spaces are said to create negative meanings that communicate messages that are likely to discourage use, at least by some portions of the public. A setting that appears to be dominated by unfriendly, dangerous, or unsympathetic persons may make other potential users apprehensive about entering. Such settings or spaces are said to produce unpleasant meanings and fail in developing connections to that place which require positive meanings based on satisfying experiences.

#### *2.4.2 Concept of crowding*

A very important concept that arises when we study the behavior of people in a particular setting with respect to their surroundings is the concept of personal distances. An important part of this field of 'proxemics' which would greatly affect people's social behavior in any setting is the concept of crowding. Ashcraft and Schefflen (1976) explain this concept with some examples. They explain about the gray areas that exist between crowding and the usual clustering behavior of human beings. It is observed that people who assemble in open spaces usually congregate together rather than scattering over the larger area. They leave sections of railway stations, subway cars, beaches and other public spaces empty while they cluster in much smaller areas. Some observations

by the above authors of passengers waiting for trains in the Long Island Railroad Station in Manhattan show that they overcrowd some areas, leaving others vacant, even during the worst moments of the rush hours. Upward of a hundred people are said to crowd into spaces that often diminish interpersonal space to a foot or so. It is assumed by the researchers in this case that, were the people to spread more evenly over the available space, inter-personal spaces would increase greatly. Ashcraft states how he once observed a person reading a folded newspaper while waiting for his train with twenty other people standing around him. Ashcraft recalls how this person does not move away from the crowd though he had an option to do so. His behavior is explained as being a response to lighting conditions, drafty sections of the station, or the habit of leaving paths free for transit. But after all this, it is still hard to avoid the conclusion that people simply tend to crowd together (Ashcraft, 1976, p. 99). This thesis does not study proxemics to a great extent, however, it is to be noted that results of participant observation show hints of proxemics, in examples where it is related to prospect-refuge theory.

#### *2.4.3 Perception of safety in an urban public space*

According to Goffman (1971), humans in contemporary industrial society cannot escape their evolutionary past, including the need to immediately detect and respond to predators and other animate and inanimate dangers in the environment. This process of scanning does not ordinarily occupy full attention, Goffman argues, but rather occurs on the edge of consciousness as individuals go about their everyday affairs.

Fear of crime is said to involve perceived threat to a person's existence or well-being (cf. Baum, Singer and Flemming, 1985, p. 185). Individuals in the United States view fear of crime as a main problem threatening quality of life (Gallup poll, 1989). A national poll of 1146 adults confirms that more than 40% are afraid to walk alone at night within one mile of their home (Americans and Crime, 1994). The Bureau of Justice Statistics states that individuals feel unsafe around their neighborhoods, where they shop, work, and go to school (Bureau of Justice Statistics, 1984). Most U.S. residents are said to have experienced fear and many experience it daily (National Opinion Research Center, 1987). These examples from previous statistical records highlight the importance of the perception of safety in our daily lives and our well-being in present times. Previous studies stress that it is important to study the aspects of the immediate social and physical environment of individuals which lead them to believe that they are in danger of becoming victims of crime (Warr, 1990). Thus, it is essential to study how areas come to be perceived as dangerous places, or certain hours as dangerous times.

Literature cites that fear of crime has an uneven distribution over space, time and populations. "Hot spots of fear" (Maltz, Gordon, and Friedman, 1990) or high crime areas conducive to perception of fear develop through ongoing experience because humans develop mental images (Evans, 1980) of their surroundings. These include images of safe and unsafe areas (Hanyu, 1993). In theory, the images help humans to quickly identify objects, predict what will happen, evaluate consequences, and act (Kaplan, 1973). Thus hot spots of fear are born out of certain human

interactions with the environment which do not succeed in bringing about a sense of safety in the human mind.

Warr (1990) explains that a key variable in producing fear in an environment is novelty; novel or unfamiliar environments are known to provoke fear of criminal victimization. Many animal species exhibit neophobia (reluctance to enter a novel area), object neophobia (reluctance to approach a novel object in a familiar space), or display apparent fear responses (escape behavior, distress calls, freezing). The relevance to human behavior is debatable, but humans display some similar traits (Russell, 1979). These reactions in humans arise out of unfamiliarity with the environment. Thus, it is important that the environment be designed keeping in mind the prime aspect of legibility.

Features of the physical environment are known to convey signals of threat or safety (Appleton, 1975; Goffman, 1971). Numerous studies, stimulated by the work of Jacobs (1961), Jeffery (1977), and Newman (1972), confirm links between characteristics of the built environment and fear of crime (Taylor and Gottfredson, 1986). Thus, fear of crime can be said to be associated with the physical features present in an environment. According to Goffman (1971) people scan their environments in search of signals of danger, and once a danger is sighted, they attempt to escape the threat (Warr, 1990). Thus, it can be said that people maintain certain awareness about their environment when it comes to personal safety.

In addition to sight, the other four senses also help humans perceive danger in the surrounding environment. According to Goffman (1971):

“Smells, sounds, sights, touches, pressures....provide a running reading of the situation, a constant monitoring of what surrounds. But by a wonder of adaptation these readings can be done out of the furthest corner of (an) eye, leaving the individual free to focus his attention on the non-emergencies around him....When the world immediately around the individual portends nothing out of the ordinary, when the world appears to allow him to continue his routines (being indifferent to his designs and neither a major help nor a major hindrance), we can say that he will sense that appearances are ‘natural’ or ‘normal’” (p. 238, 239).

Thus, sight is the main sense of the four which helps us perceive our surroundings, though the others too play a role in our interaction and perception of our environment at all times. This research restricts itself on perception information conveyed specifically by sense of sight in humans.

Skogan and Maxfield (1981) provide a well-documented difference between perceptions of safety and actual victimization, but there is substantial evidence that prospect and refuge affect actual crime sites. Perceived personal danger refers to a general fear of becoming a victim, which is associated with specific social contexts, such as visiting a party or waiting for a bus. (Van der Wurff, Van Staaldunin and Stringer, 1989). Literature on people’s spaces states that at the level of the neighborhood, crimes are most likely to occur in public streets, alleyways, and places of public transportation. Vacant subway stops and exits are extremely hazardous at night (Ashcraft and Scheflen, 1976, p. 149). Thus, it is seen that places of public transportation comprise a major part of urban public spaces where there is a likelihood of crime and victimization.

Although both natural and urban settings may contain features such as hiding places that could evoke fear, such features seem more likely to evoke fear in urban settings (Herzog and Miller, 1998). The phenomenon of perceived danger in urban

public spaces is thus related to the fear of immediate danger. This research studies perception of safety in a dynamic urban public space in relation to the physical and social design features which are present at the chosen site.

Many studies in the past are known to have already analyzed links between different physical features of the urban environment and perceived danger (Fisher and Nasar, 1992; Herzog and Kutzli, 2002; Nasar and Jones, 1997; Newman and Franck, 1982). Fisher and Nasar's study in a college campus site finds that design can be used to reduce the fear of crime as well as opportunities for crime by manipulating the three factors of prospect, refuge and escape. (Fisher and Nasar, 2000). Results from Fisher and Nasar's study show that the three features have an impact on pedestrian behavior and feelings of safety. Certain other related factors that influence perceived safety are controllability, possibility of movement, confinement in a novel area, openness, illumination and spacing behavior among others (Stamps III, 2005). This research studies prospect and refuge by assigning these characteristics to certain suited physical features of an important public space, a mass transit station, and studies the perception of safety in the minds of its users with respect to these prospect and refuge symbols. Though difference in perception of safety due to illumination on site is considered in this study to some degree, the other factors such as controllability and movement are not investigated to a great extent.

Fear of crime has been found to be more pronounced among females than males and at night than during the day (Box, Hale and Andrews, 1988; Skogan and Maxfield, 1981; Warr, 1984, 1990). This difference between the biological sexes regarding the

evaluation of crime in public space seems to increase after nightfall (Warr, 1990). Studies state that many women are afraid to go out at night unattended, and their fear of crime appears to function as a significant environmental mobility restrictor (Keane, 1998). This difference in the perception of safety due to difference in gender and daytime and nighttime is also analyzed in this research. However, this research does not study the relation between gender and perception of safety at different times of the day. Research states that fear of crime is higher in people who have been previously victimized, especially personal victimization (Skogan, 1986). This study does not delve into personal history of the participants with regard to victimization and restricts itself to the face value of the answers provided by the participants.

Previous research indicates that several other factors are important in affecting the perception of safety in landscapes. They include: more lighting (45.4%), more (or more visible) security personnel (18.2%), reduced hiding places/shrubs (15.2%), and a variety of other features-including better transportation, better signs, maps of the well-lit areas and fewer vehicles (18.2%).(Nasar and Jones, 1997). This research does not study the site with respect to the above mentioned factors, and restricts itself to prominent design features only.

Warr (1990, p. 894) studies Goffman (1971) and puts forth certain conclusions from the study. He explains with reference to Goffman's previous work that individuals exist within a zone or bubble of awareness, carrying that bubble with them as they navigate their environment. In Goffman's terms:

“ In general, then, we can define the individual's surround or Umwelt as that region around him within which signs for alarm as he is alive to can originate and

within which the sources of this alarm are also located. And for the individual person, this is likely to be measured by means of a radius that is only yards long... As the individual moves, some potential signs for alarm move out of effective range (as their sources move out of relevance) while others, which a moment ago were out of range, now come into it. A bubble or capsule of events thus seems to follow the individual around, but actually, of course, what is changing is not the position of events but their at-handedness; what looks like an envelope of events is really something like a moving wave front of relevance.” (Goffman, 1971, p. 254, 255).

Goffman (1971) discusses that “lurk lines” are lines that demarcate zones that are beyond or behind the individual’s line of sight. The area behind one’s back is always out of sight and hence amounts to a portable blind spot. Another source of lurk lines includes all partitions that block visibility, including dumpsters in alleys, shrubbery. The implications of this idea for the sociology of architecture and design are said to be rich. But there is a much larger implication to the notion of lurk lines, one that Goffman mentions briefly; that there is one routine event that transforms the outside world into an infinity of lurk lines, that event being the fall of darkness. Goffman concludes that if darkness is itself a lurk line, then a truly dangerous area is that area that lies “behind darkness.” Since there is such huge implication of this aspect in the choice of prospect or refuge, this aspect of daytime-nighttime has been taken into consideration in participant observation.

There are several other factors which affect a person’s perception of safety in an area and hence their choice of prospect or refuge. Previous studies indicate that being alone or in a crowd or group is said to be one of them. It is observed that being alone provokes fear. One possible reason is the presumption that others in the immediate vicinity will come to one’s aid in the event of attack (Warr, 1990, p. 895). A second possible reason is said to be the presumption that an isolated individual is a much more

attractive target to an offender than one in the company or presence of others. This presumption seems to be quite prevalent in that a common reaction to fear of crime is to avoid going out alone (Warr, 1985). This factor is considered during the participant observation phase of this research.

Analysis of studies in the past indicates that there is a difference in the perception of safety according to the sex and age of the participant. (Warr, 1990, p. 906). His finding bears on one of the most recurrent issues in the literature on fear of crime and perception of safety, that is, the reason why females and the elderly exhibit a substantially greater fear of victimization than males and the young. (Stafford and Galle, 1984; Warr 1984). This thesis studies if there is a difference in the perception of safety based on gender and age, and performs a quantitative analysis of the same.

#### *2.4.4 Urban public spaces: Potential settings for prospect-refuge*

Previous research conducted in urban public spaces indicates how Appleton's theory can be applied in urban public spaces (Nasar and Jones, 1997). When confronted with someone perceived as a potential offender, individuals feel less safe if the immediate surroundings impede their escape (Appleton, 1975). It is observed that features that impede escape or connection to potential observers or helpers increase risk for a victim while decreasing risk for an offender. Due to fear of facing possible entrapment, individuals avoid or escape physically bounded areas. Thus enclosure of any sort in a space can be considered as a feature which hinders the mechanism of escape. This study analyses how spaces with different levels of openness, enclosure and boundedness can serve as prospect or refuge symbols for the study. Participants' choice

for such varying spaces is observed before choosing the features as symbols of prospect and refuge for the questionnaire survey.

The Chicago School proclaimed that people living in large cities chose to maintain a distance and separateness from others, to protect themselves from the hundreds of people they encountered each day (Grafmeyer and Joseph, 1990). Here, it is seen that perception of safety is not only restricted to the distance of the individual from certain prospect-refuge design features, but also dependent on their distance from other individuals. This aspect falls under the study of personal space called proxemics. Proxemics constitutes a large part of crowding behavior. Though this study may contain observations of commuters' waiting behavior which portray to a minimal degree as to how people respond to and use the distance between themselves and others, it does not focus on the study of personal distance.

### 2.5 Role of planners in creating safe public spaces

Carr, Francis, Rivlin and Stone (1992, p. 20) opine that public spaces that satisfy people's needs, protect their rights, and offer them meaning are attractive, and hence are therefore quite likely to be economically successful. They recommend corporate and government symbolism since these are said to have appropriate aspects of the meaning of certain spaces. They also assert that public space values must grow out of an understanding of why people go to spaces, how they actually use them, and what they mean to their users over time. Thus, we understand the importance of how essential it is to understand the role that these public spaces play in people's lives, and the reason why

certain public spaces are used or ignored, in order to have effective design and management of these spaces (1992, p. 87).

Carr, Francis, Rivlin and Stone express their viewpoint that the human perspective has been neglected in both public space design and management. Places are proposed, built, and assessed with assumptions about what should be done in them. Much of this is based on the goals of space designers, their clients, and space managers and does not address people's needs or the ways that public places can function to serve those needs.(1992, p. 87) . Thus, it is explained that it is important to examine needs, not only because they explain the use of places but also because use is important to success. Places that do not meet people's needs or that serve no important functions for people will be underused and unsuccessful (1992, p. 91). Thus it is important to take into account all functional factors which govern a site before the design phase of a project at the chosen site; this particularly applies to an urban public space.

Researchers strongly reinstate that one of the goals of professional planners is to create and manage urban public settings which have aesthetic and functional value to users and discuss the relationship between criminal behavior and environmental design. [(Jacobs, 1961), (Newman, 1972), Jeffery (1977)]. Results of research on perceived danger in urban public space by Blobaum, Marcel and Hunecke (2005) clearly show the necessity of reducing behavior constraints by redesigning fear-related physical features. Physical features that impede escape or interfere with prospect in a given setting may sometimes be difficult to rebuild. Therefore, it is important to consider prospect and refuge features at the initial design stage of any project. Planners can use site-specific

information gathered from reports of fear or safety and use the same to modify features in the environment and design prospect or refuge features which increase the perception of safety in the minds of the users.

Literature about psychology and architecture (Hall, 1966, p. 169) stresses that in order to solve formidable urban problems, there is the need not only for experts-city planners, architects, engineers of all types, economists, law enforcement specialists, traffic and transportation experts, educators, educators, lawyers, social workers, and political scientists-but for a number of new experts. Also, according to them, planning and renewal must not be separated; instead, renewal must be an integral part of planning. Thus, it is important that any designed space be evaluated from time to time and any improvement in terms of its functionality and aesthetics be considered as a required maintenance criterion.

Since designed spaces are assumed to be accessible and changeable, researchers emphasize on strategic co-present social interactions in these settings since these are said to have implications not only for how people use such space, but how they gain control of it. It is observed that the numbers and densities of individuals who use and occupy such spaces are uncontrolled in many instances, and the person is thus in a continuing process of appropriating and developing his or her own "territory". Since these social settings are transient and temporary, much of this process is said to take place rapidly and very often without conscious thought. Literature states that there is much to be learned about urban processes from the ways in which residents of a large city move through, make use of, and interact with others in available and changing

public spaces. This knowledge serves as a model for better functional and aesthetic plans for urban public spaces for the future (Proshansky, 1978, p. 167, 168.).

Hall (1966, p. 104) elaborates on Goffman's detailed, sensitive record of observations on the relationship of the façade that people present to the world and the self they hide behind it. He explains how the use of the term façade is in itself revealing and signifies recognition of levels to be penetrated and hints at the functions performed by architectural features which provide screens behind which to retire from time to time. Architecture thus serves as a smart tool which people use to protect their territories and personal spaces. It is also said to provide a refuge where an individual can "let his hair down" and be himself.

According to the U.S. Department of Justice (1980), "surveillance" elevates the threat to the potential offender of being observed, identified, and apprehended. It reduces concealment and increases the victim's chance of escape. Murray, Motoyama, and Rouse (1980) describe "social surveillance" as a strategy to help residents and users observe strangers, suspicious characters, or criminal activity. They recommend improving street lighting, eliminating concealment areas, and increasing the number of people in an area. Thus, surveillance is said to add on to a well designed and well-thought of space in terms of safety of the users. Since surveillance is more so a factor related to administration of a public space than the designing strategy, the opinion of the participants as regards this factor has not been considered in preparing the questionnaire and it is assumed that surveillance at a public space increases perception of safety in the minds of the users.

## 2.6 Human preference for space settings

Preference is defined as the extent to which a setting is liked, for whatever reason (Herzog and Barnes, 1999, p. 173). Preference is generally associated with a positive affect, or subjectively ‘feeling good’, and increases in healthy natural environments. (Abello et al, 1986; Olds, 1989). Thus, we assume that circumstances which promote system maintenance or system development are selected or preferred and those which threaten the system are avoided.

Many researches which study human preference for spaces refer back to Appleton’s (1975) prospect-refuge theory that proposes a preference of places that offer prospect and enclosure (refuge). Appleton (1975) argues that natural selection has led humans to prefer settings in which, without being seen (refuge), they can see a broad vista (prospect). According to him, humans prefer places which offer both prospect and refuge because such places aid survival from animate hazards by offering an observation point to see, to react, and if necessary, to defend, as well as a protective space to keep oneself from being harmed. Appleton suggests that such preferences aid survival by affording a safe observation point and the capability to safely see, predict and act in relation to potential predators, prey and mates. Thus prospect-refuge theory relates human preference for spaces to their perception of safety in the same. This relation with respect to design features is studied in this research at a chosen site.

Appleton (1975) argued that people make judgments about the degree to which an area offers prospect and refuge even when they have not physically entered the area. People need not directly experience prospect and refuge to appreciate it. They can

anticipate an area as offering prospect and refuge by looking at it and inferring its likely qualities (Appleton, 1975). This research studies people's anticipation of an area by studying their responses to certain design features which symbolize prospect and refuge at a chosen site.

It is known from Appleton's (1975) theory that victims feel most safe in places where offenders lack refuge and victims have prospect. Lack of hiding places for an attacker and a clear view are stated as preferred design characteristics by Appleton with respect to prospect since this gives time for the victim to avoid an attack. Appleton (1975) argues that humans prefer places offering them open vistas (prospect) and places of enclosure (refuge) because these features offer an evolutionary advantage. Decrease in depth of view (reduced prospect) increases fear (Nasar et al., 1993; Schroeder and Anderson, 1983) but it does so because it increases concealment relative to the observer. Individuals may prefer a view of anticipated refuge when they feel safe, but in a climate of wariness a view to secondary refuge (a place of enclosure) probably evokes fear. Thus perceptions of safety are said to be high with high prospect and low refuge.

Certain studies confirm that offenders select targets and behave to enhance their ability to see without being seen (Archea, 1985; Brown and Altman, 1983; Stoks, 1983; Wise and Wise, 1985). Thus, places that offer secondary refuge, as defined by Appleton, may have different functionalities. In some situations they represent a positive affordance, offering the observer perceived protection, but in others, they may represent a negative affordance, affording concealment for a potential attacker. This

thesis studies the chosen site only from the viewpoint of the protection of the victim, and does not consider the participant to be a potential attacker.

Goffman (1971) notes:

“...boundedness protectively cuts off those in physical frames from the outside...this sometimes will be turned against the individual” (p. 286) in that anything that leaves an individual in a bounded area could also leave them alone with an offender.”

Just as an individual's feelings of safety are influenced by the degree to which a space affords prospect and refuge, Fisher and Nasar (2000) argue that the individual's feelings of safety are also influenced by the degree to which a space affords an opportunity for escape-either an exit route from a potential threat, or a connection to others who could respond in case of an attack. Prospect and ease of escape may tend to co vary because physical boundaries which limit prospect may also cut off possibilities for escape. (Fisher and Nasar, 2000). In sum, prospect, refuge, and escape are relevant constructs in relation to fear of crime. This research studies if and how these factors apply to the chosen site.

Herzog's (1992) studies on preference for urban spaces are based on a function of spatial category and nine predictor variables: spaciousness, refuge, enclosure, coherence, legibility, complexity, mystery, typicality, and age. This study investigates the role of spatial configuration in determining both perceptual categories and preference reactions for urban settings (Kaplan, 1979). He talks about four spatially based categories. Open-undefined settings are typically flat, open, and lacking in spatial definition. In contrast, spacious-structured settings contain elements (for example, trees, edges, landmarks) arranged to facilitate the cognitive organization of the setting in

depth. Enclosed settings contain a screened or otherwise protected area which could serve as a hiding place. The influence of Appleton's (1975) concept of refuge is apparent. Finally, blocked views contain visual obstructions near the observer that prevent visual access. Because of their evolutionary history, humans constantly evaluate settings based on these four categories in order to prepare for effective action. Three general affordances are defined for settings: spaciousness, refuge and enclosure. Humans' interaction with the surrounding space is studied based on the framework of these visual affordances.

Appleton (1990, p. 15) justifies that if there is a type of environment which we as a species can recognize as our natural habitat, it has to be a savannah, that type of plant association which takes a variety of forms in different parts of the world but consists essentially of trees spaced widely enough to permit the growth of grasses between and underneath them. He reasons that this is a fact which is agreed by the anthropologists to be the kind of environment in which the first recognizable hominids made their home. It is argued that the power of attraction which drew them towards this favorable kind of landscape, has not been eliminated from our genetic make-up but has survived-in Jungian terminology- as an archetype, whose influence is still to be seen in many ways, not least in the widespread attraction which people feel towards "parkland", and idealized, contrived arrangement of well-spaced trees within a tidily groomed grassland.

Certain types of landscapes are seen to be preferred as against certain others. Literature shows that treed courtyards as compared to untreed ones are said to have

been discovered to actually promote a sense of safety in residents of a Chicago inner-city neighborhood (Kuo et al, 1998). Sommer and Summit (1995) report investigation of preferences for tree form using computer generated tree icons differing in canopy size, trunk height and width. Preference is seen to be the strongest for trees having larger canopies and smaller, thinner trunks. Tests carried out by Legg and Hicks (1978) show preferences for spreading branched and vase-shaped trees versus columnar and narrow-conical shaped trees. These forms clearly depict refuge forms and shapes. Thus, it is seen from the above example that people have specific preference for certain prospect symbols in the landscape. In his theory of landscape perception, Appleton (1975) proposed that trees occupy a special significance aesthetically because they provide a handy way for an individual to gain a more satisfying view of the surroundings. This example shows us how certain landscape elements are preferred aesthetically.

## 2.7 Concepts linked to prospect-refuge theory

### *2.7.1 Openness and enclosure*

In addition to prospect and refuge as the main concept, there is substantial evidence of research on other features related to spaces such as openness and spaciousness with relation to preference (Wohlwill, 1974; Garling, 1976; Horayankura, 1978; Nasar, 1981). Law and Zube (1982) in their studies depict preference for scenes having natural framing elements (possible cues to refuge) in the foreground. Open-

undefined settings are often said to be not liked (Kaplan et al., 1989). Kaplan and Kaplan (1989) describe legible settings as ones that are:

‘easy to understand and to remember. It is a well-structured space with distinctive elements, so that it is easy both to find one’s way within the scene and to find one’s way back to the starting point (p.55).’

Spacious-structured settings seem to engender highest preferences, probably due to their contents of elements arranged in a way that facilitate the cognitive organization of the setting (Herzog, 1992).

Enclosure is another feature which is delved into with relation to safety in urbanscapes. Stamps III (2005) observes from previous work in neurophysiology that enclosure is such an important feature of the environment that there is a specific region in the brain responding directly to environmental enclosure. Previous experimental work suggests that five environmental features cause impressions of enclosure: the proportion of the scene covered by walls, the proportion of the scene covered by ground, how light or dark the scene is, the depth of view, and the number of sides open at the front of the scene. Stamps III (2005) infers from literature that enclosure is important for survival, natural selection and for the primary purpose of organisms. Thus enclosure is also a concept related to prospect-refuge theory. With reference to the prospect-refuge theory, environmental features which enable or retard locomotion are considered important (Stamps, 2005). The amount of enclosure in a given space to a great extent helps determine whether that is a prospect-dominant space or a refuge-dominant one and thus helps identify design features as prospect and refuge symbols in a landscape.

### *2.7.2 Mystery*

Appleton stresses the importance of investigatory or exploratory behavior. He explains that the successful selection of places which afford the optimum conditions for other forms of behavior largely depends on this behavior (Appleton, 1975, p. 64). Mystery is an informational factor which has shown itself to be a strong and often found predictor of preference (Kaplan and Kaplan, 1989). Mystery is defined as an informational factor involving a promise to learn more. Like prospect and refuge, as defined by Appleton, mystery is frequently included as a variable in landscape preference studies. Mystery has large similarities with Appleton's concept of secondary prospect. Secondary prospect refers to prospect that is only suggested and not directly experienced from where the observer is currently standing (Appleton, 1975). The deflected vista, for instance a bending road through a forest, is used both by Appleton as an example of secondary prospect and by Kaplan and Kaplan for exemplifying mystery (Appleton, 1975; Kaplan and Kaplan, 1989).

### *2.7.3 Territoriality*

Another concept that can be associated with prospect-refuge theory is territoriality. Control of space is referred to as territoriality, a concept originally developed in the field of animal behavior but carried over with its associated concepts of boundary regulation to human interactions. This basic concept in the study of animal behavior is usually defined as behavior by which an organism characteristically lays claim to an area and defends it against members of its own species. (Hall, 1966, p. 7) Campbell (1973, p.229) explains that those creatures enjoy better prospects of survival

which are more powerfully motivated by attraction to seek out and remain within territory which offers the means of satisfying the requirements of their own particular life-styles. Thus territoriality is a concept which has evolved from primitive animal behavior.

Hall (1966, p. 8) supports Hediger, Zurich's famous animal psychologist in his explanation of territoriality. Hediger explains how territoriality insures the propagation of the species by regulating density and providing a frame in which things are done- places to learn, places to play, safe places to hide. Thus it co-ordinates the activities of the group and holds the group together. It keeps animals within communicating distance of each other, so that the presence of food or an enemy can be signaled. An animal with a territory of its own can develop an inventory of reflex responses to terrain features. When danger strikes, the animal on its home ground takes advantage of automatic responses rather than having to take time to think about where to hide. Thus territoriality is seen to be a concept which involves personal distances among animals. This concept also talks about the responses that an animal develops with reference to its environment. These are Darwinian concepts which are said to be exhibited by humans even in the present.

Primitive societies which lacked sophisticated boundaries used naturally occurring markers or behavioral mechanisms such as the avoidance of eye contact to protect the area of personal space (Moore, 1984). Thus territoriality is a primeval behavior. During her study of the Utku Eskimo tribe, Briggs (1970) talks of her

experiences and mentions that she possessed a particular place in the communal igloo that was 'hers'. In her words:

‘...it even gave me a sense of privacy, since no one encroached on my space without permission.’

These concepts of territoriality and privacy can be associated more with refuge since these are mechanisms of cutting off oneself from the rest of the world.

#### *2.7.4 Personal space and proxemics*

The term ‘proxemics’ is used by Hall (1969; 1970) to define the inter-related observations and theories of man’s use of space. Personal space, a constituent part of the theory of proxemics, is regarded by Hall (1969) as an invisible area surrounding the body which was variable according to circumstance. Sommer (1969) proposes that this area be regarded as a personal space ‘bubble’, and this concept forms the core of his personal space theory. The personal space bubble is said to be the area that, if entered by another without invitation, constitutes an invasion of privacy (Canter 1975). These concepts of personal space, proxemics and privacy are related to the theory of prospect-refuge. Personal distance also comes into play when we consider personal spaces. Hall (1966, p. 119) defines personal distance as the term used earlier by Hediger to designate the distance consistently separating the members of non-contact species. It is thus defined as a small protective sphere or bubble that an organism maintains between itself and others.

Personal space is a phenomenon which is very important while considering potential prospect-refuge sites. Sommer (1969) describes personal space as an area with invisible boundaries surrounding a person’s body into which intruders may not come (p.

26). Personal space is said to be a culturally acquired daylight phenomenon. Strangers are affected differently than friends by a loss of personal space. As an example, Sommer describes how subway riders lower their eyes and sometimes “freeze” or become rigid as a form of minimizing unwanted social intercourse during rush hour (p. 28, 29). He observes that:

“.....many subway riders who have adjusted to crowding through psychological withdrawal prefer to treat other riders as non-persons and keenly resent situations, such as a stop so abrupt that the person alongside pushes into them and then apologizes, when the other rider becomes a person. There are also riders who dislike the lonely alienation condition of subway travel and look forward to emergency situations in which people become real.” (p. 37)

During the participant observation phase of this experiment in a variety of places-homes, bus depots, railway stations, theaters, and hotel lobbies, the author states how he became aware of how public spaces are used. Such places are less often used for sitting and talking and more so to read alone and to look at new arrivals. It is observed that people who talk are those who invariably arrive together. People who come alone sit alone and do not interact at all (p. 83). Thus personal space plays a great role in the study of behavior of people in public spaces.

#### *2.7.5 Privacy*

The concepts of prospect and refuge are as much linked to privacy as they are to the concept of personal space. Privacy has been defined by several authors:

*Privacy*: Privacy is the personal control over personal information (Westin, 1967).

*Privacy*: Privacy is defined as a zero relationship between a group and a person (Kelvin, 1973).

*Privacy:* Privacy is defined as the freedom to choose what, when and to whom one communicates (Westin, 1967, Proshansky et al., 1970).

*Privacy:* Privacy is defined as the control of personal space (Hall, 1969; Canter and Canter, 1971; Canter, 1975; Gold, 1980; Fisher et al. , 1984; Duvall-Early & Benedict, 1992).

*Privacy:* Privacy is also defined as a voluntary and temporary condition of separation from the public domain (Newell, 1992).

*Privacy:* Privacy is viewed as an interactive condition of the person and his/her environment.

Altman (1975) defines privacy as, ‘the selective control of access to the self or to one’s group’ (p. 18). According to this definition, privacy is said to be a boundary control process in which an individual regulates with whom contact will occur and how much and what type of contact it will be. Boundary control is said to be an optimization process directed toward achieving a desired level of contact by one’s self or group with others at a particular time and in a given circumstance. Privacy is thus a boundary control mechanism.

There are several more explanations about privacy from literature. The constitutionally protected concept of privacy is a sphere of space that a man carries around with him, which is protected from outside intrusion, as a right of selected disclosure about oneself, and as a right of personal autonomy (O’Reilly, 1984). O’Reilly finds that the operational definition of privacy as a sphere of space free from outside intrusion depends primarily on protection from visual intrusion and that this is

inadequate. The concept of spatial privacy invasion via visual access by Hill (1970) is only one of several ways in which privacy may be invaded.

Since prospect-refuge theory also involves control of boundaries to some extent, it is possible to link the concept of privacy to Appleton's theory, especially refuge. Privacy is defined as a quality of a place by Newell, a quality which is also concerned with control of boundaries and is of a more interactive nature. The concepts of refuge and personal space are discussed as qualities of space in the journal. Privacy is a concept which is linked to refuge. Refuge is defined in Webster as 'shelter or protection from danger or distress caused by a person, place or thing; giving shelter. Help or comfort, a safe retreat.... inaccessibility to an enemy or evil, a sanctuary or asylum.' Since privacy is also a sort of shelter from external human conditions by way of boundary control, this aspect ties into prospect-refuge theory. Privacy becomes one of the many reasons why people seek seclusion in urban public spaces.

Bachelard suggests that mankind shares a primal image of refuge:

"I shall show that a human being likes to 'withdraw into his corner' and that it gives him physical pleasure to do so.... With nests and above all with shells, we shall find a whole series of images that I am going to characterize as primal images." (Bachelard, 1964, p. 64).

The forms of many of the modern day shelters are associated with these primal images of shelters, thus serving as refuge symbols. Studies which concern architectural privacy emphasize the importance of the physical environment in providing opportunities for privacy (Archea, 1977). Knowing an individual's particular privacy function profile are said to be capable of being invaluable to an architect or designer in designing spaces to meet those needs. (Pedersen, 1999, p. 404). Westin (1967, p. 7)

explains how each individual is continually engaged in a personal adjustment process in which he balances the desire for privacy with the desire for self-disclosure and communication of himself to others, in light of the environmental conditions and social norms set by the society in which he lives. Thus it is important to study people's preferences or needs before designing any type of space. This helps increase the functional efficiency of that space in a great way.

Several empirical studies are found which support the position that where a person was located influences information received (Canter, 1975). Pastalan (1970) notes that among various circumstances which trigger a desire in individuals to seek privacy are social conditions and environmental factors, such as crowding or confinement. Crowding is a phenomenon seen in urban public spaces, and this is possibly one of the reasons why people seek refuge in such places. Thus, the reasons for people to seek refuge or prospect are not just based on design conditions, but several other external social factors.

#### *2.7.6 Biophilia and topophilia*

Prospect-refuge theory is linked to biophilia and topophilia. The Gestalt principle of closure is said to be linked to prospect-refuge theory and is suggested to be a vestige of evolutionary development and germane to the notion of biophilia (Nelson, Johnson, Strong and Rudakewich, 2001, p. 315). Topophilia is defined by Tuan (1974, p. 4) as the affective bond between people and place or setting.

Tuan (1974, p. 23) also talks about spatial psychology and symbolism. A symbol is defined as a part that has the power to suggest a whole. Tuan explains that an

object is also taken as a symbol when it casts a penumbra of meanings, when it calls to mind a succession of phenomena that are related analogically or metaphorically to each other. The practice of structuring the world into substances, colors, directions, animals, and human traits promotes a symbolical world view according to Tuan (1974, p. 23). Thus, symbolism and spatial psychology are said to go hand in hand.

Tuan (1974, p. 27, 28) explains about how open and enclosed spaces are spatial categories which are meaningful to many people. Open and enclosed spaces are said to have the ability to stimulate topophilic feelings. Open space signifies freedom, the promise of adventure, light, the public realm, formal and unchanging beauty; enclosed space signifies the cozy security of the womb, privacy, darkness, biologic life. As a species, man's primate ancestors are said to have migrated out of the womb-like shelter of the tropical forest to the more open and unpredictable environment of the park-like savanna (p. 27, 28). Prospect-refuge theory, when actually applied to design in simple terms, is all about open and enclosed spaces, though the degree of openness and enclosure vary in different cases.

The subject of people's preferences for certain types of spaces has also been discussed by Tuan in his book. Tuan (1974, p. 70) states that changes in styles of architecture reflect changes in technology, economy and in people's attitude toward what is desirable in the physical environment. It is thus concluded that people's attitude or desire for certain characteristics of the physical environment are what govern the changes in architecture and design. This reinforces the importance of the study of people's preferences for any kind of architectural feature or space.

### *2.7.7 Crowding*

The concept of crowding also ties into the theory of prospect-refuge since the study of personal distances is involved in both these concepts. Esser (1973) introduces findings which show that high density induce cognitive overload (Esser, 1973), impose behavioral constraints (Schopler and Stockdale, 1977), evoke feelings of uncontrollability over one's environment (Rodin, Solomon, and Metcalf, 1978), and frustrate the goal of privacy (Altman and Chemers, 1980), all of which are translated, then, into the experience of crowdedness. Crowding is thus known to influence behavior in people and have an effect on what sort of spaces and spatial features a person chooses while waiting.

Crowding is said to determine environmental perceptions. Baum and Greenberg (1975), examine the behavior of subjects who anticipate being in a crowded environment and discover findings which show that the expectancy of crowding motivates the subjects to "prepare" for the crowded environment. Researchers find that subjects who expect crowding choose to sit in the corners of the waiting room, avoid eye contact with other waiting subjects, and express discomfort before entering the crowded environment. Klein and Harris (1979) expand this approach and find that when subjects actually encounter a high-density environment, subjects who expect the high density rate the environment more negatively than subjects who enter the high-density environment without the expectation. This research does not measure the expectation of crowding prevalent in commuters' minds. But this perception of being in a crowded environment definitely persists in the minds of the commuters who wait for the train

and possibly contributes to the way they perceive their environment and the behavioral response that they show while waiting for the train.

### 2.8 Summary of literature review

Appleton (1990, p. 22) summarizes our habits of environmental perception. He states that while, invariably modified and shaped by cultural, social, historical and personal experiences, they are not created out of nothing by these influences; rather, they are the derivatives of mechanisms of survival behavior which were already there, elements of innate human make-up. While aesthetic pleasure is the pleasure of perception, environmental perception is the key to environmental adaptation which in turn is the basis of the survival of individual organisms and a central theme in the Darwinian theory of evolution by natural selection.

Pleasure on the other hand emerges both as the driving force of the whole biological system and as the criterion of excellence in hedonistic aesthetics. Appleton's (1975) conceptualization of the spatial arrangement of prospect and refuge symbols helps to study space settings in terms of prospect and refuge. The aim of this research is to study participants' preference at a chosen site with respect to prospect and refuge symbolism and apply the same as criteria to be considered in designing an urban public space.

Though prospect-refuge theory can be tested with reference to specific factors, the realm of this theory is so broad that it is difficult to clearly denote all factors which contribute to a person's preference for prospect or refuge in any circumstance. This

theory is much more sophisticated than it seems to be since it is linked to various other concepts, and there is more than one reason for why people choose prospect or refuge in a particular urban public space. This research studies as many aspects as possible with relation to the theory. However, there is a possibility of some gray areas that are not clear and are not touched upon in this research. These are considered as factors which can be good topics for research in the future with relation to prospect-refuge theory. The methodology chapter illustrates how this theory is tested at the chosen site.

## CHAPTER 3

### STUDY METHODOLOGY

#### 3.1 Choice of site for research

The purpose of this research was to study a dynamic urban public space in relation to prospect-refuge theory. A public mass transit station was chosen as the site for study since this is one of the urban public spaces where perception of safety makes a difference to the effective use of the space. Moreover, mass transit stations serve as major nodes in cities where people congregate, thus making them spaces potentially vulnerable to crime. Warr (1990) states that Dallas appears to be the Texas metropolitan area that most closely resembles US metropolitan areas as a whole. The composition of the Dallas metropolitan area with regard to education, marital status, sex, age, and ethnicity is said to be close to that for all metropolitan areas (Bureau of the Census, 1986). Hence, the Dallas metropolitan area was chosen as the site.

DART being the most commonly used urban mass transit system in the Dallas metropolitan area, the study was conducted at a DART owned station. Choice of station was based on whether the station was in an urban, rather than suburban area. Since this study involved observation of reactions to specific design features at the station, the site was also chosen based on whether the station resembled most other DART stations in terms of design features. Park Lane, the station most representative of DART mass transit stations was chosen for the survey. Specifically, Park Lane was the site for studying prospect-refuge theory since the location of this station is urban in nature and

also is very similar in design features to most transit stations. Thus, it should be possible to generalize results from the survey.

Literature stresses that the opinion of users should be considered in designing the space concerned (Carr, Francis, Rivlin and Stone, 1992, p. 87). The participants for this study were Dallas Area Rapid Transit system commuters. Since a space is said to be perceived not only by regular users of a space but also by a first-time user, this aspect was taken into consideration in the study while studying people's preferences for certain design features at the station.

### 3.2 Steps involved in the study

Previous studies of prospect and refuge in relation to safety and crime have used methodologies including rated on-site responses, and unobtrusive observation of behavior on site. In this study, participant observation was carried out by the interviewer in such a way that a position was taken and then the passerby was approached for an interview. Individuals' consent was sought by asking if they would like to take part in a study of public perceptions (Nasar and Fisher, 2000). If they agreed, the interviewer handed them a survey form to complete after reading through the instructions that informed them that their responses would be kept anonymous and confidential.

The research consisted of two steps. The first step consisted of unobtrusive participant observation. The second step consisted of return questionnaires distributed to the participants at the chosen station. The participants completed the questionnaire

and returned the same to the principal investigator. Over ninety-five percent of those requested for participation agreed to take part in the study.

Photographs of the site were taken in order to show the design conditions prevalent at the station. These observations and photographs helped to identify prevailing prospect and refuge design features at the station. Design features were identified and categorized under prospect or refuge so that they served as symbols with reference to which people's reactions were studied.

### *3.2.1 Step One: Participant observation*

Step One in the study consisted of participant observation of commuters at Park Lane station. In this stage of the study, participants were not approached, but merely observed. Transcription of the observations was carried out with pen and paper. Care was taken to maintain confidentiality of the observations so that no personal identity of the participants was revealed.

Participant observation was carried out for a total of twelve hours at Park Lane on four different days. Days for observation were chosen keeping in mind that people's reactions and preference for prospect and refuge were likely to change with weather conditions, peak hours and off-peak hours and gender. This research kept in mind previous literature reviews which have stated that preference for prospect and refuge changes with time of the day. Thus, daytime and nighttime observation was also carried out at the station.

Previous research noted that daylight increases perception of safety. Perception of safety also increases when people wait in groups. In particular, Nasar and Fisher

(1990) hypothesized that after dark, people avoid walking in or near the areas judged as unsafe. Walking in groups was said to represent a collective action in response to fear of crime. Being alone is also said to increase fear since people may presume that others in the immediate vicinity can aid a victim in the event of an attack (Warr, 1985). People may also presume that an isolated individual is a more attractive target to an offender than one in the company of others (Warr, 1990). Particular observation of such behavior was taken into account.

Prospect and refuge symbols were identified at Park Lane Station, North Dallas, based on characteristics of that station that have been attributed to prospect and refuge features (Appleton, 1975). From participant observation, four main features at the station were identified, two being prospect features and two being refuge features. The station consisted of a single platform raised to a height of twenty-four feet above ground level and oriented north-south. These features make the station itself a position of prospect. The station has a central elevator lobby (about twelve feet by twelve feet) with an elevator core on the north and the south of the lobby. Each elevator has an open area with light features, adjacent to a staircase with shelters and seating areas on the east and the west. This is in turn adjoined by a smaller open area with light features. Next are open staircases (with no shelters or benches) adjacent to them, followed by an open space, then the handicap ramp/boarding area. A plan of Park Lane station is included as Appendix A.

The two prospect features identified at Park Lane station include:



Fig 3.1 Open area with light features

1. The open area with light features near the elevator lobby, and the staircases with shelter. (Fig.3.1)
2. The open area near the platform edge. (Fig.3.2)

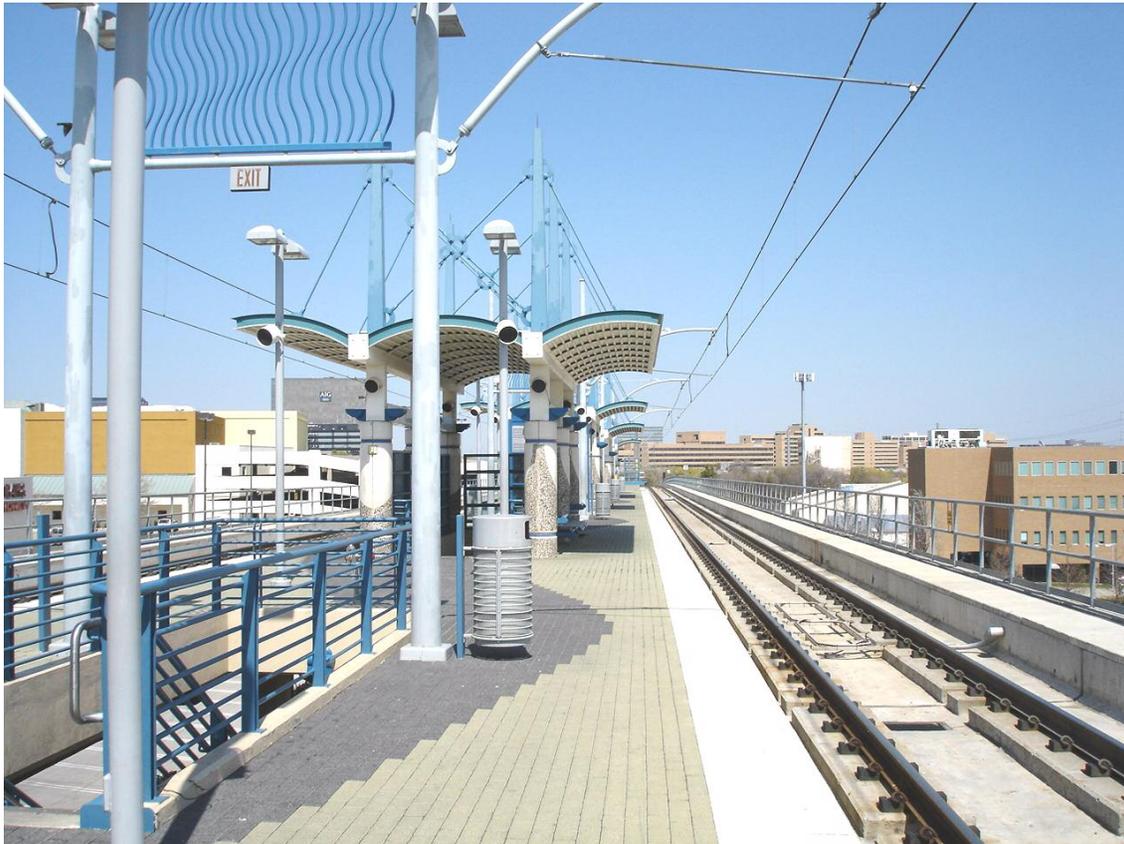


Fig. 3.2 The open area near the platform edge

The two refuge features identified at Park Lane station include:

1. The elevator lobby with shelters on the east and the west of the platform.  
(Fig.3.3)

2. The staircases with shelters on the north and the south side of the platform.  
(Fig.3.4).

Commuters' preferences for the identified prospect and refuge design features was studied by observing the distance that they maintained from these features and their level of use of these features which serve as waiting areas. Observations about participants' behavior were captured with pen and paper. This was the qualitative part



Fig. 3.3 Elevator lobby with shelters

of the study. Further confirmed by a quantitative study of people's preference for the same features, captured in a survey.

### *3.2.2 Step Two: Survey*

Peterson (2000, p. 4) explains that questioning strategies used in research are generally characterized along two dimensions: amount of structure and degree of directness. Amount of structure is defined as the extent to which all study participants are asked identical questions in an identical way. Degree of directness is defined as the extent to which direct questions are asked about the phenomena, issues, or topics of



Fig.3.4 Staircases with shelters

interest in a research project. These dimensions are said to be relatively independent.. In general, it can be stated that the more structured and direct the questioning strategy, the more quantifiable and generalizable are the answers. This research followed this strategy in constructing the survey, the instrument for the quantitative part of the research. The primary and secondary questions were detailed in two to three steps to construct the final survey instrument.

Completely structured questioning was used in this research which involved asking all study participants exactly the same questions the same way in the same order. All question answers were predetermined; only closed-end questions were used and a

choice of answers was provided to the participants. As suggested by Peterson (2000, p. 4), an identical survey consisting of closed-end questions was distributed to a sample of sixty individuals who returned the completed surveys to the principal investigator after completion.

Peterson (2000, p. 5) explains why answers obtained can be generalized when the questioning process is structured and standardized. However, it is stated by the same author that the more structured the questioning process, the more a researcher must know about, or be familiar with, the phenomena, issues, or topics being investigated, as well as the individuals being studied, before constructing any research questions. For these reasons, participant observation was carried out in order to gain more knowledge about the behavior of participants with respect to prospect and refuge at the station. This information was then employed in constructing the survey.

Peterson (2000, p. 5, 6) also talks about the degree of directness in communicating with study participants. Degree of directness is defined as the amount of information disclosed to study participants about the purpose of a research project, the sponsor of the project and what a researcher hopes to learn from the project. The degree of directness was considerable in this research. The participants were informed about the research and its objectives by handout of a research informational sheet. This sheet informed the participants about the expected benefits of the research and the duration and procedures for the survey. It also stated the criterion for participation, participants under the age of seventeen years are not allowed to participate. Participants were encouraged to read the research informational sheet before answering the survey.

Peterson (2000, p. 7) talks about seeking informed consent from the participants. Literature strongly advocates that potential study participants should be given sufficient information about a research project so they can make an informed judgment about whether to participate (e.g., Singer, 1978; Singer and Frankel 1982). The privacy of study participants was respected in this research, and no personal identities were noted in either the case of participant observation or survey. The researcher-study-participant relationship was kept sacrosanct as recommended by Peterson (2000, p. 7).

Peterson (2000, p. 21) explains that study participants may refuse to answer a research question because they perceive that the question is too personal or they believe that answering the question will take too much effort or time. While constructing the final survey, care was taken not to ask personal questions. The survey was constructed as a closed-ended one because research participants were commuters waiting for the train; thus, the survey was constructed to be completed in a maximum of three minutes.

Peterson (2000, p. 13) recommends a seven step procedure for construction of an effective survey. This study follows this procedure while evolving the final questionnaire from the primary and secondary questions. The seven step procedure given by Peterson (2000, p. 13) is as follows:

1. Review of the information requirements necessitating a questionnaire.
2. Development of a list of potential research questions that satisfies the information requirements.
3. Careful assessment of each potential research question.
4. Determination of the type(s) of questions to be asked.

5. Decision about the specific wording of each question to be asked.
6. Determination of the structure of the survey.
7. Evaluation of the questionnaire.

All these steps were followed in constructing the survey for the present study.

Literature emphasizes the importance of how demographic information can be used to compare the study participants with other groups of individuals when making inferences about answers to non-demographic questions. The final survey also asked certain demographic questions of the participants in addition to their preferences for certain identified design features at the station. Answers to demographic questions were related to answers to the preference questions in the questionnaire through statistical analyses. Thus, this analysis allowed a researcher to compare the answers of various demographic subgroups, such as males and females, and provided detailed insights into answer patterns and possible reasons for particular answers. This pattern of analysis is adapted from Peterson (2000, p. 84).

The primary and secondary research questions were first constructed to seek areas which need attention in the study. The primary research questions can be stated as:

1. Do commuters seek prospect or refuge during the waiting period at peak hours at a selected DART transit station?
2. Do commuters seek prospect or refuge during the waiting period at non-peak hours at a selected DART transit station?

The secondary research questions or sub-questions were as follows:

1. During peak hours, where are commuters most comfortable while waiting at the station?

2. During non-peak hours, where are commuters most comfortable while waiting at the station?

3. Is there a difference in the perception of prospect and refuge between daytime and nighttime?

4. Do the perceptions of prospect and refuge vary according to gender?

5. Does weather affect perceptions of prospect and refuge during the waiting period?

6. What landscape architectural features increase the perception of safety/comfort for commuters?

7. What landscape architectural features reduce the perception of safety for commuters?

The second survey was detailed to a more refined level, keeping in mind that the final survey was to be closed-ended. Certain design features at Park Lane station were identified as prospect or refuge symbols from participant observation. The symbols are identified based on certain examples and characteristics from literature (Appleton, 1975) that are assigned to prospect and refuge symbols which help in distinguishing and categorizing the feature in question. Participants' responsive behavior also helped in determining which features are preferred at the station and then those features were categorized as a prospect or refuge feature.

1. How often in a week do you board a train from or arrive at this station?

2. At what time of the day are you most often at the station?
3. What is the fewest number of persons who have been around when you were at this station?
4. What is the greatest number of persons who have been around when you were at this station?
5. During non-peak hours, which of the following design features do you feel comfortable standing close to? (Prospect design features)
6. During non-peak hours, which of the following design features do you feel comfortable standing close to? (Refuge design features)
7. During peak hours, which of the following design features do you feel comfortable standing close to? (Prospect design features)
8. During peak hours, which of the following design features do you feel comfortable standing close to? (Refuge design features).
9. Does weather affect the location where you wait for the train?
10. Which of the design features would you stand close to when it is hot?
11. Which of the design features would you stand close to when it is cold?
12. Which of the design features would you stand close to when it rains?
13. Which of the design features would you stand close to when it is windy?
14. Please specify your gender: Male or female
15. Please specify what age group you fall into: 17-25, 25-35, 35-45, 45-60, 60-75, 75-85, 85 and above.

The design features against which reactions in different weather were tested were the same as those already identified as prospect and refuge design features at the station. Questions five to thirteen were constructed to study preference for prospect-refuge design features. The rest of the questions were placed in a separate section.

The age group question was further simplified to ask people their age directly rather than the age group. This was to study if there was a difference in perception of safety based on a person's age. The gender question helped identification of a difference in choice of prospect or refuge based on gender. Questions three and four helped correlate perception of safety to the number of people at the station. Question one gave the frequency of use of the station by the individual. Question two helped identify the participant as a peak hour or off-peak hour traveler, and a daytime or nighttime traveler. These questions were included as demographic information to be collected from the participants.

Preference for design features was categorized in Likert Scale format with people's preferences for each design feature arranged from 'Strongly disagree' to 'Strongly Agree', numerically from 1 to 5 respectively. A sixth column was included in case people don't have any opinion about the prospect or refuge feature in question. A numerical value of 0 is assigned to this preference column while carrying out the statistical analysis. The final questionnaire is included in Appendix B.

The principal investigator stood under or near or in a prospect or refuge design feature and chose the second participant who entered the area. Thus prospect feature participants and refuge feature participants were alternated in succession. Participants

were approached and asked if they would like to participate in a survey. If the response was affirmative, the research informational sheet was handed over to the participant and he or she was encouraged to read the same before starting off with the questionnaire survey. The questionnaire survey was completed and then handed back to the principal investigator. A total of sixty participants were surveyed such that there were thirty males and thirty females ; thirty peak-hour commuters and thirty off-peak hour commuters, so that the survey was not biased in terms of the factors considered while studying preference for prospect and refuge; the gender and the time in this case.

The questionnaire was constructed such that there were eight questions about preference for prospect features and an equal number about preference for refuge features. This data was first entered into Microsoft Access with all relevant information such as the gender, time of the day, peak or off-peak hour and the scores for questions answered were for prospect or refuge. The data was segregated by transferring the same into Microsoft Excel. The data is provided in the Appendix.

Since preference for prospect and refuge had to be compared between males and females and between peak and off-peak hours, comparative data analysis methods had to be used. Hence it was decided to use T-tests. Four two-tailed T-tests were conducted for the data entered:

1. Prospect against gender.
2. Refuge against gender.
3. Prospect against peak and off-peak hours.
4. Refuge against peak and off-peak hours.

It was expected that there would be a significant effect of difference in gender in the preference for prospect and refuge. Similarly, it was expected that there would be a significant effect of difference in hour of the day in the preference for prospect as well as refuge. The results, however, presented a new perspective in the issue.

## CHAPTER 4

### RESULTS

#### 4.1 Results from participant observation

Participant observation was carried out at the Park Lane station during both peak and off-peak hours for a total of four days at the station. Nighttime observation was also carried out to see if there were differences in preference for prospect and refuge features between daytime and nighttime. The observations carried out at the station are summarized below.

##### *4.1.1 Comfort conditions*

People chose features at the station based both on comfort conditions and perception of safety. They looked out for places to lean against or benches and seating areas. People appeared more comfortable sitting rather than standing while waiting for the train. The trend showed that people looked for seating areas as soon as they arrive at the station if they have considerable time before the train arrives. Thus, it was observed that the seating areas (Fig.4.1) were occupied first. Seating areas at Park Lane station were located under the staircases on the north and south of the platform. These were identified as refuge features. Prospect features at this station did not have seating areas. Thus, the reasons for people seeking refuge were based on these comfort conditions.



Fig. 4.1 Seating areas at Park Lane station

The second most preferred areas (once all the seats or benches are occupied) were the metal leaning bars (Fig.4.2) under the staircase shelters. Thus, the next batch of people arriving at the station looked out for areas to lean against. The third most preferred areas against which people leaned against were the pillars supporting the shelters (Fig.4.3) and the light poles in the open areas between shelters (Fig.4.4), these were identified as prospect features. Once people arrived at the station, they positioned themselves in one place if they had time before the train arrived. They did not move from this place till they boarded the train. Most people spent their time reading or watching other people at the station.



Fig.4.2 Metal bars to lean against

Very few at the station moved around and kept walking impatiently; most people positioned themselves in one place when they waited for the train. Often people arrived just three to four minutes before the arrival of the train since timings were scheduled and trains were almost always on time. Those who came to the station first sought the time schedule display and then chose an appropriate place to wait for the train. Buses and shuttles functioned from the lower level of the train platform and buses were timed so as to drop off a batch of people for a particular scheduled train. Thus, people arrived in batches to the station.



Fig. 4.3 Pillars supporting the shelters

People with bicycles and similar vehicles sought a place against which to lean their equipment. The tops of trash cans (Fig. 4.5) sometimes served as coffee tables, sometimes as writing desks and sometimes as places to lean elbows. People arriving at the station usually used the elevator or the staircases with shelters, not the open staircases to come up to the station from the lower level. Persons on the phone had a tendency to walk around in the open spaces between light features while talking and seldom were stationary. Similar behavior was seen in people who listened to music while waiting for the train. People moved closer to the edge of the platform when it was two minutes for the train to arrive and not many waited near the platform edge.



Fig.4.4 Light poles to lean against

People did not generally wait in the elevator lobby area probably because it was not too large a space, further, it was quite enclosed and one could not see the train arriving when they waited here. Also, people did not want to be in other people's way, the space being small. Both the sheltered staircases were most often used. Thus, tendency of people was to sway towards refuge. If people did not find a seating area, they sat on the ground near the elevator lobby area under the shelter. Others used the staircase itself for shaded seating.



Fig 4.5 Trash cans: horizontal surfaces

#### 4.1.2 *Weather conditions*

When the weather was pleasant, people sought more comfort by seeking the seating areas under the staircases with shelter on the north and the south. As the sun rose higher up on a hot day and it got a little hotter on the east, people sought the elevator lobby area since it was the coolest shelter available at the station. Few people sought the open areas on such a day, most sought refuge, and not prospect. In the mornings, on a sunny day, people sought the shelter on the North-east more than the one on the south east as it got closer to noon.



Fig. 4.6 Elevator lobby area

When the weather was windy and cold, people did not use the elevator lobby area because cold winds typically passed through the elevator lobby area like a tunnel, making this area colder (Fig. 4.6). Instead, they sought shelter on the leeward direction, more so near the glass elevator core on the west, when cold winds blew from the North-east. The station was elevated at a height of twenty-four feet and hence on a windy day or a cold day, weather was windier and colder than at ground level (Fig.4.7). When it was windy or cold, the staircase shelter on the south of the station was also more often used, both on the east and west sides.



Fig.4.7 Park Lane station: Elevation above ground level

When the weather was sunny, cool and pleasant, people waited in the open areas with light features between the elevator lobby and the staircase shelters, on either side. They basked in the sun, if it was slightly cool. Thus, people sought prospect when the weather was pleasant. At noon on a sunny day, people stayed in the shade of the sheltered staircase on the south, thus they waited in the open area between the staircase on the south and the elevator lobby area, this could be classified as refuge behavior since they sought shade from the shelter, though they stood in the open area. People traveling north used the sheltered staircase with benches on the north and southbound commuters used the one on the south.

When the weather was cold, rainy and uncomfortable, people were seen to be more impatient while waiting for the train. People used the elevator lobby area which served as shelter when it rained. People were most uncomfortable and kept moving from place to place when it was cold and raining. People seemed less concerned about personal distance and awareness about themselves probably since the weather was very harsh. In such conditions, they were more concerned about comfort conditions than their perception of safety. Weather affected people's behavior with respect to prospect-refuge design features to a great extent. They did not seem uncomfortable waiting with a crowd. This sort of behavior was not normally observed on a day when the weather was fine.

#### *4.1.3 Gender differences*

Though the difference is not very significant, it was observed that females favored refuge features more than males. This difference was not noted in terms of affiliation towards prospect. Not much difference was noted overall with respect to gender regarding preference for prospect-refuge design features.

#### *4.1.4 Peak hour/off-peak hour differences*

People were seen to seek refuge areas during off-peak hours more than during peak hours. People moved away from the crowd most often and stood or waited under shelters. Extremes of this behavior included normal persons waiting in the handicap ramp area with shelter. They waited away from the few persons that were at the station. However the preference for prospect with respect to peak hour and off-peak hour was not seen to be very significant.



Fig. 4.8 Nighttime at Park Lane

#### *4.1.5 Perception of safety*

Perception of safety seemed to be good in people who wait for the train. People were generally aware of their surroundings, especially when their personal space was encroached upon, for example when a person sat in the adjacent bench under the shelter. Males and females equally were aware of their environment. But, people portrayed confidence and good perception of safety at this station.

#### *4.1.6 Nighttime observations*

Nighttime observations denoted that the station is well-lit and there is no area completely in darkness at the station. People's perception of safety regarding their

surroundings, however, increased during nighttime and they all sought prospect features. Most commuters stood in the open areas with light features, very few sat under the refuge features or shelters with benches (Fig. 4.8). Commuters did not mind standing and were not particular about seeking seating areas. They did not seek seating areas (under refuge) even when the benches were unoccupied.

#### *4.1.7 Prospect-refuge features-preference*

Among the two prospect features identified at the station, the open area with light features was the more preferred of the two. Among the two refuge features- the elevator lobby and the staircase with shelters, the staircase with shelters was the more preferred refuge feature. However, preference for all features was seen to vary depending on various other factors discussed earlier, such as weather, gender, and daytime-nighttime.

#### *4.1.8 Other observations at the station*

The number of southbound commuters traveling towards Dallas was more than the number of commuters traveling northbound, towards Plano, from this particular station. There were a considerable number of commuters from and to work during peak hours. There were very few times when the station was completely deserted. The minimum number of persons observed at the station was two, and the maximum number of persons observed at the station was about forty-five to fifty. Persons who waited at the station alone had a stronger awareness about their surroundings as against people standing in groups. Thus, perception of safety was also based on whether the commuter is alone or in a group. This behavior and its relation to preference for design features were however, not studied in detail in this research.

#### 4.2 Results from questionnaire survey

The questionnaire was structured such that there were eight prospect questions and an equal number of refuge questions. The scores from the Likert scale were entered in Microsoft Excel datasheet separately for prospect questions and separately for refuge questions with reference to each participant. A total of thirty males and thirty females were considered for prospect and refuge respectively. Similarly a total of thirty peak hour commuters were compared with thirty off-peak hour commuters for prospect and refuge respectively. See Appendix for raw data. The scores for the eight prospect questions and for the eight refuge questions were summed to create composite measures. This data was used to find the probability value or 'p' by using the two-tailed T-test in Excel.

The two hypotheses that were assumed for testing commuters' preference for prospect and refuge design features at the station while they wait for the train were as follows:

1. Commuters' preference for prospect or refuge was based on gender, that is, whether they are males or females.
2. Commuters' preference for prospect or refuge was based on whether it is peak hours or off-peak hours.

Thus, the null hypotheses against the two hypotheses were:

1. Commuters' preference for prospect or refuge was not based on gender.

2. Commuters' preference for prospect or refuge was not based on whether it is peak hours or off-peak hours.

Based on this null hypothesis, questionnaires were analyzed with the help of Excel datasheet by conducting a two tailed t-test. There were four t-tests carried out:

1. Prospect against gender.
2. Refuge against gender.
3. Prospect against peak hours and off-peak hours.
4. Refuge against peak hours and off-peak hours.

Results from the t-tests were analyzed for probability values. The Xs and Ys (Mean), 't' values or standard deviation values and 'p' values or probability values for each of the tests is given below.

Table 4.1 Results of t-tests for gender by prospect and refuge, n=60

	Male(Xs)	Female(Ys)	t	p
Prospect	2.91	3.27	1.37	0.001
Refuge	3.14	3.02	1.24	0.051

Table 4.2 Results of t-tests for peak/off-peak hours by prospect and refuge, n=60

	Peak Hour(Xs)	Off-peak hour(Ys)	t	p
Prospect	2.85	3.00	1.34	0.203
Refuge	2.79	3.029	1.39	0.034

When probability values are more than 0.05, then null hypothesis is rejected. When probability values are more than 0.05, then the null hypothesis cannot be rejected. Table 4.1 showed a probability value of less than 0.05 for prospect against gender and a value of more than 0.05 for refuge against gender. Hence the null hypothesis that preference for prospect was not based on gender was rejected. Thus, the preference for prospect was based on gender. A comparison of the means of the prospect scores among males and females showed that females prefer prospect more than males do. The null hypothesis that the preference for refuge is not based on gender was not rejected.

Table 4.2 showed a probability value of more than 0.05 for prospect against peak and off-peak hours and a value of less than 0.05 for refuge against peak and off-peak hours. Hence the null hypothesis that preference for prospect was not based on peak hour or off-peak hour was not rejected. The null hypothesis that the preference for refuge was not based on whether it was peak hour or off-peak hour was rejected. Hence preference for refuge was based on whether it was peak hour or off-peak hour. Comparison of the mean refuge scores of peak hour and off-peak hour commuters showed that refuge was preferred more during off-peak hours than peak hours.

#### 4.3 Summary of results

Since quantitative analysis yields more specific, unambiguous results than does qualitative analysis, the former was chosen as the best approach for this research. However, certain results regarding nighttime and daytime preferences were based on qualitative participant observations. The results were summarized thus:

1. There were gender differences in preference for prospect. Females preferred prospect more than males.
2. There were no gender differences in preference for refuge.
3. There were no differences in peak hours versus off-peak hours in the preference for prospect.
4. Preference for refuge was stronger during off-peak hours.
5. Preference for prospect was higher at night.
6. Preference for refuge was lower at night.
7. Weather affected preference for prospect and refuge since it affected comfort conditions.

## CHAPTER 5

### CONCLUSIONS

#### 5.1 Conclusions with reference to literature

Carr, Francis, Rivlin and Stone (1992, p. 187) explain the significance of connections with the environment with reference to legibility, particularly in the case of public areas. They stress on recognizable cues that are understood by potential users, cues that communicate what kind of place it is and whether they are welcome. This research studied perception of safety in commuters, the users of the station and drew inferences from the survey about how people using this space read and reacted to the surrounding environment. Overall, the perception of safety is considered to be good at Park Lane. Thus, the design features prevalent at the station are pretty much what was preferred by commuters.

From the survey, it was concluded that with regards to preference, prospect symbols are more preferred by female commuters, and refuge features are more so preferred during off-peak hours. Participant observation showed how weather conditions affected commuters' preference for prospect and refuge design features, where they sometimes sought prospect and sometimes refuge. While during extremes of weather, they sought refuge, nighttime brought about a totally new perspective in the limelight when commuters sought prospect features. Keeping this extraordinary blend of varying preferences in mind, it is concluded that both prospect and refuge features are a requirement at an urban public space. However, decision on whether prospect or

refuge features are to dominate a landscape is to be decided after good thought is given to all conditions that govern the site. These include weather, demographics of the users of the space in question and the study of personal spaces.

Appleton (1975) argued that people make judgments about the degree to which an area offers prospect and refuge even when they have not physically entered the area. People need not directly experience prospect and refuge to appreciate it. They anticipate an area as offering prospect and refuge by looking at it and inferring its likely qualities (Appleton, 1975). This research proved Appleton in every way since the questionnaire survey confirmed that most of the participants have strong judgments and opinions of whether a prospect or refuge feature suited their needs and preferences or not.

According to Goffman (1971) people scan their environments in search of signals of danger, and once a danger is sighted, they attempt to escape the threat (Warr, 1990). This research proved that people maintain certain awareness about their environment when it comes to personal safety. Participant observation and questionnaire survey results confirmed that people have a very strong opinion about safety in their surrounding environments.

Fear of crime has been found to be more pronounced among females than males and at night than during the day (Box, Hale and Andrews, 1988; Skogan and Maxfield, 1981; Warr, 1984, 1990). Participant observation showed us the difference in perception of safety between daytime and nighttime. That females are more concerned about perception of safety than males was confirmed from the questionnaire survey. This difference between the biological sexes regarding the evaluation of crime in public

space seems to increase after nightfall (Warr, 1990). Participant observation confirmed this observation. Though this research does not prove that both prospect and refuge preference is gender based, it is proved that prospect preference is definitely gender based. Since females prefer prospect, and nighttime observation also showed preference for prospect, it is concluded that prospect is an essential element to be considered while designing an urban public space and the architectural and landscape architectural features in that space.

### 5.2 Implications on landscape architecture

Carr, Francis, Rivlin and Stone express their viewpoint that the human perspective has been neglected in both public space design and management. This research was conducted taking into consideration people's needs and preferences. Users of an environment are very much concerned about the spaces that they use. The response rate for this research was more than ninety-five percent, which brings us to the inference that research of this kind proves useful in collection and study of important values prevalent in the minds of users of a space or environment.

Researchers strongly restate that one of the goals of professional planners is to create and manage urban public settings which have aesthetic and functional value to users and discuss the relationship between criminal behavior and environmental design. [(Jacobs, 1961), (Newman, 1972), Jeffery (1977)]. The conclusions and results from this study can be used to design landscape architectural prospect and refuge features

which reduce fear of crime in urban dynamic public space and increase the perception of safety in the minds of the users.

This thesis mainly focused on prospect-refuge preference with relation to gender, perception of safety, peak hours or off-peak hours and time of the day. There are several other factors which have been mentioned earlier in this thesis, but have not been touched upon in this study, such as difference in preference and perception of safety due to surveillance at the site, difference in ethnic backgrounds and past victimization. This survey also limited itself in the sense that it was applied to an urban public space. It is assumed that perception of safety and preference for prospect-refuge vary depending on whether the space in consideration is rural or urban. These are interesting topics to be studied with reference to prospect-refuge theory. These add on scope for future study in this topic.

The choice of site was not the most ideal one. It must be considered that participants' responses are to some extent dependent on the topographical location of the site. The chosen station is itself in prospect of its surrounding areas. It is assumed that participants' responses with respect to preference for prospect or refuge features were affected by this fact. It would be a good idea to test the same factors when the station itself is in refuge in order to see if commuters' preference for prospect or refuge or their perception of safety is affected by the same. This also gives us the option of conducting a comparative study of users' preference for prospect-refuge with reference to difference in site conditions.

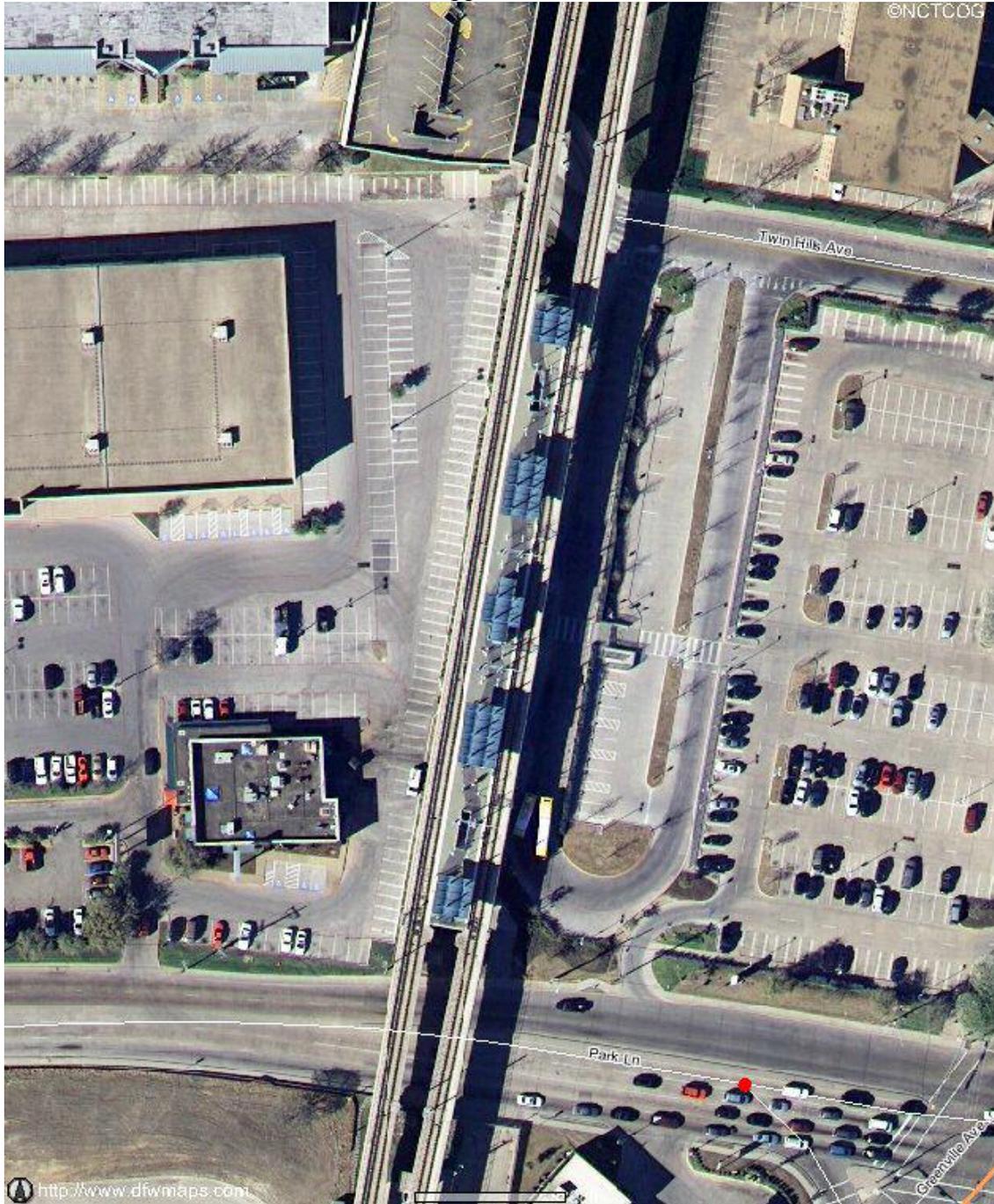
It would also be a good idea to study if the perception of safety in people and their choice for design features differs when they are alone and when they are in a group. This can become another area of research which can be linked to prospect-refuge theory. Since proxemics is a big part which is allied with prospect-refuge, this can also added as part of future research, by studying various aspects of proxemics and crowding and gathering participants' opinions on the same while getting to know their preferences for prospect and refuge design features.

3D simulation with AutoCAD and other computer programs are being widely put to use as effectual designing software. Once widely preferred space and design conditions have been discovered through surveys, design of those spaces can be facilitated with the assistance of graphic computer programs and test by conducting surveys as to what sort of spaces are preferred by people with reference to specific site conditions. These can be further refined based on user preferences till a final stage is reached from where implementation in design can take place. Thus, users' preference can be considered at every stage of design of dynamic public spaces right from the conceptual stage to the final one. This progressive process can aid in making the designing of urban public spaces more effective, functional and aesthetic.

APPENDIX A

PARK LANE STATION AERIAL

Appendix A



APPENDIX B

FINAL QUESTIONNAIRE-PAGE ONE AND TWO

**Prospect-refuge theory revisited: A search for safety in dynamic public spaces with a reference to design: Section I : Demographic data:**

1. How often do you board a train at this station (Please check one?)
  - This is my first time at this station
  - Less than once a week
  - Once a week
  - Twice a week
  - 3-4 days a week
  - 5-7 days a week
  - More than once in a day
  
2. At what time of the day do you most often board a train at this station (Please check one?)
  - 8 - 10am
  - 4 - 6pm
  - Other (Please check one)
    - Daytime
    - Nighttime
    - Both
  
3. What is the fewest number of persons you have seen while you were waiting at this station (Please check one?)
  - Zero
  - Other (please specify number) \_\_\_\_\_
  
4. What is the greatest number of persons you have seen while you were waiting at this station (Please check one?)
  - Zero
  - Other (please specify number) \_\_\_\_\_
  
5. Please specify your gender:
  - Male
  - Female
  
6. Please specify your age: \_\_\_\_\_ years

**Prospect-refuge theory revisited: A search for safety in dynamic public spaces with a reference to design: SectionII : Preference for chosen design features:**

**Section II Preference for chosen design features**

In this section of the survey, we are studying your preference for certain design features at this station.

⇒ **Please circle the rating scale number which best reflects your views**

<b>Preference for certain identified design features</b>	<b>Strongly Disagree</b>	<b>Moderately Disagree</b>	<b>Neither Disagree nor Agree</b>	<b>Moderately Agree</b>	<b>Strongly Agree</b>	<b>No opinion (NO)</b>
1. I feel comfortable standing in the open area near the light features between shelters while waiting for the train.	1	2	3	4	5	NO
2. I feel comfortable standing in the open area closer to the platform edge while waiting for the train.	1	2	3	4	5	NO
3. I feel comfortable waiting closer to, or in the elevator lobby	1	2	3	4	5	NO
4. I feel comfortable waiting closer to the staircases with shelters at either end	1	2	3	4	5	NO
5. I feel safe while waiting for the train at this station.	1	2	3	4	5	NO
6. Daytime or nighttime would affect where I wait for the train.	1	2	3	4	5	NO
7. During daytime, I feel comfortable waiting in the open areas between shelters.	1	2	3	4	5	NO
8. During nighttime, I feel comfortable waiting in the open areas near light features.	1	2	3	4	5	NO
9. During daytime, I feel comfortable waiting closer to, or in the elevator lobby.	1	2	3	4	5	NO
10. During nighttime, I feel comfortable waiting closer to, or in the elevator lobby.	1	2	3	4	5	NO
11. Weather would affect where I wait for the train.	1	2	3	4	5	NO
12. During hot weather, I feel comfortable waiting in the open areas between shelters	1	2	3	4	5	NO
13. During cold weather, I feel comfortable waiting in the open areas between shelters .	1	2	3	4	5	NO
14. During rain, I feel comfortable waiting in the open areas between shelters, given that I have raingear.	1	2	3	4	5	NO
15. When it is windy, I feel comfortable waiting in the open areas between shelters.	1	2	3	4	5	NO
16. During hot weather, I feel comfortable waiting closer to, or in the elevator lobby	1	2	3	4	5	NO
17. During cold weather, I feel comfortable waiting closer to, or in the elevator lobby.	1	2	3	4	5	NO
18. During rain, I feel comfortable waiting in the elevator lobby irrespective of having raingear.	1	2	3	4	5	NO
19. When it is windy, I feel comfortable waiting closer to, or in the elevator lobby.	1	2	3	4	5	NO

APPENDIX C

DATA ENTERED INTO MICROSOFT ACCESS

Table1												
ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
22	M	O	D	P	5	4	5	5	5	1	1	4
23	M	O	D	R	3	3	4	4	4	5	5	5
24	M	P	D	P	3	4	4	5	5	5	1	1
25	M	P	D	R	0	3	2	2	5	5	5	5
26	M	P	D	P	3	3	3	5	2	2	2	2
27	M	P	D	R	2	4	3	4	3	3	3	3
28	M	P	D	P	4	3	4	4	2	2	3	3
29	M	P	D	R	4	4	3	3	5	5	3	3
30	M	P	D	P	1	1	2	3	2	1	1	1
31	M	P	D	R	5	5	5	5	5	5	5	5
32	M	P	D	P	3	2	4	4	4	2	1	2
33	M	P	D	R	4	2	2	4	3	3	4	3
34	M	P	D	P	4	2	1	1	3	4	3	1
35	M	P	D	R	1	1	1	1	1	1	3	1
36	M	O	D	P	5	2	4	5	2	2	2	2
37	M	O	D	R	4	2	2	2	4	4	2	4
38	M	O	D	P	5	3	4	3	4	2	2	2
39	M	O	D	R	3	3	3	3	4	5	5	4
40	M	P	D	P	2	4	3	4	2	2	2	4
41	M	P	D	R	3	3	3	3	4	4	5	4
42	M	P	D	P	4	5	4	4	3	2	4	3
43	M	P	D	R	2	2	2	4	2	3	4	3
44	M	P	D	P	5	4	3	5	5	1	5	1
45	M	P	D	R	2	3	3	4	3	4	3	3
46	M	O	D	P	1	1	1	1	1	1	1	2
47	M	O	D	R	1	4	4	4	4	4	4	1
48	M	O	N	P	1	1	1	1	1	1	1	2
49	M	O	N	R	1	4	4	4	4	4	4	1
50	M	O	N	P	4	4	4	4	2	1	2	3
51	M	O	N	R	2	4	3	2	4	4	5	4
52	M	P	D	P	4	3	5	5	2	4	1	1
53	M	P	D	R	1	1	1	1	1	1	5	3
54	M	P	D	P	3	4	3	4	1	2	2	2
55	M	P	D	R	1	1	3	3	3	3	5	4
56	M	P	D	P	3	3	2	2	2	3	1	3
57	M	P	D	R	3	3	2	2	3	2	2	3
58	M	O	D	P	4	2	5	5	5	2	2	4

Table1												
ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
59	M	O	N	P	4	2	5	5	5	2	2	4
60	M	O	D	R	3	5	2	3	4	2	5	5
61	M	O	N	R	3	5	2	3	4	2	5	5
62	M	O	D	P	3	3	3	3	3	4	3	3
63	M	O	N	P	3	3	3	3	3	4	3	3
64	M	O	D	R	3	3	3	3	1	5	5	4
65	M	O	N	R	3	3	3	3	1	5	5	4
66	M	O	D	P	4	2	5	5	1	1	1	2
67	M	O	N	P	4	2	5	5	1	1	1	2
68	M	O	D	R	1	3	1	1	3	4	3	5
69	M	O	N	R	1	3	1	1	3	4	3	5
70	M	P	D	P	4	3	4	4	4	2	1	3
71	M	P	D	R	1	3	3	3	3	3	4	3
72	M	O	D	P	2	2	5	5	5	5	2	2
73	M	O	D	R	5	4	3	3	4	4	3	3
74	M	O	D	P	3	5	4	4	4	2	1	3
75	M	O	D	R	2	2	3	3	3	3	5	3
76	M	P	D	P	3	3	3	4	2	2	4	2
77	M	P	D	R	4	2	4	4	4	4	0	4
78	M	P	D	P	3	4	3	4	3	3	5	3
79	M	P	D	R	2	3	3	3	3	3	2	3
80	M	O	D	P	3	4	3	3	4	2	3	3
81	M	O	D	R	2	2	3	3	2	2	3	3
82	M	O	N	P	3	4	3	3	4	2	3	3
83	M	O	N	R	2	2	3	3	2	2	3	3
84	M	O	D	P	5	4	3	5	3	2	3	4
85	M	O	N	P	5	4	3	5	3	2	3	4
86	M	O	D	R	3	3	3	3	3	3	5	4
87	M	O	N	R	3	3	3	3	3	3	5	4
88	M	P	D	P	4	4	4	4	5	2	2	2
89	M	P	D	R	1	3	4	4	4	3	2	2
90	M	O	N	P	3	1	3	3	5	2	4	2
91	M	O	N	R	4	4	3	3	0	0	0	0
92	M	P	D	P	4	0	3	0	3	5	1	3
93	M	P	D	R	3	3	0	0	3	5	5	5
94	M	P	D	P	0	0	1	1	5	1	1	2
95	M	P	D	R	0	5	0	0	0	5	5	5
96	M	O	D	P	4	1	4	4	2	2	2	3
97	M	O	D	R	3	3	3	3	3	4	4	3

Table1												
ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
98	M	P	D	P	0	1	3	3	5	3	3	3
99	M	P	D	R	1	5	3	3	1	3	5	3
100	M	O	D	P	1	1	3	4	3	1	1	2
101	M	O	D	R	3	3	2	2	2	2	3	3
102	M	P	D	P	3	2	4	4	2	2	4	2
103	M	P	D	R	3	2	2	4	4	4	4	4
104	M	P	D	P	4	2	4	3	4	2	2	3
105	M	P	D	R	2	2	3	3	3	3	4	3
106	M	P	D	P	3	3	2	2	4	2	2	2
107	M	O	D	P	3	3	2	2	4	2	2	2
108	M	P	D	R	2	2	2	2	2	4	4	4
109	M	O	D	R	2	2	2	2	2	4	4	4
110	M	P	D	P	3	3	3	3	0	0	0	3
111	M	P	D	R	3	3	3	3	3	0	0	3
112	M	P	D	P	4	3	4	5	4	5	2	4
113	M	P	D	R	2	4	2	2	2	3	2	2
114	M	O	D	P	5	3	2	3	5	2	2	4
115	M	O	D	R	2	3	3	4	5	5	5	3
116	M	P	D	P	4	2	4	4	2	2	1	2
117	M	P	D	R	1	3	1	1	4	3	5	4
118	M	O	D	P	5	3	4	5	5	4	3	2
119	M	O	N	P	5	3	4	5	5	4	3	2
120	M	O	D	R	4	4	5	5	4	5	5	5
121	M	O	N	R	4	4	5	5	4	5	5	5
122	M	O	N	P	3	1	4	3	2	2	2	3
123	M	O	N	R	1	4	4	4	3	3	2	2
124	M	P	D	P	2	3	2	4	4	3	2	2
125	M	P	D	R	2	3	4	4	3	2	2	4
126	M	P	D	P	3	4	3	4	0	0	0	2
127	M	P	D	R	3	3	3	4	0	0	0	3
128	M	P	D	P	5	3	5	5	5	5	5	5
129	M	O	D	P	5	3	5	5	5	5	5	5
130	M	P	D	R	0	0	0	0	0	0	0	0
131	M	O	D	R	0	0	0	0	0	0	0	0
132	M	O	D	P	0	5	0	5	3	1	0	0
133	M	O	D	R	0	0	0	0	3	0	0	0
134	F	P	D	P	5	3	4	4	2	2	2	3
135	F	P	D	R	4	3	3	4	3	3	4	3
136	F	P	D	P	2	3	2	5	4	2	2	2

Table1												
ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
137	F	O	D	P	2	3	2	5	4	2	2	2
138	F	P	D	R	2	2	2	4	2	2	3	4
139	F	O	D	R	2	2	2	4	2	2	3	4
140	F	P	D	P	5	5	5	5	3	2	3	2
141	F	P	D	R	2	2	3	5	5	5	1	2
142	F	P	D	P	5	2	4	4	4	3	5	4
143	F	P	D	R	4	2	3	4	4	3	4	5
144	F	P	D	P	5	4	4	5	4	4	2	3
145	F	P	D	R	2	4	2	2	3	2	3	2
146	F	P	D	P	5	1	5	5	1	1	1	1
147	F	P	D	R	3	2	3	5	5	5	5	5
148	F	P	D	P	0	3	5	5	4	2	4	4
149	F	P	D	R	4	5	2	3	2	4	5	3
150	F	O	D	P	3	2	4	4	3	2	3	4
151	F	O	D	R	2	2	3	3	4	4	4	4
152	F	O	D	P	4	1	4	4	3	3	4	2
153	F	O	D	R	1	2	2	2	3	4	4	4
154	F	P	D	P	4	3	5	5	5	1	1	1
155	F	P	D	R	5	5	3	3	3	3	1	3
156	F	O	N	P	5	5	5	5	4	4	4	4
157	F	O	N	R	5	4	5	5	4	4	3	4
158	F	O	D	P	5	2	5	4	5	2	2	2
159	F	O	D	R	2	5	2	4	2	2	2	2
160	F	P	D	P	5	1	5	5	1	1	1	5
161	F	P	D	R	1	1	1	1	1	1	1	1
162	F	P	D	P	3	3	3	5	1	3	1	3
163	F	P	D	R	3	5	4	3	3	3	1	3
164	F	O	D	P	2	1	4	4	4	2	2	2
165	F	O	D	R	3	3	3	2	2	3	4	4
166	F	P	D	P	5	1	5	5	5	1	3	2
167	F	P	D	R	1	2	2	2	1	5	4	5
168	F	O	D	P	4	4	3	5	3	1	2	2
169	F	O	D	R	2	3	2	2	2	2	2	2
170	F	P	D	P	4	0	4	4	0	0	1	0
171	F	P	D	R	2	2	2	2	0	0	0	0
172	F	O	D	P	4	2	4	4	2	2	2	3
173	F	O	N	P	4	2	4	4	2	2	2	3
174	F	O	D	R	1	3	2	2	3	2	3	2
175	F	O	N	R	1	3	2	2	3	2	3	2

Table1												
ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
176	F	P	D	P	4	4	4	4	4	4	3	4
177	F	O	D	P	4	4	4	4	4	4	3	4
178	F	P	D	R	2	3	2	2	2	2	2	2
179	F	O	D	R	2	3	2	2	2	2	2	2
180	F	P	D	P	5	1	4	4	1	1	1	1
181	F	P	D	R	4	5	4	5	3	5	5	5
182	F	O	D	P	5	5	5	5	2	4	5	5
183	F	O	N	P	5	5	5	5	2	4	5	5
184	F	O	D	R	3	4	5	2	2	5	4	3
185	F	O	N	R	3	4	5	2	2	5	4	3
186	F	P	D	P	5	1	5	5	1	1	4	5
187	F	P	D	R	1	5	1	1	5	5	1	1
188	F	O	N	P	3	3	3	3	3	4	4	4
189	F	O	N	R	2	2	3	3	4	3	4	4
190	F	O	D	P	5	5	5	5	3	3	2	3
191	F	O	D	R	3	3	3	3	4	3	4	3
192	F	O	D	P	4	2	4	4	3	3	4	3
193	F	O	D	R	4	2	3	3	4	4	4	4
194	F	O	D	P	5	5	5	5	5	1	1	3
195	F	O	D	R	3	3	3	3	3	3	3	3

APPENDIX D

PROSPECT AGAINST GENDER; 30 MALES

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
22	M	O	D	P	5	4	5	5	5	1	1	4
24	M	P	D	P	3	4	4	5	5	5	1	1
26	M	P	D	P	3	3	3	5	2	2	2	2
28	M	P	D	P	4	3	4	4	2	2	3	3
30	M	P	D	P	1	1	2	3	2	1	1	1
32	M	P	D	P	3	2	4	4	4	2	1	2
34	M	P	D	P	4	2	1	1	3	4	3	1
36	M	O	D	P	5	2	4	5	2	2	2	2
38	M	O	D	P	5	3	4	3	4	2	2	2
40	M	P	D	P	2	4	3	4	2	2	2	4
42	M	P	D	P	4	5	4	4	3	2	4	3
44	M	P	D	P	5	4	3	5	5	1	5	1
46	M	O	D	P	1	1	1	1	1	1	1	2
48	M	O	N	P	1	1	1	1	1	1	1	2
50	M	O	N	P	4	4	4	4	2	1	2	3
52	M	P	D	P	4	3	5	5	2	4	1	1
54	M	P	D	P	3	4	3	4	1	2	2	2
56	M	P	D	P	3	3	2	2	2	3	1	3
58	M	O	D	P	4	2	5	5	5	2	2	4
59	M	O	N	P	4	2	5	5	5	2	2	4
62	M	O	D	P	3	3	3	3	3	4	3	3
63	M	O	N	P	3	3	3	3	3	4	3	3
66	M	O	D	P	4	2	5	5	1	1	1	2
67	M	O	N	P	4	2	5	5	1	1	1	2
70	M	P	D	P	4	3	4	4	4	2	1	3
72	M	O	D	P	2	2	5	5	5	5	2	2
74	M	O	D	P	3	5	4	4	4	2	1	3
76	M	P	D	P	3	3	3	4	2	2	4	2
78	M	P	D	P	3	4	3	4	3	3	5	3
80	M	O	D	P	3	4	3	3	4	2	3	3

APPENDIX E

PROSPECT AGAINST GENDER; 30 FEMALES

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
134	F	P	D	P	5	3	4	4	2	2	2	3
136	F	P	D	P	2	3	2	5	4	2	2	2
137	F	O	D	P	2	3	2	5	4	2	2	2
140	F	P	D	P	5	5	5	5	3	2	3	2
142	F	P	D	P	5	2	4	4	4	3	5	4
144	F	P	D	P	5	4	4	5	4	4	2	3
146	F	P	D	P	5	1	5	5	1	1	1	1
148	F	P	D	P	0	3	5	5	4	2	4	4
150	F	O	D	P	3	2	4	4	3	2	3	4
152	F	O	D	P	4	1	4	4	3	3	4	2
154	F	P	D	P	4	3	5	5	5	1	1	1
156	F	O	N	P	5	5	5	5	4	4	4	4
158	F	O	D	P	5	2	5	4	5	2	2	2
160	F	P	D	P	5	1	5	5	1	1	1	5
162	F	P	D	P	3	3	3	5	1	3	1	3
164	F	O	D	P	2	1	4	4	4	2	2	2
166	F	P	D	P	5	1	5	5	5	1	3	2
168	F	O	D	P	4	4	3	5	3	1	2	2
170	F	P	D	P	4	0	4	4	0	0	1	0
172	F	O	D	P	4	2	4	4	2	2	2	3
173	F	O	N	P	4	2	4	4	2	2	2	3
176	F	P	D	P	4	4	4	4	4	4	3	4
177	F	O	D	P	4	4	4	4	4	4	3	4
180	F	P	D	P	5	1	4	4	1	1	1	1
182	F	O	D	P	5	5	5	5	2	4	5	5
183	F	O	N	P	5	5	5	5	2	4	5	5
186	F	P	D	P	5	1	5	5	1	1	4	5
188	F	O	N	P	3	3	3	3	3	4	4	4
190	F	O	D	P	5	5	5	5	3	3	2	3
192	F	O	D	P	4	2	4	4	3	3	4	3

APPENDIX F

REFUGE AGAINST GENDER; 30 MALES

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
23	M	O	D	R	3	3	4	4	4	5	5	5
25	M	P	D	R	0	3	2	2	5	5	5	5
27	M	P	D	R	2	4	3	4	3	3	3	3
29	M	P	D	R	4	4	3	3	5	5	3	3
31	M	P	D	R	5	5	5	5	5	5	5	5
33	M	P	D	R	4	2	2	4	3	3	4	3
35	M	P	D	R	1	1	1	1	1	1	3	1
37	M	O	D	R	4	2	2	2	4	4	2	4
39	M	O	D	R	3	3	3	3	4	5	5	4
41	M	P	D	R	3	3	3	3	4	4	5	4
43	M	P	D	R	2	2	2	4	2	3	4	3
45	M	P	D	R	2	3	3	4	3	4	3	3
47	M	O	D	R	1	4	4	4	4	4	4	1
49	M	O	N	R	1	4	4	4	4	4	4	1
51	M	O	N	R	2	4	3	2	4	4	5	4
53	M	P	D	R	1	1	1	1	1	1	5	3
55	M	P	D	R	1	1	3	3	3	3	5	4
57	M	P	D	R	3	3	2	2	3	2	2	3
60	M	O	D	R	3	5	2	3	4	2	5	5
61	M	O	N	R	3	5	2	3	4	2	5	5
64	M	O	D	R	3	3	3	3	1	5	5	4
65	M	O	N	R	3	3	3	3	1	5	5	4
68	M	O	D	R	1	3	1	1	3	4	3	5
69	M	O	N	R	1	3	1	1	3	4	3	5
71	M	P	D	R	1	3	3	3	3	3	4	3
73	M	O	D	R	5	4	3	3	4	4	3	3
75	M	O	D	R	2	2	3	3	3	3	5	3
77	M	P	D	R	4	2	4	4	4	4	0	4
79	M	P	D	R	2	3	3	3	3	3	2	3
81	M	O	D	R	2	2	3	3	2	2	3	3

APPENDIX G

REFUGE AGAINST GENDER; 30 FEMALES

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
135	F	P	D	R	4	3	3	4	3	3	4	3
138	F	P	D	R	2	2	2	4	2	2	3	4
139	F	O	D	R	2	2	2	4	2	2	3	4
141	F	P	D	R	2	2	3	5	5	5	1	2
143	F	P	D	R	4	2	3	4	4	3	4	5
145	F	P	D	R	2	4	2	2	3	2	3	2
147	F	P	D	R	3	2	3	5	5	5	5	5
149	F	P	D	R	4	5	2	3	2	4	5	3
151	F	O	D	R	2	2	3	3	4	4	4	4
153	F	O	D	R	1	2	2	2	3	4	4	4
155	F	P	D	R	5	5	3	3	3	3	1	3
157	F	O	N	R	5	4	5	5	4	4	3	4
159	F	O	D	R	2	5	2	4	2	2	2	2
161	F	P	D	R	1	1	1	1	1	1	1	1
163	F	P	D	R	3	5	4	3	3	3	1	3
165	F	O	D	R	3	3	3	2	2	3	4	4
167	F	P	D	R	1	2	2	2	1	5	4	5
169	F	O	D	R	2	3	2	2	2	2	2	2
171	F	P	D	R	2	2	2	2	0	0	0	0
174	F	O	D	R	1	3	2	2	3	2	3	2
175	F	O	N	R	1	3	2	2	3	2	3	2
178	F	P	D	R	2	3	2	2	2	2	2	2
179	F	O	D	R	2	3	2	2	2	2	2	2
181	F	P	D	R	4	5	4	5	3	5	5	5
184	F	O	D	R	3	4	5	2	2	5	4	3
185	F	O	N	R	3	4	5	2	2	5	4	3
187	F	P	D	R	1	5	1	1	5	5	1	1
189	F	O	N	R	2	2	3	3	4	3	4	4
191	F	O	D	R	3	3	3	3	4	3	4	3
193	F	O	D	R	4	2	3	3	4	4	4	4

APPENDIX H

PROSPECT - PEAK/OFF-PEAK HOURS; 30 PEAK HOURS

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
24	M	P	D	P	3	4	4	5	5	5	1	1
26	M	P	D	P	3	3	3	5	2	2	2	2
28	M	P	D	P	4	3	4	4	2	2	3	3
30	M	P	D	P	1	1	2	3	2	1	1	1
32	M	P	D	P	3	2	4	4	4	2	1	2
34	M	P	D	P	4	2	1	1	3	4	3	1
40	M	P	D	P	2	4	3	4	2	2	2	4
42	M	P	D	P	4	5	4	4	3	2	4	3
44	M	P	D	P	5	4	3	5	5	1	5	1
52	M	P	D	P	4	3	5	5	2	4	1	1
54	M	P	D	P	3	4	3	4	1	2	2	2
56	M	P	D	P	3	3	2	2	2	3	1	3
70	M	P	D	P	4	3	4	4	4	2	1	3
76	M	P	D	P	3	3	3	4	2	2	4	2
78	M	P	D	P	3	4	3	4	3	3	5	3
88	M	P	D	P	4	4	4	4	5	2	2	2
92	M	P	D	P	4	0	3	0	3	5	1	3
94	M	P	D	P	0	0	1	1	5	1	1	2
98	M	P	D	P	0	1	3	3	5	3	3	3
102	M	P	D	P	3	2	4	4	2	2	4	2
104	M	P	D	P	4	2	4	3	4	2	2	3
106	M	P	D	P	3	3	2	2	4	2	2	2
110	M	P	D	P	3	3	3	3	0	0	0	3
112	M	P	D	P	4	3	4	5	4	5	2	4
116	M	P	D	P	4	2	4	4	2	2	1	2
124	M	P	D	P	2	3	2	4	4	3	2	2
126	M	P	D	P	3	4	3	4	0	0	0	2
128	M	P	D	P	5	3	5	5	5	5	5	5
134	F	P	D	P	5	3	4	4	2	2	2	3
136	F	P	D	P	2	3	2	5	4	2	2	2

APPENDIX I

PROSPECT - PEAK/OFF-PEAK HOURS; 30 OFF-PEAK HOURS

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
22	M	O	D	P	5	4	5	5	5	1	1	4
36	M	O	D	P	5	2	4	5	2	2	2	2
38	M	O	D	P	5	3	4	3	4	2	2	2
46	M	O	D	P	1	1	1	1	1	1	1	2
48	M	O	N	P	1	1	1	1	1	1	1	2
50	M	O	N	P	4	4	4	4	2	1	2	3
58	M	O	D	P	4	2	5	5	5	2	2	4
59	M	O	N	P	4	2	5	5	5	2	2	4
62	M	O	D	P	3	3	3	3	3	4	3	3
63	M	O	N	P	3	3	3	3	3	4	3	3
66	M	O	D	P	4	2	5	5	1	1	1	2
67	M	O	N	P	4	2	5	5	1	1	1	2
72	M	O	D	P	2	2	5	5	5	5	2	2
74	M	O	D	P	3	5	4	4	4	2	1	3
80	M	O	D	P	3	4	3	3	4	2	3	3
82	M	O	N	P	3	4	3	3	4	2	3	3
84	M	O	D	P	5	4	3	5	3	2	3	4
85	M	O	N	P	5	4	3	5	3	2	3	4
90	M	O	N	P	3	1	3	3	5	2	4	2
96	M	O	D	P	4	1	4	4	2	2	2	3
100	M	O	D	P	1	1	3	4	3	1	1	2
107	M	O	D	P	3	3	2	2	4	2	2	2
114	M	O	D	P	5	3	2	3	5	2	2	4
118	M	O	D	P	5	3	4	5	5	4	3	2
119	M	O	N	P	5	3	4	5	5	4	3	2
122	M	O	N	P	3	1	4	3	2	2	2	3
129	M	O	D	P	5	3	5	5	5	5	5	5
132	M	O	D	P	0	5	0	5	3	1	0	0
137	F	O	D	P	2	3	2	5	4	2	2	2
150	F	O	D	P	3	2	4	4	3	2	3	4

APPENDIX J

REFUGE - PEAK/OFF-PEAK HOURS; 30 PEAK HOURS

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
25	M	P	D	R	0	3	2	2	5	5	5	5
27	M	P	D	R	2	4	3	4	3	3	3	3
29	M	P	D	R	4	4	3	3	5	5	3	3
31	M	P	D	R	5	5	5	5	5	5	5	5
33	M	P	D	R	4	2	2	4	3	3	4	3
35	M	P	D	R	1	1	1	1	1	1	3	1
41	M	P	D	R	3	3	3	3	4	4	5	4
43	M	P	D	R	2	2	2	4	2	3	4	3
45	M	P	D	R	2	3	3	4	3	4	3	3
53	M	P	D	R	1	1	1	1	1	1	5	3
55	M	P	D	R	1	1	3	3	3	3	5	4
57	M	P	D	R	3	3	2	2	3	2	2	3
71	M	P	D	R	1	3	3	3	3	3	4	3
77	M	P	D	R	4	2	4	4	4	4	0	4
79	M	P	D	R	2	3	3	3	3	3	2	3
89	M	P	D	R	1	3	4	4	4	3	2	2
93	M	P	D	R	3	3	0	0	3	5	5	5
95	M	P	D	R	0	5	0	0	0	5	5	5
99	M	P	D	R	1	5	3	3	1	3	5	3
103	M	P	D	R	3	2	2	4	4	4	4	4
105	M	P	D	R	2	2	3	3	3	3	4	3
108	M	P	D	R	2	2	2	2	2	4	4	4
111	M	P	D	R	3	3	3	3	3	0	0	3
113	M	P	D	R	2	4	2	2	2	3	2	2
117	M	P	D	R	1	3	1	1	4	3	5	4
125	M	P	D	R	2	3	4	4	3	2	2	4
127	M	P	D	R	3	3	3	4	0	0	0	3
130	M	P	D	R	0	0	0	0	0	0	0	0
135	F	P	D	R	4	3	3	4	3	3	4	3
138	F	P	D	R	2	2	2	4	2	2	3	4

APPENDIX K

REFUGE - PEAK/OFF-PEAK HOURS; 30 OFF-PEAK HOURS

ID	Sex	Hours	Time	Type	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
23	M	O	D	R	3	3	4	4	4	5	5	5
37	M	O	D	R	4	2	2	2	4	4	2	4
39	M	O	D	R	3	3	3	3	4	5	5	4
47	M	O	D	R	1	4	4	4	4	4	4	1
49	M	O	N	R	1	4	4	4	4	4	4	1
51	M	O	N	R	2	4	3	2	4	4	5	4
60	M	O	D	R	3	5	2	3	4	2	5	5
61	M	O	N	R	3	5	2	3	4	2	5	5
64	M	O	D	R	3	3	3	3	1	5	5	4
65	M	O	N	R	3	3	3	3	1	5	5	4
68	M	O	D	R	1	3	1	1	3	4	3	5
69	M	O	N	R	1	3	1	1	3	4	3	5
73	M	O	D	R	5	4	3	3	4	4	3	3
75	M	O	D	R	2	2	3	3	3	3	5	3
81	M	O	D	R	2	2	3	3	2	2	3	3
83	M	O	N	R	2	2	3	3	2	2	3	3
86	M	O	D	R	3	3	3	3	3	3	5	4
87	M	O	N	R	3	3	3	3	3	3	5	4
91	M	O	N	R	4	4	3	3	0	0	0	0
97	M	O	D	R	3	3	3	3	3	4	4	3
101	M	O	D	R	3	3	2	2	2	2	3	3
109	M	O	D	R	2	2	2	2	2	4	4	4
115	M	O	D	R	2	3	3	4	5	5	5	3
120	M	O	D	R	4	4	5	5	4	5	5	5
121	M	O	N	R	4	4	5	5	4	5	5	5
123	M	O	N	R	1	4	4	4	3	3	2	2
131	M	O	D	R	0	0	0	0	0	0	0	0
133	M	O	D	R	0	0	0	0	3	0	0	0
139	F	O	D	R	2	2	2	4	2	2	3	4
151	F	O	D	R	2	2	3	3	4	4	4	4

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## BIOGRAPHICAL INFORMATION

Priti Ramanujam was born in Mumbai, Maharashtra, India. She completed her degree in architecture from Mumbai University. After her Bachelor's degree in Architecture, she worked for a couple of years with an architecture firm in Mumbai. She developed an interest in Landscape Architecture when the subject was introduced as part of the core curriculum for her Undergraduate degree. Priti joined the Masters' Program in Landscape Architecture at The University of Texas at Arlington in Fall 2003.

After graduation, Priti Ramanujam looks forward to some work experience in landscape architectures before she decides to go in for a Doctorate in Landscape Architecture.