THE RELATIONSHIP BETWEEN WINDOWS AND INTERIOR DESIGN PREFERENCES IN OFFICE SPACES: AN EXPLORATORY STUDY

by

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(ABSTRACT)

The purpose of this study was to explore the relationship between windows and interior design preferences in enclosed office spaces. The research sample consisted of forty executives from NASA. Subjects were asked to plan the interior design of an executive office space (simulated with a scale model) in response to four different window types and then asked to choose one of the four window types for the space. Subjects' reactions were observed and questioned throughout the experiment, to study the relation between windows and interior design preferences. Window functions and configurations, subjects' age, sex, country of origin, activity, and interaction levels were investigated as independent variables influencing the dependent variable-perception of the relation between windows and interior design preferences. The data was analyzed by means of descriptive statistics and in-depth theoretical analysis

of individual responses.

Subjects' consciousness of the relation between windows and interior design preferences increased as activity and interaction levels increased. Window configurations and functions influenced interior design preferences, especially furniture arrangement and color selection preferences. Interior design preferences influenced the choice of a window type to a considerable extent, perhaps as much as view and daylight. An overview of the study indicates that windows and interior design preferences are parts of a cyclic inter-relationship where each factor influences the other and therefore should each be considered with equal importance by both architects and interior designers.

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CHAPTER ONE

INTRODUCTION

Daylighting is a recently rediscovered realm of architecture. Once inseparable from the practice of building design, lighting by natural means began to be regarded as outdated early in the twentieth century when electric lighting became both practical and economical (Moore, 1985). Architecturally flexible, artificial illumination dominated building design and became the exclusive mode of illumination. The use of artificial illumination increased to the point of excess when the prevailing international style used it to promote the aesthetic of machine imagery.

The Arab oil embargo of 1973 rudely awakened the world to its extravagant use of energy, by bringing to its attention one of the most sudden and dramatic changes in recent history - the energy crunch, in the form of depletion of nonrenewable energy resources and it's resultant ecological implications. The oil embargo focused the world's attention on America's dependence on nonrenewable energy resources. Rapidly escalating prices for these resources prompted the United States government to call for energy conserving measures and for research and

development of alternative energy strategies (McLain, 1979, p.4).

The need for energy conservation forced some fundamental re-evaluation of building design. One aspect that came under review was that of windows. Although windows can provide daylight and ventilation, they can also allow undesirable heat gain and loss (Collins, 1975). In the 70's energy loss through windows was calculated at about 5% of the total United States energy usage (McLain, 1981). Furthermore, windows were no longer absolutely essential for light and ventilation because of the ubiquitous use of mechanical ventilation and artificial illumination. As a result, a number of people including engineers and utility company personnel suggested that a substantial reduction in the size of windows or a complete elimination of windows was desirable in order to reduce excessive energy consumption.

These suggestions raised objections about the degeneration of human environment and triggered a series of studies to determine, whether or not there were any detrimental effects from the absence of daylight and windows (Evans, 1981). The studies spotlighted a host of psychological and other functions performed by windows that were clearly recognized and highly preferred by users. Adding more substance to the arguments of window proponents were other experimentations which indicated that when properly used, daylighting through windows can

actually save energy. This aspect can be particularly beneficial to office buildings where energy is used on a large scale. Moore pointed out that a typical office building can cut down 50-60% of its lighting energy expenditure by using natural illumination for the perimeter areas during daylight hours. Besides, daylighting of office buildings reduces peak load requirements and daylight is always an available commodity during power outages.

All these endeavors indicate that windows are as essential as they are desirable. But the issue does not end here. In order to be effective, windows have to be well integrated into a building's design. An important part of this integration is the relation of all aspects of windows to the interior and it's components in a manner that is comfortable and acceptable to the user.

Research in passive solar design has shown that once installed, windows can have a strong impact on almost every aspect of interior design. This may have implications for other buildings that bank strongly on windows, (such as offices designed to make maximum use of daylight during work hours) in that interior designers have to be conscious of windows while designing interiors.

In this regard it would be beneficial if research could provide answers to certain questions regarding user opinions about window issues such as, "How do windows and

interior design preferences relate to each other? How do windows affect interior design preferences? Do interior design preferences, in turn, influence the user's choice of a window? If so, what is the extent of this influence?" Accordingly, the purpose of this study was to explore the relation between windows and user preferences for interior design in enclosed executive office environments.

Subjects in the study were asked to plan the interior design (i.e. arrange furniture and plan the general decoration) of an executive office in response to four different window configurations, and then asked to choose one of the four window configurations for the space. Subjects' reactions were then analyzed as to whether windows influenced interior design preferences and whether interior design preferences influenced the choice of a window type.

Objectives of the Study

1. To determine how windows influence user preferences for interior design especially for furniture arrangement.

2. To determine if, and how much, interior design preferences influence the subject's choice of a window type.

Justification for the study

User preference studies regarding window issues can help bridge the communication gap between builders and users and make daylit buildings successful as well as comfortable. But substantial conclusions regarding user preferences for various aspects of windows are limited by a paucity of research in these fields. This study adds to the scant database on such preferences by reporting in general, what people look for in windows from the interior and interior design point of view.

An interesting aspect of the study is that it analyzes user preferences for interior design in a daylit environment. In doing so, it informs how people feel about and accommodate their immediate surroundings in reaction to the presence of windows and daylight. This aspect may provide important information to both the interior designer and the architect. While it may give the architect information to consider regarding user preferences for interior design while designing a window, it may provide interior designers with strategies to accommodate their interior design with the existing window structure creating a compatible and hopefully pleasing environment for the user at the same time. Studies such as this can help make interior design a more fact based and user-oriented art.

The study was concentrated on executive officials in enclosed office spaces. Why study office spaces? A great

many office buildings are being built today with an ultimate aim of using daylighting as a major source of illumination. If windows and daylighting are affecting interior design in such buildings, it is necessary to know why and how because interior design is strongly related to user comfort. Interior design that interferes with or ignores window aspects may waste the potential of a good window and complicate the problems of a bad one.

The reason for studying executives in enclosed office spaces is that today's building techniques and theories have spawned the widespread specification of the square, deep building with a central mechanical core for commercial spaces such as office buildings. Daylit spaces in such environments are usually occupied by enclosed perimeter office spaces set aside for executive officers. So it seems logical and beneficial to deal with people and spaces that are most likely to have windows and daylight.

CHAPTER TWO

REVIEW OF LITERATURE

A review of related research was included in this chapter to first examine the preferred functions and dimensions of windows and then the interior design aspects they seem to relate to in the users' viewpoint. Because the study is concerned with office buildings, most of the review was restricted to research concerning the same.

Functions of Windows

Windows serve a variety of functions. These functions can be broadly classified as physical (such as ventilation and lighting), physiological (functions related to the human body), and psychological (such as view). While the physical and physiological functions are largely replaceable by artificial means, the psychological ones are not; and, perhaps, this is what makes windows so appealing to people.

Ventilation of rooms can be achieved by opening windows but many designers have advocated the more precise control of ventilation by artificial means such as fans and air-conditioning. With energy costs rising, designers are returning to the specification of windows for this function (Olygyay, 1963). Although research regarding the techniques of cross-ventilation by windows has been done,

there is little investigation into people's reaction to the use of windows for ventilation instead of artificial methods (McLain, 1979).

Windows can provide an excellent means of escaping from a building fire, even though they may not be the preferred exit (Griffith, 1962). In a survey of fires in windowless buildings, Juillerat (1964) concluded that more people died because of their inability to escape.

By providing sunshine and daylight, the window acts as a valuable source of illumination when it comes to cutting down energy expenditure in office buildings. Apart from its energy benefits the quality of illumination provided by both daylight and sunshine seems to have a positive psychological impact upon humans. In Wotton and Borkow's (1983) investigation of the effects of windows and lighting on the well being and performance of managerial and clerical staff, subjects gave the following reasons for liking daylight in their work atmosphere - "it provides a warm and pleasant feeling", "It provides information about weather and time of the day," and "It is less straining than electrical lighting and improves glare from electrical lighting" (Wotton and Borkow, 1983, p.408). It is perhaps for these reasons that office workers believe that daylight is superior to artificial illumination. Markus (1967) found in his survey of four hundred office workers that 95% of them preferred daylight to artificial light. Manning's (1965) study of office

workers revealed that 65% of his subjects preferred daylight.

In contrast to the desire for daylighting, the desire for sunshine in office buildings is dependent upon the level of interaction, the type of task, and the climate and latitude at which the subject is situated. Collins (1975) comments after reviewing the research done in several parts of the world that the desire for sunshine in buildings is strongest where its duration is most limited. Ne'eman (1974) suggests that the more confined the activity the more severe the adverse effects of sunshine may be.

The study of photobiology indicates that people have not only psychological but also physiological requirements for natural illumination. Such requirements include vitamin D synthesis and maintenance of normal biological rhythms (Wurtman, 1967). Russians claim that lack of ultraviolet rays lowers resistance to disease, reduces vitality, and causes the worker to tire more quickly (Hollister, 1968). In their study Wotton and Borkow found too much daylight to be associated with increased occurrences of headaches, whereas too little led to eyestrain and sickness resulting in increased absences among office workers.

Consideration of user response to the actual presence of windows indicates that another essential function of a window is the provision of view yielding some contact with

the external world. A view provides a building occupant with information about the weather and outside activities as well as lends a feeling of spaciousness to the room. Jackson and Holmes (1973) expanded upon the importance of a view for an office worker.

> He looks out also for release, in the form of movement compared with his static situation inside. He looks out of the window to check the weather and to reassure himself that life is still going on in the real world outside. The window may serve as a very real release from the claustrophobia arising from a small office (p.80).

The desire for a view seems to be well documented in relation to offices. Office workers seem to prefer view and daylight more than any other aspect of windows. Of the office workers that Wells (1965) surveyed, 89% indicated a desire to see outside even if there was plenty of artificial lighting available. In the Cooper and Crisp (1983) study, when office workers were asked to rate a number of environmental factors in their office, view was consistently rated as the highest. The researchers noted that most people in their study were satisfied provided they could see out, even if the view was restricted.

Preferred Window Dimensions

Along with window functions, sizes, and shapes of

windows also seem to influence interior design and user preferences for interior design. Sizes and shapes of windows become critical when it comes to cutting down window sizes for energy purposes. As Collins (1975) puts it, "The question arises as to what size and shape would satisfy the desire for a view and yet be small enough to reduce excessive energy consumption" (p.46).

Research regarding window sizes in office buildings suggests that an optimum minimum acceptable size lies between 20% to 40% of the window wall. After reviewing research done in this regard Collins comments that "if a recommendation were to be made from existing research, it would be that windows should occupy at least 20-30% of the window wall"(p.53). Ne'eman and Hopkinson (1970) used both a 1/10th and a full scale model in their studies of minimum window size preferences in office buildings. The mean acceptable size in percentage of wall covered by window was 25%. However, in order to satisfy 85% of the subjects the window size had to be increased to 35%. Kieghley (1973a) on the other hand measured satisfaction with different amounts of window area in offices. He found that less than 10% of window covering the wall was very unsatisfactory to the experimental subjects while 20% or larger was deemed most satisfactory.

As for the shape and position of windows horizontal apertures seem to be largely preferred. Kieghley's subjects choose wide aperture settings located in the

center of the wall. In another study Kieghley (1973b) restricted window area to 35% of the window wall and varied the number of apertures. He found that subjects were dissatisfied with large number of windows and also with narrow apertures.

Most of the above mentioned studies regarding preferred window size and location have been conducted in European countries which distinctly differ from the united states in their climatic conditions. Much more research has to be conducted, especially in this country before any window shapes or positions can be agreed upon as optimum.

After a review of the functions of windows and the configurations they prompt, it would be worthwhile to examine what it is that draws people to certain configurations of windows, or to windows themselves. Definitely there is the role of functional aspects of windows involved in an answer to this question. A desire for view seems to be the most powerful of these functional aspects, with sunshine, daylight, and a desire for privacy also wielding considerable influence. McLain (1981) studied the psychological effects of windows in a residential setting to gain some insight into what people find important in windows. She found that preferred window size was proportional to the importance of the window function to the user. She also noted that a correlation existed between a subject's ranking of view as the most important function of a window and a preference

for larger window sizes. Both the Ne'eman(1974) and Kieghley (1973a) studies supported the contention that view wields a powerful influence on window configuration preferences. In Ne'eman's study, where subjects' minimum window size preferences were investigated, views of near objects consistently required wider windows. In Kieghley's study where subjects choose wide aperture settings located at the center of the wall, the dimensions of the aperture were determined by the elevation of the skyline.

On the other hand McLain's (1983) study of user preference for direct/indirect configurations in passive solar residences suggests that window configuration preferences may also be influenced by a desire for sunlight and privacy. Subjects here rated four different window configurations (each occupying a different amount of area on the window wall) and reasoned their selections. Persons who chose windows occupying 88% of the wall usually did so because they liked the sunlight afforded by these windows, whereas persons who chose windows occupying 35% of the window wall (with the increased wall area covering the lower portion of the wall) did so because they preferred the privacy that was afforded by the extra wall area.

The type of enclosure, amount of interaction, and activity level in a commercial or institutional environment seem to exert an interesting influence on user

preferences for windows. Ne'eman found in his study that indoor conditions like activity level determined the degree of contact desired with the external world and hence the size of the window. Collins (1975) suggested that adverse reaction to windowless environments seems to be dependent on the amount of activity or the type of enclosure. Collins notes that there is very little adverse reaction reported in very active and stimulating environments such as a theater or department store. But as the activity and stimulation is restricted as in an office environment the complaints against the windowless rooms increase. Thus it appears that the window provides a psychological relief or stimuli for the user in such non-stimulating environments.

Apart from influencing activity levels, amount of interaction, and the type of work enclosure there are other ways by which occupation can affect user preferences for windows. Langdon (Daytime lighting of buildings: Report of an IES symposium,1974) suggested that occupation may also influence the basic way in which window functions are perceived by people. For example, he feels that the executive would express a preference for a view, not so much because he was likely to avail himself of it (he often sat with his back to the window) as to provide himself with a status symbol.

As for the demographic factors of age and sex influencing window preferences, so far there has been no

such suggestion in any relevant research. One reason is that most of the studies regarding windows have been conducted with samples the size of which have been too small to bring out any statistically significant correlation. Further examination of these factors is required before coming to any conclusions.

Apart from the above discussed there are many other factors that influence user preferences for windows. For example, McLain (1983) found familiarity with a window may be one factor that influences user preferences. In her study some subjects chose particular windows (like sliding glass doors) merely because they were used to seeing them. With regard to windows there is also the complex situation of window functions interrelating with other aspects producing new factors that influence window preferences. For example, window functions and dimensions affect interior design aspects which in turn affect user preferences for windows.

Windows and the interior
The Effect of Windows on Interior Design and User Preferences for Interior Design

Most of the research regarding the effect of windows on interior design is confined to passive solar buildings because it is here that the effect is most perceptible to the user. McLain (1981) has noted that the large amount of sunlight coming from one direction in such buildings

can have a significant impact on interior design both physically and esthetically.

Breen, Cronin, Kirkham, Redman, Ribaudo, and Shilliday (n.d.) expand on the effect of windows on passive solar interiors in their paper concerning interior applications for passive solar buildings (which is part research, part application of design and solar theory, and part their twelve year design experience). The authors observe that designing for sunlight affects interior media, texture, light, color, and furniture. For example, textiles react to sunlight and humidity from windows and deteriorate due to ultraviolet radiation. Another example they cite is the interaction of color and sunlight that affects the selection of colors for passive solar homes. The authors suggest that since dark hues absorb both light and heat, and light hues reflect both these energies, users may find colors of warm high reflectance and medium to high values and intensities more acceptable in north facing areas of a building and the opposite in the south facing areas. They also alert designers to the fact that smooth surfaces increase glare although they reflect light and also retain heat on the surface and, should hence be used with caution. In general the authors recommend dark hues, textured floors and walls, rough textiles, and matt finishes for passive solar interiors.

Towle (1979) studied user experience in passive solar homes. She noted that most of her subjects were aware of

the potential problem with solar degradation of furniture, fabrics, carpet, and wall covering, but few had taken any precautions against such damages. This may suggest that people may be aware of, but not too concerned with solar degradation of interior materials. But the Ne'eman and Longmore (1973) study of residential subjects suggests the opposite. People here expressed a strong dislike for the fading effect of sunshine.

In addition to their effects on textiles, colors, and finishes, windows seem to affect furniture arrangement also. Common sense would suggest that because people have such strong preferences for window functions such as view, ventilation, or daylight, they would be conscious of these functions while arranging furniture. For example, furniture may be arranged to take maximum advantage of a view. But the question to be answered here is how exactly do these functions affect furniture arrangement?. In Wotton and Borkow's (1983) study of office workers, 74% wanted windows near their work space next to their desks, rather than in front or behind their desk. In the same study, office workers expressed a preference for a desk near a small window rather than a desk far from a large window, suggesting that nearness of work space to window area is a relatively important aspect to office workers. Nimnicht's (1966) study about schools suggested that the use of daylight from side windows as a primary source of illumination may result in an inflexible style of

classroom arrangement. This may hint that windows play another role in furniture arrangement by restricting the wall space available.

Windows are perhaps most interesting to designers as a design feature itself. Windows lend character and beauty to the facade by breaking the monotony of a featureless expanse of wall. McLain (1981) notes that the importance of a window's function as a design feature depends upon the function or activity of the room. For example, the decorative value of a window may be more appreciated in the reception area of an office (where the emphasis is on projecting an image) rather than in a library. In Mclain's study of residential passive solar buildings, users rated the highest function of the window in the living room as decorative.

Collins (1975) has observed that windows frequently furnish an indication of status and wealth. This aspect is particularly important to interior designers while designing for image conscious people. Langdon notes that executives perhaps would not mind even sacrificing other functions of a window if they could just make use of its status value.

Daylight that enters an interior through windows exerts a well defined impact on the interior all by itself. As a design variable, daylight can have a profound influence on a building's orientation, form, scale, and character of interior spaces. As already

discussed under passive solar design, it can affect interior surfaces and finishes also. Daylight and sunshine contribute a highly dynamic character to the interior of a room. They introduce change and variety into an otherwise static space. Daylight also contributes to the quality of interior lighting by providing a directional component (O'Sullivan, 1973). Because windows are located on the side walls, daylight enters a building horizontally. This horizontal direction to daylight contributes to the modeling of objects (Button, 1970). Modeling can increase the apparent detail of an object while improving its appearance. Thus daylight has a more pleasing and natural character than artificial illumination.

Perhaps the most appealing aspect of a window to people is the way it enhances the basic character of a room itself. The mere presence of a window makes interiors appear more spacious, pleasing, and cheerful. This is very important to designers as the appeal of any design lies in its psychological prospects. In the Wotton and Borkow (1983) study of office workers, perceived pleasantness of office spaces showed a nonlinear relation to window access. In the Collingro and Roessler (1972) study where the effect of window size on feelings of enclosure was evaluated, subjects reported extensive feelings of enclosure and restraint with very small or no windows but not with larger ones. The Inui and Miyata

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(1973) study of subjects with conference and other office rooms showed that window size had the greatest effect on perceived spaciousness.

It is interesting to note that interior design and interior design aspects affected by windows can at times be a decisive factor in influencing people's preference for windows, window sizes, or shapes. Discussion of this matter may help one to learn more about the relation between windows and interior design.

The Effect of Interior Design and Interior Design Preferences on Windows

In the Nimnicht (1966) study of schools, a majority of educators and interior designers preferred windowless classrooms as it offered more space for furniture arrangement. Yet in Burts' (1961) study, educators preferred windows as they added a dimension of spaciousness to a cramped and crowded classroom.

McLain (1983) constructed a scale model of a passive solar home and asked her subjects to arrange furniture in the living area of the model for four different window configurations. The subjects were then asked which configuration they preferred and why. Quite a few design related factors featured in the subjects' reasoning for a preferred configuration. The subject who liked windows that occupied 88% of the window wall (direct configuration) said that one reason for liking this

configuration was because it allowed for the growth of many plants. On the other hand, many subjects disliked this arrangement because they hesitated to place furniture in front of the glazed area and this, they thought restricted furniture arrangement. Subjects who liked the combination configuration (44% of the window wall covered by windows) did so because this configuration looked familiar, balanced, and also gave them more wall space to hang pictures and arrange furniture. Some subjects thought it would be easier to purchase window treatments for this configuration (perhaps because it looked familiar). Subjects who disliked another window configuration with 65% of window wall covered with windows (here the bottom parts of the wall were covered) did so because they thought that the window looked poorly integrated with rest of the wall.

Just as proper designing may help exploit the potential of windows, improper designing may interfere with its functions. McLain (1981) has noted that esthetic decisions affecting window design in interior architecture can have profound effects on energy consumption of the building. Breen et al. (n.d.) observed that incorrect placement of furniture in passive solar homes blocks thermal mass and incorrect selection of fabric can reduce thermal efficiency.

Evans (1981) alerts designers to several interior design issues that may affect the functioning of

daylighting. For example, he notes that ceilings, walls, and floors in that order control the daylight coming into a room and reaching the task. He suggests that it would be best to keep the ceilings and walls in light colors while restricting strong colors and character giving patterns to the floors that have little or no effect in controlling daylight. Another example he cites, is of glasses prescribed for windows. Evans alerts designers to the fact that although translucent glass such as glass block blocks views it becomes excessively bright with exposure to sun and should hence be used with caution, especially where it can be seen from visually dark areas in the interior. Tinted glass, on the other hand, distorts the appearance of interior colors and should be avoided if possible.

Summary

A review of research regarding various aspects of windows suggests that by cutting down energy expenditure on one hand and by boosting employee morale on the other, windows can be a irreplaceable asset to the office environment. A critical overview of the same research shows that the approach taken to windows in the past has always tended to fragment its various functions and aspects into compartments which can then be more easily converted into physical recommendations. Usually no attempt is made to reassemble these parts into a

meaningful whole or relate them to the interior.

The relation between windows and the interior seems to follow two distinct trends. First of all, windows definitely seem to affect the design of the interior and the way it is perceived. But more interestingly, the design of the interior itself seems to affect windows, their functioning, and the way they too are perceived. But these deductions can be made from only fragmentary references in various studies dealing with different aspects of windows. There has been no single study devoted to this interesting and obviously important relationship between windows and the interior. Studies such as this that probe the above relation can not only provide an unique way to reassemble window functions into a meaningful whole as they relate to the interior, but may also help make interiors more comfortable to the user.

CHAPTER THREE

METHODOLOGY

Variables investigated in the study

A few factors or variables that have been found to influence user opinions about window issues were discussed in detail in the review of literature. The following is a discussion of some of those factors or variables that seemed to influence the dependent variable (user perception of the relationship between windows and interior design preferences) and were hence investigated in this study.

1. Activity and interaction levels at work

As evidenced in the review of literature two aspects of occupation influence user opinions about window issues - activity level (the amount of physical work done in the work environment) and interaction level (the amount of interaction with other people in the work environment). As the activity level and interaction level increase in the work environment, users seem to perceive window issues less strongly because their attention is more captured by work rather than the work environment itself. In other words, people are most conscious about windows in environments that have the lowest activity and interaction levels. This suggested that people whose office routine

was characterized by lower activity and interaction levels may relate design preferences to windows more often and more strongly than people whose office routine was characterized by higher activity and interaction levels.

2. Window Configuration (Window Shape and position on the window wall)

The review of literature revealed several instances where people liked or disliked a window's configuration (either shape or position or both) because of it's effects on interior design. For example, certain windows were preferred because they allowed plenty of wall space to arrange furniture and hang pictures, whereas certain other windows were disliked because they restricted the same wall space. Large windows were preferred because they allowed for the growth of plants which again helped to accent interior design. In some cases, certain window configurations were preferred just because it was easy to purchase window treatments for them. All this suggested that window configurations may be another important factor that influences user preferences for interior design and therefore user perception of the relation between windows and interior design preferences.

3. Window functions

The review of literature indicated that apart from window configuration, window functions like view,

daylight, and ventilation can also wield a perceptible influence on interior design and user preferences for interior design and therefore on user perception of the relationship between windows and interior design preferences. Daylight for example, affects fabric dyes, object appearances, and furniture placement (As in cases where people arrange furniture either to avoid or take advantage of daylight). View is always considered an aesthetic asset to any interior and it too may affect furniture arrangement (as in cases where people avoid looking at a bad view or try to take advantage of a good one). Ventilation benefits the inherent feeling in a space enhancing the psychological prospects of it's interior design. Sometimes by virtue of their appearance windows may themselves be a design feature (This function of the window is referred to as the decorative aspect of a window throughout the study). In such cases they may influence or themselves be influenced by the design theme of the interior.

4. Demographic variables

Although the review of literature did not suggest any demographic variables that could influence the perception of the relationship between windows and design, subjects' age, sex, and country of origin were investigated in the study for their influence on the dependent variable since the subjects in the study came from different age, sex,

and nationality groups. Subjects ranged in age from 23 to 58 years with 35% being in the 20-40 range and the rest in the 40-60 range. Males represented 70% of the sample and females 30%. As for nationality, 17.5% of the subjects in the study were from the tropical countries of India, Iran, and Africa and the rest were all natives of the United States. The subjects in the study who were originally from tropical countries came from cultures that were distinctly different from the culture of their American counterparts. This suggested that subjects who were from the tropical countries could vary in their perception of the relationship between windows and interior design preferences from their American counterparts.

Approach to the Problem Situation

The problem situation or the objective (determining how windows affect interior design preferences and whether interior design preferences affect the choice of a window or, in simple words, exploring the relation between windows and interior design preferences) was approached by creating a hypothetical situation. A scale model of an office space was given to the subjects and they were told to imagine that it was a private executive office allocated to them by their management. The subjects were given a set of scaled furniture typical of an executive office and told to imagine that the management had provided them with basic furniture. Then they were asked

to plan the interior design of their own office space. Six different interior design preferences were investigated in the study: furniture arrangement, color selection, plant and wall hung accessory selection and placement, selection and location of ceiling and floor lighting fixtures, and selection of wall and floor finish type. To plan the interior design in the context of the study would meant to think about all these preferences.

The researcher then set up four different types or configurations of windows on the window wall of the office one after the other and asked the subjects to plan the interior design of their office space in the presence of each configuration. Every time the subjects planned the interior design of their office in the presence of a particular window configuration, the researcher questioned them to determine whether they were conscious of windows while designing, and if they were, how windows affected their interior design preferences or plans. By observing the subject's reaction to four window configurations, the researcher studied whether different configurations affect interior design preferences in different ways, to learn more about the effect of windows on interior design preferences.

The researcher later asked the subjects to choose one of the four windows for their office space and questioned the reasoning behind their choice to determine whether interior design preferences influenced their choice of a

window type.

Operational Definitions

The following operational definitions were used in the study.

1. Activity level - the amount of bodily work performed by the subject in his/her office (in case of the executive subject, typing writing etc.) on a typical work day and was divided into three categories - light, medium and heavy activity levels.

2. Interaction level - the number of fellow workers and visitors met by the subject in his/her office on a typical work day. This factor was also divided into three categories - light (if a person meets less than 5 people in his/her office per day), medium (5-10 people a day) and heavy (10 or more people a day) interaction levels.

3. Window functions - Four window functions were explored in the study and were defined as follows:

    a. Daylight - sunshine and light used for work activities.

    b. View - Scene beyond the window which can be informative and aesthetic i.e. ugly or beautiful.

    c. Ventilation - air circulation caused by opening windows.

    d. Decorative functions - Decorative qualities of

the window like its shape or style that influence
the interior design of a room.

4. Window configuration - the shape and position of the
window on the window wall.

5. To plan the interior design of a space - Six interior
design aspects are investigated in the study:
a. Furniture arrangement
b. Color selection for walls, floors and upholstery
c. Wall and floor finish type selection
d. Number and location selected for wall hung accessories
e. Number and location selected for ceiling and floor
   lighting fixtures
f. Number and location selected for plants

   To plan the interior design of a space in the context
of the study means, to think about the above mentioned
aspects.

The Instrument

   Because the major objective of the study was to
elicit the interrelationship between behavior (user
preferences for design) and an environmental factor
(windows) simulation of the environment in question (the
executive office) would prove to be an indispensable tool
in collecting information from subjects. As studies
conducted by researchers like DeLong (Kleeman, 1981) and

Lau (1970) show, the scale model provides a superior simulation technique and was hence chosen as the major research instrument for the study. One aspect of scale models that was particularly favorable to the study was that people could interact and even make design changes in the model.

Delong's research on scale models has shown that users react most easily to a 1/12 scale model. Thus a 1/12 scale model was constructed using a combination of mat board and two-ply corrugated board for walls and the ceiling and 2" styrofoam for the base. The model simulated an executive office measuring 14'wide X 16'long X 9'high, with a door on one wall and a window area on the opposite wall. Each wall was constructed as a freestanding unit that could be fixed on the styrofoam base with toothpicks inserted at the base of the wall. The wall containing the door was left open in the model as an aperture through which the model's interior could be viewed and manipulated. The reflectance of the walls and ceiling were 85% and 15% respectively. The ceiling was left flat. A view of a landscape and the sky were simulated just behind the window wall using pale blue paper, miniature plants, and trees. Finally the following set of scaled furnishings that are typical of an executive office were provided with the model:

desk - 72"w x 36"d x 28"h

credenza - 72" x 24"d x 28"h

executive chair - 27"w x 24"d

2 armchairs - each 18"w x 15"d

2 small sofas - seat width-27", seat depth-24"

end table - 30"w x 30"d x 18"h).

A two section interview was specially designed for the study. The first section contained questions that were more relevant to the model. The second section consisted of questions related to demographic information (see appendix B for interview instrument).

General Procedure

The model was set up in an indoor area. Daylight entering the office was simulated in the model by having a incandescent lamp shine through the window from behind the model. The entire model was placed in a corrugated board booth in such a way that subjects looking at the model could see just the interior of the model and thus not be distracted by either the surrounding objects or the light source located behind the model. The study was begun by acquainting the subjects with the scale model of the office space and asking them to imagine that it was a private executive office allocated to them by their management. The subjects were then given the set of scaled furniture and told to imagine that the management had provided them with basic furniture and asked them to plan the interior design (see definition of variables) of their own office space.

At this stage the researcher set up four different types or configurations of windows on the window wall of the office, one after the other. The four configurations could be described as follows-

1. The split window - The split window (see figure 1) consisted of 2 window areas, each measuring 2'-7"w x 7'h (sill height-1'-6") and extending from floor to ceiling, but occupying opposite corners of the window wall.

2. The clerestory window - The clerestory window (see figure 2) measured 13'w x 2'-9"h occupying the entire length of the window wall and was situated just 6" below the ceiling level (sill height - 5'-9").

3. The 3-section window - The 3-section window (see figure 3) also occupied the entire length of the window wall but was divided into 3 sections by beams running along it's breadth. Each section of the 3-section window measured 3'w x 4'-2"h (sill height- 3'-10"). Locationwise, the 3-section window was located a foot below the ceiling level.

4. The centered window - The centered window (see figure 4) was a rectangle measuring 7'-6"w x 5'h and was situated exactly at the center of the window wall (sill height - 3'). The centered window was located a foot below the ceiling level.

Although the windows differed in their shape and location, window size was held constant at 30% of the window wall (37.8 sq.ft). Because an optimum range for window size in office buildings has already been established by research at 20-40% of the window wall area (Kieghley, 1973a; Ne'eman and Hopkinson,1970) the mid point of the range or 30% of the window wall area was assumed to be an optimum window size for the executive office.

The researcher first set up the split window on the window wall and asked the subjects to plan the interior design (meaning arrange furniture, choose the number and location of plants and wall hung accessories they want in their office, select colors for walls, floors and upholstery, choose the type of wall and floor finish, and choose the number and location of modular ceiling and floor lighting fixtures) of the resulting office space. As the researcher waited for the subjects to complete their work she would quickly sketch the pattern of the subjects' furniture arrangement on small floor plans affixed onto her interview sheets. She then asked them "Were you in any way conscious of the window while planning the interior design of your office ?" If the subjects replied affirmatively the researcher then questioned the subjects as to how windows influenced their interior design preferences, especially their preferences for furniture arrangement.
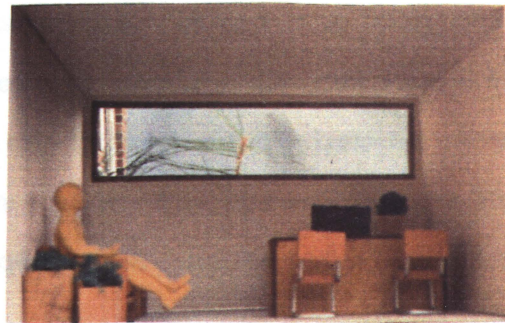
Figure 1. split window

Figure 2. Clerestory window
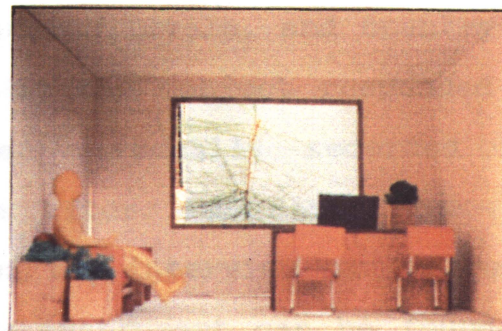

Figure 3. 3-section window

Figure 4. Centered window

Next the researcher set up the clerestory window on the window wall and asked the subjects what aspects of their interior design plan they would change because of the change in the window wall. They were then asked to explain those changes. The researcher asked the subjects to plan their furniture arrangement again, in response to the given space and then questioned them as to how windows affected their furniture arrangement in this case. The process was repeated with both the centered and the 3-section windows.

The subjects were next told to choose one of the four window configurations for their office. They were then asked to reason out their choice by picking the factors that influenced their choice from a listing of defined factors. Subjects were also asked to rank the factors that influenced their choice of a window type in the order they influenced them. Information regarding each person's age, sex, activity and interaction levels, and country of origin were also collected. As the subject responded to the interview the researcher personally recorded the responses and reviewed them after each interview for clarity. (A written report of the interview can be found as appendix A. The interview instrument can be found as appendix B) Certain multiple choice questions in the interview required the subjects to look at a listing of answers and then respond. In such instances, the researcher gave the subjects index cards with the

respective answers typed on them and then let them answer the question.

Pretest

The instruments used in the study, the scale model, and the interview instrument were pretested with eight subjects - four graduate students and four executives. Results indicated certain trends in the subjects' response to the open-ended interview questions. Based on these trends precoded answers were listed under each question in the interview instrument to facilitate data collection.

Follow up questions to certain open ended questions in the interview seemed to lead away from the objective at times. The follow up questions therefore were rephrased and more strongly worded to conform to the objectives of the study. The pretest also suggested that the scale model may not be strong enough to stand constant and rough use by either the researcher or the subject. The scale model was hence rebuilt to endure more constant use.

On the whole, the pretest results indicated that both the intent of the model and the wording of the interview were clear to the participants.

Characteristics of the Sample

The sample for the study was composed of 40 executive officials (to be more specific 24 engineers, 8 scientists, and 8 senior accountants) working for the National

Aeronautical and Space Administration (NASA) base in Hampton area at the time of the study. A listing of executives working at the hampton NASA base was compiled with a computer. Out of this listing 60 people were randomly selected for the study by the lottery method. Of these 60, 40 executives volunteered to participate in the study after the researcher contacted them personally and explained the intent and nature of the study. All subjects participating in the study had independent offices and could hence easily identify with the enclosed office situation in the study. Subjects ranged in age from 23 to 58 years with 35% being in the 20-40 range and the rest in the 40-60 range. Males represented 70% of the sample and females 30%. People who were originally from tropical countries of India, Iran and Africa comprised 17.5% of the sample. The rest were all natives of the United States.

Method of Data Analysis

Due to the smallness of the sample and the exploratory nature of the study, the data were analyzed completely through descriptive statistics such as means, medians and percentages.

Limitations of Methodology

Because of the time and individual attention required in scale model studies the sample size was restricted to a

small size. This made it difficult to use statistical data analysis procedures.

De Long (Kleeman,1973) has indicated that people get quickly fatigued during interaction with a scale model. This drawback precluded the use of long questions or elaborate detail in the interview designed for the study.

However, steps were taken to somewhat counter the above drawbacks. To make up for the lack of statistical analysis procedures, qualitative research procedures (such as in depth theoretical analysis of the response from each individual subject) that probed the small sample in more detail were adopted. These procedures provided more specific information and perhaps were more suited to the exploratory nature of the study than statistical analysis itself.

To counter subject fatigue due to long and detailed questions a compact interview that mainly consisted of short open ended questions was especially designed for the study.

CHAPTER FOUR

RESULTS

The results of the study are discussed under two subdivisions - 1. The influence of interior design preferences on the choice of a window type and 2. The influence of windows on interior design preferences.

The Influence of Interior design Preferences on the Choice of a window type

Once the subjects had chosen a window type for their office space, they were given a list of four factors (view, ventilation, daylight, and interior design preferences) and asked to pick from the list, factors that had influenced their choice of a window type (see Q2a-appendix B). As portrayed in Figure 5 the highest percentage of subjects - 98% (39) thought that interior design preferences had influenced their choice of a window type whereas 93% (37) thought that the view had influenced their choice. Sixty-three percent (25) of the subjects thought that daylight had influenced their choice of a window type whereas a mere 10% (4) thought that ventilation had influenced their choice.

In order to learn how much interior design preferences had influenced one's choice of a window type as compared to view, ventilation, and daylight; subjects

were asked to rank these factors in the order they had influenced their choice. The more a factor influenced one's choice the higher it's ranking would be (see Q16 -appendix B). The ranking order as portrayed in Figure 6 suggests that interior design preferences influenced subjects' choice of a window type to a considerable extent -perhaps as much as view and daylight but certainly more than ventilation. Forty-three percent (17) of the subjects thought that interior design preferences had influenced their choice of a window type more than any other listed factor or in other words they ranked it number one, as compared to 35% (14) who ranked view as number one. Similarly 40% (16) and 28% (11) of the subjects ranked view and interior design aspects respectively as number two. Twenty five percent (10) and 18% (7) of the subjects ranked interior design aspects and daylight respectively as number three and 28% (11) and 8% (3) ranked ventilation and daylight respectively as number four. The median rank of interior design preferences was two as were those of view and daylight. The median rank of ventilation however, was four. In simple terms this means that the typical subject thought that interior design preferences were the second most influential among the four given factors when it came to choosing a window type.

Additional evidence that interior design preferences do influence the choice of a window type was seen when
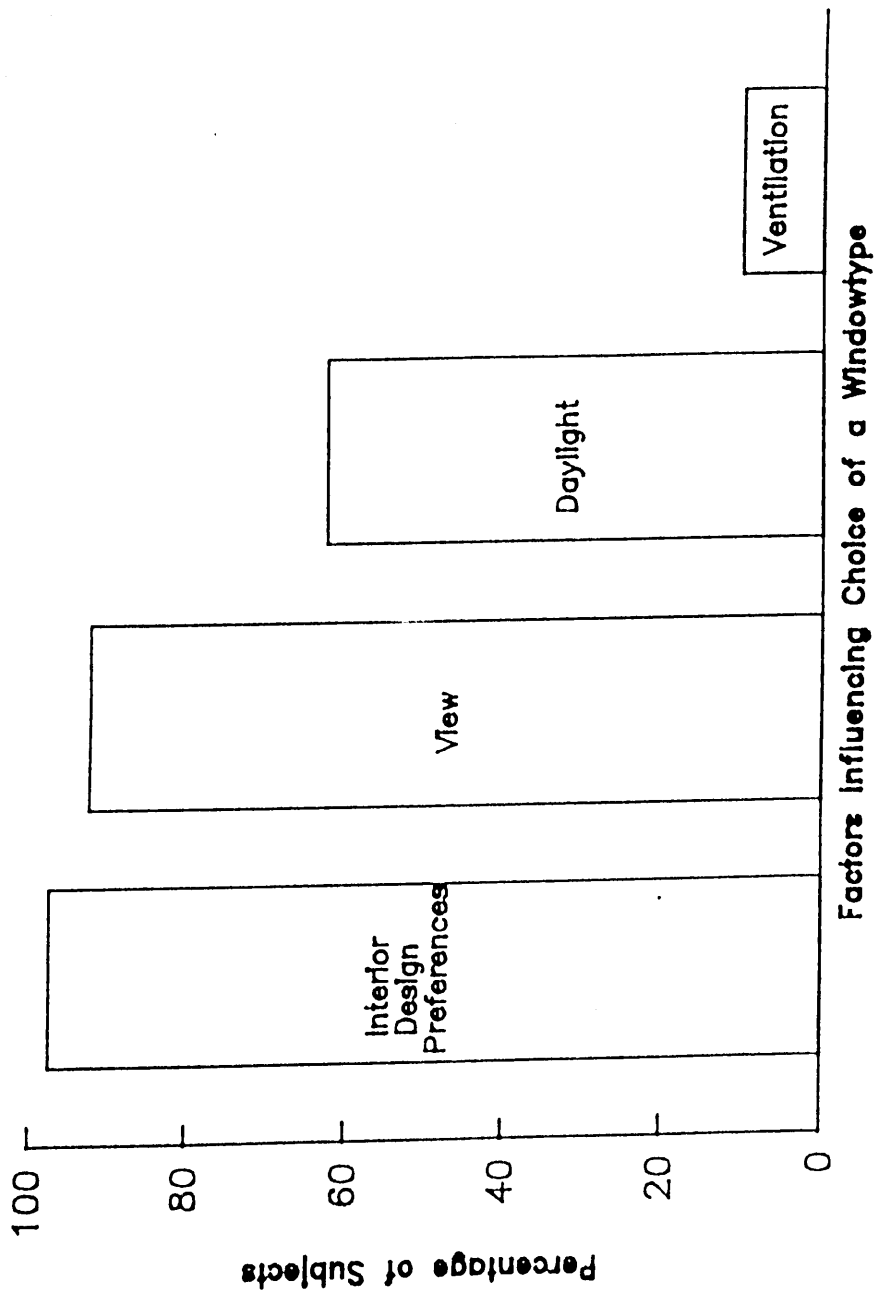
Figure. 5 — Factors Influencing Subjects
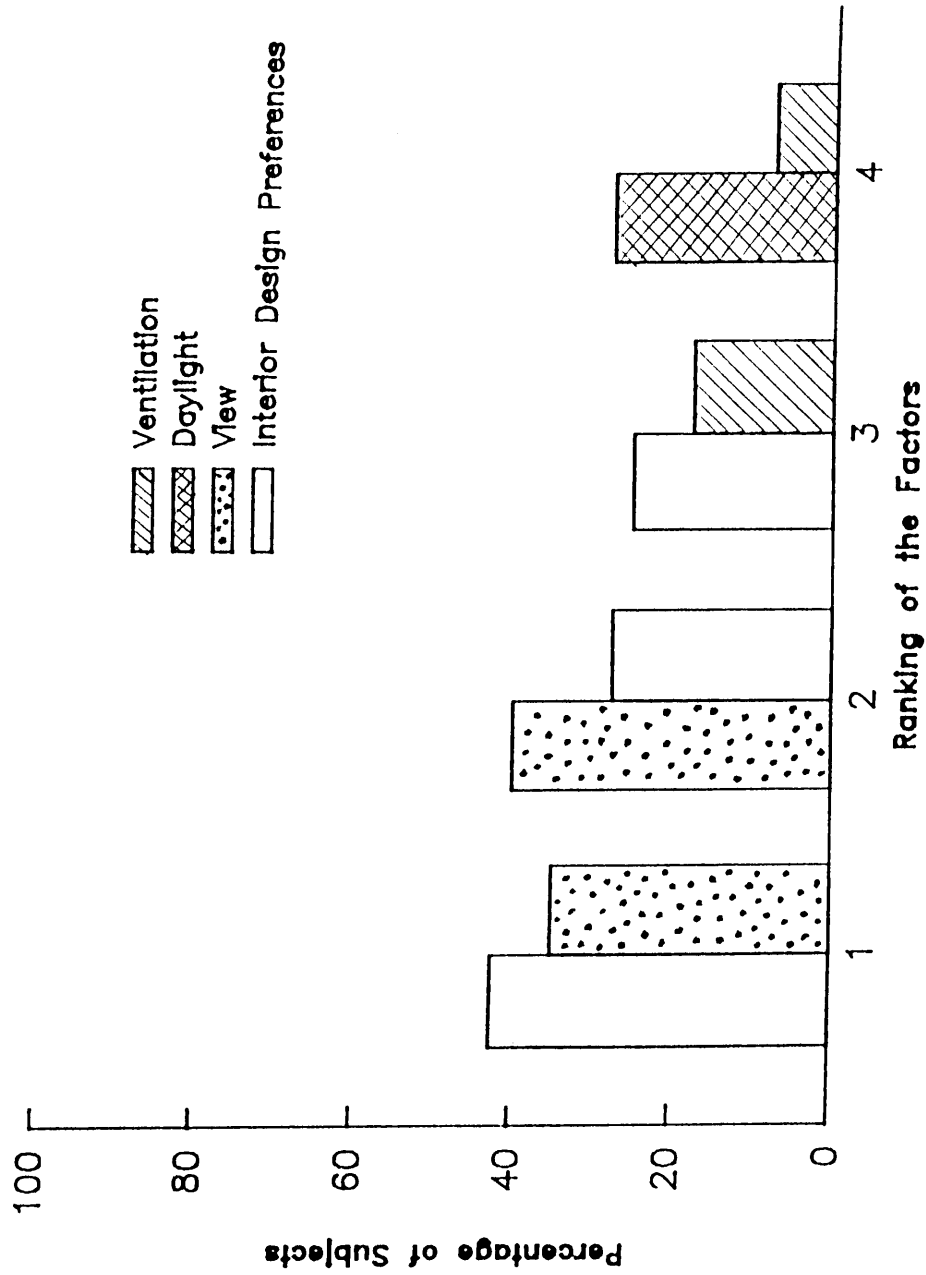Choice of a Windowtype

Figure. 6 — Subjects Ranking of Factors that Influenced
their Choice of a Windowtype

subjects were asked why they liked or disliked each of the four windows that were shown to them (refer Q1b, Q3b, Q5b, and Q8b-appendix B). One hundred percent (40) of the subjects spontaneously cited at least one interior design preference as a causative factor influencing their like/dislike (inseperably associated with the choice of a window type) of a window. The most common interior design preferences cited as influencing a subject's like/dislike of a particular window type were:

1. Window cosmetic preferences or preferences for how the window looked from the interior design point of view (whether it looked modern or conventional, whether it was well proportioned or not, whether it looked professional or not, whether it looked familiar or not etc.) cited by 45% or 18 of the subjects.

2. Furniture arrangement preferences, (certain windows were liked because they allowed practically any pattern of furniture arrangement whereas, others were disliked because they severely restricted furniture arrangement) cited by 50% or 20 of the subjects.

3. Preferences for the room atmosphere as created by a particular window (certain windows were disliked because they made a room appear smaller than it was whereas others were liked because they made the room appear larger than it actually was) cited by 35% or 14 of the subjects.

The Influence of Windows on Interior
Design Preferences

During the study every time subjects designed their office space in the presence of a particular window type, they were asked if they had taken the window into consideration while planning the interior design of their office space (see Q2a, Q5a, Q8a, 11a-appendix b). An overwhelming 95% (38) of the subjects spontaneously agreed that they had taken the window into consideration while planning the interior design of their office space in at least one instance. Further questioning of the remaining 5% (2) revealed that they too had unconsciously taken the window into consideration while planning the interior design of their office space in at least one instance.

Intensive questioning of the subjects' interior design schemes indicated that windows had influenced different interior design aspects investigated in the study to different extents (see figure 7). Furniture arrangement was the interior design aspect most influenced by the window with 98% (39) of the subjects mentioning that their furniture arrangement was influenced by the window. Plant selection and placement and color selection for floor, walls, and upholstery were the interior design preferences next most influenced by the window. Wall /floor finish selection was the interior design preference least influenced by the window. The influence of windows on each of the interior design preferences investigated is

discussed individually in the following sections.

A. The influence of windows on furniture arrangement

Ninety eight percent (39) of the subjects interviewed said that their furniture arrangement was influenced by the window in at least one instance (judging from the response to Q2b, Q5a, Q8a, and 11a-see appendix B). Fifty-three percent (21) of these subjects changed their furniture arrangement in one or more instances in response to the mere change of a window type. Figure 8 suggests that compared to the 98% (39) of the subjects who said that their furniture arrangement was influenced by windows, only 40% (16) of the subjects said that their furniture arrangement was influenced by the location of the door, 50% (20) said that their furniture arrangement was influenced by the need for convenience, and 60% (24) for other reasons like number of visitors, need to save time and so forth. (Judging from the responses to Q3a, Q6a, Q9a, and Q12a - appendix B). All these data suggest that windows had a pronounced influence on furniture arrangement.

View, daylight, window configuration (the shape and location of the window), and to some extent ventilation were the most common window aspects that influenced furniture arrangement in the subjects' offices. Ninety percent (36) of the subjects said that the view through the window had influenced their furniture arrangement in
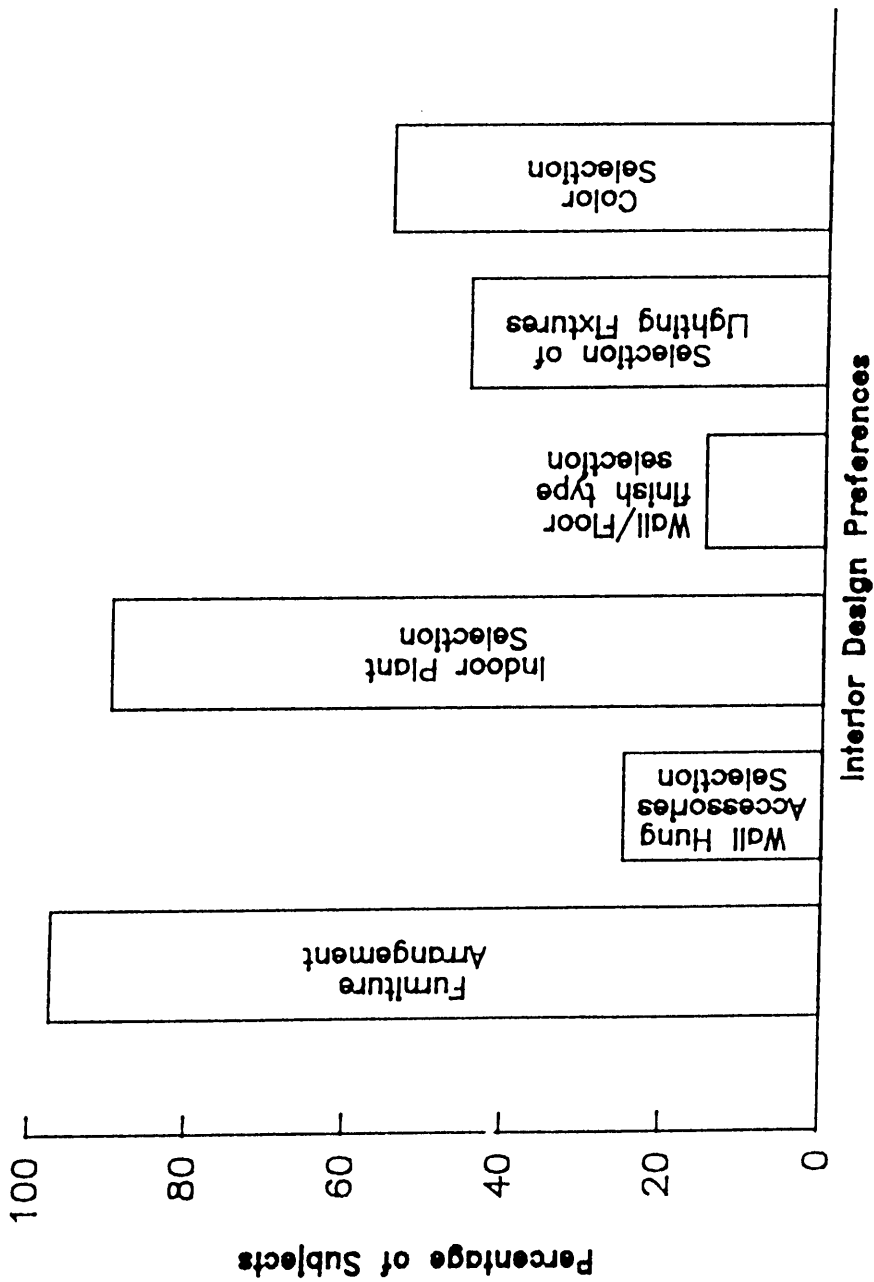
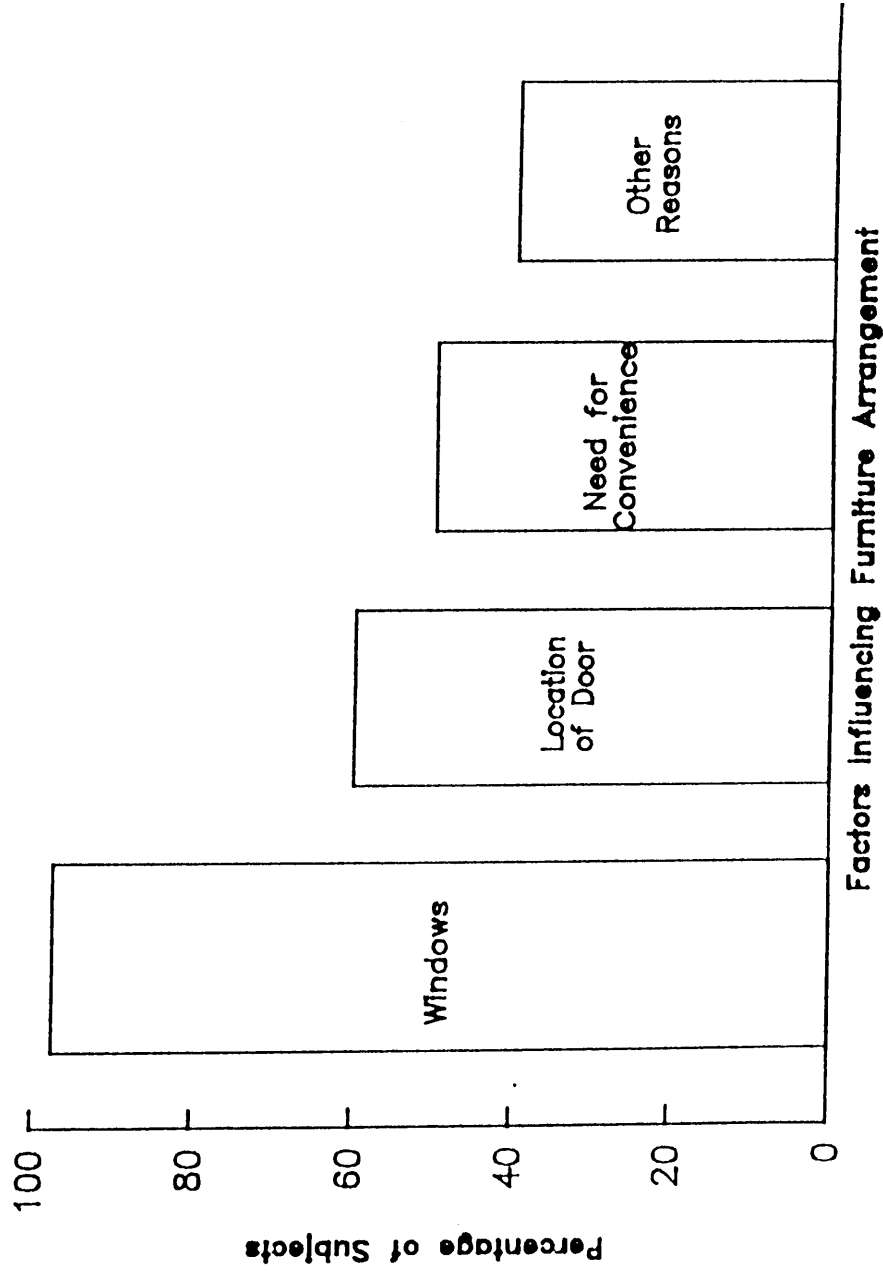Figure. 7 — Extent to which Interior Design Preferences were Influenced by the Window

Figure. 8 — Factors Most Listed as Influencing Furniture Arrangement

at least one instance. The most pronounced indication of this influence was seen in the positioning of the desk. Seventy percent (28) of the subjects always placed their desks either in a position where they could sit with their back to the window or in a position where they faced the window sideways. When asked to explain their behavior 40% of the subjects said that these positions would let them turn around and glance at the view whenever they wanted to without being distracted by it. The other 35% (14) of the subjects who always sat with their back to the window thought that the view behind them gave a certain impression of their power and status to the entering visitor. In cases where the positioning of the credenza (which in most instances was a computer work surface also) was affected by the view it's placement was such that people could look up or turn sideways and glance at the view even while working at the computer. Armchairs and conference seating were the other furniture that were usually manipulated to take advantage of the view.

Next to view, daylight was the single most important window aspect that influenced furniture arrangement. Eighty-five percent (34) of the subjects manipulated their furniture to either avoid glare from daylight, or to take advantage of the sunshine. There was a surprisingly high awareness and concern among subjects about the quality of daylight. Sixty-five percent (26) of the subjects were concerned about glare due to sunlight hitting their

computer screens and turned their credenzas or computer work surfaces away from the windows to avoid glare. Fifty percent of the subjects who had located their desks facing away from the window or facing the window sideways did so because they perceived daylight falling on their desks from behind or sideways as being more glare free and uniform. Armchairs and conference furniture were the other most common pieces of furniture arranged to take advantage of daylight.

Ventilation seemed to exert an interesting influence on the furniture arrangement of subjects who were from tropical countries. Six out of nine subjects, who mentioned that ventilation had affected their furniture arrangement in at least one instance, were subjects from tropical countries (there were seven subjects in the study who were from the tropical countries of India, Iran and Africa). There was a distinct difference in the way ventilation influenced the furniture arrangement of American subjects and subjects who were from tropical countries. The American subjects were trying to avoid a breeze from the window. (two subjects said that they had placed their desk away from the window to prevent the wind from blowing their papers away, whereas one person avoided keeping any furniture near the window because he thought that the humid air outside may cause mold to grow on the furniture) The subjects who were from tropical countries were arranging their furniture, especially their desks to

actually take advantage of the ventilation. Subsequent interrogation indicated that this behavior may be due to the fact that people born and brought up in tropical countries are more accustomed to natural ventilation and would thus try to take advantage of it whenever they can. On the other hand, people born and brought up in the United States are so used to artificial ventilation that natural ventilation may not be a crucial issue for them.

As for the influence of window configuration (shape/location) on furniture arrangement, 40% (16) of the subjects thought that the configuration of the split window because of it's low sill height restricted furniture arrangement. These subjects hesitated to place any furniture right next to the split window due to reasons of either security, privacy, or lack of wall space. The split window almost dictated their furniture arrangement by compelling them to place their desks against the wall in the area between the windows since that was the only wall space available on the window wall. The location of the rest of the furniture depended on the location of the desk.

The configuration of the clerestory window on the other hand, was thought to be the most flexible configuration for furniture arrangement because of the additional wall space it provided (only 5% or 2 of the subjects thought it restricted furniture arrangement). Thirty percent (12) of the subjects responded to the high

height of this window by moving their desks and credenzas away from the window so that they could enjoy as much daylight and view as possible from their work space. But these subjects were noticeably disappointed with the furniture arrangement they came up with because however they positioned their desk and credenzas they could not enjoy the view and daylight since there was very little of both available.

Although they restricted privacy, the configuration of both the centered and the 3-section window did not restrict furniture arrangement to a great extent since, both windows had sill heights high enough to allow the placement most average height furniture. Twenty percent (8) and 10% (4) of the subjects, felt that the centered and the 3-sectioned window respectively restricted either security or privacy and hence avoided placing their desks near or against these windows.

It was interesting to note that subjects from low activity and interaction groups were more conscious than subjects from the high activity and interaction groups of the influence of windows on furniture arrangement. Of the 53% (21) of the subjects who made changes in their furniture arrangement in response to the change of a window type, only 5% (2) were from the high activity group, as opposed to 30% (12) who were from the low activity group, and 15% (6) who were from the medium activity group.

Similarly out of the 53% (21) of the subjects who made changes in their furniture arrangement in response to the change of a window type, only 10% (4) were from the high interaction groups, as compared to 13% (5) who were from the medium interaction group, and 28% (11) who were from the low interaction group.

B. The Influence of Windows on the Number and Placement of Wall Hung Accessories Selected

Subjects were asked if windows had influenced the number or location of wall hung accessories they had selected every time a window type was shown to them (see Q2b, Q5a, Q8a, and Q11a -appendix B). Judging from the response to these questions 5% (2) of the subjects thought that windows had influenced the location of the wall hung accessories they had selected in at least one instance and 18% (7) thought that windows (or window shape to be more specific) had influenced the number of wall hung accessories they had selected in at least one instance. Follow up questioning revealed that all subjects who thought that windows had influenced the number of wall hung accessories they had selected in at least one instance, thought so because they had changed the number of their wall hung accessories in one or more instances in response to the mere change of a window type. Fifteen percent (6) of the subjects chose more wall hung accessories than they had chosen with the other windows

when the clerestory window was shown and 10% (4) chose less wall hung accessories than they had chosen with the other windows when the 3-section window was shown. The reasoning the subjects offered for the above reactions followed a consistent trend. When shown the clerestory window subjects thought that the office started looking monotonous due to the lack of view and increased the number of wall hung accessories to make their office look more interesting. On the other hand, when shown the 3-section window, subjects thought that their office looked interesting enough due to the large view and reduced the number of wall hung accessories to keep the office looking simple.

C. The Influence of Windows on the Number and Location of Plants Selected

Subjects in the study were asked to choose the number of plants they would have in their office and roughly point out their locations when each of the four window types were shown to them (see Q2b, Q5a, Q8a and Q11a - appendix B). Judging from the response to these questions windows had influenced the location of plants in 75% (32) of the subjects' offices and the number of plants chosen in 45% (18) of the subjects' offices in at least one instance. Further questioning revealed that daylight and view were the window aspects responsible for this influence.

Daylight had influenced both the number and location of plants chosen in the subjects' offices. All 75% (32) of the subjects who said that windows had influenced the location of their plants had their plants' daylight requirements in mind while locating them. When window types were changed with consequent changes in the amount and direction of daylight entering a room, 30% (12) of these subjects reacted by changing the location of plants in their office to get optimum daylight and 25% (10) reacted by changing the number of plants in their office. The reactions of the subjects in the latter case followed a consistent pattern. When shown the clerestory window which seemed to provide lesser daylight than the other windows shown, 20% (8) of the subjects decreased the number of plants in their office because of the concern that their plants may not grow well. On the other hand, when shown the 3-section window which seemed to provide more daylight than the other windows, 15% (6) of the subjects increased the number of plants in their office not only as they liked having more plants, but mainly because they were confident that their plants would fare well. In other words, the higher the amount of daylight entering the room the higher were the number of plants chosen by certain subjects in the study.

View, on the other hand, influenced only the number of plants chosen in 25% (10) of the subjects' office (in at least one instance). Here, too, a consistent pattern

was seen. When shown the clerestory window, which provided a much smaller view as compared to the other windows, 15% (6) of the subjects increased the number of plants in their office to compensate for the poor view. On the other, hand when shown the 3-section window which provided a larger view than the other windows 10%, (4) of the subjects reduced the number of plants in their office because they thought there was already enough view outside and anymore greenery would make the office look like a jungle.

D. The Influence of Windows on the Selection of Wall and Floor Finishes

During the study, every time a window type was introduced subjects were asked if windows had influenced their choice of either a wall or floor finish type (See Q2b, Q5a, Q8a, and Q11a-appendix B). Judging from subjects' responses on the whole 10% (4) of the subjects thought that the window had influenced their choice of a wall finish type in at least one instance and 5% (2) of the subjects thought that the window had influenced their choice of a floor finish type in at least one instance. Subjects' explanations in the above case of exactly how the window had affected their choice of a wall/floor finish type indicated that windows had not influenced the choice of wall/floor finish types in any consistent and hence reportworthy manner.

E. The Influence of Windows on the Number and Location of Modular Ceiling and Floor Lighting Fixtures Selected

During the study everytime a window type was introduced subjects had to choose the number of modular ceiling light fixtures they wanted for their office and roughly point out the locations of these fixtures on the modular ceiling. The responses to question nos. 2b, 5a, 8a, and 11a (see appendix B) indicated that although windows had in no way influenced the number of modular ceiling light fixtures chosen they did to a certain extent influence the locations chosen for these fixtures. Thirty-five percent (14) of the subjects thought that windows (to be more specific daylight coming through the windows) had influenced where they located their ceiling light fixtures in at least one instance. Twenty percent (8) of these subjects concentrated their lighting fixtures in the area between the windows when the split window was shown as they thought that this area received insufficient daylight from the window. Eighteen percent (7) of the subjects concentrated their light fixtures in the area away from the window when the clerestory window was shown as they felt that this area received insufficient daylight from the window.

Everytime a window type was introduced subjects in the study also had the option to choose additional floor light fixtures and if they did they had to point out the locations of these fixtures. Sixty percent (24) of the

subjects interviewed wanted additional floor light fixtures. Fifty-eight percent (23) of the subjects chose just one lighting fixture and 55% (22) of the subjects always placed the light fixture at their desk. The responses to the questions 2b, 5a, 8a, and 11a (see appendix B) indicated that windows (to be more specific daylight provided by the windows) had influenced both the decision to have a floor lighting fixture and the location of the fixture in 25% (10) of the subjects' offices in at least one instance. Fifteen percent (6) of these subjects chose to have a lamp at their desk when the clerestory window was shown because they felt that the window did not provide enough daylight in their room especially at their desk. Thirteen percent (5) of the subjects chose to have a lamp at their desk when the split window was shown because they felt that the split window did not provide enough daylight in their room especially at their desk. In both the above cases subjects did not think just the manipulation of the modular ceiling light fixtures would solve their lighting problems.

None of the demographic variables made a difference as to how subjects perceived the relation between windows and the number/location of ceiling or floor light fixtures selected except activity groups. Of the 35% (14) of the subjects who said that the location of their ceiling light fixtures were influenced by the window only 5% (2) were from the high activity group whereas 10% (4) were from the

medium activity group and 20% (8) were from the low activity group. This again suggests that subjects from the low activity group were much more conscious or concerned than subjects from the medium and especially high activity groups about the influence of windows on the location of modular ceiling light fixtures.

F. The Influence of Windows on Color Selection

During the study everytime a window type was introduced subjects were asked if the window had in any way influenced their color selection for walls, floors and upholstery (See Q2b, Q5a, Q8a, and 11a-appendix B). Although a majority of subjects felt the their color selection for the given surfaces was in no way associated with the window when the first window type was introduced, they distinctly changed their opinions when the other three windows were shown. On the whole 55% (22) of the subjects felt that their color selection for the given surfaces was influenced by the window in at least one instance. Follow up questioning revealed that a majority of these subjects (50%) had in at least one instance changed the colors they had selected earlier for one or more given surfaces, in response to the mere change of a window type.

Twenty-five percent (10) of the subjects chose colors that were lighter in value than the colors they had chosen earlier when the clerestory window was shown (18% for the

floor finish and 8% for the upholstery). A commonly heard explanation for the above reaction was that the clerestory window did not provide enough daylight (here subjects were both comparing the clerestory window to the window they had seen earlier and evaluating it as an individual window) and lighter colors than those chosen earlier would brighten up the room by reflecting daylight. Twenty percent (8) of the subjects chose colors that were comparatively darker in value than the colors they had chosen earlier when the centered window was shown (15% for the floor finish, 5% for the upholstery and 5% for the wall finish). Some of the subjects said that they used darker colors not only because they liked dark colors but also because they could afford to use darker colors now there was more daylight. These subjects felt that if they had used dark colors with the windows they had been shown earlier the rooms would look too dark since those windows did not provide as much daylight as the centered window. The rest of the subjects used darker colors than earlier because they felt that the centered window provided too much daylight and darker colors may cut down the daylight by absorbing it. Thirteen percent (5) of the subjects chose comparatively darker colors than before when the 3-section window was shown (8% for the walls 5% for the upholstery and 3% for the wall finish) because they thought that the window provided too much daylight and felt that the darker colors would reduce the intensity of

the incoming light by absorbing it.

A consistent pattern was noted regarding the color changes that subjects made in response to the change in a window type. The more the daylight a window type provided, the darker was the value of the colors chosen and vice versa. For example, when the split window was replaced by the clerestory window that provided lesser daylight subjects chose colors that were lighter in value than they had chosen earlier. On the other hand, when the clerestory window was replaced by the centered and later the 3-section window which provided much higher amounts of daylight, subjects chose colors that were darker in value than they had chosen earlier.

Age, sex, and ethnic group did not seem to make any noticeable difference as to how subjects perceived the relation between windows and color selection. However, activity and interaction levels did. Of the 55% (21) of the subjects who said that their color selection was influenced by the windows, 35% (14) were from the low activity group as compared to 15% (6) from the medium activity group and 5% (2) from the high activity group. This suggests that subjects in the low activity groups were more conscious or concerned than the subjects in medium and heavy activity groups about the influence of windows on color.

Similarly, of the 55% (21) of the subjects who said that their color selection was influenced by the window,

40% (16) were from the low interaction group, 10% (2) were from the medium interaction group and only 5% (2) from the high interaction group. This again suggests that subjects from the low interaction group were more conscious or concerned than subjects from the medium and especially the high interaction group about the influence of windows on color selection.

Summary

Windows had a profound influence on subjects' furniture arrangement and color selection. Interior design preferences influenced subjects' choice of a window type to a considerable extent, perhaps as much as view and daylight. Subjects' activity and interaction levels at work, window configurations, and window functions distinctly influenced the perception of the relationship between windows and interior design preferences. These and other findings will be discussed in detail in the last chapter of the study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, DISCUSSIONS, AND RECOMMENDATIONS

Windows are a common feature of enclosed office spaces throughout the country. The purpose of this study was to explore the relationship between windows and interior design preferences in enclosed executive office spaces.

A review of related literature suggested that the relationship between windows and interior design preferences is mutual, whether at home or at the office. Windows seem to influence preferences for the design of the interior and the way it is perceived. But more interestingly, preferences for the design of the interior itself seem to affect windows, their functioning, and the way they too are perceived. But these deductions could be made from only fragmentary references in studies dealing with various aspects of windows. There was no single study exclusively devoted to this interesting and obviously important relationship between windows and interior design preferences. The review of literature however suggested activity and interaction levels at work, window functions, and window configurations as variables affecting the perception of the relationship between windows and interior design preferences in office spaces.

Forty executives from the NASA base in Hampton

composed the research sample. The subjects were asked to plan the interior design of an executive office (simulated in the study through a scale model) in response to four different window types and then asked to choose one of the four window types for the space. Subjects' behavior was observed and questioned throughout the experiment to study the relationship between windows and interior design preferences. Window configurations, window functions, subject's age, sex, country of origin, activity, and interaction level at work were explored as variables influencing the dependent variable- the perception of the relationship between windows and interior design preferences. The data were analyzed with the help of descriptive statistics and in-depth theoretical analysis of individual responses.

Conclusions and Discussions

The conclusions of the study are discussed under three headings - the influence of windows on interior design preferences, the influence of interior design preferences on the choice of a window type, and the interrelationship between windows and interior design preferences.

Influence of Windows on Interior Design Preferences

Windows influenced all six interior design preferences investigated in the study but to different

extents. Furniture arrangement and color selection were the interior design preferences most influenced by the window, whereas wall and floor finish type selection was the interior design preference least influenced. The influence of windows on each of the interior design preferences investigated in the study is discussed briefly in the following sections.

a. Influence of Windows on Furniture Arrangement

Windows had a profound influence on furniture arrangement of the subjects. Ninety-eight percent of the subjects interviewed said that their furniture arrangement was influenced by the window in at least one instance. Fifty three percent of the subjects changed their furniture arrangement in one or more instance in response to the mere change of a window type.

View, daylight, window configuration, and to some extent ventilation were the most common window aspects that influenced furniture arrangement in the subjects' offices.

A majority of the subjects interviewed (90%) considered taking advantage of the view while arranging major pieces of furniture in their office spaces. This supports findings of earlier studies (Jackson and Holmes,1973; Wells,1965; Cooper and Crisp,1983.) which indicate that view is one of the most desired physical aspects of a building to occupants of office spaces.

Desks, credenzas, armchairs, and even conference chairs in that order were the pieces of furniture most commonly manipulated to take advantage of the view. An interesting finding in this regard was that a majority of subjects (70%) placed their desks in a position where they could sit with their back to the view or in a position where they faced the view sideways, even though they liked the view. This is in contradiction with the findings of Wotton and Borkow's (1983) study in that clerical and other workers in the office spaces they studied never wanted to sit with their back to the view. Two types of explanations were offered by the subjects for the above behavior. One group of subjects said that these positions would let them turn around and glance at the view without being distracted by it. The other group of subjects thought that having the view behind them would give a certain impression of their status to the entering visitor. The latter outlook might have sprung from the common notion that window spaces, especially ones with a view are a rare commodity in today's office buildings and hence can be associated with luxury and thus even status, and supports Collins' (1975) remark that windows frequently furnish an indication of status and wealth. It also agrees with Langdon's speculations that executives may value windows more for their status value than the view (Langdon, 1983).

Next to view, daylight was the single most important

window aspect that influenced furniture arrangement. Eighty-five percent of the subjects had manipulated their furniture in at least one instance to either take advantage of sunshine and daylight or to avoid glare from daylight. Desks, credenzas, armchairs, and conference furniture in that order were the common pieces of furniture influenced by daylight. There was a surprisingly high awareness and concern among the subjects about the quality of daylight. Sixty-five percent of the subjects were concerned about the glare due to sunlight hitting their computer screens and therefore turned their credenzas or computer work surfaces away from the window to avoid glare. A majority of the subjects (50% of the study sample) who had located their desks facing away from the window or facing the window sideways did so because, they perceived daylight falling on their desks from behind or sideways as being more glare free and uniform. (This explanation happens to be scientifically justifiable since incident rays of daylight falling in front of a subject from behind or from aside reflect away from the subject's eyes thus eliminating glare from his/her work surface).

Ventilation provided by the windows had a rather curious effect on the furniture arrangement of subjects who were from tropical countries. This aspect has been discussed in a later section of the chapter.

Window configuration (shape/location of the window on the window wall) influenced furniture arrangement in

different ways. First of all it influenced window functions, especially view and daylight which in turn influenced furniture arrangement. For example, a substantial number of subjects thought that both the view and daylight provided by the clerestory window was insufficient because of it's configuration, especially it's high sill height. These subjects responded to the high sill height of the window by moving their desks away from the window so that they could enjoy as much view and daylight as possible.

Window configuration also influenced the degree of privacy, security, and wall space available in the office space which again in turn influenced furniture arrangement. Privacy decreased as sill height of a window decreased, consequently restricting furniture arrangement to a substantial proportion of the subjects. These subjects thought that the centered window, the 3-sectioned window, and especially the split window restricted privacy because of their low sill height and hesitated to place their desks and computer work surfaces facing or close to the window.

Security decreased as sill height decreased, consequently restricting furniture arrangement by a small proportion of subjects who had sensitive equipment and information in their offices. These subjects thought that the centered, the 3-sectioned, and especially the split window threatened security because of their low sill

height and hesitated to place their desks and credenzas near the windows.

Window configurations also dictated the amount of wall space available and in doing so, indirectly influenced flexibility in furniture arrangement. For example, many subjects thought that the clerestory window (due to it's configuration) provided more wall space than the other windows they were exposed to. These subjects responded to the extra wall space provided by the clerestory window by trying different and more unusual furniture arrangements which they could not have tried with the other windows. Some subjects even added more or bigger pieces of furniture.

b. The Influence of windows on other
interior design preferences

No relationship was detected between windows and subject's choice of a wall or floor finish type.

View and daylight provided by windows influenced the number and location selected for plants in a large proportion of the subjects' offices. The amount and direction of daylight provided by a window influenced both the number and location selected for plants. Seventy-five percent of the subjects had their plants' daylight requirements in mind when they located them. When different types of windows were introduced with consequent changes in the amount and direction of daylight provided

by the window, some of these subjects reacted by changing the location of their plants to get optimum daylight. Others reacted by changing the number of plants in their office depending on the amount of daylight a window provided.

View influenced only the number of plants selected in the subjects' offices to a limited extent. Of particular interest was that some subjects increased the number of plants in their office when the clerestory window was shown to compensate for the lack of the view. This observation supports the findings of Collins' (1975) study that some people try to make up for the lack of view through objects of decor (in this case indoor plants).

The findings of the study indicate that windows to a limited extent did influence the number of wall hung accessories selected in subjects' offices. Of particular interest was that some subjects chose more wall hung accessories with the clerestory window than with the other windows to compensate for the monotony caused by the lack of view. This again supports findings of Collins' study that people try to make up for the lack of view through elements of decor.

A substantial percentage of subjects (35%) had taken the amount and direction of the daylight provided by the window into consideration while planning the layout of modular ceiling light fixtures. This reaction was basically found to be due to their desire for an even

distribution of light in the office space, whether natural or artificial. Most of these subjects were trying to avoid too dark or too bright spots in their office, especially in front of their window due to it's location.

Windows influenced the color selection of a substantial proportion (53%) of subjects who were aware that some color values reflect daylight more than other color values, and were trying to make use of this property of color to achieve optimum daylight in their office space. This observation suggests that there may be an optimum range of color values for every level of daylight. For example, using very dark values in a room with a window providing relatively less daylight may be depressing or even intolerable since dark values of color absorb and further reduce the amount of daylight provided by the window. On the other hand, using a relatively light value may brighten up the room and make it more tolerable since light values of color would reflect and visually enhance the amount of daylight provided by the window.

The influence of interior design preferences on the choice of a window type

Interior design preferences influenced subjects' choice of a window type to a considerable extent, perhaps as much as view and daylight but certainly more than ventilation. Ninty-eight percent of the subjects said

that interior design preferences had influenced their choice of a window type. When subjects were asked to rank the factors that had influenced their choice of a window type in the order they had influenced their choice 43% of the subjects ranked interior design preferences number one and 28% ranked them number two. The median rank of interior design preferences was two as were those of view and daylight. The median rank of ventilation was four.

The Interrelationship between Windows and Interior Design Preferences

Detailed investigation of the reasoning behind subjects' responses and observation of subjects' behavior throughout the study provides clear cut evidence that windows and interior design preferences do influence each other mutually. An attempt has been made in figure 9 to portray the essence of this relationship, as discovered through the study.

Windows seem to influence user preferences for various aspects of interior design through their characteristics such as their functions, their configuration and so forth. When there comes a situation where the user has to choose a window type these interior design preferences that are influenced by the window may in turn influence his/her choice of a window type. For example, a particular window may restrict furniture arrangement (here the window is influencing interior
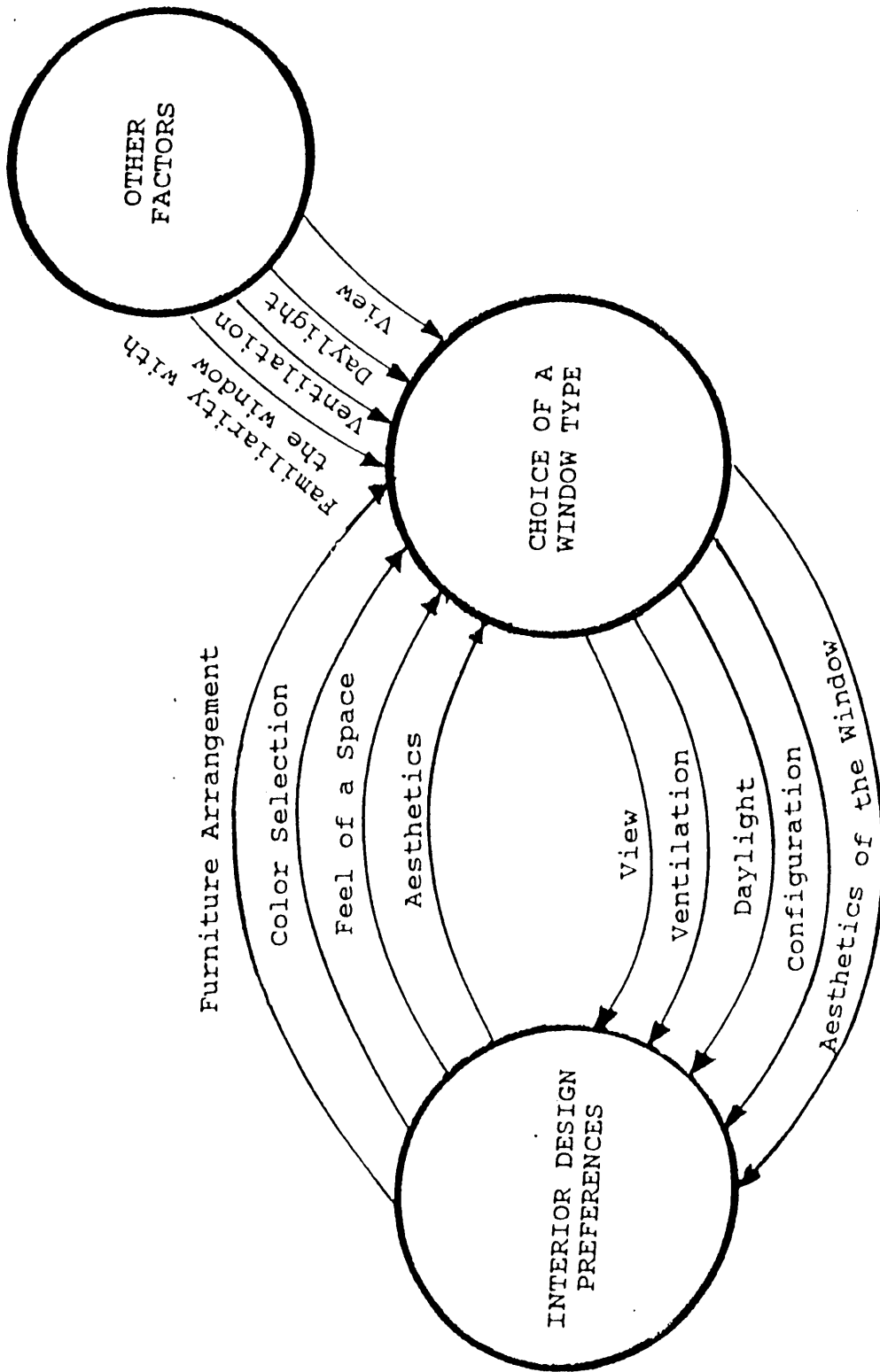
Figure. 9 — The Interrelationship Between Windows and
Interior Design Preferences

design preferences). The fact that this window restricts furniture arrangement may withhold a person from choosing this window type for his/her office space. Here interior design preferences are influencing the choice of a window type. This chain of reactions places windows and interior design preferences in a cyclic relationship, where each factor influences the other and should, therefore, be considered with equal importance.

As for the variables investigated in the study, it was amply evident that both window functions and window configurations influenced subjects' interior design preferences and therefore subjects' perception of the relationship between windows and interior design preferences. This aspect has been discussed in detail in earlier parts of the chapter.

Age and sex had no influence on the perception of the relationship between windows and interior design preferences. However, this may be attributed to the smallness of the sample size. Larger samples of subjects should be studied before concluding that there is no relationship between these variables.

Country of origin seemed to have an interesting effect on subjects' perception of relationship between ventilation and furniture arrangement. Subjects from tropical countries (who comprised 18% of the study sample) were distinctly more eager to take advantage of ventilation while arranging furniture than their American

counterparts.   Subsequent interrogation suggested that this behavior may be due to the fact that people born and brought up in tropical countries are more used to natural ventilation and would try to make use of it whenever they can.   On the other hand, people born and brought up in the United States are so used to artificial ventilation that natural ventilation may not be a crucial issue to them.

The study provides evidence that activity and interaction levels do influence the perception of the relationship between windows and interior design preferences.   Subjects from lower activity and interaction levels were distinctly more conscious of the influence of windows on furniture arrangement, color selection, and even indoor plant selection than subjects from higher activity and interaction groups.   These findings are compatible with Collins' (1975) and Ne'eman's (1974) observations and can be explained as follows: Subjects from lower activity and interaction groups have more time by themselves and their environments are less stimulating. Windows provide a psychological relief or stimuli to subjects in such nonstimulating environments who hence tend to be more conscious and concerned about them. Subjects from high activity and interaction groups on the other hand are so preoccupied with their work that they have little time by themselves and thus tend to be less conscious and concerned about windows or their work environment. It was interesting to note that the interiors

of subjects from higher activity and interaction groups were usually dictated purely by function and rarely by environment.

Implications of the Study

This study is limited in its implications for the general population by virtue of the fact that it is exploratory in nature. However, the study provides sufficient evidence to suggest that the relationship between windows and interior design preferences is of great importance to both architects and interior designers, in integrating interiors with exteriors. The study thus provides evidence of the need for more research so that guidelines can be established for architects and interior designers to better use the relationship between windows and interior design preferences in their work.

Recommendations for Further Research

1. The study provides ample evidence of the relationship between windows and interior design preferences in office spaces. More studies of the same nature should be conducted both in homes and offices with larger samples of subjects, to determine trends, patterns, and the exact nature of this relationship.

2. Findings of the study suggest that windows influence color selection and furniture arrangement much

more than any other interior design preferences in office spaces. More studies should be conducted with special attention given to the relationship between these factors and the window.

3. Additional studies should be conducted with larger samples to isolate, identify, and better understand the variables influencing the relationship between windows and interior design preferences. Both the present study and past research have indicated window configurations and functions, and activity and interaction levels of workers as variables influencing the perception of the relationship between windows and interior design preferences. Particular attention should be given to these variables.

4. Established guidelines regarding the relationship between windows and interior design preferences are needed for architects and interior designers so that they can better integrate interiors with exteriors. Architects will benefit from guidelines regarding interior design preferences to consider while designing windows. Likewise, interior designers will benefit from guidelines regarding window aspects that influence interior design preferences to consider while designing interiors.

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APPENDIX A
A WRITTEN REPORT OF THE INTERVIEW

The following is a written report of the interview conducted by the researcher. The actual interview instrument can be found as appendix B.

SECTION 1

"The study in which you are about to participate requires you to put yourself into a hypothetical situation. The hypothetical situation has been developed with respect to your occupation as an executive officer."

"Before we begin the study it is important that you understand the meaning of the word "INTERIOR DESIGN" as it is used in the study. The word "INTERIOR DESIGN" in the context of this study means to arrange furniture, to choose colors, wall finishes, and floor finishes, and to select and arrange accessories such as wall hangings and planters in the given area."

"Any reference to the window in the study also implies the factors we experience through the window such as view, daylight, and ventilation. For example a question such as "How does this window influence you?" really means "How does this window and the daylight, view, ventilation etc. you experience through this window influence you?"

" Imagine that this is a private executive office. (At this point the researcher has the subject walk a scaled figure through the scale model of the office.) The office is located on the perimeter of a large office building and is 9' high, 14' wide and 16' deep."

" You have just been allocated this office by your management. The management has provided you with a set of furniture typical of a executive office and asked you to plan the interior design of your own office." (The researcher acquaints the subject with the scaled furniture.)

(The researcher now fixes the split window template on the window wall and as she does so, she asks the subject-)

1a. What is your impression of this window wall?
a. I like it
b. I do not like it
c. It looks alright
d. It looks better than the last window I saw
e. other

1b. Depending on the subject's answer the researcher asks him/her **"Why do you say so?"**
a. it makes the room appear smaller
b. it makes the room appear bigger

c. it makes the room look airy
d. it has a odd shape
e. it provides a good/bad view
f. it does/does not provide good sunlight
g. it does not look well integrated with the rest of the wall
h. other

(The researcher then instructs the subject as follows-) **"Plan the interior design of your office space. Use the furniture provided to plan your furniture arrangement and think about the colors, wall and floor finish types you would use in this space. Think about the number and location of plants and wall hung acessories you would have in this space. Given the 2*4 ceiling grid think about how you would lay out modular light fixtures on this ceiling and also think of the number and location of the floor lighting fixtures you would have in this space."** (As the researcher waits for the subject to complete his/her work she quickly sketches the pattern of the subject's furniture arrangement on a small floor plan and then questions him/her as follows-)

2a. Were you conscious of the window while you were planning the interior design for your office?
a. yes
b. No

2b. If the subject's answer to the above question is "yes" the researcher asks him/her **"which of the following aspects of your interior design did the window influence?"** (The researcher gives the subject an index card with the below listed factors)
a. selection of wall/floor finishes
b. selection of colors
c. furniture arrangement
d. accessory selection/placement
e. other

3a. What factors influenced your furniture arrangement?
a. door
b. window
c. need to save more area for circulation space
d. convenience
e. other

3b. If the subject says that the window influenced his/her furniture arrangement the researcher asks him/her **"how exactly did the window influence your furniture arrangement?"**
a. I placed furniture to take advantage of the view
b. I placed furniture to take advantage of daylight
c. I placed furniture to take advantage of the fresh breeze from the window

d. the window influenced the location of my workplace
e. the window influenced the location of my planters
f. other

4a. Did the window in any way restrain your furniture arrangement?
a. yes
b. no

4b. (If the subject's answer to the above question is "yes" the researcher asks him/her-) **What do you think these constraints were?**
a. The window restricted privacy and hence furniture placement
b. The window restricted wall space and hence flexibility in furniture arrangement
c. other

(The researcher then fixes the clerestory window template on the window wall and repeats questions 1a. and 1b. He then asks the subject -
"Which of the following aspects of the interior design you planned with the other window would you change now?" (The researcher gives the subject an index card with the below listed factors on it)
a. colors
b. floor/wall finishes
c. furniture arrangement
d. selection/placement of accessories
e. other

Depending on the subject's response the researcher asks him/her **"why do you say so?"**
a. this window is too open. I do not want to place my desk too close to it. So I may change my furniture arrangement slightly.
b. this window is too high. It may not provide enough light to my plants. So I may eliminate some of the plants I planned to have with the other window.
c. other

The researcher then removes the furniture in the scale model and asks the subject **"Plan the furniture arrangement again for this space."** He then repeats question nos 3a, 3b, 4a, and 4b. The same procedure is repeated for the centered window and the 3-section window templates. The researcher then questions the subject as follows-)

5. Which window did you think offered the most flexible furniture arrangement? (The researcher shows the subject templates of all four windows)

a. The split window
b. The clerestory window
c. The 3 - section window
d. The centered window

6. Which of the four windows would you choose for your office? (The researcher again shows the four window templates to the subject)
a. The split window
b. The clerestory window
c. The 3 - section window
d. The centered window

7. (This question requires the subject to answer in writing). **Which of these factors influenced your choice of a window? Place a check mark against the factors that influenced you. Rank the factors numerically in the order they influenced your choice. For example 1.view 2.daylight ...... etc. Place the numerical ranks in the blank provided against each factor.** (The researcher gives the subject an index card with the below listed factors)

_____ **a. Daylight** - "sunshine and light provided by the window that are used for work and activities".

_____ **b. View** - "Scene beyond the window which can be informative and aesthetic i.e. ugly or beautiful."

_____ **c. Ventilation** - "air circulation caused by opening windows."

_____ **d. Aesthetic/Interior design** - "Effects of the window on the Interior design of the office."

SECTION 2

As a part of the study you are requested to provide the following information.

1. Age _____

2. Sex _____

3. Country of origin _____

4. If activity level can be described as the amount of bodily (physical) work done in the office on a typical working day, which of the following activity levels do you feel best describes your present occupation?
a. Light
b. Medium
c. Heavy

5. If interaction level can be described as the number of fellow workers and visitors you meet in your office on a typical working day, which of the following interaction levels do you feel best describes your present occupation?
a. Light (interaction with 5 or fewer persons/day)
b. Medium (interaction with 6-10 persons/day)
c. Heavy (interaction with more than 10 persons/day)

APPENDIX B
THE INTERVIEW INSTRUMENT

SECTION 1

THE SPLIT WINDOW

1a. What is your impression of this window wall?
a. I like it
b. I do not like it
c. It looks allright
d. It looks better than the last window I saw
e. other

1b. Why do you say so?
a. it makes the room appear smaller
b. it makes the room appear bigger
c. it makes the room look airy
d. it has a odd shape
e. it provides a good/bad view
f. it does/does not provide good sunlight
g. it does not look well integrated with the rest of the wall
h. other

2a. Were you conscious of the window while you were planning the interior design for your office?
a. yes
b. No

2b. Which of the following aspects of your interior design did the window influence?
a. selection of wall/floor finishes
b. selection of colors
c. furniture arrangement
d. accessory selection/placement
e. other

3a. What factors influenced your furniture arrangement?
a. door
b. window
c. need to save more area for circulation space
d. convenience
e. other

3b. How exactly did the window influence your furniture arrangement?
a. I placed furniture to take advantage of the view
b. I placed furniture to take advantage of daylight
c. I placed furniture to take advantage of the fresh breeze from the window
d. the window influenced the location of my workplace
e. the window influenced the location of my planters
f. other

4a. Did the window in any way restrain your furniture arrangement?
a. yes
b. no

4b. What do you think these constraints were?
a. The window restricted privacy and hence furniture placement
b. The window restricted wall space and hence flexibility in furniture arrangement
c. other

THE CLERESTORY WINDOW

5a. Which of the following aspects of the interior design you planned with the other window would you change Now?
a. colors
b. floor/wall finishes
c. furniture arrangement
d. selection/placement of accessories
e. other

5b. Why do you say so?
a. this window is too open. I do not want to place my desk too close to it. So I may change my furniture arrangement slightly.
b. this window is too high. It may not provide enough light to my plants. So I may eliminate some of the plants I planned to have with the other window.
c. other

6a. What factors influenced your furniture arrangement?
a. door
b. window
c. need to save more area for circulation space
d. convenience
e. other

6b. How exactly did the window influence your furniture arrangement?
a. I placed furniture to take advantage of the view
b. I placed furniture to take advantage of daylight
c. I placed furniture to take advantage of the fresh breeze from the window
d. the window influenced the location of my workplace
e. the window influenced the location of my planters
f. other

7a. Did the window in any way restrain your furniture arrangement?
a. yes
b. no

7b. What do you think these constraints were?
a. The window restricted privacy and hence furniture placement
b. The window restricted wall space and hence flexibility in furniture arrangement
c. other

THE CENTERED WINDOW

8a. Which of the following aspects of the interior design you planned with the other window would you change Now?
a. colors
b. floor/wall finishes
c. furniture arrangement
d. selection/placement of accessories
e. other

8b. Why do you say so?
a. this window is too open. I do not want to place my desk too close to it. So I may change my furniture arrangement slightly.
b. this window is too high. It may not provide enough light to my plants. So I may eliminate some of the plants I planned to have with the other window.
c. other

9a. What factors influenced your furniture arrangement?
a. door
b. window
c. need to save more area for circulation space
d. convenience
e. other

9b. How exactly did the window influence your furniture arrangement?
a. I placed furniture to take advantage of the view
b. I placed furniture to take advantage of daylight
c. I placed furniture to take advantage of the fresh breeze from the window
d. the window influenced the location of my workplace
e. the window influenced the location of my planters
f. other

10a. Did the window in any way restrain your furniture arrangement?
a. yes
b. no

10b. What do you think these constraints were?
a. The window restricted privacy and hence furniture placement
b. The window restricted wall space and hence flexibility in furniture arrangement
c. other

THE 3-SECTION WINDOW

11a. Which of the following aspects of the interior design you planned with the other window would you change Now?
a. colors
b. floor/wall finishes
c. furniture arrangement
d. selection/placement of accessories
e. other

11b. Why do you say so?
a. this window is too open. I do not want to place my desk too close to it. So I may change my furniture arrangement slightly.
b. this window is too high. It may not provide enough light to my plants. So I may eliminate some of the plants I planned to have with the other window.
c. other

12a. What factors influenced your furniture arrangement?
a. door
b. window
c. need to save more area for circulation space
d. convenience
e. other

12b. How exactly did the window influence your furniture arrangement?
a. I placed furniture to take advantage of the view
b. I placed furniture to take advantage of daylight
c. I placed furniture to take advantage of the fresh breeze from the window
d. the window influenced the location of my workplace
e. the window influenced the location of my planters
f. other

13a. Did the window in any way restrain your furniture arrangement?
a. yes
b. no

13b. What do you think these constraints were?
a. The window restricted privacy and hence furniture placement
b. The window restricted wall space and hence flexibility in furniture arrangement
c. other

14. Which window did you think offered the most flexible furniture arrangement?
a. The split window
b. The clerestory window
c. The 3 - section window
d. The centered window

15. Which of the four windows would you choose for your office?
a. The split window
b. The clerestory window
c. The 3 - section window
d. The centered window

16. Which of these factors influenced your choice of a window? Place a check mark against the factors that influenced you. Rank the factors numerically in the order they influenced your choice. For example 1.view 2.daylight ...... etc. Place the numerical ranks in the blanks provided against each factor. (The researcher gives the subject an index card with the below listed factors)

_____ a. **Daylight** - "sunshine and light provided by the window that are used for work and activities".
_____ b. **View** - "Scene beyond the window which can be informative and aesthetic i.e. ugly or beautiful."
_____ c. **Ventilation** - "air circulation caused by opening windows."
_____ d. **Aesthetic/Interior Design** - "Effects of the window on the Interior design of the office."

SECTION 2

As a part of the study you are requested to provide the following information.

1. Age _____

2. Sex _____

3. Country of origin _____

4. If activity level can be described as the amount of bodily (physical) work done in the office on a typical working day, which of the following activity levels do you feel best describes your present occupation?
a. Light
b. Medium
c. Heavy

5. If interaction level can be described as the number of fellow workers and visitors you meet in your office on a typical working day, which of the following interaction levels do you feel best describes your present occupation?
a. Light (interaction with 5 or fewer persons/day)
b. Medium (interaction with 6-10 persons/day)
c. Heavy (interaction with more than 10 persons/day)