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BARRIERS AS A RESPONSE TO THREAT IN OFFICES

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## INTRODUCTION

A contemporary trend has been the study of how people use space and how the physical environment affects behavior.

Reactions to Behavioral Stimuli in the Environment

Personal distance. Hall (1966) defined three kinds of space which shape the environment: 1) fixed-feature space; 2) semi-fixed feature space; and 3) informal space. These refer to, respectively, the territory, the physical settings, and the personal space linked to each individual which he termed a "bubble". By categorizing personal space into intimate (0" to 18"), personal (18" to 48"), social (48" to 144"), and public (144" to the limits of visibility or hearing), Hall observed that human interactions fell into different spatial zones. He also noted the presence of implicit norms within any culture or subculture regarding the permissible ranges of distance between two speakers. When these are exceeded, negative responses and attitudes would be created. He proposed that both degree of intimacy and particular function of relationships determine the comfortable interpersonal distance between the interacting persons.

Sommer (1969), besides observing that seating distances in natural settings fell into the four spatial zones, also found seating arrangements to be affected by factors such as leadership, dominance, task at hand, sex, and acquaintance. Subjects chose side-by-side, corner-to-corner, or opposite each other seating pattern in different situations. Sommer

pointed out that personal space zones are fluctuating circles which vary under different social conditions.

By asking subjects to converse with people whom they had previously classified as acquaintances, friends, or close friends, Willis (1966) found that both relationship and sex of interacting persons were responsible for distance variations. Close friends were observed to interact with subjects at the closest distances while acquaintances at the farthest. Two way interaction showed that women stand close to close friends but quite far from those they described as acquaintances only. Willis also found that peers approach one another more closely than they approach those who are older.

Byrne, Baskett, and Hodges (1971) asked subjects to participate in an attitude survey discussion and observed the personal distance and seating orientation between subject and confederate to vary according to sex and relationship. Females were more attracted to and sat more closely beside a similar rather than a dissimilar stranger; males were more attracted to and sat directly across from a similar rather than a dissimilar stranger.

The relationship of personal distance and cultural background was reviewed by Little (1968) who had subjects from several countries position dolls relative to one another for a variety of social situations. The result showed that individuals from North America and Northern Europe used a larger personal distance than those from the Mediterranean area.



Territoriality. The concept of territoriality was first studied with animals. Carpenter (1958) revealed the different functions of territoriality in animals. Some of these include insuring adequate space for individuals, regulating population, reinforcing dominance structures, providing for security and defense, and reducing the rate of spread of disease.

There are similarities in the use of territory by humans and other animals. For example, territories provide both with a reliable piece of space in which to exercise everyday functions. In addition, man and many other animals exhibit certain behaviors only or mainly on home territory. There are also close relations between humans and other animals on territory size and social status; higher status is usually associated with larger personal territory (Sommer, 1969).

There are also important differences. Foremost, territoriality in animals is instinctive due to its stereopathy, whereas little if any instinctive behavior is observable in man. Further, territoriality in animals is a male behavior, while both sexes in humans exhibit such responses. Active defense is conventionally used by animals as a definitional criterion of territoriality. In humans, this active defense is inappropriate because most humans are simply not engaged in fighting intruders from the boundaries of their houses, offices, or other territories. Territoriality in humans is largely a passive affair, based on individual's mutual avoidance of one another's place. Humans learn through socialization that specific environmental contexts often accompany

certain roles, such as "Faculty Use Only" washrooms or "No Trespassing" signs in front of some big industrial buildings. Sommer (1966) saw the most logical extension of the territoriality concept to humans as emphasizing physical possession and defense.

While territoriality has been discussed to be important regulator of social interactions, Allen and Gerstberger (1973) have noted some interesting findings on the impact of a non-territorial office layout on its occupants. A group of product engineers who previously used small private offices was assigned to a new office layout in which there were no walls separating the various working stations. Employees worked at large round tables which were distributed through the office area. They could locate themselves anywhere they wished. The facilities in the new office were common among all employees and no personal objects were allowed to declare ownership of a particular space. Allen and Gerstberger found that no unpleasant feelings were found among the users of the new office during the year long investigation, and communication within the department increased significantly even though no performance increments were observed. These findings contradict in some aspects with territoriality. Personal association with the area is almost impossible and behavioral freedom is also restricted. Allen and Gerstberger were quick to point out that there are limited applications of this non-territorial concept, such as when mobility is frequent during working.

Threat. The investigators of human proxemics, the study of spatial influences on behavior, have demonstrated that many negative emotional and interpersonal reactions occur when people are placed too close to each other.

Argyle and Dean (1965) postulated the affiliative-conflict theory which states that during human interactions, approach and avoidance forces produce an equilibrium level of physical proximity, eye-contact, and other aspects of intimacy. If one of these is disturbed, compensatory changes may occur along the other dimensions. Argyle and Dean found that the closer subjects were being placed relative to each other, the more the gazing away by subjects.

Using natural settings in a mental hospital and a university campus, Felipe and Sommer (1966) found that the closer an intrusion, the greater the flight by victims. Those intruded upon also exhibited other nonverbal behaviors designed to ward off the intruder, such as turning away or pulling in elbows.

Middlemist, Knowles, and Matter (1975) used a men's lavatory to provide a setting where norms for privacy were salient, where personal space invasions could occur in the case of men urinating, and where the opportunity for compensatory responses to invasion were minimal. In a three-urinal lavatory, three levels of interpersonal distance were achieved by having the confederate stand immediately adjacent to a subject, or having the confederate stand at a separation of one urinal, or the confederate was absent. It was found that close interpersonal distances increased the delay of onset and decreased the per-

sistence of urination. These findings provide objective evidence that personal space invasions produce physiological changes associated with arousal.

Evans and Howard (1973) proposed a stress model as the mechanism responsible for negative effects in personal space invasions. There are indications that stress due to high density, insufficient privacy, and personal space invasion can lead to a break-down in task performance as well as other stressful behavior such as total withdrawal from social life.

Brehm (1966) has defined threat as being created whenever an individual's behavioral freedom is restricted or eliminated. An individual is said to be threatened if he is subjected to an uncontrollable outcome and finds himself unable to engage in a behavior that he originally felt free to pursue, or if he finds himself faced with an undesirable option that he ordinarily would choose to avoid.

Dosey and Meisels (1969) have theorized that greater interpersonal distances would be obtained under conditions of threat, whether the threat was from environmental or intrapsychic sources. They manipulated stress to self-esteem and found that college students whose physical attractiveness was called into question used larger spatial distances than peers in a nonthreatened control group.

Altman (1976) stated that privacy serves to maximize freedom of choice and behavioral options, thereby permitting control by people over their social activities. Individuals set boundaries between themselves and others to achieve a balance be-

tween openness and withholding information about the self. When intrusion of privacy occurs, the equilibrium is shifted and results in overarousal. Altman classified places like home and office as very private territories in which intrusions are stressful.

Too close a proximity to others results in excessive social or physical stimuli. Personal space serves as a protective layer and a buffer against potential emotional and physical threats as a result of too much stimulation, overarousal leading to stress, insufficient privacy, or too much intimacy. An office is one of the common territories in which human interaction takes place in a variety of forms. Its physical settings are usually very much the same (desk, chairs, artifacts, etc.) but flexible. These provide a very fruitful source for observing human spatial behavior. However, there has not been much research done in this area.

#### Behavioral Stimuli in an Office

Roles. Altman (1976) stated that intrusion of a private territory interrupts the privacy of the occupant and results in excess stimulation to both the occupant and the visitor. The interaction reduced behavioral freedom of both parties and is perceived as a threat. According to Dosey and Meisels (1969), the intrusion would result in the occupant and the visitor both acquiring a larger personal distance.

Evans and Eichelman (1976) also considered the intrusion to personal territory as a threat to security. However, the occupant's continued association with the place provided him

with a better control of the outcome than the visitor which in turn would compensate for some of the arousal from overstimulation. This should reduce the personal distance associated with an occupant.

Edney (1975) theorized that on his own territory, an individual has higher control and that the higher controller usually needs less personal distance. An occupant on home ground has the rights to claim privacy and resist unnecessary intrusions. In other words, he controls the amount of interaction in the setting. The territorial control provides the occupant with the priorities of access to the place, initiation and choice of behavior, and the ability to resist control by others. The anticipation of future events also leads to a greater control by the occupant, and consequently a more relaxed and secure feeling than the visitor. This implies a smaller personal distance for the occupant.

Although intrusion to an office creates threat to both the occupant and the visitor, the occupant's better control and more options for behavioral freedom would lower his stress level and the expectation is that the occupant would have a smaller personal distance than the visitor.

Status. Burns (1964) observed that subjects in an office setting consistently identified a man's status according to spatial relationships. An intruder was consistently rated a subordinate if he stopped just inside the door and conversed from that distance with the man at the desk.

Little (1968) asked subjects to position dolls according to various situations and found differences of distance in the placement of dolls was due to status differences in the various physical settings.

Using findings which relate the posture and position of a communicator to his addressee, Mehrabian (1969) showed that the distances between two communicators are positively correlated with their status discrepancy.

Lott and Sommer (1967) used a paper-and-pencil technique to find the relationship between seating arrangement and status. Subjects were asked to indicate, on a given paper with a 1-3-1-3 seats per side rectangular table printed on it, where they preferred to sit. The results showed that subjects sat farther from higher status or lower status individuals than they did from peers.

Research on individual pairs in military settings by Dean, Willis, and Hewitt (1975) supported the proposition that interaction directed toward superiors is characterized by greater distance than those directed toward peers and further that the distance is greater when the difference in rank is greater. However, this relationship does not hold when interaction is directed toward individuals lower in rank. These results indicate that differences in status lead to differences in distance, and the greater the status difference, the larger the distance in between, but it is the subordinate who is responsible for this distance.

It is no coincidence that important individual meetings between two persons usually take place on the territory of the higher status person. Thus, a visitor to an office would either be at a lower status or same status as the occupant. It is expected that when there is a status difference between communicators during interaction, a larger personal distance would be used and that this choice of larger personal distance is due to the lower status person.

Topics. Leipold (1963) used a design in which subjects were interviewed by an experimenter who they expected would evaluate them positively or negatively, based on information provided to the subjects by a confederate prior to the interview. It was found that subjects who expected a negative evaluation selected chairs which were farther away from the experimenter during the interview than did subjects who expected a positive evaluation.

Rosenfeld (1965) instructed his subjects to role play an approval-seeking attitude in contrast to an approval-avoiding attitude toward another subject who was actually a confederate in the experiment. He found that under the approval-seeking instructions, subjects sat closer to the confederate than they did under the approval-avoiding instructions.

Little (1968) observed that pleasant topics produced the closest placement of dolls than neutral and unpleasant topics.

Mehrabian (1969), in an attempt to understand the non-verbal behavior of a communicator during interaction, observed that distance is shortened as willingness to communicate increases.



Sommer (1969) attributed this kind of behavior to the anticipation of whether the interaction is a pleasant one or an unpleasant one as a major factor in explaining the distance variation. This enlargement of personal distance was also confirmed by Meisels and Dosey (1971) as due to stress arousal from verbal threat.

The threat resulting from the anticipation of an unpleasant interaction is expected to induce a larger personal distance than a neutral topic, and a pleasant topic is expected to induce the smallest personal distance.

#### Physical Barriers

The effect of the physical environment on personal distance was observed by Desor (1972) who found that by varying architectural features which increased the impact of individuals on one another, substantial differences in perceived room capacities and judgments of crowding could be obtained. There were distinct differences in the number of paper figures being placed in a model room when architectural settings in the room were varied. A room perceived to be pleasant results in the placement of more figures and this implies smaller personal distances.

Lesko (1977) placed a large glass partition on a table between two subjects sitting at opposite ends of the table and discussing social issues, and found that there was more mutual gazing between the subjects than in the control situation in which no glass partition was used. The glass partition increased

the psychological distance and according to Argyle and Dean (1965), more eye contact was used.

Barefoot, Hoople, and McClay (1972) used a water fountain in the hall of a college building to observe whether people would violate other's personal space by drinking water from the fountain with a confederate close by. He placed the confederate at three distances of one foot, five feet, and ten feet from the water fountain. The results showed that when the confederate was at one foot or five feet from the fountain, the number of people approaching to drink water was greatly reduced as compared to both the control and the situation when confederate was ten feet away from the fountain. Drinking time was also shortened for those who did approach the fountain.

Baum, Reiss, and O'Hara (1974) used the same experimental design as Barefoot et. al. (1972) and obtained similar results. However, in the second part of his experiment, he had the water fountain built into a wall so as to have eight inches of wall screening the fountain from the hallway in which it was located. In this case, he found that even with a confederate at the close proximity of one foot or five feet, the number of people drinking water from the screened fountain was not significantly different from the control fountain in which no confederate was present. The presence of walls as screens or barriers around a water fountain reduced the tendency to avoid drinking, and also increased the lengths of time drinkers activated the fountain. As screens around the fountain should reduce the

impact of the confederate's presence, reaction to potential or actual spatial invasion should be moderated, and tendencies to avoid or flee these situations should be reduced. This reduction in stress level allows people to stand in close proximity without feeling threatened.

There has not been much research done on the function of a desk barrier in an office and little is known on its practical applications.

By defining people sitting "at ease" as those who sit with their backs leaning on the back of chairs, and people sitting "ill at ease" as those who sit on the edge of chairs and leaning towards communicator or arms resting on the desk, White (1953) observed the patients' sitting patterns in his office and found that a much greater number of patients would sit "at ease" when a desk barrier was not between them and the physician. The patients explained that removing the desk barrier provided them with an easier feeling, that the physician was willing to help which was what the patients needed most. Interaction in this setting did not create the idea of threat to both parties since more cooperative and helping concepts were involved.

Using a room on a university campus to conduct a similar experiment as White's (1953), Khan (1977) asked subjects, who were actually guests to the university open house, to participate in an energy conservation survey and had quite similar findings. Khan attributed these to the friendly and welcoming atmosphere in the open house. Those who participated perceived the survey as an interesting experience.

Zweigenhaft (1976) in a study of personal space in faculty offices, asked faculty members to draw their own offices with the furniture locations. Results showed that those with higher status and older age tended to place their desks between themselves and visitors more often. Students also evaluated these faculty members as less willing to help students in course work.

Bennett, Krishna, and Chitlangia (1977), in evaluating the aesthetic reactions to faculty offices and living rooms, found that visitors to an office chose offices with the desk as a barrier as more pleasant. Fong (1977), in a pilot study using a scale model to test office arrangements, also found discrepancies in subjects' preferences of interacting distance. Subjects preferred a rather large distance of eight feet between the occupant and the visitor. Fong attributed this behavior as due to the emptiness of the model office, which had only two chairs and a desk as furnishings; he felt that this created an insecure feeling in the subjects.

Joiner (1976) has summarized some of the behavior typical of offices in his findings. He interviewed occupants of more than a hundred offices in London and observed that the specific arrangement of furnishings accompany certain roles. Important components of the space organization in a single-person office involve the positioning of the desk in the room so that it divides the room into two major zones and that the orientation of the desk and the occupant's seating position indicate the strength of the zone definition, and the expected interaction pattern. Joiner found that occupants of commercial and govern-

ment offices tended to use a desk barrier to maintain dominance role and status level during interactions, which are more of a competitive and negotiative type. Occupants of academic institutions, in which cooperation and common goals are more important, displayed less zone definition and arranged their offices so that a desk barrier was not used during interaction. This finding is consistent with White's (1953) observations of patients in a physician's office, and emphasizes the importance of designing according to need.

In light of all the above, it is concluded that a barrier can reduce the threat from personal intrusion because it provides some sort of defense element and thus increases the psychological distance. Thus it may be expected that:

- 1) Visitors will choose a barrier more often than occupants;
- 2) Two people of different status will use a barrier more often than two people of same status, and that this choice of barrier is initiated by the lower status person;
- 3) Two people discussing pleasant topics will use a barrier less often than two people discussing neutral topics which in turn will use a barrier less often than two people discussing unpleasant topics.

## PROBLEM

There has not been much research on how the physical settings in an office affect human behavior; interior designers have been neglecting the impact of a desk barrier on the communication process. The purpose of this study was aimed at understanding how the behavioral variables would affect the social distance in an office, as well as how subjects would respond to a desk barrier during intrusion of personal space.

The effect of behavioral variables on social distance in an office was tested with the following hypotheses:

1. Occupants would require a smaller personal distance than visitors.
2. Personal distance would be greater when people interacted with high status persons than when they interacted with same status persons.
3. A pleasant topic would entail a smaller personal distance than a neutral topic which in turn would entail a smaller personal distance than an unpleasant topic.
4. Smaller personal distance would be selected when there was barrier between communicators.

To examine how subjects would respond to a desk barrier, the following hypotheses were tested:

1. Occupants would use a desk barrier less often than visitors.

2. People interacted with high status persons would use a barrier more often than when they interacted with same status persons.
3. A pleasant topic would entail a barrier less often than a neutral topic which in turn would entail a barrier less often than an unpleasant topic.

These hypotheses were all tested at 0.01 alpha level.

## METHOD

Task, Informed Consent and Instructions

Each subject was first informed:

" We are doing a study on visitor seating in offices. You will be shown a scale model office, a situation will be described to you, and you will be asked to place a visitor's chair in the office.

There will be no discomfort nor risk in this experiment, however, you are free to quit at any time. If you have any questions, now or later, please feel free to ask them. "

The subject's task was to place a model chair in a model office according to a situation described to him on the instruction sheet. There were twelve different versions of the instructions, specifying whether subject was an occupant or a visitor, his status relative to the interacting person, and the type of discussion topics involved during interaction. Each subject was assigned to and tested on only one of the twelve versions. Figure 1 shows the different versions of the instructions used exclusively by subjects who were being assigned to the occupant role, and Figure 2 shows the different versions of the instructions used exclusively by subjects who were being assigned to the visitor role.

The model was presented to the subjects diagonally and at two different angles. Subjects viewed the model office from the back end corner when his role was an occupant (Figure 3), or from the front end corner when his role was a visitor (Figure 4).



\_\_\_\_\_ ( 1. A friend who works with you in the same company; 2. An employee under your supervision ) comes to your office to discuss \_\_\_\_\_ ( 1. arranging a Christmas party for the company; 2. the possibility of changing certain procedures; 3. the conflict between you two as to whose department will get certain resources ).

Please put the visitor's chair in the model office to show where you prefer the visitor to sit.

Figure 1. The six different versions of instructions assigned to occupant subjects.

You are to meet \_\_\_\_\_ ( 1. your boss in your boss' office; 2. your friend who works with you in the same company in your friend's office ) to discuss \_\_\_\_\_ ( 1. arranging a Christmas party for the company; 2. the possibility of changing certain procedures; 3. the conflict between you two as to whose department will get certain resources ).

Please put the visitor's chair in the model office to show where you prefer to sit.

Figure 2. The six different versions of instructions assigned to visitor subjects.



Figure 3. The model office as viewed by occupant subjects.



Figure 4. The model office as viewed by visitor subjects.

After a subject completed his task, the experimenter replaced the visitor's chair with a penny, and then used a ball pen to divide the office into two areas which represented the barrier zone and the non-barrier zone. Subjects who placed the visitor's chair in the barrier zone on first observation were then asked to place the chair in the non-barrier zone and vice versa. The instructions of this task are as shown in Figure 5.

When the subject had completed the second task, the experimenter measured the two distances between the centers of the occupant's and the visitor's chair from the two observations, as well as recorded down whether a barrier was chosen by the subject from the first observation.

#### Experimental Design

Experimental set up. A model was built with thick cardboard at a scale of one to twelve. The represented dimensions of the office were 15x12x9 feet. There was a fixed wall and a movable wall. It was presumed that entrances to offices were usually at the corners and people would thus view through an office diagonally. The use of only two walls enabled subjects to identify every feature inside the office while still enclosing most of the office area. When the subject was an occupant, the movable wall was placed to enclose the area in front of the desk as shown in Figure 6. When the subject was a visitor, the wall was then placed at the opposite end to enclose the area behind the desk as shown in Figure 7. Wall to wall carpeting was achieved by using a dark blue cotton

Instructions for occupant subjects:

" If the visitor prefers having the conversation in this area, where would you put the chair? "

Instructions for visitor subjects:

" If the occupant prefers having the conversation in this area, where would you put the chair? "

Figure 5. Instructions for the second task of visitor's chair placement.

movable wall

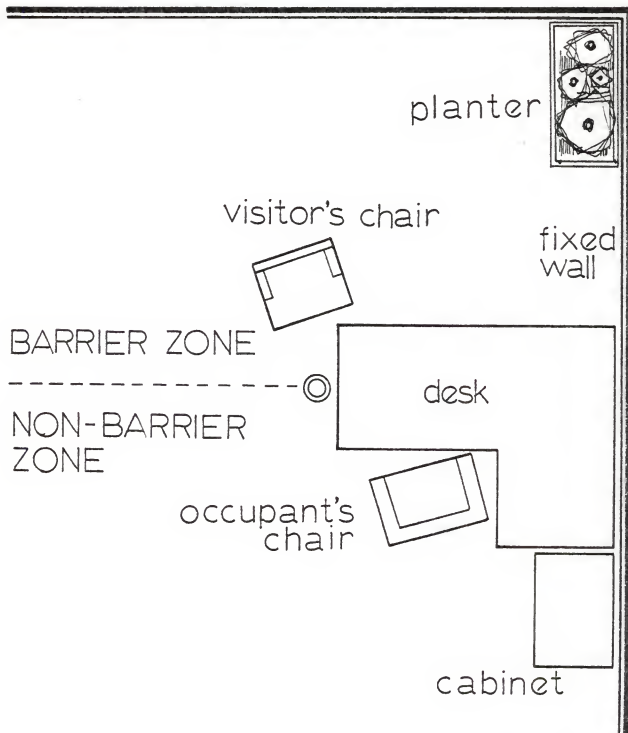


Figure 6. Dimensioned floor plan of office, showing visitor's chair in barrier area. Occupant subjects observed from lower left corner. Scale of figure is 1:24.

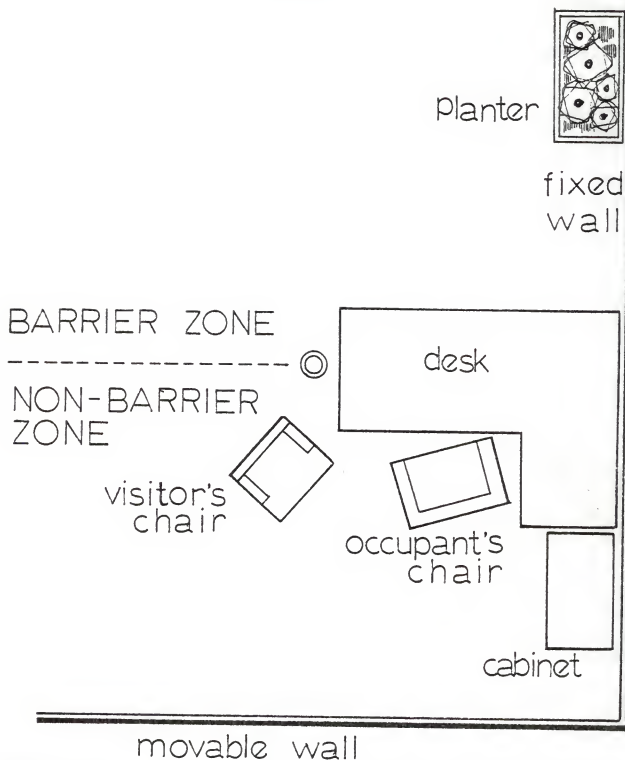


Figure 7. Dimensioned floor plan of office, showing visitor's chair in non-barrier area. Visitor subjects observed from upper left corner. Scale of figure is 1:24.



towel cut to fit the exact office area.

Furnishings included a desk measuring 72x30 inches with a fixed extension for a typewriter, a cabinet, an occupant's chair measuring 24 inches wide and 18 inches deep, and a visitor's chair measuring 21 inches wide and 18 inches deep. There were also some simulated plants and pictures decorating the interior. The occupant's chair was not movable, it did not face the desk directly, but at a displacement of about 15 degrees. The walls were light yellow and the illumination level maintained throughout the experiment was 65 foot-candles. The two chairs and the penny used for displacing the visitor's chair all had tiny unnoticeable marks at each center so that precise measurements could be made. Realizing the importance of distinguishing between the barrier and the non-barrier zones, a waste basket was put next to the side of the desk. The perpendicular line to the desk passing through the waste basket, which also divided the office into equal areas, was assumed to be the divider of the barrier and the non-barrier zones. The tiny mark at the center of the visitor's chair was used to decide if the chair was being placed by the subject in one zone or another.

Independent variables and dependent variables. The experiment was a 3x2x2 factorial design. The three independent variables were the discussion topic, the status, and the role relationship. The three levels in the discussion topic variable were a pleasant topic, a neutral topic, or an unpleasant topic. The status variable had two levels, being occupant and visitor

at the same status, or occupant at a higher status than the visitor. The role variable had two levels, either with the subject as occupant of the office or with the subject as a visitor to the office.

The barrier variable was dependent on the first three variables in determining the percentage of subjects choosing a barrier. However, the barrier variable was used as one of the four independent variables in determining the seating distance between occupant and visitor.

Assignment and sequence of conditions. The model office was first set up for subjects who would represent occupants of the office. The experimenter randomly gave one version of the occupant subject instructions to a subject, and then asked the subject to put the visitor's chair in the model according to the situation described. This was done for five more subjects using the remaining occupant subject instructions. The experimenter then set up model for visitor subjects, and as before, randomly gave each visitor subject a version of the visitor subject instructions until six subjects were run. When twelve subjects were run, the experimenter again set up model office for occupant subjects as before, and repeated the above procedures.

#### Subjects and Recruitment Procedures

Subjects were guests at the annual open house at Kansas State University. They were recruited by a graduate student while they were touring the Industrial Engineering exhibits. Each subject was asked to participate in a human factors

project which would take only two minutes.

Two hundred and six subjects were run during the two days of the open house. Most of the subjects were faculty and students at Kansas State University; their average age was around 20 and about one quarter of them were females.

## RESULTS

The raw data of the experiment and the personal data of the subjects are presented as the Appendix.

First observations from the subjects were used to analyse the social distance relationships and the percentage of subjects choosing a barrier in an office, using the analysis of variance method for non-equal subclasses (Kemp, 1976).

Mean distances for the various sub-levels of the independent variables are presented in Table 1. The analysis of variance on the social distance in an office is shown in Table 2. The barrier variable was found to be significant in determining the social distance chosen in the office.

Mean percentages of subjects choosing a barrier under the various sub-levels of the independent variables are shown in Table 3. Table 4 gives the analysis of variance of these percentages. The results show that all three independent variables are significant. The interaction between topic and role is also found to be significant, the various means were further analysed using the Newman-Keuls Test at  $\alpha = 0.01$  (Snedecor and Cochran, 1974). This is presented in Table 5.

TABLE 1. Mean Interaction Distance (in scale feet) for each Independent Variable on First Observations from Subjects.

Variable	Sub-level	Mean Distance, Scale feet
Topic	Pleasant	4.79
	Neutral	4.77
	Unpleasant	4.95
Status	Same	4.71
	Visitor at lower	4.97
Role	Visitor	4.86
	Occupant	4.82
Barrier	No barrier	4.15
	Barrier	5.52
Grand Mean		= 4.84

TABLE 2. Analysis of Variance on Social Distances in an Office.

Source	Degrees of Freedom	Mean Squares	F-ratio	Alpha Hat
Topic (T)	2	0.656	1.54	0.2170
Status (S)	1	1.163	2.73	0.1002
Role (R)	1	0.046	0.11	0.7415
Barrier (B)	1	51.655	121.26	0.0001
T x S	2	0.148	0.35	0.7076
T x R	2	0.541	1.27	0.2831
T x B	2	0.722	1.70	0.1865
S x R	1	1.674	3.93	0.0489
S x B	1	0.034	0.08	0.7782
R x B	1	0.255	0.60	0.4397
T x S x R	2	1.618	3.80	0.0242
T x S x B	2	0.337	0.79	0.4544
T x R x B	2	0.723	1.70	0.1859
S x R x B	1	0.899	2.11	0.1479
T x S x R x B	1	0.988	2.32	0.1294
Error	183	0.426		
Total	205			

Table 3. Mean Percentage of Subjects Choosing a Barrier on First Observations.

Variable	Sub-level	Percentage of Subjects Choosing a Barrier
Topic	Pleasant	56.7
	Neutral	59.1
	Unpleasant	80.9
Status	Same	50.3
	Visitor at lower	80.8
Role	Visitor	78.0
	Occupant	53.1
Grand Mean		= 65.6

Table 4. Analysis of Variance on Percentage of Subjects  
Choosing a Barrier in an Office.

Source	Degrees of Freedom	Mean Squares	F-ratio	Alpha Hat
Topic (T)	2	1.205	7.25	0.0009
Status (S)	1	4.755	28.60	0.0000
Role (R)	1	3.159	19.00	0.0000
T x S	2	0.364	2.19	0.1146
T x R	2	0.912	5.48	0.0048
S x R	1	0.059	0.36	0.5519
T x S x R	2	0.466	2.80	0.0633
Error	194	0.166		
Total	205			



TABLE 5. Newman-Keuls Test at  $\alpha = 0.01$  for Topic and Role Interaction in Analysis of Variance of Percentage of Subjects Choosing a Barrier.

Sub-level of Topic vs Role	Mean Percentage
Unpleasant x Occupant	81.2
Unpleasant x Visitor	80.6
Pleasant x Visitor	78.9
Neutral x Visitor	74.4
Neutral x Occupant	43.8
Pleasant x Occupant	34.4

Non-significant values connected by straight lines.

## DISCUSSION

The hypotheses testing the effect of topic, status, role, and barrier on personal distance were not supported. The barrier variable was shown to be significant. It was expected that choosing a barrier would increase the psychological distance and reduce the threat due to intrusion of personal distance, thus allowing subjects to interact with each other at a smaller personal distance without stress arousal. The results show that subjects, in fact, used a larger personal distance when they chose a barrier which contradict the findings of Baum et. al. (1974).

Non-significances of all the other independent variables in the evaluation of personal distance lead one to think that when a barrier is present as an option, distance variation may not be a very sensitive response as in most of the other territories. Presumably, the desk barrier has a very large effect in compensating this distance sensitivity due to intrusion and the resulting stress arousal.

To further understand the distance and barrier relationship, two more hypotheses were proposed.

In the model office under study, the desk used was 30 inches deep. When this barrier was used, the minumum distance between the occupant and the visitor was close to five feet, which implies that the interacting dyads were virtually sitting next to the desk. A t-test was used to test whether those who chose a barrier on first observation would use a larger personal

distance behind the desk than those who did not choose a barrier on first observation but were instructed to place the visitor's chair in the barrier zone on second observation. The result shows that the personal distance behind the desk for the barrier users (mean = 5.5 feet) and the non-barrier users (mean = 5.4 feet) was not significant ( $t = 1.10$ ,  $P = 0.250$ ). While this does not explain whether choosing a barrier was because of distance awareness, it does point out that erecting a barrier would result in similar personal distance for each subject.

Zweigenhaft (1976) found that faculty members using a desk barrier chose a larger distance from people and were less willing to help by student judgment. Then subjects who used a barrier during interaction would be psychologically less intimate towards the other person than subjects who did not use a barrier. Another t-test was performed to compare the personal distance when no barrier existed, between subjects who did not prefer a barrier on first observation and subjects who preferred a barrier on first observation but were instructed to place the visitor's chair in the non-barrier zone on second observation. It was found that those who preferred a barrier used a larger personal distance (mean = 4.3 feet) than non-barrier users (mean = 4.0 feet). This significant result ( $t = 2.78$ ,  $P = 0.008$ ) supports the theory that those preferring a barrier in the office indeed perceived a greater psychological threat, as can be seen from the larger personal distance used.

These results confirm a previous point that a barrier can affect the distance sensitivity in stress situations. The

options of either having a barrier or not having a barrier reduce subjects' distance awareness, since choosing to interact with a barrier or without a barrier would still be within the distance zones proposed by Hall (1966) for personal and social interactions.

Joiner (1976) has compared the desk placements and orientations between commercial and academic offices and found that commercial office occupants erect a desk barrier more often than academic ones because competition is common within the commercial offices. The design of this experiment assumed the office would be used by persons of various status levels in a company. Thus, interactions can be competitive, negotiative, or cooperative, maintaining the self image and ego by the occupant is not uncommon and is noticed by both the occupant and the visitor. Under such conditions, a barrier seems to be a more important organizer of social behavior. A logical explanation for the hypotheses on social distance being rejected is that choosing a barrier or not for the anticipated interaction is more accounted for than choosing a particular personal distance for the anticipated interaction. It is likely that distance is still an important factor, but the existence of a barrier seems to override its significance.

Most of the hypotheses on the effect of topic, status, and role on the choice of a barrier were confirmed. A pleasant topic, communicators at the same status level, and being the occupant were all shown to result in less use of a desk barrier in an office during interaction. These findings

further support the previous result that the desk barrier has a significant effect on the seating pattern in an office.

The percentages of subjects choosing a barrier were not significantly different between a pleasant discussion topic and a neutral discussion topic. Besides questioning the validity of the versions of instructions which considered "discussion on the arrangements of a Christmas party" as a pleasant topic in the office, it is doubtful also that intimacy in an office can be achieved as those observed in private territories such as the home or public territories such as the recreation parks. Indeed, Sommer (1969) has pointed out that topic intimacy interacts with the kind of physical setting. He cited two lovers talking about the climate at home can be very intimate while a professor talking about sex in a classroom does not have any intimacy. Another factor which could affect the perceived intimacy is that the experiment was conducted without stating the amount of privacy which could be achieved in the model office. The use of only two walls would also give give subjects the impression that total privacy seemed to be impossible under the circumstance.

The two way interaction of topic and role shows that subjects in an occupant role discussing pleasant or neutral topics significantly avoid the use of a barrier. Since stress arousal for an occupant has been discussed as due to the perceived threat from the intrusion of unpredicted outcome, the anticipation that the upcoming interaction is not unpleasant seems

to reduce the threat significantly and the occupant is again confident that his behavioral freedom and security are not in jeopardy because he can control the outcome without overarousal (Evans and Howard, 1973).

There was no interaction between status and role on the percentage of subjects choosing a barrier, which would imply that the use of a barrier was initiated by the person of lower status. This could be for the reason that in a commercial office, in which competitive situations are common, maintaining one's dominance and status superiority over the lower status visitors would result in the occupants' more frequent use of a barrier (Joiner, 1976).

There are some interesting findings on subjects' behavior. The difficulties of distinguishing between the boundaries of the barrier zone and the non-barrier zone had persuaded the experimenter to assume a line passing through the desk as a divider of the two zones. The placing of a waste basket next to the desk was intended to force the subjects to place the visitor's chair either in front of the desk, which would create a barrier situation, or next to the occupant's chair which would create a non-barrier situation. However, the experimenter observed that even with the waste basket present, the number of subjects putting the visitor's chair next to the desk was still very significant (40%). This was further complicated when the orientation of the visitor's chair sometimes created the image that the chair could be considered to be acceptable in either

zone, depending on how an experimenter interpreted it. Although observations could still be made because of the tiny mark on the chair allowed the experimenter to judge which zone the chair was being placed, the validity of the results is sometimes questionable. Whether this corner-to-corner seating preference for both the occupant and the visitor is because of function, defense, intimacy, or some other kind of nonverbal behavior will be left for future researchers to clarify.

These responses of subjects to threat during intrusion of personal space have been very striking, mainly because of the reduced awareness of distance when a barrier becomes an option for both the occupant and visitor. The appropriateness of using a barrier upon an anticipated situation relates the behavioral variables to the frequency of a barrier being erected. That two-thirds of the subjects preferred a barrier during interaction and that there was no significance on the personal distance when a barrier was used, seem to provide the evidence that subjects in this experiment were actually using a barrier as a response to threat.

The present study has shown that interactions in an office are influenced considerably by the presence of a desk barrier. Personal distances of communicators were found to be insignificant for many independent variables due to the presence of a barrier. Although many have provided the basis behind the use of a barrier as related to the type of work and personality, much research is still needed regarding the size of a barrier,

the effect of a barrier on task performance, and the applications of a barrier, as related to social stimuli. The present experiment revealed that using the desk barrier was effective in response to threat. By using a smaller barrier and thus forcing the subject to interact at a distance smaller than the natural personal distance when no barrier exists, comparisons can then be made to understand if the use of a barrier can reduce the personal distance during stress-inducing situations.

While homogeneity of users of space is always questionable, no fixed setting can satisfy all. By understanding more about the effect of a barrier on social behavior, and thus allowing space to be designed according to the needs of users, physical environment can then be made as unstressful as possible. It is hoped that future designers takes this aspect of flexibility in planning space so that each individual is provided with options for his particular needs.



## CONCLUSIONS

The following conclusions can be drawn from the present study:

1. There is no significant difference in personal distance when a barrier is used.
2. Those who prefer a barrier will use a larger personal distance when no barrier is present.
3. The existence of a desk barrier reduces the sensitivity of personal distance during interaction.
4. The significance of the independent variables on the frequencies of choosing a barrier implies that the barrier is effective to threat of behavioral freedom.
5. Commercial offices erect a barrier more often.
6. The anticipation that an outcome is pleasant can greatly reduce an occupant's stress level.
7. Corner-to-corner seating is commonly used in offices.

## APPENDIX

Experimental Data and Personal Informations of Subjects

The following abbreviations and symbols represent the different levels of the instructional versions:

Topic (T) - pleasant (1); neutral (2); unpleasant (3)

Status (S) - same (1); visitor at lower (2)

Role (R) - visitor (1); occupant (2)

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal Distance(ft)	
					1st	2nd
1	M	22	121	yes	5.4	3.6
2	M	50	311	no	3.4	4.5
3	M	55	111	yes	6.0	4.0
4	M	58	121	yes	5.0	4.0
5	M	17	221	yes	4.5	3.8
6	M	23	321	yes	5.5	4.0
7	M	18	211	yes	5.8	4.2
8	F	21	321	yes	4.6	4.1
9	M	24	321	yes	5.0	6.5
10	M	28	121	yes	5.3	4.0
11	M	29	221	yes	6.2	4.9
12	M	40	221	yes	4.4	3.7
13	M	19	121	yes	6.8	5.7
14	M	49	211	no	4.1	4.8
15	M	45	311	no	4.0	7.5
16	M	33	111	yes	5.1	3.9

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
17	M	18	221	no	4.3	5.0
18	F	19	111	yes	5.5	7.0
19	M	15	321	yes	4.7	4.1
20	M	20	311	no	4.2	5.5
21	F	12	121	yes	5.4	4.1
22	M	61	311	yes	5.2	4.5
23	M	26	112	no	3.8	5.5
24	M	11	112	yes	4.8	3.5
25	F	21	221	yes	4.0	3.7
26	F	56	322	yes	5.3	4.1
27	F	16	222	yes	5.2	3.7
28	F	50	212	no	4.2	4.8
29	F	17	221	yes	6.2	4.5
30	M	55	122	no	5.3	6.2
31	M	23	322	no	4.4	4.7
32	M	21	222	yes	6.5	4.0
33	F	45	322	yes	6.0	4.5
34	M	21	222	no	4.0	5.5
35	F	18	112	no	4.3	6.0
36	F	17	312	yes	3.9	5.0
37	M	20	112	yes	6.0	3.8
38	F	55	312	yes	6.5	4.1
39	M	23	212	no	3.5	4.8
40	F	53	122	no	3.2	4.5
41	F	19	212	no	4.2	5.9

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
42	F	19	122	no	4.5	6.0
43	M	36	322	yes	6.5	4.3
44	M	17	222	yes	6.0	4.5
45	F	47	322	yes	5.6	4.4
46	M	25	222	no	4.3	5.8
47	M	20	112	no	4.0	6.2
48	M	58	312	yes	4.6	4.6
49	M	18	112	no	4.5	5.5
50	F	40	312	yes	5.4	3.9
51	M	22	212	no	4.3	6.7
52	M	45	122	no	3.9	5.2
53	F	17	212	no	3.9	5.2
54	M	17	122	no	4.5	5.4
55	M	40	322	no	4.5	6.3
56	M	17	222	yes	5.0	3.9
57	M	45	112	no	3.0	4.3
58	M	17	312	yes	5.3	4.5
59	F	22	212	no	4.2	5.8
60	M	19	122	no	3.7	5.0
61	M	25	322	yes	6.0	4.5
62	M	24	222	yes	6.0	4.2
63	M	25	112	no	3.8	5.4
64	F	14	312	yes	7.5	4.8
65	F	20	212	no	3.8	5.0
66	F	16	122	yes	7.0	5.0
67	M	25	322	yes	6.5	4.9

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
68	F	25	222	no	4.4	5.6
69	M	23	112	no	3.3	5.5
70	F	41	312	yes	5.9	4.8
71	F	47	212	no	3.9	5.7
72	M	19	122	yes	5.7	4.3
73	F	56	312	yes	5.2	5.1
74	M	29	212	no	3.3	4.8
75	F	23	222	yes	5.7	3.9
76	M	33	312	yes	5.9	5.5
77	M	20	112	yes	6.1	3.4
78	M	17	312	no	3.9	5.6
79	M	27	122	no	3.1	5.3
80	M	37	212	yes	4.5	3.3
81	F	31	212	no	3.9	5.8
82	M	20	322	yes	6.4	4.9
83	M	52	112	no	3.4	5.3
84	M	38	312	yes	4.9	5.2
85	M	25	222	yes	4.4	4.0
86	M	15	122	yes	5.0	3.1
87	M	30	322	yes	6.5	5.2
88	M	28	112	no	3.6	5.3
89	M	36	312	yes	5.1	4.3
90	M	41	122	yes	4.8	4.0
91	F	39	222	no	3.9	6.2
92	M	18	212	no	3.5	4.4

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal Distance(ft)	
					1st	2nd
93	F	18	322	yes	5.7	4.2
94	M	41	222	yes	6.7	4.5
95	M	21	322	yes	5.5	3.9
96	M	25	322	yes	5.5	5.2
97	M	24	322	yes	5.5	4.0
98	M	27	222	no	4.5	5.6
99	M	41	122	no	4.1	4.8
100	M	21	112	no	4.4	4.9
101	M	22	312	no	4.5	5.5
102	F	44	122	yes	5.5	3.2
103	M	21	322	yes	5.5	4.5
104	F	22	222	yes	6.0	4.2
105	F	23	212	no	4.2	5.7
106	F	22	112	yes	5.6	3.8
107	M	22	312	no	4.9	6.2
108	M	27	122	yes	6.9	3.8
109	M	21	322	yes	5.7	4.2
110	M	17	222	yes	7.0	4.5
111	M	20	112	yes	6.0	3.5
112	M	20	212	no	3.6	5.6
113	M	9	312	no	3.0	4.3
114	M	27	122	no	3.0	5.3
115	M	14	212	yes	4.6	3.2
116	F	22	221	yes	5.2	4.0
117	M	20	211	yes	5.4	3.8

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
118	F	22	111	yes	4.9	4.0
119	M	22	311	no	4.1	5.7
120	M	17	111	yes	5.2	3.8
121	M	27	111	no	4.5	6.6
122	F	26	121	no	4.0	5.0
123	M	20	311	yes	7.0	7.0
124	M	12	321	yes	7.2	6.2
125	M	16	311	yes	5.6	3.5
126	M	56	211	yes	5.3	3.2
127	M	17	221	yes	5.7	3.4
128	M	37	211	no	4.1	4.9
129	M	22	221	yes	5.5	3.9
130	F	16	111	no	3.9	5.0
131	M	24	121	yes	4.8	3.6
132	F	25	211	yes	6.5	3.8
133	M	55	221	yes	4.8	4.5
134	M	24	111	no	3.5	5.1
135	F	61	121	yes	5.6	4.5
136	F	20	321	yes	6.0	4.3
137	M	49	311	yes	6.2	4.7
138	F	47	121	yes	5.4	3.7
139	M	32	211	yes	5.5	4.2
140	F	18	121	yes	5.5	5.0
141	M	14	211	yes	5.6	4.2
142	M	25	221	yes	4.2	5.5
143	M	15	111	no	3.7	4.7

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
144	M	25	221	yes	4.4	3.3
145	M	16	111	yes	6.1	3.8
146	M	26	321	yes	4.6	3.8
147	F	23	311	yes	5.5	4.1
148	M	15	321	yes	6.0	4.5
149	M	33	311	yes	6.7	5.0
150	M	20	121	yes	4.8	3.7
151	F	40	211	no	4.8	5.7
152	M	14	121	yes	5.4	3.8
153	M	14	211	yes	6.0	3.8
154	F	54	221	no	4.9	5.6
155	M	18	111	yes	4.5	4.5
156	M	71	221	yes	5.2	3.8
157	M	42	111	no	5.8	5.9
158	M	19	321	yes	5.6	4.0
159	F	20	311	no	3.2	5.0
160	M	12	111	yes	4.0	4.9
161	M	22	121	yes	5.3	3.8
162	F	22	321	yes	6.3	3.8
163	M	23	311	no	4.1	5.0
164	M	25	321	yes	4.8	3.7
165	M	67	311	yes	5.8	4.2
166	F	19	211	no	3.9	5.5
167	F	22	221	yes	4.8	3.8
168	F	22	111	yes	5.5	4.2



Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
169	M	14	121	yes	6.0	6.1
170	M	46	321	yes	5.5	5.7
171	M	55	311	no	4.2	5.7
172	M	32	111	no	2.9	4.7
173	M	22	321	yes	6.5	5.2
174	M	22	311	yes	5.9	4.2
175	F	26	121	yes	5.6	4.0
176	M	22	211	yes	5.7	4.0
177	M	57	221	yes	4.4	4.0
178	M	23	111	yes	4.8	3.1
179	M	34	321	yes	6.0	3.3
180	F	25	311	yes	4.8	4.0
181	F	23	121	yes	5.6	4.5
182	M	27	211	no	4.5	5.5
183	M	45	221	yes	5.6	4.5
184	M	20	111	yes	6.7	5.0
185	M	24	321	yes	4.5	5.5
186	F	25	311	yes	6.7	5.2
187	M	20	121	yes	6.1	4.5
188	M	23	211	no	4.2	4.9
189	F	21	221	yes	4.8	4.0
190	M	18	111	no	3.0	4.2
191	F	69	321	yes	6.0	4.9
192	M	30	311	yes	5.0	4.0
193	M	29	121	yes	4.5	3.5

Subject	Sex	Age	Instruction (TSR)	Barrier	Personal 1st	Distance(ft) 2nd
194	M	44	211	yes	5.3	3.7
195	M	23	121	yes	6.4	5.3
196	M	18	211	no	4.8	6.2
197	M	22	221	yes	5.5	3.3
198	M	26	112	no	3.9	4.6
199	M	16	211	yes	5.0	3.5
200	M	15	221	yes	5.0	3.6
201	M	20	111	yes	4.9	3.2
202	F	45	321	yes	5.7	5.2
203	F	18	212	no	3.6	4.5
204	M	29	312	yes	5.2	4.9
205	M	21	122	no	3.2	5.0
206	M	26	222	yes	6.0	4.8

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BARRIERS AS A RESPONSE TO THREAT IN OFFICES

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## ABSTRACT

An experiment was conducted to analyze the effect of social stimuli on office seating, regarding the preferred seating distance and choice of arrangement where the desk was a barrier. A scale model office was used and twelve experimental conditions were simulated to achieve the various levels of stimulation in the environment.

The results showed that there were no significance of preferred seating distance as related to the different stimuli. Further analysis showed that the personal distances when a desk barrier existed were not significant but that subjects who preferred a barrier used a larger personal distance when no desk barrier existed. These findings were attributed to the distance insensitivity when a desk barrier became an option for behavioral freedom.

The variables topics, status, and roles were found to be significant in determining the percentage of subjects choosing a barrier. The interaction of topic and role suggested that anticipation of a pleasant outcome in one's own territory greatly reduced the stress from intrusion of personal space. Insignificance of pleasant topic and neutral topic was attributed to the difficulty of achieving intimacy in office territory.

The overall results confirmed the effectiveness of a barrier as a response to threat of behavioral freedom but did not provide positive evidence that personal distance was also a factor.