THE RESULT OF DIFFERENTIAL SEATING ARRANGEMENTS
UPON STUDENTS' ANXIETY LEVEL, ACQUAINTANCE
VOLUME, AND PERCEIVED SOCIAL DISTANCE

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The study was conducted to investigate the result of three differential seating arrangements in college classrooms on anxiety level, acquaintance volume, and perceived social distance among students.

Seventy-six college students enrolled in three approximately equal-sized sections of an education course comprised the population for the study. Three sections, assigned to be straight-row seating arrangement, rectangular-tables seating arrangement, and horseshoe seating arrangement, utilized three different rooms. For the purpose of the experiment, the central focus of student attention was on the instructor, who taught three sections with identical style, procedure, and content. The students were not assigned to have permanent seats. The experimental period was the first eleven weeks in the spring semester of 1972.

All subjects, in addition to filling out an information card, responded to a pre- and post-test of the Taylor Manifest Anxiety Scale, the Acquaintance Volume Scale, and
the Sartain and Bell revision of Bogardus Social Distance Scale during the second and eleventh weeks. Using both the analysis of covariance and Tukey's A Posteriori pair-wise comparisons, it was determined whether different seating arrangements in class would contribute to any significant changes on the three tested variables. From the data collected, none of the six hypotheses made was substantiated at .05 level of significance.

A general conclusion was drawn from the findings. It was concluded that the differential seating arrangements in college classrooms did not produce any measurable changes on college students' anxiety level, acquaintance volume, and perceived social distance.

It was recommended that further research be considered to test more concrete variables which could be used as indices of classroom participation and overall learning atmosphere; that further research include larger groups of subjects; that further research require stricter control of extraneous factors of identical room size and meeting frequency; that further research be extended to different types, as well as different levels, of learning situations; that further research develop more sophisticated scales to investigate acquaintance volume and interaction pattern; and that further research encompass instructors' preferential seating arrangements.
THE RESULT OF DIFFERENTIAL SEATING ARRANGEMENTS
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VOLUME, AND PERCEIVED SOCIAL DISTANCE

DISSERTATION

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For the Degree of

DOCTOR OF PHILOSOPHY

By

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CHAPTER I

INTRODUCTION

The use of space is a constant element in the life of all kinds of organisms, as manifested in the wide diversity of territorial habits. Although governed by the rule of geographical area, man is actually more concerned with the implied relevancy of this rule to his behavior. How the individual places himself consciously or unconsciously in relation to others is far more significant than is physical proximity.

Spatial ecology of the classroom has somewhat been taken for granted in education for years. Generally viewed to be relatively stationary, the concept is in fact very flexible, since each individual carries his personal space around with him. Unlike natural settings, however, the classroom has a rather confined territory, with little opportunity for mobility in terms of personal use of space. Such restriction often frustrates the students; this frustration in turn may change their attitudes, interaction pattern, and possibly learning. It seems reasonable then to assume that different seating arrangements would have different impacts with reference to students' anxiety level, acquaintance volume, and perception of social distance. A deficiency in the intelligent use of possible classroom seating arrangements
might lead to undesired behavior and become a hindrance in overall classroom atmosphere. As a result, optimal achievement by the students might not be attained.

**Statement of the Problem**

The problem of this study was the relationship of differential seating arrangements in the college classroom to certain personality and social variables among students.

**Purposes of the Study**

The purposes of this study were (1) to investigate seating practices commonly used in the college classroom through different arrangements and their possible effect upon students' anxiety level, acquaintance volume, and perceived social distance, and (2) to evaluate the implications of these effects for college teachers with reference to spatial ecology of the classroom.

**Hypotheses**

To carry out the purposes of this study, the following hypotheses were tested:

1. Students seated in a horseshoe arrangement (Group III; see Appendix A) will have a significantly lower post-test manifest anxiety mean score as measured by the Taylor Manifest Anxiety Scale than will students seated in a traditional straight-row arrangement (Group I; see Appendix A).
2. Students seated in a horseshoe arrangement will have a significantly lower post-test manifest anxiety mean score as measured by the Taylor Manifest Anxiety Scale than will students seated in a rectangular-tables arrangement (Group II; see Appendix A).

3. Students seated in a rectangular-tables arrangement will show a significantly greater post-test gain in acquaintance volume as measured by the Acquaintance Volume Scale than will students seated in a traditional straight-row arrangement.

4. Students seated in a horseshoe arrangement will show a significantly greater post-test gain in acquaintance volume as measured by the Acquaintance Volume Scale than will students seated in a traditional straight-row arrangement.

5. Students seated in a horseshoe arrangement will have a significantly lower post-test mean (desirable) social distance score as measured by the Bogardus Social Distance Scale than will students seated in a traditional straight-row arrangement.

6. Students seated in a rectangular-tables arrangement will have a significantly lower post-test mean (desirable) social distance score as measured by the Bogardus Social Distance Scale than will students seated in a traditional straight-row arrangement.

Background and Significance

Study of space in psychology and education has just recently caught the attention of many researchers, although
the term "life space" had been coined as early as 1935 by Lewin (29) in his studies of personality, in addition to "personal space" by Katz and "personal world" by Stern (48). Unlike physical territory, which does not carry its meaning beyond the existed, personal space has a center, the person himself, from which and to which everything pertaining to it extends. Each individual arranges himself in relation to others on the basis of his cultural background, personality, degree of acquaintance, discussion topics, etc. Thus the underlying psychological implications of the use of personal space are far more significant than we normally realize. Nevertheless, seldom are we aware of the importance of space, as Hall (21, p. 188) once put it: "we treat space somewhat as we treat sex. It is there but we don't talk about it."

Research done within the parameters of psychology and sociology on the concept of personal space presents a wide spectrum of settings, ranging through zoos (3), housing developments (14, 52), cafeterias (44, 45), restaurants (51), offices (33), to mental hospitals (44, 17), military psychiatric wards (23, 24), libraries (45, 19, 30), classrooms (13, 37, 47), and laboratory conditions (27, 28, 31, 34, 2). Overall there is an apparent void in the study of classroom spatial ecology, as educational settings have not been popularly employed in experiments, particularly in classroom situations. One disadvantage of utilizing the classroom in
the experimental design lies in the fact that classroom arrangement has very limited space. The students, who carry their personal space into classroom, passively accept the arrangement of the assigned seats, and a sit-and-learn philosophy. Conventional ideas of teaching generally focus on the instructor's role of lecturing, thus minimizing the significance of students' seating patterns and interaction. This, however, does not rule out the possible significance of spatial ecology in the classroom, as Biddle (5) pointed out that even such common classroom ecological components as chalk, pencils, or carpeting are worthy of investigation.

While the purpose of the investigation was primarily exploratory, several ideas were formulated on the basis of previous work. Little (34) and Baxter and Phelps (4) generally found that indoor settings such as classrooms would result in tighter clustering since the degree of interpersonal intimacy expected in indoor locations would be greater. Variation of proximity between persons has produced differences in general perception on such traits as friendliness, aggressiveness, dominance, extroversion, and intelligence (39). Immediacy of seating is a correlate of the amount of conversation between strangers (35). McEride and King and James (33) found that approaching a subject from the front produced a greater galvanic skin response than approaching a subject from the side, which was, in turn, greater than that from behind. Too close a distance may
produce tension and anxiety on the part of the experimental victim and lead to avoidance or flight reactions (19, 20, 38).

Physical proximity in relation to social attitude has been studied, but the findings tend to be inconsistent. Sommer (46) quotes two unpublished studies with contrasting results: one by Little, Ulehazi and Henderson (32), the other by Elkin (16). Sommer theorizes that the intensity of the discussion and the interest shown by each of the participants is influenced by seating arrangements and proximity more than is attitude concordance or discordance.

Seating arrangement in the classroom generally falls into three categories: the conventional straight-row arrangement, the horseshoe or semi-circular arrangement, and the rectangular-tables arrangement. Sommer (47) showed in one experiment that in a horseshoe arrangement, those students in the center participated more than did those at the sides of the rows. Feitler (18) questioned 276 college students and found that students as well as teachers felt most comfortable with a horseshoe arrangement. Sommer (46) noted that textbooks of group dynamics recommend a horseshoe seating arrangement rather than straight-row seating for classrooms, and that rectangular tables have been criticized for fostering authoritarian leadership. These statements are somewhat speculative and are yet to be substantiated by experimental research. However, intuitively
we could expect more production, smoothness of the flow of communication, achievement of higher intimate acquaintance, and reduction of tension and anxiety with optimal seating arrangement.

The classroom has long been taken at its face value, and intelligent utilization of personal space of the student is generally neglected. The need for effective spatial arrangements in classrooms is apparent in education. This study could point to the possibilities of drawing from the uncovered inherent strengths of spatial ecology in classrooms, and the result of its underlying strength could undoubtedly enhance overall learning atmosphere.

Definition of Terms

For the purposes of this study, the following definitions were formulated:

**Personal Space** was defined as the area immediately surrounding the individual in which the majority of his interaction with others takes place (31).

**Anxiety** was defined as an inner state of insecurity which may take one or more of the following forms: fears, phobias, lack of self-confidence, extreme shyness, ideas of reference, and marked sensitivity (15).

**Anxiety Level** was defined on the basis of total score earned from the fifty items on the Taylor Manifest Anxiety Scale.
Acquaintance Volume was defined in terms of the scores derived from the Acquaintance Volume Scale, which classifies the degree on interpersonal intimacy of the student with other members of the class into (1) intimately, (2) well, (3) slightly, and (4) not at all.

Social Distance was defined as the degree of sympathetic understanding existing between persons and groups, where sympathy refers to feeling reactions of a favorably responsive type and understanding involves that knowledge of a person which leads to favorably responsive behavior (8). The greater the degree of social distance, the lesser the sympathetic understanding of a group or its individual members, while a lesser amount of social distance implies more sympathetic understanding.

Perceived Social Distance was defined in terms of the score derived from the Bogardus Social Distance Scale.

Delimitation

This study was limited to those students enrolled in a course entitled "The Nature and Conditions of Learning" at the College of Education in North Texas State University in the spring semester of 1972.

Basic Assumptions

It was assumed that all uncontrollable effects would be operating similarly on three groups so that any difference would result from three various conditions. It was
further assumed that the same instructor would handle the three groups alike with reference to content and procedures of teaching. It was also assumed that the subjects would respond honestly to the instruments administered to them.

Instruments

The Taylor Manifest Anxiety Scale (TMAS) was originally designed for use in a study of eyelid conditioning by Taylor (49). It consists of fifty items taken from the MMPI and judged by five clinicians to be indicative of manifest anxiety as defined by Cameron (12). Since the publication of the scale (50), it has been used very extensively, ranging from measuring the level of internal anxiety or emotionality to social desirability (1, 36). Original normative data were collected from a total of 1971 college students from September, 1948, to June, 1951. The scale has since gone through several modifications, and the current form includes the twenty-eight rewritten items after fifteen judges sorted the items in terms of comprehensibility.

Fifty-nine college students were given the original scale with a lapse of three weeks, and the Pearson product-moment correlation coefficient was found to be .89. The revised scale tested on 179 individuals with an intertest interval of four weeks yielded a product-moment correlation coefficient of .88. When the first scale was given to fifty-nine college students, followed by the revised scale
three weeks later, the product-moment correlation coefficient was .85.

Several studies of validity of the scale have shown that it correlated substantially with clinical estimates of anxiety. Buss, Wiener, Durkee, and Baer (11) reported a validity study with clinical rating of eight categories of anxious behavior on anxiety and found a .60 correlation coefficient with TMAS. Hoyt and Magoon (25) had validated the scale through counselor's rating of clients in a college counseling population. When Taylor scores were trichotomized and compared with counselor ratings, the adjusted contingency coefficient was .47.

The Acquaintance Volume Scale is essentially a sociometric device which classifies the degree of interpersonal intimacy into four categories: (1) intimately, (2) well, (3) slightly, (4) not at all. According to Pepinsky (40), validity, the extent to which a test measures that which it purports to measure, is intrinsic to sociometric data, since test results are choice behavior, and the test purports to measure that choice behavior. Therefore, "face validity" would be enough for the usage of the present scale, since no one is a better judge of an individual's feelings toward others than is this individual himself. Bonney and Fessenden (10, p. 6) asserted that "a sociometric evaluation is a direct measure of the kind of behavior under investigation."
The reliability of sociometric choice is the consistency of feeling responses between individuals. There is a strong tendency for the members of groups to maintain quite similar sociometric ranks over several weeks or several months. Bonney summarized several test-retest studies including time intervals ranging from two to nine weeks, and reported correlations from .70 to .89, with a median of .76 (9). The reliability of the Acquaintance Volume Scale had been checked in a pilot study by the experimenter, tested on fifteen college students with an intertest lapse of six weeks. A Pearson product-moment stability coefficient of .90 was obtained. In comparison to Bonney's summarized data, the present result proved to be highly satisfactory.

The Bogardus Social Distance Scale is the product of the lifelong work of the eminent sociologist Emory Bogardus who is best known for his contribution of the scale. Appearing in various forms (6, 7) in addition to subsequent variations, the scale has been called one of the most useful direct devices for tapping attitude toward various outgroups (43). The main reason for its adequacy and continued use is that it was devised on the basis of empirical observation of group relations and the role of group norms in shaping the attitudes of members toward others.

Newcomb, Turner, and Converse (36) observe that the scale has proved highly reliable as a measure of general
social distance, as distinguished from distance in regard to a specific racial or national group. Split-half reliability coefficients of .90 and higher have repeatedly been found. The group reliability of the Bogardus scale has also been shown to be very high when another method of measuring reliability is used. Prothro and Miles (41) had administered a revised Bogardus scale of social distance in the South and found that the scale ranks correlated .84 with the original ranks obtained by Bogardus a quarter of a century ago.

For purposes of measuring order of performance among various ethnic groups, the validity and the reliability of the Bogardus scale seem satisfactory, at least as the validity can be checked by examining the correspondence of Bogardus results with those from other scale employing different strategies of measurement. It has been found that scores from scales of a Bogardus type relate closely to scores from a scale measuring an intensity dimension of the attitudes involved (36). Hartley (22) compared the pattern of ethnic preference found among a group of college students in 1938 with those reported by Bogardus in 1928 for a cross section of the American adult population and found a correlation coefficient of .78 between two data drawn from a ten-year interval.

The present form is the revision of Sartain and Bell (42). The scale was constructed by the Thurstone technique of equal-appearing intervals and offers several advantages
over the original Bogardus scale. The revised scale, which is composed of nine items, appears as follows:

1. I would accept a member of this group as my husband/wife.

2. I would accept a member of this group as a personal chum in my club.

3. I would accept a member of this group as one of my business friends.

4. I would share a taxi with a member of this group.

5. I would accept a member of this group as a house servant.

6. I would grant citizenship only to members of this group who adopt our customs and mores.

7. I would eliminate members of this group from my neighborhood by zoning laws.

8. I would prohibit members of this group from voting.

9. I would exterminate all members of this group.

In addition, the present form provided an opportunity for choice daring by including three non-existent ethnic groups (Gandinese, Walloviana, and Veddas). The coefficients of correlation between the original Bogardus and the Sartain and Bell revision tested on 100 students with reference to attitude toward the English, the Japanese, and the Negro respectively are .91, .83, and .78.

In scoring each individual's social distance scale, the total score was derived from the sum of all checked items for each group, each mark being weighted quantitatively from 1 (Item 1) to 9 (Item 9). In this case, it was slightly
deviated from measurement of attitude toward a specific group since the primary focus was the general attitude (total score) toward people as a whole. The higher the degree (score) of social distance, the lesser the sympathetic understanding of people in general, while a lesser amount (score) of social distance implied more sympathetic understanding.
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CHAPTER II

SURVEY OF RELATED LITERATURE

Introduction

A comprehensive perusal of the psychological literature on the area of personal space is futile without devoting a section to animal research. As late as 1966, Robert Sommer (83, p. 68), one of the few renowned psychologists in this field, bemoaned the fact that "almost all of the solid research in this field has been done with animals, and only the barest start has been made in studying human spatial behavior."

Before any formal studies of human spatial behavior had been made, biologists and ecologists had long been interested in the territorial habit of animals, both for academic and practical reasons. Universally, most animal species, including man, have highly specific spatial needs and if these are not met, the animal will not reproduce or live. When the animals in captivity are expensive, such as in a zoo or circus, this is sufficient to alert the owner to undertake research into conditions necessary for their survival. It is then logical that a survey on territoriality in animal kingdom serves as a prelude to the discussion of human spatial behavior.
Territoriality, a basic concept in the study of animal ecology, had been noticed by naturalists as far back as the seventeenth century. However, Howard (41) in his *Territory in Bird Life*, written in 1920, was the first scientist to state the concept in some detail. He identified territory as one of the most indispensable factors in the life of all organisms, and asserted that every species occupies a mosaic system with units of specific size. In many species this simple ownership is not a permanent one but is merely temporary. On this fact the concept of personal space was later formulated. Many important functions in animal social life are expressed in territoriality, "an utterly primitive element of social behavior," according to Hediger (39, p. 54).

Hediger (38), Zurich's famous animal psychologist, discussed extensively these social functions in the animal kingdom and explained succinctly the mechanisms by which they operate. Territoriality, in his conception, insures the propagation of the species by regulating density. It provides a frame in which vital functions are performed: places to learn, places to play, places to eat and places to hide. It coordinates the activities of the group and holds the group together. It keeps animals within communicationg distance of each other so that the presence of food or of an enemy can be signaled. An animal with a territory of its own can develop an inventory of reflex responses to terrain features. When danger strikes, the animal on its home ground can take
advantage of automatic responses rather than having to contemplate where to hide.

From these biological substructures came the beginning of the work of anthropologist Edward T. Hall (32, 33). Hall endeavored to study the structure of experience as it is molded by culture. Collective human spatial behavior as demonstrated in customs and modes, he observes, are not without underlying meaning. It is the group's persistence in maintaining their identity and insuring their survival. Man's use of space, the space that he maintains between himself and his fellows and which he builds around him in his home and office, has been taken for granted. Much irrational behavior could well be illuminated if intelligent knowledge of ecological elements in space could be attained, in that spatial behavior is largely unconscious and unverbalized. Thus, space is the universal language, or to quote Hall's own words, "the silent language." Hall (34, pp. 110-120) even originates a classification system of the distances in man, which he describes in four categories:

1. Intimate Distance (0-18 inches), combine visual, olfactory and thermal sensations to signal unmistakable involvement with another body.

2. Personal Distance (18 inches-4 feet), the distance which comfortably separates individuals.

3. Social Distance (4-12 feet), substantially reduces involvement.

4. Public Distance (12 feet-more), generally outside of the circle of meaningful involvement with other.
The measured distances, according to Hall, vary somewhat with differences in personality and environmental factors, a point where cultural orientation is taken into account. The hypothesis behind the proximic classification system is that (34, p. 120):

...it is in the nature of animals, including man, to exhibit behavior which we call territoriality. In society, they use the senses to distinguish between one space or distance and another. The specific distance chosen depends on the transaction, the relationship of the interacting individuals, how they feel, and what they are doing.

The first breakthrough in systematic study of human spatial behavior was that of Sommer in 1959 (78), who studied the psychiatric patient's use of personal space. He found that schizophrenics reacted to space differently from normal persons. Ease in verbal interactions is affected by the distance between individuals. Unlike normal persons, who prefer to sit opposite one another in a discussion, schizophrenic patients tend to sit side-by-side until that distance exceeds a comfortable range. A change from opposite to adjacent seating by normal persons has been noted at approximately 5.5 feet, which would be classified in Hall's category of social distance (78, 80). Other factors which affect the closeness of chairs in discussion groups are the size of the room, the topic of conversation, and the relationship between the individuals involved.

Sommer's extensive work covers not only psychological problems, but also anthropological and architectural
concerns. He realizes that the institutional field, such as hospital administration, education, or business management, is the clearest connection between environmental form and human behavior. Often decisions regarding physical plants costing tens of millions of dollars are made without adequate information about user behavior. He (67, p. vii) commented:

For too long we have accepted physical forms and administrative arrangements based on outdated views of human activity. We are told that classrooms should have straight rows of chairs so the children will face the teacher, prisoners should be kept in separate jail cells, college students should have roommates, and park benches should be heavy and indestructible so that vandals will not cart them away. With or without a conscious philosophy or explicit recognition of the fact, designers are shaping people as well as building.

Evidently little is known as to how the alternatives in environment affect people.

In educational practice, functional arbitration usually dominates the physical design and facilities in classrooms. It is sad to acknowledge that, throughout the history of education, not much is known about the spatial ecology of seating arrangement within classrooms. The origin of the straight-row arrangement is untraceable, resulting from centuries of use; but it seems likely that it was adopted because it reduced interaction and communication between people in the rows and focused their attention on the front of the room. As early as 1900, John Dewey criticized the fixed row arrangement as antagonistic to the philosophy of experimentalism (63). Much has been written about the
advantages of other types of arrangements, but there are few studies to buttress these recommendations. Classroom seating arrangement is too often beyond the control of the teacher. In most cases, the janitors choose whatever arrangement is most convenient.

Seating arrangement undoubtedly plays a critical role in the overall atmosphere of classroom learning and interaction patterns. Because of the dearth of research studies in this area, a general review of literature is covered regardless of practical and direct relevance to the topic currently studied.

Social Organization of Animal Kingdom

The field study of territory has attracted the attention of biologists and zoologists for many years. Long before psychologists attempted to study human behavior, scientists had focused their attention upon social organization of the animal kingdom. Behavior such as fighting and competition, or group intergration and cooperation, which is clearly demonstrated in colonies of ants and termites, herds of mammals, and flocks of birds, is highly related to territorial habits of the species. Many highly cooperative social groups such as ants and termites, which have no fighting within the social unit, would as a group defend viciously their territory against intruders. With vertebrates, the high degree of harmony within the group never
exists, and some fighting occurs between members of the group for claim of territorial dominance. Animals do not fight for revenge or personal glory. In fact, fighting among them serves the important function of what Eibl-Eibesfeldt called "spacing out" the individuals or groups in the area they occupy (25). It thereby secures for each the minimum territory required to support its existence, prevents overcrowding, and promotes the distribution of the species.

It has been shown that birds fight much more violently in the vicinity of their nests (69). Howard (41) hypothesized that all fighting in birds is "territory" defense. This extreme view was a general reaction from another view held by Darwin, that fighting is primarily in reference to the mate. Craig (19) takes a much broader view that the animal fights in order to gain or to retain possession of that which is of value to him, such as food, mate, or nest. Generally, social behavior of either fighting or grouping within a species is the combined result of heredity and environmental elements.

In studying a flock of domestic fowl, Schjelderup-Ebbe (76) found that the individuals usually arranged themselves in a definite linear order of dominance as determined by pecking. This he called "the pecking order." The order of position was established upon the first meeting between individuals and remained constant until a revolt occurred after which a new constant order persisted, providing that
the rebelling bird was the winner of the fight. When strange birds were introduced into a pen with resident birds, the latter usually took the dominant position by defending territory. Masur and Allee (55) repeated Schjelderup-Ebbe's observations on fowls and extended them to include pigeons. They noticed an effect of spatial relations to dominance. For example, one bird stood higher in the social order when near the food pan and the other when at the entrance to the roost. A series of similar experiments by Bain (3) later verified territoriality to be associated with status. He reversed the dominance relationship by shifting the position of feeding stations in relation to birds living in adjacent areas. As the feeding station was placed closer and closer to a bird's home range, the bird would accrue advantages it lacked when away from its own home ground.

Evans (27) described a social hierarchy in the lizard Anolis, particularly during the breeding season, when sexual fighting was at its height. Winter mating and fighting were induced by injection of sheep pituitary or by antuitrin S. Normal males, castrated males, or castrated females fought and defended territory while normal females did not. A female with atrophied ovaries in January, when injected with testis materials, fought males, but an uninfected female failed to fight.

Noble, Wurm and Schmidt (62) showed that birds fight harder in certain space relationships, thus complicating the
results of the social hierarchy study. They observed the
interesting phenomenon that males, though usually dominant
over females, assumed a subservient attitude in order to
attract the females into their territories. In his study of
canary, Shoemaker (77) demonstrated that social hierarchy
was determined by territory defense. A canary which was
dominant to another in neutral territory normally become
subordinate in the nesting territory of another bird.
Carpenter (15) tested the relative roles of sexual vigor
and dominance in a territorial context and found that even
a desexed pigeon would, in its own territory, regularly win
a test encounter with a normal male, even though desexing
usually resulted in a lesser position in a social hierarchy.
Thus, while dominant animals determine the general direction
in which the species develops, the fact that the subordinate
can win on his home grounds helps to preserve plasticity in
the species by increasing variety, thus preventing the domi-
nant animals from freezing the direction which evolution
takes.

Natural conditions in the wilderness demand more
competition, as well as fighting, simply because the condi-
tions for life are not always optimal. Territorial defense
has to be maintained by most animals in order to insure sur-
vival. Captive animals in cages should be relatively free
from any aggressive behavior if food is abundant. Neverthe-
less, certain types of social behavior do develop among caged
animals. Brown (11) observed fighting among wild mice in the free state and found that social hierarchies were formed in groups confined in small pens. Crowcroft (21) confirmed the observation in caged groups of laboratory mice and suggested fighting to be territorial in function. Each territorial male spent most of its time within its own territory, and frequently a tentative investigation of another area was terminated after a sniff at the threshold of the male's nest box. Davis (22) studied the role of density in aggressive behavior of mice and observed that crowding did increase frequency of aggressive acts. He (23) later studied the social rank of both wild and captive starlings in relation to territorialism and reported that starlings behaved aggressively in the wild the same as in captivity. Starlings did not select and defend an area of land in which the female would build. Rather, the males dominated a nest hole and drove other birds away. Birds of either sex might perch nearby in transit or feed on the ground, but were not permitted near the hole while the owner watched. Davis concluded that the starling had a social rank in the wild, but the subordinate individuals were present only temporarily, thus having a superficial resemblance to territorial behavior. He postulated that territorial behavior is simply social rank without subordinates. However, it only represents, he indicated, one point on a continuum which exists from
situations that are exclusively territorial at one extreme to those that are exclusively social rank.

Population Density on Animal Social Behavior

Whether exclusively territoriality or social rank, the behavioral patterns and social interactions of animals are density dependent. Animals do require a minimum space, a "critical space" of the organism, as it has been termed by Hediger (38), without which survival is impossible. According to Hediger, each animal is surrounded by a series of bubbles or irregularly shaped balloons that serve to maintain proper spacing between individuals. When population has built up so greatly that proper space is no longer available, a crisis develops. In this type of critical situation, the individual becomes vulnerable even to others of the same species, and some are sacrificed to maintain the population balance.

In his study of the crab, Schaffer (75) discovered an interesting self-regulating process of population control. Periodically the crab sheds its shed its shell; thus its only protection in the soft-shell stage is the space that separates it from crabs in the hard-shell stage. Once a hard-shell crab expands its territory, it becomes the predator of the soft-shell crab, thus preventing overpopulation. In his investigation of the complete reproduction sequence of the stickleback fish, Tinbergen (94) was able to observe actual population decrease when he disrupted the complex
sequence. Under highly crowded conditions, males would battle each other until some were physically eliminated.

The experiments by Calhoun (12, 13) on wild Norway rats in a colony have produced considerable insights in animal population dynamics. In twenty-eight months of study, even with plenty of food and no pressure from predatoriness, the rat colony never exceeded 200 individuals when mathematical figures of reproduction rates should have approached 50,000. Calhoun's study unequivocally demonstrates how social behavior that accompanies crowding could have significant physiological consequences.

Generally in line with Calhoun's findings, Archer (1, p. 198) observed the population density to have a direct causal relation to aggression:

As density increases, the reaction is an increase in aggression, so that surplus animals tend to be driven out to less densely populated area. In confined conditions where emigration is not possible, aggression tends to increase even further and may be regulated through the formation of learned dominance hierarchies.

Southwicks (90), in a study of forty rat populations from English corn-ricks, detected a greatly increase percentage of wounded males at high population densities. Rowe, Taylor and Chudley (72) also found evidence of aggressive behavior in high-density rick populations.

The study of grouse by Jenkin, Watson and Miller (43), and song sparrows by Tompa (95) all indicated that
either the fall or spring occupation of territories caused a dispersion of the population in excess of the carrying capacity of the local habitats. The excluded birds might either leave the location and suffer increased mortality through various causes in the peripheral and suboptimal environments, or they might remain as a non-breeding population overlapping with the breeding population, and to some extent, perhaps competing for food and ready to occupy vacated territory as soon as it appeared. Crook (20) pointed out that the work on gulls had shown survival value in terms of reproductive success in occupying the preferred territories in the center of a colony rather than peripheral sites. Coulson (18), in his study of certain colonial seabirds showed that intense competition for central sites in a kittiwake colony resulted in their occupation by heavier birds. Both sexes surviving at least five years from the time of the first breeding were heavier than were their neighbors that died within this time. In the center of the colony there was also a large mean clutch size, higher hatching success, and more fledged young than at the periphery. It appears that spatial dispersion, whether in conventionally territorial or colonial-territorial mating system, involves higher individual survival and better reproductive success for the occupiers of prime sites than for those animals forced to a periphery.
The work of Murton, Isaacson and Westwood (61) has shown very explicitly the importance of socially mediated mortality in British woodpigeon populations. In flocks the feeding rate of these birds was greater in the middle and to the rear than in the van. Only a proportion of pigeons could gain entry to the preferred flock center; others were pushed to the periphery. Those in front were usually hustled and harried by those behind them, ate less, and commonly fled from flock to flock. Under limiting conditions the effect of such behavior led to differential mortality.

It is evident that population density per se, that is, crowding, affects social hierarchy, psychopathology, and mortality rates. Empirical research on animals, done rather comprehensively, tends to support the observation, and this is especially true among the territorial birds, which have been most extensively studied by the biologists. The bulk of information accumulated from animal study, however, will not provide easy generalization and application to human behavior. Dubos (24, pp. 108-109) cautioned:

The readiness with which man adapts to potentially dangerous situations makes it unwise to apply directly to human life the results of experiments designed to test the acute effects of crowding on animals. . . . The problems posed by crowding in human populations are thus more complex than those which exist in animal population because they are so profoundly conditioned by social and cultural determinant.
Research on Leadership and Spatial Arrangement

In addition to providing an impetus for the behavioral scientist to focus on human subjects, research on animals' territorial habits and social organization forms the basis for the study of human spatial behavior. The concept of territory, as it is applied to human ecology, refers not merely to space in a geographic sense, but also to the personal space of the organism, the distance a man customarily places between himself and other people (44). The relationship of human behavior and physical setting indicates that one structures the other, although a cause-and-effect tie is not always definable. One of the assumptions in environmental psychology proposed by Proshansky, Ittelson, and Rivlin (70, p. 32) stated: "Behavior in relation to a physical setting is dynamically organized: a change in any component of the setting has varying degrees of effects on all other components in that setting, thereby changing the characteristic behavior pattern of the setting as a whole."

Early studies of human spatial behavior, mostly in the area of the arrangement of the individual in small groups, used post hoc analysis of data collected for other purposes. Despite consistent and distinct findings obtained in animal research, psychologists seemed reluctant to make the spatial arrangement of people a major independent variable. Beginning with Steinzor (91) in 1950, the use of space as
an independent variables in research becomes more prevalent among psychologists, in spite of the fact that, according to Sommer's estimates (85), at least half the published studies of small group arrangements involved the reanalysis of data already collected. Steinzor noticed a participant changing his seat in order to sit opposite another person with whom he had recently had a verbal altercation, while he was investigating the effect of the intent of verbal behavior in face-to-face groups. He found that in a small group seated in a circle, the greater the seating distance between two people, the greater the chance that they would follow one another verbally. When one person stopped speaking, someone opposite rather than alongside was next to speak, an effect he attributed to the greater physical and expressive value a person had for those opposite him in a circle.

Prior to Steinzor, Harris (36, p. 75) expressed an criticism of certain types of arrangement in group procedure by stating: "To arrange the participants in a semi-circle, the chord of which is occupied by observers, is psychologically bad. The end candidates of the semi-circle are isolated, the central candidate is spotlighted." Intending to test Steinzor's findings against Harris' supposition, Bass and Klubeck (5) re-analyzed their discussion of group data to determine if leadership ratings varied as a function of location in an inverted V or a parallel row arrangement. Inferences from the data revealed inverted V
arrangements, when the effects of a person's outside status were eliminated, the particular seat a person occupied was of negligible importance in determining a participant's tendencies to attain leadership status during the course of the discussion. Nevertheless, the researchers cautioned the considerable confounding factors, including a non-random selection of seats by people of different status levels. Even if the effects did exist, it was shown that the particular seat a person occupied had little effect on the final paper-and-pencil leadership rating he attained during the course of a discussion.

Hearn (37) re-analyzed data collected for his doctoral dissertation ten years later and discovered that leadership style had a significant influence on what was termed the "Steinsor effect." When direction by a designated leader was at a minimum, members of a face-to-face discussion group would direct more comments to those sitting opposite them than to their neighbors on either side; when direction by a designated leader was at a maximum, members of a face-to-face discussion group would direct more movements to their neighbors on either side than to those sitting opposite them; and when direction of the face-to-face discussion group was shared about equally by members and the designated leader, factors other than the spatial factor would determine which would be the underchosen and over-chosen seating intervals.
These results may be explained in terms of eye contact. According to Goffman (31), Hall (33), and Birdwhistell (9), direct visual contact can be exceedingly uncomfortable and disconcerting under ordinary conditions, producing feelings of anxiety in the person upon whom the eyes are directly centered. Since it is not permissible to look directly at a dominant individual at close quarters, the individual restricts his gaze to his immediate neighbors when a strong leader is close by. Argyle and Dean (2) refined Steinzor's expressive contact hypothesis by studying the connection between eye contact, distance, and affiliation. A one-way mirror was used to chart interaction between a naive subject and a confederate who gazed continually at the subject. There was less eye contact and glances were shorter when the people were closer together, and this effect was most pronounced for mixed-sex pairs. They theorized that eye contact was a component of intimacy governed by both approach and avoidance forces kept in a state of equilibrium during any given encounter. When the equilibrium was disturbed by increasing physical proximity or decreasing eye contact, there were compensatory changes along the other dimensions.

Visual contact with the leader seems more important to the other people at the table than physical proximity. Working with discussion groups in a cafeteria setting, Sommer (79) showed that leaders tended to select the head position at a rectangular table and other people would arrange
themselves so that they could see the leader. A similar finding was obtained by Strodteck and Hook (93) who recorded the seating arrangements in experimental jury sessions carried out in Chicago which were not, however, actual court cases. The experimental jurors were accompanied by a bailiff into a jury room that contained a rectangular table with one chair at the head and one at the foot and five chairs on either side (1-5-1-5). The jurors first task was to elect a foreman, and there was a striking trend for the person seated at one of the head positions to be elected foreman. It was also found that the initial choice of seats was not random. Subsequent ratings by all jury members showed that the people at the head chair were considered to have made the most significant contributions to the deliberations.

Communication flow as a function of spatial relationship was emphasized by Leavitt (47) who continued the work of Bavelas (6). The arrangements of individuals consisted of circles where messages went around the periphery, wheels where all the messages had to come into a center hub, as well as Y-shaped and incomplete circle arrangements. After the sessions the experimenter asked each group whether one member had been a leader. About half the group in circular arrangements named someone as a leader, and he was found among all positions in the circle, but 92 per cent of the groups with the wheel arrangements named leaders, and this was invariably the person at the hub. Lott and Sommer (51)
verified the connection:

There is a connection between status and location which is determined both by fixed and relational aspects of the environment, the identification of certain table positions with status levels, as well as the location of another person already seated. The symbolic significance of the head position at a rectangular table confounds any attempt to relate status to physical distance (p. 95).

Howell and Becker (42) arranged groups of five subjects around small rectangular tables with three people on one side, two on the other. Their results indicated that more leaders than would be expected by chance would emerge from the two-man side of the table.

Russo (73) asked college students to rate diagrammed seating arrangements along dimensions of friendliness, talkativeness, intimacy and equality. The ratings along the first three dimensions correlated perfectly, with increasing physical distance indicating less acquaintance, friendliness, talkativeness, except where increased eye contact countered the effects of increased distance.

Studies of the ways in which a person's location influences his status have been infrequent, probably because experimentation requires conditions that are uncommon in nature. Typically, status and location are associated in that prestigious individuals and leaders occupy the best places. Space assignment policies not only indicate the role that people are expected to play, but also make it difficult for people in other locations to exercise leadership. The
type of activity within the group may carry some connotations in the choice of seating and leadership emergence. In cafeterias where casual interaction is usually encouraged, Sommer (81) observed, people tend to prefer corner seating. Less competition within a group decreases less status hierarchy with reference to differential choices of seating. Thus the task of a group implicitly influences the choice of seat as well as group interaction. Hare and Bales (35) indicated that both centrality of seating positions and distance in combination could be used to predict the interaction pattern in a "task" session, which is essentially in line with Steinzor's observation. According to Cohen (17), this, however, would not apply to a "social" session. Cohen found that during the social session, individuals tended to talk more to persons on either side of them, which reflected the pairing modality of Bion (8) and Stock and Thelen (92). Pairing is evident when group members wish to have more intimate conversation, and turn away from the group to speak to the person next to them. This type of behavior is apparently the unexpected behavior for a social session; whereas the subjects in a task session are expected to speak so that everyone can hear and offer to direct their comments to the formal or informal leader.

In sum, although human spatial behavior is activity as well as culture oriented, all the studies agree that choice of seats is universally non-random with respect to status
and personality. Seating structure as an index of personality and attitude become the legitimate questions to ask.

Research on Personality and Social Variables as Related to Spatial Factors

As early as 1931, the sociologist Bogardus had stated, "It is only as social and physical facts can be reduced to, or correlated with, spatial facts that they can be measured at all (10, p. 6)." Since then, research on personality correlates to spatial use has been sporadic. Attempts to relate personality and social variables to interaction distances have, like most other studies relating personality variables to behavioral indices, been less decisive than experimental manipulations of the variables.

Williams (98) showed that introverts place themselves further from other people than did extroverts. A physical distance measure based on the seat a female subject chose in an interview situation with a male was found by Patterson and Holmes (66) to be significantly related to scores on the MPI extroversion-introversion scale. Introverted subjects rated the interviewer as significantly less friendly and showed a strong tendency to talk less and rate themselves as more anxious in the interview. Leipold (48) noted the chair a person occupied vis-a-vis a seated decoy under anxiety and praise conditions. There was greater closeness under praise than anxiety conditions, and extroverts placed themselves closer to the decoy than did introverts.
In a study of the use of distance as a cue in impression formation, Patterson and Sechrest (68) asked subjects, who were to interview other "subjects" which were actually confederates, to rate impressions on the traits of friendliness, aggressiveness, dominance, extroversion and intelligence. The mean ratings across all of the traits indicated that the most distant position yielded significantly lower ratings than did the three closer positions. In closest condition, it was frequently observed that both the subject and confederate made attempts to increase the distance between them. Even the confederates, who were aware of the nature of the experiment and were instructed to remain relatively neutral during the interviews, were obviously uncomfortable at the closest distance.

Fear of rebuke tends to increase individual distance, but approval-seeking reduces it. A shared fear such as that produced by a ghost story reduced social distance (29). It seems probable that an internal threat, some danger originating within the group itself, would increase the average spatial distance between individuals.

One variable most often under examination by psychologists is anxiety. Churchill (16) found a significant correlation between level of anxiety and desire to avoid a leader's seat. This indicates that subjects who have a high level of anxiety wish to avoid the high-talking seats.
Following sessions in which pairs of female subjects rated their impressions of one another, Luft (52) found that estimates of the distance between them were related to their manifest anxiety scores. In six of seven dyads, the individuals having the greater manifest anxiety in each pair judges the distance between herself and her partner significantly closer than did her less anxious partner. The judged distance by the more anxious member was also less than the actual distance. King (46), in a study of small groups of kindergarten children, found that the number of unfriendly acts made by one child toward another influenced the mean distance maintained by the latter from the former in free play situations. This distance could be reduced, however, when a prized toy was placed near the aggressive child.

Seating aggregation in a university classroom was related to racial attitudes. Campbell, Kruskal and Wallace (14) found clustering of Negroes and Whites to be associated with differences in ethnic attitudes in three schools. This might be due to the different ingrained ethnic group's prejudice and perceived dissimilarity of beliefs, which vary systematically along a social distance continuum, a theoretical position viewed by Triandis (96), and Triandis and Davis (97). Both Baxter (?), who made observations in natural settings, and Little (50), who used doll placement in an experimental set-up, confirmed the ethnic group patterns in spacing to be strikingly consistent and different.
Sommer (86) verified the observation, based on his research in five countries, that spatial arrangements can be used as indices of psychological closeness among cultures.

Attitude is generally considered to be developed out of the process of social interaction. Within a social context, Mehrabian (56) has found that the manipulation of degree of liking of an imagined stimulus person produced differences in the amount of eye contact, interpersonal distance, body orientation, and body relation. He further used the term "immediacy" (57) to refer to the cumulative effects of increasing proximity, touching, forward leaning, eye contact, and directness of body orientation between interacting persons. Employing his own scale to measure two personality variables (58), Mehrabian along with Diamond (59) explored characteristic responses to the physical environment. Subjects who scored high on both the affiliative tendency and sensitivity to rejection scales were expected to be most preoccupied with the interpersonal cues and to be least aware of the physical setting in which they interacted with others. One of the determinants of a sociopetal arrangement is the immediate positioning of the furniture, which could be pre-arranged without much notice of the users.

Studies dealing with reaction to the "immediacy" of an intruder have been extensive: Garfinkel (30), McBride, King, and James (54), Felipe and Sommer (28), Sommer (82), Sommer and Becker (89), and Patterson, Mullens and Romano (67).
The experiments, whose methodology is somewhat identical, in general fall into the three categories of territorial encroachment outlined by Lyman and Scott (58): (a) violation: unwarranted use of the territory, (b) invasion: the physical presence of an intruder within boundaries of the territory, and (c) contamination: rendering a territory impure with respect to its definition and usage.

Garfinkel (30) instructed his subjects to select a friend or acquaintance, and in the course of conversation, without indicating that anything unusual was happening, bring his face up to the other person's face. Regardless of whether the pairs were of like or opposite sex, this approach apparently motivated, in both the experimenter and subject, attributions of sexual intent on the part of the other. Attempted avoidance, bewilderment, and acute embarrassment were characteristic, being especially pronounced between males.

McBride, King, and James (54) tested galvanic skin response (GSR) in relation to various amounts of proximity. They found that GSR was greatest when the subject was approached frontally, while a side approach yielded a greater response than a rear approach. Being touched by an object produced a lesser GSR than being touched by a person.

Felipe and Sommer (28) systematically staged invasion sequences under natural conditions, namely, the hospital and the library, and demonstrated observable flight reactions.
They found the first reaction to be one of accommodation or adaptation by turning aside or placing something between the experimental victim and the experimenter when the latter invaded the former's personal space. If this failed to reduce the tension, flight reactions occurred. Sommer (82) noticed that individual readers in the library marked out territories in various ways, both by offensive display or by avoidance procedures. Patterson, Mullens and Romano (67) employed similar procedures in the library, based on "immediacy" concepts. They detected that compensatory reactions, exclusive of actual flight responses, were produced as a function of increasing immediacy by an intruder. This was most clearly indicated by increased leaning or sliding away from the intruder and blocking responses, an attempt to decrease immediacy to a more comfortable level.

In an ingenious experiment to see how people reacted to spatial invasion in public areas, Sommer and Becker (89) had one female experimenter approach people and inform them that they were sitting in her seat. They found that people who had been seated for brief periods did not feel any rights to their chairs and moved away. However, those who had been seated for longer periods, strongly resisted the invasion.

Several studies have involved psychiatric patients' use of personal space. Patterson (65), quoting Sommer's estimate, pointed out that more studies currently in process are on patient populations than on normals. Sommer (78) found that
schizophrenics approached a seated decoy differently than normal subjects did. In discussion sessions, schizophrenics remained more distant from partners than did normals who typically made use of the corner positions of a table. When subjects were told to approach a seated decoy, schizophrenics again differed from normals, tending to sit alongside the decoy rather than opposite him. Sommer hypothesized that schizophrenics may exhibit a distorted concept of personal space which causes others to withdraw. The hypothesis of distorted personal space in the schizophrenic was substantiated by Horowitz, Duff, and Stratton (40). The subject in this study approached nonthreatening inanimate objects, i.e., hatracks, more closely than persons. Schizophrenics, characterized by interpersonal withdrawal and avoidance, tended to place greater distances around themselves than did non-schizophrenic groups. The authors hypothesized through observations that each human being had, as part of his body-image constellation, an internal projection of the space immediately around him, which they called "Body-Buffer" zone. The size, shape, and penetrability of this buffer zone probably depends on immediate interpersonal events, current ego and drive states, and the individual's psychologic and cultural history.

In an ambitious undertaking by Esser, Chamberlain, Chappel and Kline (26), the interaction of schizophrenics on a research ward was studied as a function of the
territoriality of each patient. They found that a person's instability in a dominance hierarchy and his possession of a territory were both related to aggressive behavior. Patients whose positions in the hierarchy were established, but who lacked a specific territory for themselves, did not show aggressive behavior. Those who were very low in dominance generally lacked a territory and avoided any threatening gestures by the more dominant patients.

Research on spatial distance as indices of personality variables is too inconclusive to warrant a dynamic theory. Many attempts have been made in this direction, and yet it is far too early to propose a comprehensive personality theory on the basis of personal space. Physical elements, as correlated with spatial facts, may not be always attainable since one could hardly be equated with the other. However, the interest instigated by Sommer has now been commonly shared by researchers, and the prospect for a dynamic theory seems highly promising.

Classroom Ecology and Seating Arrangements

Personality and social variables of the student within a classroom are of major concern to educators, who are, unfortunately, somewhat ignorant of how they operate in relation to spatial context in an institutionalized learning process. For too long interior classroom space has been taken for granted in education, as if learning occurs in
regimentation and discipline within the closed walls. Unlike a static entity, a classroom is, according to Barker and Gump (4), in fact a "complex ecosystem," a miniature society itself.

Traditionally, the classroom is of rectangular shape with wide windows and straight rows of chairs. Any deviation from this frame would be considered by teachers as a challenge to their authority. However, there have been criticisms of the current set-up, ranging from fostering authoritarianism on the part of the teacher to discouraging students' interaction. Sommer (87, p. 99) wrote:

The straight rows tell the student to look ahead and ignore everyone except the teacher, the students are jammed so tightly together that psychological escape, much less physical separation, is impossible. The teacher has 50 times more free space than the students with mobility to move about. . . . From a student's eye level the world is cluttered, disorganized, full of people's shoulders, heads, and body movements.

Educators, whose main concern seems to lie in student's overt behavior, are not keenly aware of the interrelation between learning and designs, and between education and facilities. Even when the proper facilities are provided, the practice often remains unchanged. The Bureau of Laboratory Schools at the University of Texas had experimented with "work center" classroom furniture which contained a variety of items that could be used for different but simultaneous activities with only half as many individual desks as there were pupils in the room (64). All pieces of
furniture were fully portable and could be moved easily and quickly. When the work center arrangement was evaluated, Sanders (74) found that movable chairs rarely moved in practice. He lamented the seeming unawareness among teachers and administrators of the importance of room arrangements.

Many have opposed the sit-and-learn educational program in which teacher did most of the talking. Lewis (49, p. 29) said, "If teachers are guiding children to do their own thinking, purposing, planning, executing and appraising, as recent educational philosophy maintains, then the classroom becomes a workshop, a library, a museum, in short, a learning laboratory." Such a learning laboratory would undoubtedly require intelligent use of spatial arrangement.

Rolfe (71) believed traditional classrooms with fixed row seating to be unsuitable for group discussions, pupil interaction, and a variety of activities taking place simultaneously. When he compared, within the same school district, activities in traditional classrooms with those in new, larger classrooms with portable furniture, he was quite discouraged by the sameness. Whether a teacher has ample room or little room, fixed or movable chairs, ample or limited storage space, made little difference in individual class activities, teaching methods, or the range of activities. He (71, p. 279) commented:
Space use and learning situations were, in large measure, determined by a pattern of teaching that except for a few deviations was the same in both small and large classroom; a pattern of teaching that persisted regardless of differences in classroom size, features, equipment, or design.

Students have long been conditioned to the straight-row seating arrangement and do not alter the habit even if a change of spatial design is available. Sommer (63) recalled one instance when he moved his class out to the lawn in a spring day. He was disheartened to find the students arranging themselves in three straight rows in front of him.

Much has been said regarding the merits of semi-circular or horseshoe arrangement and rectangular-tables arrangement, and yet the question remains unanswered experimentally. Apparently the criteria are related to the students' needs and educational philosophy. One can show that a democratic student-oriented teacher can elicit more class discussion than an authoritarian teacher, but whether class discussion is desirable or undesirable depends on such factors as the amount of material learned, the content of the discussion, the type of society in which the students live, etc. As Sommer (89, p. 110) pointed out, "it is laudable to make man the measure of buildings, but there is no agreement about which man should be the yardstick."

There is no systematic experiment to test the advantage of one type of seating arrangement over the others. However, there are several studies dealing with classroom ecology,
particularly in such variables as students' participation, interaction, and achievement as it relates to seating arrangement.

Sommer (84) found in a horseshoe arrangement that students directly opposite the instructor participated more than students at the sides. In classrooms with straight rows, students in front participated more than students in the rear, and students in the center of each row participated more than students at the sides.

Norum, Russo, and Sommer (63) examined how people arranged themselves in a task-performance activity. They indicated that the perceived interpersonal relationship between individuals affects how they arrange themselves spatially. It was interesting to point out that both preschool children and college students treated spatial arrangement identically.

Moxey (60) studied the relationship of the seating choice to academic achievement, and found that achievement in class is highly related to choice of seat. Average grade of the students taking the front row is far greater than average grade over succeeding rows. He postulated that some measurable relationship existed between the location chosen and personality factors related to achievement, rather than between achievement and the physical location alone. It seems, then, rational to assume that an understanding of personality and social variables in relation to spatial
arrangement would enhance better understanding of the classroom as a complex man-environment system.

Summary

This chapter is divided into three main sections: general introduction, research on animals, and research in sociology and psychology, upon which the main emphasis is placed.

In the first section, a historical development of man's interest in studying territorial habit is examined. The idea of personal space is introduced since the conceptual framework of the present study is based upon it. The work of Hall and Sommer is frequently quoted to call attention to their extensive contribution in the area of human proximic behavior. The review lays the groundwork for subsequent discussions.

Section two is devoted to animal research because of its comprehensive scope and its relevance to human behavior. Two variables examined in animal research are social organization and population density. Extensive studies on the territorial bird have made it imperative to warrant an individual section here. Cautions have been given with reference to its adequate application to human spatial behavior.

Section three, the main body of the chapter, deals with research done on human subjects. A large portion has been allotted to leadership and spatial arrangement in small groups, as many early studies were done with post hoc
analysis of data collected for other purposes. Several personality and social variables in spatial behavior are examined; among them are introversion-extroversion, social distance, anxiety, attitude and interaction pattern. It must be pointed out that a great numbers of studies have been done in subnormal populations. Classroom ecology is explored, particularly as it is related to learning. Advantages and disadvantages of various seating arrangements have been discussed.

No previous research has attempted to test these intuitive observations. Most research studies in classroom ecology examine other variables. The present study represents the first endeavor to make a systematic comparison among different seating arrangements commonly practiced in education.
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CHAPTER III

METHODS AND PROCEDURES

This study was conducted to investigate the effects of differential seating arrangements upon anxiety level, acquaintance volume, and perceived social distance of the students in college classrooms. Three class groups were assigned to a straight-row seating arrangement, rectangular-tables seating arrangement, and horseshoe seating arrangement respectively. The period of experimental treatment was the first eleven weeks in the spring semester of 1972. Permission was obtained from the College of Education at North Texas State University to utilize student samples for this study.

Description of the Subjects and Classes

There were seventy-six subjects engaged in the study. Their ages ranged from twenty to forty-seven years of age, with a mean of twenty-three years of age. Of the subjects involved in the study, thirty-three were males and forty-three females. Except for three blacks and one Mexican American, all were Caucasians. One foreign student was excluded from the final data analysis. The academic classification of the subjects was as follows; thirty-seven
juniors, thirty seniors, and seven graduate students. All of them had intentions of enrolling in the Teacher Education Program.

The subjects were those students who enrolled in three sections (03, 05, 09) of a course with the title of "The Nature and Conditions of Learning" at the College of Education, North Texas State University, Denton, Texas. The course was designed for juniors and seniors; its official description being "A study of learning—its nature, process, conditions and measurement—with particular reference to the significance of this study for the organization and techniques of education."

The number of the students in each section was twenty-four in Section 03, twenty-seven in Section 05, and twenty-five in Section 09. Section 03, designated Group II, was assigned to the rectangular-tables seating arrangement; Section 05, designated Group I, was assigned to the straight-row seating arrangement; and Section 09, designated Group III, was assigned to the horseshoe seating arrangement. Both Section 03 and Section 05 had a Monday-Wednesday-Friday schedule, while Section 09 had a Tuesday-Thursday schedule. All three sections met in the morning and each section occupied a different room.
Description of the Instructor

For the purpose of this experiment, the focus of student attention was on the instructor. A lecturing teaching method was adopted, with the instructor standing at the front of the class. Under no circumstance did he sit among the students; thus a clear distinction between the instructor and the students was evident. Although class discussions were encouraged, the instructor's position, as well as seating arrangement in the room, remained unchanged.

The instructor was a doctoral teaching fellow with considerable experiences both in teaching and clinical work. He was near the completion of his doctoral program. Because of his major in psychology, he was highly competent and knowledgeable in the subject area. At the time of the experiment, he had taught the same course once in the previous semester.

The instructor was only informed of the experimental procedures. No knowledge in terms of the research hypotheses made in the present study was made known to him, in order to guard against "bracketing the experience as a research experiment (2)." Daily contact with the instructor was maintained since the experimenter was also a doctoral fellow working in an adjacent office. The furniture in three rooms was constantly checked or pre-arranged, both by the instructor and the experimenter.
Description of Experimental Design

A request was made of the Associate Dean of the College of Education for the appropriate rooms with reference to official room assignments for the spring semester. Group II was arbitrarily assigned to Section 03 because of the fixed nature of the furniture in the room. Group I and Group III were assigned by chance to be Section 05 and Section 09 respectively with the flip of a coin prior to the beginning of the semester.

At the very beginning of the semester, the instructor announced to each class that a particularly designated seating arrangement would be observed, and he requested the class to arrange in the pattern originally announced for each class session throughout the semester. Prior to each class period, he made sure that the arrangement met the criteria established. However, he did not assign a permanent seat to each student. As long as the designated seating arrangement was properly maintained during the class period, the instructor was free to teach in any style he chose, or to employ any teaching aids. Arrangement was made with the instructor assuring that all three groups received identical treatment in terms of content covered, procedures applied and teaching aids implemented. An equal pace of course progress was maintained, including the testing. During the weeks of pretest and posttests there was no class test scheduled.
Procedures for Collection of Data

On the first day of class, the instructor announced that he intended to follow a strict rule in a particular seating arrangement in the class. A card was handed out to each student, requesting the following information: Name, Social Security Number, Sex, Age, Nationality, Race, Major-Minor, Classification and Religion. Prior to each test, all classes were assured that the information they provided would be held in confidence and were for experimental purposes only.

All three groups were pretested and posttested with the Taylor Manifest Anxiety Scale, the Acquaintance Volume Scale, and the revised Bogardus Social Distance Scale. At the beginning of the second week, three tests were administered. The Taylor Manifest Anxiety Scale was given in one class period, while both the Acquaintance Volume Scale and the revised Bogardus Social Distance Scale were given in another period. Provision was made to furnish the student class roster for the Acquaintance Volume Scale.

At the beginning of the eleventh week, the identical procedure was applied to the three groups. All the make-up tests were conducted in the classroom session only in the following week so that the intervening variables of the setting and time operated similarly to the original session. Only those students who had completed both the pretest and
posttest were included in the final analysis of data. The attrition rate was very negligible.

Procedures for Analysis of Data

At the conclusion of the tests, data were punched into cards for computer data processing. Computer programs were utilized by the Computer Center at North Texas State University. All the hypotheses were tested for significance of difference by an analysis of covariance with Tukey's A Posteriori pair-wise comparison on three tested variables (1). Covariants were used for the adjusted means in the posttest, aiming to achieve statistical equation among three groups. The .05 level of significance was utilized in determining the rejection region of the hypotheses.
CHAPTER BIBLIOGRAPHY


CHAPTER IV

STATISTICAL ANALYSIS OF RESULTS AND DISCUSSION

Analysis of Data

The purpose of this chapter is to present and analyze the statistical findings of the study. Analyses of the results were made utilizing the analysis of covariance technique with Tukey's A Posteriori pair-wise comparison for differences among three adjusted means. The .05 level of significance was established as the basis upon which the hypotheses would be accepted. Means and standard deviations for all three groups on three variables are shown in Appendix E.

In Hypothesis I, it was predicted that students seated in a horseshoe arrangement (Group III) would have a significantly lower posttest manifest anxiety measure on the Taylor Manifest Anxiety Scale than would students seated in a traditional straight-row arrangement (Group I).

The results of analysis of covariance computed to test this hypothesis are shown in Table I. For this table, the value of a significant difference must equal or exceed 3.17 at the .05 level of significance. It will be noted that the F ratio was not significant. Since the obtained F Ratio
was not significant, further analysis of Tukey's pair-wise comparison on differences between two adjusted means was not warranted. Three adjusted means for Group I, Group II, and Group III are 17.17, 17.01, and 17.88 respectively. This indicated that no difference exists between these two groups treated in different seating arrangements.

TABLE I

ANALYSIS OF COVARIANCE OF ANXIETY SCORES FOR THREE TREATMENT GROUPS

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>74</td>
<td>891.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>72</td>
<td>881.55</td>
<td>12.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>2</td>
<td>9.99</td>
<td>4.99</td>
<td>0.41</td>
<td>0.67</td>
</tr>
</tbody>
</table>

In Hypothesis II, it was predicted that students seated in a horseshoe arrangement would have a significantly lower posttest manifest anxiety mean score as measured by the Taylor Manifest Anxiety Scale than would students seated in a rectangular-tables arrangement (Group II). The results of the analysis of covariance computed to test this hypothesis were shown previously in Table I. Hypothesis II must be rejected since the F ratio did not reach 3.17 for significance at .05 level. The statistical analysis did not warrant further treatment by Tukey's test of significant
differences between two means. The results of the analysis supported the conclusion that there were no significant differences between two groups in decreasing the score on the Taylor Manifest Anxiety Scale.

Hypothesis III stated that students seated in a rectangular-tables arrangement would show a significant greater posttest gain in acquaintance volume as measured by the Acquaintance Volume Scale than would students seated in a traditional straight-row arrangement.

**TABLE II**

ANALYSIS OF COVARIANCE OF ACQUAINTANCE VOLUME SCORES FOR THREE TREATMENT GROUPS

<table>
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<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>74</td>
<td>1144.67</td>
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<td></td>
<td></td>
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<tr>
<td>Within</td>
<td>72</td>
<td>1108.77</td>
<td>15.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>2</td>
<td>35.91</td>
<td>17.95</td>
<td>1.17</td>
<td>0.32</td>
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</tbody>
</table>

The results of analysis of covariance to test this hypothesis are shown in Table II. The F ratio here must equal or exceed 3.17 to be significant at the .05 level of significance. It will be noted that F ratio on acquaintance volume tested in this hypothesis did not reach the established level of significance. Thus there was no need to compare for significant differences between two adjusted means using
Tukey's test. The three adjusted means for Group I, Group II, and Group III are 10.80, 9.21, and 9.53 respectively. It may be concluded that the experimental treatments did not contribute to differences in enhancing acquaintance volume of the students between these two groups.

Hypothesis IV stated that students seated in a horseshoe arrangement would show a significant greater posttest gain in acquaintance volume as measured by the Acquaintance Volume Scale than would students seated in a traditional straight-row arrangement. The F ratio of analysis of covariance as indicated in Table II was not significant at the .05 level of significance. Therefore the hypothesis was not accepted.

Hypothesis V predicted that students seated in a horseshoe arrangement would have a significant lower posttest mean (desirable) social distance score as measured by the revised Bogardus Social Distance Scale than would students seated in a traditional straight-row arrangement.

The results of analysis of covariance computed to test this hypothesis are shown in Table III. For this table, the value of a significant difference must equal or exceed 3.17 at the .05 level of significance. It will be noted that the F ratio was not significant. Since the obtained F ratio was not significant, further analysis of Tukey's pair-wise comparisons on differences between two adjusted means was not warranted. Three adjusted means for Group I, Group II,
and Group III are 40.24, 39.06, and 40.92 respectively. The data do not support the hypothesis. This indicated various treatements of differential seating arrangements do not contribute to significant differences between two groups on the revised Bogardus Social Distance Scale.

**TABLE III**

**ANALYSIS OF COVARIANCE OF SOCIAL DISTANCE SCORES FOR THREE TREATMENT GROUPS**

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<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
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<tbody>
<tr>
<td>Total</td>
<td>74</td>
<td>16156.40</td>
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<tr>
<td>Within</td>
<td>72</td>
<td>16113.43</td>
<td>223.80</td>
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<tr>
<td>Difference</td>
<td>2</td>
<td>42.97</td>
<td>21.48</td>
<td>0.10</td>
<td>0.91</td>
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</tbody>
</table>

Hypothesis VI predicted students seated in a rectangular-tables arrangement would have a significantly lower posttest mean (desirable) social distance score as measured by the revised Bogardus Social Distance Scale than would students seated in a traditional straight-row arrangement. The F ratio of analysis of covariance as indicated in Table III was not significant at the .05 level of significance. Therefore the hypothesis was not supported. A possible trend is suggested in the two adjusted means between Group I and Group II in that Group II seemed to achieve a lower mean
score than Group I (39.06 vs. 40.24); however, the result is not statistically significant.

Discussion of Manifest Anxiety Level

It was predicted in Hypotheses I and II that subjects treated in horseshoe seating arrangements would show significant lower posttest mean manifest anxiety levels than those in traditional straight-row arrangements, as well as in rectangular-tables arrangements. These hypotheses were not supported by the data obtained. That the horseshoe seating arrangement did not prove more effective in lowering manifest anxiety levels than the other two arrangements is somewhat inconsistent with Sommer's speculation (5), though not experimentally substantiated, of the superiority of horseshoe seating arrangement over both straight-row and rectangular-tables arrangements.

Although variables of anxiety have been explored in relation to spatial distance, however, most of the studies were done with anxiety as an experimentally manipulated variable in a highly controlled situation of small group interaction (1, 3, 4). In fact, no previous research has attempted to systematically compare one seating arrangement with the other in a classroom as it relates to anxiety level. Feitler's (2) preliminary finding that students as well as teachers felt most comfortable with a horseshoe arrangement generally did not prove to be experimentally sound, since
he failed to define operationally the variable "comfortable." Evidently his term "comfortable," as it was used in a questionnaire, could not be equated to anxiety level measured by the Taylor Manifest Anxiety Scale.

The failure of horseshoe seating arrangements to be more effective in lowering anxiety level than other arrangements may be partially the failure of the Taylor Manifest Anxiety Scale to measure significant personality differences. Perhaps more appropriate and concrete measures might have shown more differences among three experimental groups than the Taylor Manifest Anxiety Scale. Such significant intervening variables as activities outside the classroom, personal adjustment to school, financial status, etc., may interfere with the results. Most investigators had very poor luck in trying to find minor correlations between anxiety as established by some paper and pencil test, and virtually anything else, as has been pointed out by Sommer (6). In addition, most students had been exposed almost exclusively to straight-row arrangements throughout their school years, and they inclined to feel more at ease in a traditional sense.

Discussion of Acquaintance Volume

Hypotheses III and IV stated that students, both in rectangular-tables seating arrangement and horseshoe seating arrangement, would show significantly greater mean gain
on the **Acquaintance Volume Scale** than students seated in a traditional straight-row arrangement. These hypotheses were not supported. Since the central focus of the experiment was on the instructor, who adopted a lecturing teaching method, daily regimentation in class activities could contribute to the lack of significant differences. It was observed that students in both the rectangular-tables arrangement and horseshoe arrangement tended to stabilize in seating choice shortly after the semester began while students in straight-row arrangement shifted considerably throughout the experiment period. Had the task of the experimental setting been something else, such as small discussion group or group counseling session, the kind of interaction pattern, and, furthermore, the acquaintance volume might be different in relation to seating arrangement. Classroom activity is highly task-oriented, thus minimizing general eye-contact among students. The room used for the straight-row arrangement was somewhat smaller than the other two rooms, which tended to increase spatial density. In addition, the numbers of students in the straight-row arrangement were greater than in the other two groups; therefore choice volume per se was higher. This last factor might account for the higher acquaintance volume in the straight-row arrangement group.
Discussion of Social Distance

Hypotheses V and VI stated that both the rectangular-tables arrangement group and the horseshoe arrangement group would have significant lower posttest mean (desirable) social distance score as measured by the revised Bobardus Social Distance Scale than would the straight-row arrangement group. These hypotheses were not supported. In view of social distance as an index of attitudinal change, it had not always been sensitive, particularly in a task-oriented group where the main concern, as in this case, was academic achievement instead of feeling reactions of a favorable responsive type and understanding among members of the group. It should also be pointed out that the experimental period of eleven weeks may not suffice for any significant change. Again, the teaching style applied to the subjects could contribute to the lack of significant differences among the three groups. Inasmuch as the scale contained nine items of differential choice, the variance tended to be extremely high. A careless or uncorporative subject could fault the results very easily, with a choice range of twenty-one categories and a possible score range of 22 to 198. This was particularly true when the purpose of the experiment was not clearly explained to the class. One such subject was observed after learning that the experimenter was an Oriental.
Summary

The purpose of this chapter has been to present and analyze the statistical findings of the study. The analyses of the results were planned to utilize two statistical techniques: analysis of covariance and Tukey's A Posteriori pair-wise comparisons for differences among three adjusted means. The .05 level of significance was established as the basis upon which the hypotheses would be accepted. The three treatments based on different seating arrangements did not show any significant differences on anxiety level, acquaintance volume and perceived social distance among three groups in college classroom. Interpretations of the results of three dependent variables in experiment were discussed.
CHAPTER BIBLIOGRAPHY


6. __________, Personal communication, 1971.
CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS
AND RECOMMENDATIONS

Summary

The study was an investigation of the effects of differential seating arrangements in the college classroom on certain personality and social variables among students. The three dependent variables, namely anxiety level, acquaintance volume, and social distance, were considered significant factors in overall classroom atmosphere and learning. No previous study, which tried to relate various seating arrangements to these variables, had been done in a classroom. Preliminary guidelines in the literature were pure speculations, still unsubstantiated by systematic explorations. For this reason, the present study attempted to make a systematic comparison among three most commonly practiced seating arrangements in classrooms: straight-row arrangement, rectangular-table arrangement, and horseshoe arrangement. It was postulated that some measurable differences of the tested personality and social factors might exist among these three groups.

The subjects were seventy-six college students of three junior Education classes of approximately equal size taught
by the same instructor and using three different rooms. One class was arbitrarily assigned to rectangular-tables seating arrangement whereas the other two were randomly assigned to straight-row seating arrangement and horseshoe seating arrangement. The instructor, at the beginning of the semester, had announced to each class that a certain designated seating arrangement would be observed throughout the semester. The practice of various seating arrangements was constantly checked and pre-arranged, both by the instructor and the experimenter. The three groups received identical treatments in terms of teaching method, content covered, audio-visual aids, test schedule, and class assignment. The experimental period was eleven weeks.

All subjects, in addition to filling an information card, responded to a pre-and post-test of the Taylor Manifest Anxiety Scale, the Acquaintance Volume Scale, and the revised Bogardus Social Distance Scale during the second and eleventh weeks. The subjects were assured by the instructor that the information obtained was to be strictly confidential and would have no effect on final course grades.

Following the collection and tabulation of the data, the results were analyzed by analysis of covariance and the Tukey's A Posteriori test of pair-wise comparison for significant differences among three adjusted means. The statistical analyses of the data revealed the following:
Hypothesis I was not supported. There were no significant differences between the horseshoe arrangement group and the straight-row arrangement group on the posttest adjusted mean scores of the Taylor Manifest Anxiety Scale.

Hypothesis II was not supported. There were no significant differences between the horseshoe arrangement group and the rectangular-tables arrangement group on the posttest adjusted mean scores of the Taylor Manifest Anxiety Scale.

Hypothesis III was not supported. There were no significant differences between the rectangular-tables arrangement group and the straight-row arrangement group on the gain of acquaintance volume as measured by the Acquaintance Volume Scale.

Hypothesis IV was not supported. There were no significant differences between the horseshoe arrangement group and the straight-row arrangement group on the gain of acquaintance volume as measured by the Acquaintance Volume Scale.

Hypothesis V was not confirmed. There were no significant differences between the horseshoe arrangement group and the straight-row arrangement group on the posttest mean social distance scores of the revised Bogardus Social Distance Scale.

Hypothesis VI was not confirmed. There were no significant differences between the rectangular-tables arrangement group and the straight-row arrangement group on
the post-test mean social distance scores of the revised Bogardus Social Distance Scale.

Findings

1. It was found that college students in the horseshoe seating arrangement class did not achieve an overall significantly lower manifest anxiety level than did those in the traditional straight-row arrangement class on the Taylor Manifest Anxiety Scale.

2. It was found that college students in the horseshoe seating arrangement class did not achieve an overall significantly lower manifest anxiety level than did those in the rectangular-tables arrangement class on the Taylor Manifest Anxiety Scale.

3. It was found that the rectangular-tables seating arrangement applied to students in Group II was not of significant strength to be indicated by greater gain scores of acquaintance volume on the Acquaintance Volume Scale than the traditional straight-row seating arrangement for students in Group I.

4. It was found that the horseshoe seating arrangement applied to students in Group III was not of sufficient strength to be indicated by greater gain scores of acquaintance volume on the Acquaintance Volume Scale than the traditional straight-row seating arrangement for students in Group I.
5. It was found that college students in the horseshoe seating arrangement class did not have significantly lower desirable social distance scores on the revised Bogardus Social Distance Scale than did students seated in the traditional straight-row arrangement class.

6. It was found that college students in the rectangular-tables seating arrangement class did not have significantly lower desirable social distance scores on the revised Bogardus Social Distance Scale than did students seated in the traditional straight-row arrangement class.

Conclusions

It was concluded from this study that differential seating arrangements in college classrooms do not produce any measurable changes on students' anxiety level, acquaintance volume, and perceived social distance.

Recommendations

In view of the findings of the present investigation, the following recommendations are made:

1. In an effort to measure the effects of various seating arrangements upon students, it is recommended that more concrete variables be used as indices of classroom participation and overall learning atmosphere. These include class absenteeism, verbal resentment toward class, and course grade. For example, it was observed by the instructor that students in straight-row arrangement tended to express more
verbal hostility and more absenteeism. The fact that more verbal hostility and absenteeism occurred in the straight-row arrangement group cast some light on the search for classroom coherence and general attitude toward the whole class.

2. For maximum effect, a larger group of subjects is highly recommended, even if several instructors are to be involved in the study.

3. Stricter control of extraneous factors of identical room size and meeting frequency is recommended. This could reduce uncontrollable variables operating in the experiment to a minimum. However, it must be noted that any research on classroom ecology is always confronted with considerable numbers of ecological factors, which are entirely uncontrollable.

4. Since this study investigated only a few dimensions of personality and social factors out of many variables which might have been highly correlated with different seating arrangements, the recommendation is given to similar studies investigating such variables as introversion-extroversion, and frequency of verbal participation in group discussion.

5. Further research in different levels of academic preparation and different class situation is recommended. For the former, elementary and secondary classrooms should be included; for the latter, seminar classes be studied.
6. It is recommended that more sophisticated and better scales to investigate acquaintance volume and interaction pattern be developed.

7. Investigations of instructor's preferential choice of seating arrangements are recommended.
APPENDIX A

CHART OF SEATING ARRANGEMENTS

Group I: Straight-row Arrangement

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\begin{align*}
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  &\circ \circ \circ \circ \circ \circ \circ \\
  &\circ \circ \circ \circ \circ \circ \circ \\
  &\circ \circ \circ \circ \circ \circ \circ \\
  &\circ \circ \circ \circ \circ \circ \circ \\
\end{align*}
\]

Group II: Rectangular-tables Arrangement

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\begin{align*}
  &X \\
  &\begin{array}{c}\circ \circ \circ \circ \circ \circ \\
  \circ \circ \circ \circ \circ \circ \\
  \circ \circ \circ \circ \circ \circ \\
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  \circ \circ \circ \circ \circ \circ \\
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  \end{array} \\
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Group III: Horseshoe Arrangement

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\begin{align*}
  &X \\
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  \end{align*}
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APPENDIX B

TMAS

INSTRUCTION:

This inventory consists of numbered statements. Read each statement and decide whether it is true as applied to you or false as applied to you.

If a statement is TRUE or MOSTLY TRUE as applied to you, mark T in front of the question.

If a statement is FALSE or NOT USUALLY TRUE as applied to you, mark F in front of the question.

Remember to give YOUR OWN opinion of yourself.

Do not leave any blank spaces.
Your Name:

1. I do not tire quickly.
2. I am often sick to my stomach.
3. I am about as nervous as other people.
4. I have very few headaches.
5. I work under a great deal of strain.
6. I cannot keep my mind on one thing.
7. I worry over money and business.
8. I frequently notice my head shakes when I try to do something.
9. I blush as often as others.
10. I have diarrhea once a month or more.
11. I worry quite a bit over possible troubles.
12. I practically never blush.
13. I am often afraid that I am going to blush.
14. I have nightmares every few nights.
15. My hands and feet are usually warm enough.
16. I sweat very easily even on cool days.
17. When embarrassed, I often break out in a sweat which is very annoying.
18. I do not often notice my heart pounding and I am seldom short of breath.
19. I feel hungry almost all the time.
20. Often my bowels don't move for several days at a time.
21. I have a great deal of stomach trouble.
22. At times I lose sleep over worry.
23. My sleep is restless and disturbed.
24. I often dream about things I don't like to tell other people.
25. I am easily embarrassed.
26. My feelings are hurt easier than most people.
27. I often find myself worrying about something.
28. I wish I could be as happy as others.
29. I am usually calm and not easily upset.
30. I cry easily.
31. I feel anxious about something or someone almost all the time.
32. I am happy most of the time.
33. It makes me nervous to have to wait.
34. At times I am so restless that I cannot sit on a chair for very long.
35. Sometimes I become so excited that I find it hard to get to sleep.
36. I have often felt that I faced so many difficulties I could not overcome them.
37. At times I have been worried beyond reason about something that did not really matter.
38. I do not have as many fears as my friends.
39. I have been afraid of things or people that I know could not hurt me.
40. I certainly feel useless at times.
41. I find it hard to keep my mind on a task or job.
42. I am more self-conscious than most people.
43. I am the kind of person who takes things hard.
44. I am a very nervous person.
45. Life is often a strain for me.
46. At times I think I am no good at all.
47. I am not at all confident of myself.
48. At times I feel that I am going to crack up.
49. I don't like to face a difficulty or make an important decision.
50. I am very confident of myself.
APPENDIX C

ACQUAINTANCE VOLUME SCALE

Your Name: ____________________________

Will you please list below the people in this class you know in the following categories:

Intimately
Well
Slightly

I know these people—intimately

I know these people—well

I know these people—slightly
**APPENDIX D**

**SOCIAL DISTANCE SCALE**

Your Name: __________________________

**INSTRUCTION:**
According to my first feeling reaction, I would admit members of each of the following groups (as a class and not the best I have known, nor the worst members) to ONE of the nine categories of the relationship beside which I have placed an X.
(If you are wholly unfamiliar with any of these groups, use your feeling as well as best judgement to select one.)

Regarding these racial groups, I would:

<table>
<thead>
<tr>
<th></th>
<th>Arab</th>
<th>American, White</th>
<th>Canadian</th>
<th>Chinese</th>
<th>English</th>
<th>French</th>
<th>German</th>
<th>Hindu</th>
<th>Indian</th>
<th>Italian</th>
<th>Japanese</th>
<th>Jew</th>
<th>Mexican</th>
<th>Russian</th>
<th>Scandinavian</th>
<th>Spanish</th>
<th>Turkish</th>
<th>Veddah</th>
<th>Europeans</th>
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<tbody>
<tr>
<td>1. Accept a member as my husband/wife</td>
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<td>2. Accept a member as a personal chum in my club</td>
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<td>3. Accept a member as one of my business friends</td>
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<td>4. Share a taxi with a member</td>
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<td>5. Accept a member as a house servant</td>
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<tr>
<td>6. Grant citizenship only to members who adopt our customs and mores</td>
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<td>7. Eliminate members from my neighborhood by zoning laws</td>
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<td>8. Prohibit member from voting</td>
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<td>9. Exterminate members of this group</td>
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</table>
APPENDIX E

MEAN AND STANDARD DEVIATION

FOR THREE TREATMENT GROUPS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Manifest</td>
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<tr>
<td>Pre</td>
<td>21.22</td>
<td>7.82</td>
<td>18.00</td>
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<td>Anxiety</td>
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<td>Post</td>
<td>19.52</td>
<td>7.04</td>
<td>16.71</td>
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<tr>
<td>Acquaintance</td>
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<td>9.17</td>
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<td>Post</td>
<td>44.48</td>
<td>18.99</td>
<td>36.46</td>
<td>13.21</td>
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Dear Mr. Wang:

Thank you for your letter of Sept. 23. I am very pleased to hear of the research design you plan to use. There is indeed a dearth of systematic studies of different classroom arrangements and this condition needs to be remedied. We are building too many expensive schools without knowing what we are doing. I assume that you have seen the chapter on classroom design in my paperback book *Personal Space* (Prentice Hall 1969). There is also a brand new book by Louis Smith and Pat Kieth—-I can't think of the title at the moment--but it has just been published and deals with the evaluation of a "novel" school design. However there is virtually nothing in the book about the arrangement of individual classrooms.

We have conducted a study here—since the chapter in *Personal Space* was written—and I emphasize the natural condition aspect. We are just in the process of writing up the paper so I don't have it available yet. Essentially what we did was enter an instructor's classroom before he arrived and moved the chairs about to form a circular or a horse shoe arrangement. We felt that the janitors had been arranging classrooms according to their educational theories for many years, and so we might as well experiment with ours. We were amazed to see the consternation that this modest rearrangement produced. In virtually all the cases, the instructors or the students immediately rearranged the chairs themselves to form straight rows. I remember some years back taking students in one of my lecture classes out on the lawn on a particularly nice day. I was terribly disheartened to find that they seated themselves in straight rows on the grass!

So the "natural condition" of the University is markedly affected by years of prior conditioning in favor of the straight row arrangement—sit and learn teaching. However I gather that you are going to use an experimental design such as I use in the "Classroom Ecology" article—where the sections originally started out in one of three types of arrangements and then changed in the middle of the semester. If the
instructors are aware of the design, they will also put up with it
and "bracket" the experience as a "research experiment." By this I
mean that they will put aside their references for an authoritarian
sit-and-learn arrangement out of courtesy for your experiment.

I hope that you are going to use anxiety level as a dependent
variable. By this I mean learning how comfortable students feel in
each type of arrangement. Most investigators had very poor luck in
trying to find minor correlations between anxiety as established by
some paper and pencil test and virtually anything else.

I hope that this is helpful. I consider your study a valuable
one and look forwards to seeing the results. I'll enclose a few
reprints that may be helpful. Also I would suggest that you look at
the chapter in Personal Space and also—although there is not much
empirical data there, a chapter by Elizabeth Richardson in the book
Environmental Psychology edited by Harold M. Proshansky et al.

Sincerely,

Robert Soramer
Professor and Chairman
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