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THE RELATIONSHIP BETWEEN AGE AND CONTROL
OF SPATIAL BEHAVIOR:
A FILM STUDY

By

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B.A., University of Montana, 1969

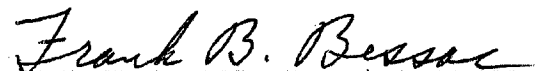
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CHAPTER I

INTRODUCTION

Spatial behavior is the culturally determined, learned way man handles himself in regard to his environment and his personal spatial boundaries. In the process of acquiring this skill, he progresses from a total-contact infancy, through degrees of independence and increasing ability to manage space conduct, to an effective control of all types of space as an adult. Although he uses space dynamically and systematically and understands others' use of it, he cannot define or give explicit rules for the way he uses space because this behavior operates unconsciously.

While no specific "spatial sense," as visual or auditory sense, exists, this behavior does have a sensory basis in that the stimuli evoking his patterned spatial reactions involve all senses in a constant interaction with the environment and with other people. Because perception of thermal, tactile, or olfactory signals stimulate spatial response as well as do visual and auditory signals, a

disturbance of any one triggers compensatory changes in the others. This constant move towards an equilibrium forces everyone to correct deviations that would otherwise disrupt a person's psychic and social processes.

These predictable responses to spatial stimuli are an integral part of normal adult behavior. Through this behavior adults function within their society and handle new situations in an effectual way; however, a child's grasp of this behavior is unstable, developing much slower than his other sensory skills.

This study, based on film observation of children between the ages of seven and fourteen, examines the acquisition of spatial behavior, specifically the correlation between age and control. It looks for the point in childhood that indicates the child uses spatial responses in a purposeful way.

Literature Review

The review of literature and previous research relevant to this study is divided into three general categories:

1. Determinants of spatial behavior.
2. Function of spatial behavior.
3. Cultural basis of spatial behavior.

Determinants

The concept of the extension of the individual into his surrounding environment is not new. Leonardo da Vinci's "bubble" (1938:167), Katz' "snail shell" (1937:96), and Simmel's "personal sphere" (1950:321) all express the notion of man enclosed by a barrier, invisible yet acknowledged as a reality by others. This dimension, recognized more recently as personal space, is that individual and private space impenetrable to others except by permission and/or adherence to established rules. As such, personal space corresponds roughly to within "arm's length," while social space extends to four feet, and business to ten feet. There are near and far limits within each category.

Body posture, voice volume, and eye contact are indicators of actual involvement in an interaction. When an individual violates a spatial dimension, any or all of these variables adjust in direction or intensity to bring the situation back into acceptable patterns.

However, proximity is a product of many determinants. In each social situation mutual adjustments to the pressure of individual variations in age, sex, and status and such variables as topic, place, or degree of friendship, dictate the actual spacing used.

Sex.---Several studies specify sexual differences for adults. Jourard (1964:138) reports more body contact initiated and allowed by females than by males; however, he limited his study to young unmarried adults. Mehrabian (1971:258) in correlating seating preference to affiliative feelings and to sex, notes that while women use more proximity than men, they respond more immediately to feelings of dislike by choosing a more distant seat.

Some early influences that may be responsible for part of these differences are found in studies of American child-rearing practices.

Sears (1957:58) notes that because girl babies are more wanted, regardless of their ordinal position in the family, parents show more affection and feel warmer towards the them than towards boys. The Fischers (1966:937) found girls are considered easier to raise and tend to be treated with more indulgence as reflected in their later weaning age. Clay (1966) also found girls receive more body contact from both parents, and for a longer time, than do boys.

Other than this, no specific data for children by sex exists.

Age.---Children begin life as total contact creatures dependent on others to initiate this experience, but from the age of three months the infant himself uses physical

contact. Buhler (1933:374) notes babies of this age show individual variation in aggressiveness, the more coordinated and physically developed infants taking the initiative in touching behavior.

American children become accustomed to decreasing tactile stimulation quite early. Clay (1966) found deprivation beginning at two years.

The literature examined shows no spatial boundaries for children although Argyle and Dean (1965:295) and Fisher (1958:90) note that normal children maintain a closer distance in all situations than do normal adults. Norum, Russo, and Sommer (1967:278) demonstrated that young children favor side-by-side seating over face-to-face, a choice that reverses with age. However, the children's pattern of seat choice oscillated between too far and too close as judged by adult standards. This was most pronounced in the preschool group, the group age nine to twelve showing a more stabilized distance pattern.

Status.--Individual status and dominance relationships affect physical distances. According to Sommer (1961:104) students do not want to sit next to a professor in a seminar situation and, if forced to, participate less than those sitting further away. As in all situations, the maximum interaction results from a position given both eye

contact and some distance. In conventional classrooms students in the front rows participate the most, those on the extreme ends of the rows and towards the rear of the room, the least. However, in small cramped classrooms the front rows are avoided as "too close." Mechanical barriers such as a lectern or pile of books, set the professor off from the students and counteract this proximity.

Status and dominance relationships also determine how closely people approach each other. King (1966:112) related dominant-submissive traits in school children to their approach behavior. The dominant children approach closer in any situation; the submissive children approach closely only when tempted by a favorite toy.

In their study of sailors in cramped quarters, Altman and Haythorn (1967:170) noted a "cocooning" pattern closely allied to the dominate/subordinate characteristics of the subjects. The tendency to withdraw into a personal space zone, one recognized and respected by others, becomes stronger when aggravated by incompatible personality traits. The dominant partner in these unequal pairs consistently chose and used more of the shared area while the subordinate individuals withdrew to left over territory -- the bed, chair, and the areas immediately surrounding these objects. They

also withdrew from social contact, in effect folding into themselves both emotionally and spatially. Here the usual social system failed and the spatial system functioned to limit aggression.

Relationship.--While the nearest acceptable distance for strangers of the same sex is eighteen to twenty inches, "arm's length" is the preferred spacing. When a boundary is violated and the other person cannot correct this proximity by moving away, he resorts to shielding tactics. He narrows his eyes, looks down, leans back in his chair, smokes, lowers his voice, or puts his hand in front of his eyes.

Hall (1968:93) notes that with friends, however, we use a much closer spacing, even to the point of allowing an overlapping of personal space zones.

Topic.--The influence of topic of discussion is dependent upon the degree of friendship. Because relationship takes precedence in determining distance, close friends comfortably discuss sensitive topics without spatial adjustments but casual acquaintances do so only by reducing physical and visual contact, and by adjusting voice volume.

Situation.--Situations also influence spatial behavior. Hall (1968:93) described boundaries for both public and private situations. Most everyone converses at four to a maximum of five and one-half feet, and misuse of this

distance thwarts satisfactory social interaction. Beyond ten feet space becomes public and the situation becomes either a crowd reaction or space becomes personal with individuals ignoring each other.

Group Structure.--While studying small group structure, Steinzor (1950:552) discovered more interaction occurs with the distant members of a group than with those seated close by. Because satisfactory interaction requires a balance between correct distance and opportunity for eye contact, people tend to converse more with those comfortably distant yet within their line of vision.

Sommer also relates distance to conversational groupings as well as to leadership in small groups (1961:104). He uses these findings to design environments for classroom, dormitory, and hospital designed with spatial behavior in mind. The goal of his "environmental engineering" is to encourage maximum interaction yet provide opportunity for privacy.

Environment.--The arrangement of objects outside and furniture inside buildings inhibits or encourages interaction. Felipe and Sommer (1966:206) report individuals make themselves appear approachable or withdrawn by the position they choose in relation to objects in their environments. A position vulnerable from all sides enhances active socialization, a position at the end of a table or toward the edges

of a room insures solitude, a position at the head-of-the-table gives an aura of leadership.

In public situations where no physical barriers exist, social patterns provide the necessary spatial segregation. Side-by-side or sociofugal public seating etiquette dictates at least one space between strangers. When crowding forces proximal seating, lack of eye contact partially alleviates the discomfort and this lack of eye contact also makes the more sensitive opposite or sociopetal seating tolerable. Long benches without dividing arm rests appear as wasted seating space until sheer density overcomes the fear of proximity. Choosing a seat next to a stranger while others remain vacant constitutes aggressive behavior and invasion of personal space. Sommer's students provoked flight reactions by seating themselves next to a stranger while other seats at the table were unoccupied.

Furniture arrangement in public offices separates the public from the employees. An executive signifies his accessibility by having his desk at right angles to the entrance rather than as a barrier across the room. This also denotes his status because in lower echelons desks are placed as obstacles.

Other Determinants.---People adjust to the discomfort and anxiety aroused in associations with crippled or maimed

persons (Kleck 1969:53), introverted personalities (Williams 1963), and in cases of personal dislike (Mehrabian and Diamond 1971:382) by "keeping their distance." On the other hand, schizophrenics (Sommer 1969:70) violate spatial norms in both directions. When interacting they vary erratically from keeping too much to too little distance between themselves and the other person, most often erring on the long side. Likewise, mentally disturbed children follow a similar pattern (Fisher 1958:88).

Thus, several categories of space are differentiated in the literature. The boundaries of each kind fluctuate as the personal, social, and environmental elements vary. Although an active participant in his society's spatial system, the average man is unaware of these boundaries responding automatically to the discomfort of a violation by adjusting other dimensions of his personal space zone.

Function

Hall (1968:84), using a linguistic model in his analyzation of proxemic behavior, presents it as a form of nonverbal communication. This spatial language communicates through the dynamic use of the space itself. Thus, when man varies the spatial features of a situation, he uses space in a communicative manner and when he violates proxemic norms the result is an unsatisfactory communication.

The primary function of spatial behavior -- facilitating human interaction -- depends upon this reciprocal communication for information about emotions and attitudes. The kind of interaction, whether friendly or hostile, business-like or intimate, is indicated through this spatial language as it conveys dominance, status, and territorial information.

A reverse form of this function, first discussed by Simmel (1950:308) and later by Goffman (1967:66), is the use of space to conceal, a form of privacy maintained by a nonknowledge of each other. Allowing another within personal boundaries gives out too much information of self; behaving in the expected manner for the situation gives out the least information; behaving in an unpredictable manner or one improper to a situation, makes others uncomfortable and actually inhibits social intercourse.

Eye contact, perhaps the most sensitive information source, likewise reveals or conceals. For example, competitors seek eye contact as a way of reading the other's intent and only by avoiding all visual contact can such forced proximal situations as crowded elevators, be endured. Another way we avoid unwanted eye contact in public is by choosing seats around the edges of an area; thus we deliberately avert any accidental involvement from "catching the eye" of a

stranger.

Thus the spatial system eases social relationships through a set of culturally determined norms. All members of a group recognize reciprocal rights and obligations and violation of these not only imparts the wrong information but can also completely disrupt interaction.

Cultural

As early as 1927 Sapir noted as much cultural variation in gestures as there is in language, and in 1941 Efron filmed varying gesture patterns of Jewish and Italian immigrants. These people are from groups designated by Hall as "contact cultures," contrasting with northern Europeans, English, Scandinavians, and Americans as "non-contact."

Hall was looking for the causes of cultural shock when he recognized distance as culture specific (1966:124). His numerous articles and books directed attention to the behavior and emphasized the cultural differences in the way men use space. He coined the term "proxemics" to designate this new area of study.

His informal work encouraged Watson and Graves (1966: 971) to validate his observations by experimental work on the variations between Arabs and Americans. Adult Arab males

use more tactile and eye contact, more voice volume, and in general move closer to each other than do American males. In an informal conversation with a stranger of the same sex, they use a distance Americans consider proper only for cross-sex, personal conversation. This reflects the Arab's high regard for, and the American's suspicion of, male/male friendships.

Jourard (1968:137), observing pairs in public places, counted the number of completed touches in a one hour period. He compared four countries, England, United States, France, and Puerto Rico, that scored respectively, 0, 2, 110, and 180 completed touches during the observation period.

Williams (1966:27) observed a well-defined touch etiquette among the Dusun of Northern Borneo. The males consider touching the head an aggressive act but females observe no corresponding restriction. A sexual difference exists also in denoting restricted tactile zones; the females do so by their clothing and cosmetics while their males indicate these areas through kinesics. These people also apply varying tactile restrictions to different classes of property. Touching private property indicates intention to steal, trespassing on private land is an aggression punishable by death.

Greeting etiquettes vary. Copper Eskimos hit each

other on the head (LeBarre 1947:49), Frenchmen embrace, Americans shake hands.

In our own culture, we can totally contradict our verbal message by gesture, posture, facial expression and spacing. Our tactile taboos inhibit touching others except in special situations -- greeting and farewell behaviors. Other than this, actual physical contact, even between two close acquaintances, is rare, and more so between males than females.

The way we divide our living space, both public and private, expresses our cultural pattern. The American preference for single family dwellings surrounded by open private space is a legacy of our frontier thinking when the supply of free space seemed inexhaustible. The layout of American towns tends to a more or less regular grid system. The European preference for dense housing areas with small gardens hidden away from public view contrasts with this. European city streets grew out of the medieval markets that centered around the town gates. The main arteries funnel out from these entrances to the center of town and the connecting streets circle in a spider web rather than a grid.

Space is a universal human experience varying by culture and it is this cultural style that underlies the cultural shock suffered by those spending some time in

foreign societies. Because of its unstated nature, it is difficult for an outsider to recognize or learn the style and he feels uncomfortable and ill-at-ease in the foreign situation.

Spatial variations exist between animal species as well as between human cultures. In their experimental work with animals, ethologists (Carpenter 1958:229; Christian, Flyger, and Davis 1961:439) discovered definite species-specific boundaries to flight, attack, and territoriality distances. Carpenter's description of the typical group scatter of various primate groups seems akin to Hall's contact and noncontact classification of human societies.

Territoriality acts as a survival mechanism regulating population in the animal world and, together with dominance, helps control aggression and uphold the social order. The animals in Calhoun's (1951:113) experimental studies were abnormally crowded and not permitted the normal relief of dispersal. These unalleviated conditions resulted in deviated sexual behavior or death.

Crowding.--Only in extreme and unusual situations, as arctic or submarine living conditions does man depend on a different way of ordering. The known limits of these situations remove some of the stress but within such forced circumstances, spatial behavior does become an important element in the smooth functioning of the social system.

Modern nuclear submarines provide five cubic yards of living space per man. Even after rigid psychiatric testing during the training period to eliminate claustrophobic-prone individuals, seven percent are rejected during the first cruise because of a "dislike for extreme crowding."

Flight Reaction.---Flight reaction, the response to territorial invasion, is that distance an outsider is allowed to approach before provoking retreat. It is closely allied to the attack reaction because at a species-specific distance, the animal becomes the aggressor and reverses his flight to attack.

Human flight reactions tested experimentally by Williams (1963), and Felipe and Sommer (1966:206), show similar patterns. They discovered the first adjustments to personal space violations are in eye contact or the degree of body orientation. When the experimenters followed up these reactions by moving even closer, over sixty-six percent of the subjects left.

Body orientation strongly influences flight reactions. A frontal approach produces the strongest response, evoking both compensatory and flight reactions, while a dorsal approach yields the weakest response, often handled by compensatory movements alone. Reactions to an approach from the side fall in between these extremes. This suggests eye contact as an influential factor in spacing patterns.

Williams linked personality traits to flight reaction distance, showing that introverted people tolerate less proximity than the extroverted. The study of McBride, King, and James (1965:153), with chickens, and King's (1966:107) work with school children, confirm these findings.

Deprivation.--Over a period of years, Harlow (1959:40) studied the reverse of this problem, or the effects of a complete lack of proximity. His experiments suggest that infant monkeys denied close body contact with their mothers and segregated from their peers, form no normal affectionate ties as adults. They are passive and withdrawn with other monkeys and unable to mate successfully. Of the 145 experimental animals, only four became pregnant. These four mothers respond either by passively ignoring the presence of the baby, or by actively abusing it. They show no protective maternal response; only one has consented to nurse the infant but she continues to mistreat it.

Harlow concludes that contact comfort is a crucial factor in the development of infant love and that deprivation during infancy will permanently impair the animal's ability to have a normal social and sexual life at maturity.

Montagu's discussion of growth and development (1971:216) echos these findings on the human level:

Tactile stimulation appears to be a fundamentally necessary experience for the healthy behavioral development of the individual. Failure to receive tactile stimulation in infancy results in a critical failure to establish contact relations with others.

and on page 217:

The tactually failed child grows into an individual who is not only physically awkward in his relations with others, but who is also psychologically, behaviorally, awkward with them.

The advantages of daily handling of laboratory animals have long been known. Gentled rats utilize food better, have a high resistance to surgical shock (Hammet 1922:221), and various forms of experimentally produced convulsions (Bovard 1954:187).

In marasmus, human infants show clinical symptoms similar to those exhibited by the neglected monkeys. Afflicted infants, put on a "mothering" routine, recovered the lost weight and functioned normally (Ribble 1943:6). Gentling laboratory rats involves picking them up once a day; an aid holds the babies twice a day just before feeding.

Summary of Literature

The distance setting mechanism in humans is a self-correcting system involving all senses in a constant interaction with the environment and with other people. A

disturbance of any variable triggers an automatic compensatory response bringing the situation back into normal boundaries.

Spatial norms vary widely by culture, each society defining proper and improper behavior for its members.

"Noncontact" Americans are uncomfortable with the proximal preferences of "contact" people. Societies are dissimilar in their tolerances of voice volume, temperature and odor perception, and eye contact, with the "contact" people tolerating a greater amount of these variables than do Americans.

The ways we use space while interacting with the environment and with others, is a form of communication through which we share the information necessary for satisfying social encounters. The ability to use suitable spatial norms eases social relationships and communicates personal information.

Human spatial behavior relates to the territoriality instinct in animals but culture highly modifies it. Man no longer depends upon territoriality for survival because his culture protects him from gross spatial invasions and sanctions manipulations to alleviate tensions.

Hallowell (1955:184) emphasized physical closeness and tactile experience as essential to the normal development

of humans:

Spatially, like temporally, coordinated patterns of behavior are basic to the personal adjustment of all human beings. They involve fundamental dimensions of experience and are a necessary condition of psychological maturity and social living.

Montagu (1971:131) draws the same conclusion from his observations:

It appears probable that for human beings tactile stimulation is of fundamental consequence for the development of healthy emotional or affectional relationships.

Buhler's and Sommer's studies suggest a progressive control of spatial behavior through childhood, a movement from the indiscriminate contact of infancy to the selective tactile expression of our culture.

Highly predictable interpersonal physical distances exist for adults who unconsciously manipulate space in all their personal transactions from formal to intimate. However, these are adult norms; none exist for other age groups. While it seems obvious that control does vary with age, the literature contains no investigations of the acquisition of spatial behavior. We have no guidelines on normal development by age or by sex.

Two research questions evolve from this lack in the literature:

1. Does control of spatial behavior vary with age?

2. Does a sexual difference exist in this behavior?

Conclusions

Guided by the preceeding information, I conclude that:

1. This is an unconscious behavior learned during prepubertal years.

2. Tactile contact is a reliable index of the amount of control at any age.

The study as described in the following chapters, is designed to look for a correlation in age, sex, and spatial behavior.

CHAPTER II

PROCEDURES

This study is designed to examine the spatial behavior of grade school children with the specific intent of discovering age and sexual differences in the stabilization of this conduct into adult patterns.

Limited to one type of personal space, it examines physical contact in a public situation, contact is further defined as an actual touch of any part of the body initiated by the subject under observation. The study records behavior while the students line up to enter the school building or board a bus. The study began in September and finished in November 1971.

Prestudy

A prestudy carried out in 1970 had three aims:

1. Overcome adverse reactions to camera and observer.
2. Find a behavior situation that physically lends itself to filming.

3. Find a way to statistically describe the behavior as observed on film.

Wright (1967:41) suggests familiarity as the quickest way to overcome observer reactions with children, but in this study I had the added problem of sensitivity to the camera. These reactions were minimized by allowing the children time to question me and to see the equipment at close range. After spending a few recess periods on the playground, they ignored the camera and went back to their normal play.

The preliminary work indicated the queue situation as the most convenient one to film for the following reasons:

1. It is the one activity in which all participate. It occurs daily in the same place and at the same time.

2. It does not call for special equipment because with the subjects in a line, one stationary camera captures all the activity.

3. Given an acclimitization period, normal behavior can be assumed because the queue is a familiar daily occurrence.

At Central School the queue forms as a line-up bell calls the students into the building following recess periods and lunch breaks. Each grade forms its queue adjacent to its assigned entrance. Opportunity for unsupervised inter-

action arises as the students form the line and wait for the entrance signal. Queuing time varies daily, at times the students wait in line over five minutes, other days they enter the building immediately following the first bell. By the time the second bell rings, one or more teachers are present to monitor behavior, and the students move into the building single-file.

Eighth graders do not queue to re-enter the school building but do form a line waiting for the arrival of a school bus taking them to special classes daily. They spontaneously form a queue at the bus stop, a single-file to facilitate loading.

The study uses Olson's (1930:4) time-sampling method to retrieve information from the filmed record. He first developed this technique to observe autistic behaviors in children. Olson directly observed the behavior for a stated time period and based the individual scores on the number of time units it occurred. Jones (1941:105) later applied it to film studies of psychotic adult behaviors. Sainsbury (1954:742) further refined the technique for use with motion pictures. Thomas, Loomis, and Arrington (1933:105) verified observer reliability and scoring judgment of the filmed material. The two main requirements of the method consist of small time intervals with equal time in

each category.

Although Olson used this method for direct observation, Sainsbury discovered the advantage of repeated viewings shortened the recording period. In his experiment he found eight minutes of movie film produce the equivalent reliability of one hundred minutes of direct observation. The resulting decrease in time and in number of field workers significantly reduces camera reaction.

Three advantages result from the application of the time sampling technique to the observation of spatial behavior:

1. Description of the behavior in quantitative terms.
2. Abbreviated observation period.
3. Accurate, reliable measurement.

General Design and Procedures

Subjects.--The subjects were all students of the second, fourth, and sixth grades at Central School and the eighth grade at Prescott School.

Observation Period.-- The period beginning with the line-up signal and ending as the first child moves into the

building, limited the behavioral situation for the students at Central. They were filmed twice a day following their morning recess and lunch. The Prescott episodes began when two students started a bus queue and ended as the first one boarded the bus.

Data Collection.--One hundred feet of 8 mm color film was exposed for each group. The processed film divided into ten foot sequences, with five units randomly selected from each, yields fifty feet per group for scoring purposes and assures equal observation time despite variance in the queueing time on the days observed.

Scoring Procedures.--The total score for each subject was based on the number of touches completed in each ten foot sequence, or a maximum of forty-five touches per sequence.

After a short practice period, one person easily observed and scored the film (Sainsbury 1954:744). The scorer observed one subject at a time for the entire behavior sequence. A timer activated for 2.5 seconds marked off the time periods. Behavior occurring within a time period received a plus score; if it did not occur, a minus; a check mark on the score sheet designated initiators of cross-sex contacts. Prolonged contacts received one plus in each time block. Only those movements observed as completed were scored. Contact of the subject by another person

was disregarded.

The presence of a teacher or playground supervisor modifies behavior invalidating these episodes for scoring purposes.

The procedure provides an accurate score of the movements, and one readily verified by a second observer. Discrepancies on the scoring sheet call for re-examination of the disputed behavior.

A second observer viewed ten random sections of the film and demonstrated the level of agreement shown in Table I.

Summary of Procedures

A prestudy indicated the feasibility of measuring spatial behavior by the time sampling method. Subjects, filmed as they lined up to enter the school building, were scored for number of contacts completed per child during a stated time interval.

The statistical analysis, treatments by levels and t-tests, indicated the following:

1. There is a significant difference in control by age.
2. There is no significant difference in control

by sex.

Interjudge reliability is established at the .9992 level.

TABLE I

INDEX OF INTER-JUDGE RELIABILITY OF NUMBER OF CONTACTS PER INDIVIDUAL.

Sequence	Judge No. 1	Judge No. 2
1	25	27
2	59	58
3	19	19
4	55	55
5	33	33
6	4	4
7	14	15
8	20	20
9	14	14
10	8	8
$r = .9992$		

CHAPTER III

RESULTS

This research, based on a film study of the spatial behavior of children, was designed to test the correlation between age, sex, and control of this behavior. American adults, described as "noncontact" by Edward T. Hall (1966), rarely use tactile stimulation; therefore actual body contact is a reliable measure of how much command our children have over this conduct.

The data, gathered by filming grade school children as they queue to enter school or board a school bus, yielded the total number of body contact per child. Two hundred feet of processed film, randomly selected from the original research footage, were scored by Olson's time sampling method. The data, tabled by grade level and by sex, were then analyzed. This chapter contains the statistical summaries of this data.

The statistical design, as discussed by Bruning

and Kintz (1968:12, 38) analyzed variance as related to age and sex.

1. Age. Treatments by levels analysis of variance tests the first statistical hypothesis that control of spatial behavior will increase with age. Table II summarizes the differences in total number of contacts both by age and by sex.

2. Sex. t-tests for correlated data test the second statistical hypothesis that control of spatial behavior will vary by sex. These differences are summarized in Tables III and IV.

TABLE II

SUMMARY OF DIFFERENCES IN NUMBER OF CONTACTS BY GRADE LEVEL AND BY SEX.

Source of Variance	SS	df	MS	F ratio
Sex	360.00	1	360.00	2.74**
Grade.	1352.50	3	450.83	3.43*
Interaction.	835.40	3	278.47	2.12
Within Cells	4209.60	32	131.55	
Total.	6757.50	39		

*indicates statistical significance at the .05 level

**indicates statistical significance at the .10 level

The null hypothesis is rejected on the basis of this test. Therefore, the statistical hypothesis that there is a difference in control of spatial behavior with increasing age seems acceptable.

Because the data also indicate an apparent difference by sex at the .10 level, t-tests were used to determine the significance of this difference. (Tables III and IV).

TABLE III

SUMMARY OF DIFFERENCES IN NUMBER OF CONTACTS BY FEMALES COMPARED TO NUMBER OF CONTACTS BY MALES AS MEASURED BY GRADE.

	2&4	2&6	2&8	4&6	4&8	6&8
Both Sexes.	.86	2.27*	1.94	2.30*	1.33	.32
Males . . .	.73	1.92	3.17*	1.74	2.05	2.03
Females . . .	.37	1.14	.12	2.71	.79	2.68

*indicates statistically significant differences at .05 level

TABLE IV

SUMMARY OF MEAN DIFFERENCE BETWEEN SEXES IN NUMBER OF CONTACTS AS MEASURED BY GRADE.

	2	4	6	8
Males vs Females	1.18	1.35	4.62*	4.88*

*indicates statistically significant differences at .05 level

The results summarized in Tables III and IV indicate no significant difference by sex.

Summary of Data Analysis

The data, analyzed by treatments by levels analysis of variance and t-tests for correlated data, indicates the following:

1. There is a significant difference in the age factor. That is, there is increasing control of spatial behavior with increasing age.
2. There is no significant difference in the sex factor. Although the t-tests shows a slight variation by sex, this factor does not make a significant difference to the amount of control at the ages tested.

Summary of data is found in Table V.

TABLE V

SUMMARY OF DATA.

Grade	2	4	6	8	Totals
Males	37 21 13 56 12	7 1 37 9 23	4 4 21 5 6	3 1 3 2 0	
ΣX	139	87	40	9	275
Females	0 4 8 3 41	12 5 18 3 0	0 0 10 0 0	17 5 9 12 8	
ΣX	56	38	10	51	155
Totals	195	125	50	60	430

CHAPTER IV

SUMMARY AND CONCLUSIONS

SUMMARY

A survey of the literature reveals an orientation primarily toward the examination and explanation of adult spatial behavior with little information and no guides for children's spatial behavior. This study investigated control of spatial behavior at the seven to fourteen year level, or that time period during which we could expect children to learn the behavior.

Opportunity for sanctioned body contact is scarce in American culture. Although our children do receive tactile stimulation as infants, deprivation initiated at approximately two years of age accustoms them to a lessening degree of body contact with increasing age. As adults they neither expect nor exchange tactile communication to the extent true in other societies.

Because our adult American norms permit minimal tactile expression, the amount of physical contact used

by our children is an indication of their progression toward an adult control of spatial behavior.

Multifactor ANOVAS analyzed the relationship between age, sex, and control of spatial behavior. In assessing the results these factors must be considered:

1. Small sample size.
2. The likelihood that subjects are not well acquainted. Two circumstances influence this -- timing of the study and the large bus population of Central. It is not primarily a "neighborhood" school.

The study took place during the early weeks of the school year because friendship is such an important variable. The fact that over ninety percent of the children are bused in from other areas further controls this. An investigation at the end of the school year might show corresponding differences in amount of contacting.

Problems encountered during the study altered the original plan to film all four groups at the same school (Central). Although a traditional queueing situation exists for grades one through seven, the principal of Central allows the eighth graders to return to the building at their own discretion. After observing queueing behavior of eighth graders at four other schools, it became apparent that

although these principals do expect the older students to line up, real behavior deviates.

The students tend to arrive at the last minute and walk directly into the building. The few who arrive early do not queue as such, but form conversational clusters composed mainly of females. The males move about the area and do not form groups.

While this behavior is not a comparable one with the queueing of the other groups studied and is therefore excluded, it should be noted that it does approach adult behavior in comparable situations. Adults gathering outside public meeting places, as churches and classrooms, arrange themselves in similar conversation groups.

Only one queueing activity common to all eighth grades was found -- daily busing of each group to special classes. Although they follow the same scatter and cluster pattern while waiting for the bus to arrive, they spontaneously form lines to facilitate boarding.

Filming of the eighth grade group took place at Prescott School during bus queues.

The method used for this study not only measures spatial behavior but has practical possibilities for further research in exploring spatial behavior. It lends itself to replication because the queue activity is common to all

schools. It furnishes a guide for further correlations by age groups. It utilizes economy both in amount of time and number of observers required. It permanently preserves all information because the film record is available for comparison with other groups.

As the accelerated population rate fills up available space, the need for private space becomes as important as the adequate arrangement of public space. The freedom to move away from an irritant is a prerequisite of social life. There is a need for space in the right place although recent experiments with space and submarine habitats show spatial preferences can be adapted to exigencies. The strong influence previous experience exerts on interaction distance indicates new proximate levels could be learned through exposure.

A child's experience of space begins at the territorial level when he must learn which objects and places are open to him. Punished or rewarded in these first explorations he learns to use the approved actions for the appropriate people and situations.

Children, because they do not understand the cues nor how to use them effectively, expose themselves to spatial violations, and in fact, have no control over their own

personal space. Among adults the ability to invade the personal space zone is an indication of the invader's status: medical personnel, barbers, beauticians, and clothing salespeople trespass with impunity. A child has no status and no command over his boundaries. Sommer suggests that children are unable to distinguish between proper and improper proxemic behavior because they do not recognize their own self-boundaries.

Although newborns receive a great amount of close body contact, Clay (1966) found an increased rate for those just walking. Perhaps this reflects their greater need for handling as an aid to mobility and for their own protection, as well as the fact that contacting now is a reciprocal experience. The child can contact on his own initiative and can prolong these contacts.

The steady decline in tactile stimulation from this point, stabilizes when the child himself controls and uses his space in a meaningful way. This gradual weaning from close body contact within the family unit readies him for the independence of school years where he must depend on the outside influence of peers and school authorities to stabilize his spatial patterns. This culminates in the marked decline in contact frequency at age 11.6 to 12.10 as noted in this study.

The child not only learns the sanctioned spatial conduct but also learns to substitute expression, gesture, and dress for tabooed tactile stimulation. Body territory would seem the most sacrosanct of all territories but even here our culture intervenes by restricting our rights through dress and moral codes. Lyman and Scott (1967:243) hypothesize that spatial deprivation in other areas, such as living space, increases the tendency to make full use of body territory through exaggerated forms of dress and dance, and through attempts to escape the body by way of drugs or alcohol. These occur in response to restrictions of individual control of free space.

CONCLUSIONS

There is increasing control of spatial behavior with increasing age; the data discloses an emphatic decrease in peer contact frequency at the sixth grade level, or age 11.6 to 12.10.

If we consider Jourard's score of two contacts as normal adult behavior, and our score of 195 contacts as normal second grade behavior, the sixth grade score of fifty clearly falls into the adult end of the scale having decreased 74.4% between the second and sixth grades.

Therefore, I conclude that the behavior at this age is closer to our nontactile adult standards and that the dependency on physical contact observed in the lower grades is being replaced by other forms of communication. They express themselves more through gesture and expression than through direct physical contact.

There is no significant sexual variance in the control of spatial behavior. Although males in the lower grades contact more than twice as much as females, they exhibit a steady decrease throughout, and both sexes demonstrate a significant drop at the sixth grade level.

The increase in the female contact frequency at the eighth grade level may be a reflection of the adult female behavior described by Mehrabian and Diamond (1972:258) and by Jourard (1964:138); that is, they contact more frequently and use closer spacing than do adult males. However, if female babies are more desired and therefore allowed more body contact for a longer period in infancy than males, it is difficult to explain why their contact rate is less than the male rate throughout the lower grades. It seems likely that a child accustomed to expressing herself tactually would continue to contact at a greater rate than a tactually deprived child.

In seeking an explanation for the rise in female contact frequency at the eighth grade level, the influence of friendship and situation must be considered.

Prescott is a "neighborhood school" in contrast to Central as a "bus school." Students living in the school neighborhood have more opportunity to become well acquainted through after-school association than do bus students.

Busing is a novelty to these students since they live within walking distance of their school. The psychological situation varies also because they are leaving the school building whereas the other groups studied are entering the building.

In considering these conclusions, the following recommendations are made:

1. Replication of the study with larger samples. This sample size was too small to do more than indicate the success of the method and a significant decrease in contact frequency within the age group seven to fourteen.
2. The eighth grade group requires further investigation to find out if the upward swing on the part of females is a real trend or a chance occurrence. Extension of the age groups to include high school is also indicated.

3. Study of adult waiting behavior in public situations to compare with that of the eighth grade group.

4. Areas of investigation for further research:

a) Determinants. Which determinants have relevance for children? What spatial cues do they recognize and respond to? Is eye contact, for example, as important to them as it is to adults or do they depend more on voice volume and gesture? The study of seating choice as related to task (Norum, Russo, and Sommer 1967:64) suggests they do not use eye contact in the same way adults do because their seating preferences are not well suited to visual access.

(1) Activity. Does a child's queue behavior vary when the activity is voluntary, as swimming or movies, rather than a required one, as going to school?

(2) Emotion. What is the effect of emotional states as fear, dislike, or embarrassment on spatial preferences?

(3) Temperature. Do external factors as weather affect proximate patterns? While no attempt was made to correlate behavior with temperature, this was an unusually chilly period. The children huddled close to each other on cold days yet appeared to contact more actively on mild days.

(4) Background. Do children from large families tolerate closer interpersonal distances than those from one-child families? Likewise, do those from crowded urban areas prefer more proximity than rural children?

While studying mother-child interaction Clay (1966) found a class difference in tactile scores, both in frequency and duration. Working class mothers have the lowest scores, upper class mothers the highest. If we accept Harlow's evidence, these tactually deprived children would exhibit a low contact frequency. Following this line of thought, we should find as much variance by culture for children as for adults. The child rearing practices of a society dictate the proximal behavior of its members.

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