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ABSTRACT

FACTORS AFFECTING TERRITORIALITY IN
COLLEGE STUDENTS

By

Judith W. Krupka

Although a great deal of evidence has accumulated from animal data with regards to territoriality, there is very little similar data regarding humans. Most of the data which exists from humans consists of studies of correlations of indices of stress and crowding which would be presumed to involve a breakdown in territoriality. Many of the complaints which college students make of roommate conflicts, crowding in the residence hall, the noise level of the residence hall have their initial roots in a disruption of the student's territoriality. Our lack of understanding of this problem results in our attempting to deal with them by adjusting the student to the situation and rarely considering the possibility of adjusting the situation to fit the needs of the student.

This study represented an attempt to formulate some hypotheses generated by the existing theories and determine by empirical evidence whether or not they were applicable to humans. In particular, the study focussed on what actions constituted invasions of territory, what kinds of responses were made following a perceived invasion of territory, and

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whether or not the quantity of the responses differed from one territory to another within the university setting.

The study itself was divided into two sections. Section A consisted of observations of staged invasions of 96 experimental subjects, in three different kinds of territory, home, interactive and transient. Two other variables, sex and race were considered, and all possible combinations of these three variables were observed, with two replications for each combination. Comparisons of significant gain scores indicated that the sex of the victims results in differential responses to the same situation, with the women more likely to show a decline in activity. The interaction of the location and the victim's sex did affect the frequency and kinds of responses made. In general, male victims were more active, but female victims were more likely to withdraw during the invasion. The male victims were more apt to respond differentially to female invaders in the grill, supporting the likelihood that the grill did serve as an interactional territory. The particular response observed accounted for some of the differences, thus, males in the grill showed more facial responses to invasion, whereas in the library women made significantly more facial responses. Black victims were more apt to make body responses.

The evidence from this study confirms the assertion that invasions of even relatively inoffensive types such as sitting next to some one can be sufficiently stressful as to disrupt an individual's functioning. There is some indication that the amount of reactivity is reflective of the degree of stress, and that that is affected by the sex and the race of the victim as well as the sex and race of the invader, and that these

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in turn are affected by the type of territory where the invasion occurs. It is not possible to say that females are more reactive than men, all that can be said is that under certain conditions, some responses will be more typical of men than women, and that increases or changes in these responses is dependent upon such variables as sex, race and territory.

The second section of the study, Section B, consisted of the responses of 102 residence hall occupants to a questionnaire describing ten hypothetical roommate conflicts involving territorial violations. The students were asked to respond to the questions in terms not only of how they would feel and act in those situations, but as they thought their roommates would feel and act. Men expressed a significantly greater amount of hostility in response to three hypothetical invasions, but it is difficult to determine whether the differences represent a lesser sense of territory among women, hence less willingness to defend it or the result of cultural training which does not permit women to be as openly angry as men. The findings do seem to confirm the generalizations that the student is uncertain of his territory within the room and is not always sure how much of a right he has to express feelings which might be aroused by an infringement upon his territory. Roommates tend to predict their roommate's feelings and responses as slightly more hostile than their own.

The results of the two studies suggests that infractions of territory results in stress, and that college students are not always free to respond as they feel, a condition which might increase the stress.

FACTORS AFFECTING TERRITORIALITY IN COLLEGE STUDENTS

By

Judith W. Krupka

A THESIS

Submitted to
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in partial fulfillment of the requirements
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DOCTOR OF PHILOSOPHY

Department of Counseling, Personnel Services,
and Educational Psychology

1970

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ACKNOWLEDGMENTS

Thanks are due to the anonymous ninety-six college students whose involuntary participation in this study made it possible, and to the one hundred and two others who voluntarily took time from their studies to respond to the questionnaire.

Special acknowledgement must also be made to the eight members of the observing team, J. Elek Ludvigh, Oscar Butler, Irving Williams, David Denton, Trellis Waxler, Mary James, Billye Suttles, and Laura Packman, whose indefatigability made the difficult process of data collection possible. My particular gratitude is extended to one of the team members, J. Elek Ludvigh, who took on the burden of administering the questionnaires.

I would like to express my appreciation to the members of my doctoral committee, Dr. Dozier Thornton, Dr. Max Raines, and Dr. Richard Johnson, for their helpful comments and suggestions which avoided unnecessary difficulties for me, and I am especially grateful to the Chairman of my doctoral committee, Dr. W. Harold Grant, for having the patience and the faith to encourage me to persist.

To my husband, Larry, for his support and encouragement and to my children, Jeri and Eric, for their tolerance during these hectic months, I apologize for this inadequate expression of my appreciation and my gratitude.

LIST OF TABLE

LIST OF APPEN

Chapter

I. INTRO

Ter
Hyp
Def

II. REVIE

III. METHO

Sec
Ins
Sam
Met
Sec
I
Sam
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IV. RESUL

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TABLE OF CONTENTS

Table

LIST OF TABLES

Table

Appendix

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Counseling psychologists in the university often deal with students complaining of anxiety precipitated by such events as roommate conflicts, the crowded situation of the residence hall, the noise level of the residence hall, or their acute awareness of their lack of privacy, all problems whose initial roots can be traced back to a disruption of territoriality. Our lack of understanding of this problem results in a focusing on the separate problems, attempting to deal with them by adjusting the student to the situation and rarely considering the possibility of adjusting the situation to fit the needs of the student. There are purists who would undoubtedly argue that after all, the student's primary concern at the university is to attend classes and gain knowledge, but often the distress which these discomforts elict is severe enough to interfere with his intellectual pursuits. In addition, it is well to remember that the average student probably spends less than fifteen hours per week in the classroom and a significant portion of the rest of his week in an environment other than the class. It would seem to be an act of negligence to overlook the effects of the out-of-class environment.

It is the purpose of this study to determine what actions constitute invasions of territory, what kinds of responses are made

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following a perceived invasion of territory, and whether or not the quantity or quality of responses differs from one territory to another within the university setting. The university is well suited for the study of invasion and defense of territory, because not only does it abound with ambiguous territorial situations with which the student is constantly confronted, but the numbers of people increases the number of possible interactions, hence possible invasions. The student may be more sensitive to the stress of crowding, because one system of protection, territoriality, is less clearly defined in this setting. Depending upon his background, he may be less certain of the appropriate defensive response to make, and even unsure as to what territory is rightfully his to defend.

The theories of human territoriality have been beautifully developed from a paucity of actual data. Most of the studies to date are subject to the criticism of Campbell and Stanley (1963) of being, "carefully detailed case studies compared to hazily remembered prior events." Much of the rationale pertaining to territoriality has been transferred from work with animals directly to humans without any actual evidence. This study represents an attempt to formulate some hypotheses generated by the existing theories and to determine by empirical evidence whether or not they are operable. Thus not only is the study designed to lead to a better understanding of some of the problems confronting college students, but to an understanding of the theory of territoriality as it applies to humans as well.

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To summarize the definitions of territoriality found in most discussions of this theory (Lorenz, 1966; Ardrey, 1966; Sommer, 1969; Wynne-Edwards, 1969), territoriality refers to the tendency of animals to claim a given area or space and by means of either actual combat or more commonly by a ritualistic display prevent other animals of the same species from entering the territory. Behaviors corresponding to this description occur in both the lower animals and man, although the bulk of the data has been accumulated from studies of the lower animals. In subhumans, the territorial convention serves as a very effective force in checking the growth of natural populations, according to Wynne-Edwards (1969). By restricting the number of animals of a single species permitted in a given area, not only is the population dispersed rather evenly over the countryside, assuring an adequate food supply under normal conditions, but any excess population is forced to the perimeter of the habitat, and the population tends to remain at a stable level. Although there is a great deal of variation among the animal species with respect to the size of the territory claimed, the size of the territory required remains remarkable constant within a species.

As mentioned earlier, territoriality has been studied to a limited extent in man, but its primary function seems to be modified, and it would appear to be less important as a population check than as a way of regulating privacy in a highly social system. In his excellent book, Personal Space, Robert Sommer (1969) proposes the theory that the territorial convention acts as a means by which man can effectively control the number or level of interpersonal contacts by the regulation

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In the lower animals, overcrowding invariably tends to result in extreme physiological and psychological stress. Some animals die as a result of the stress and others begin to exhibit bizarre patterns of behavior which tend to interfere with almost all aspects of the animals' lives, including eating, sleeping, and reproduction (Calhoun, 1962). For the lower animals, there appears to be no escape from the harmful effects of overcrowding.

Although there have been no studies of man comparable to these carefully controlled, deliberately set up laboratory studies of conditions of overcrowding, the data which exist would seem to indicate that by means of cultural adaptations, it is possible for man to sometimes escape the stressful effects of overcrowding. Even in those most malignant environments of overcrowding, such as the present-day urban ghettoes or the concentration camps of World War II, the actual impact of crowding upon the individual seems to be less than would be predicted (Stott, 1962; Schmitt, 1966; Winsborooger, 1966; Gans, 1967).

In order to understand the role that territory plays in compensating for overcrowding, it will be necessary to understand some of the basic concepts underlying the theory of territoriality. Hence the remainder of this part of the discussion will concern such concepts as invasion, defense reactions and types of territories. Part of the difficulty which accompanies a discussion of this kind is that there is no single, agreed upon theory; there is not even a common terminology. Therefore, those concepts and definitions which best describe the university setting will be discussed.

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If all animals, including man, claimed territories, and if their claim were recognized and respected by all other animals, the question of territoriality would be of very little consequence. However, this is not the case. Individuals do intrude, sometimes deliberately and sometimes unknowingly, into the territory of another. This intrusion is known as a territorial invasion. In man, in particular, the intrusion can occur in a number of different ways. There can be an actual physical invasion of another's territory. An individual stands too close to another, and the other person becomes uncomfortable. This constitutes an invasion. A student uses his roommate's desk without asking; the roommate finds himself getting angry. His territory has been invaded. Edward Hall (1959, 1966) who pioneered some of the early attempts at systematic research into these problems cites the classic example of the South American business man and his North American counterpart. The South American keeps edging closer and closer to the North American who keeps backing away. The upshot is that the South American is puzzled by the "cold, aloof" northerner, and the North American cannot understand the "pushiness" of the southerner.

Physical invasion is not the only possible type of invasion. Auditory invasion can also be extremely unsettling. An auditory invasion is characterized by the presence of unwanted noise in one's territory. The debate over the development of the supersonic transport is centered around its threat of auditory invasion from its sonic boom. A preliminary investigation by this researcher on factors in campus housing relating to invasion indicated that the uncontrolled noise level of the residence halls was often disturbing to the residents. One

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coed described the effects of auditory invasion very aptly in her reply to the question of where she went when she wished to be alone, "When you want to be alone, a voice down the hall is crowding you. There is no getting away. Always someone is laughing when you want to cry, and it gets damned frustrating."

There are even visual invasions, such as the evil eye, when an individual fixes a stare upon his victim. This technique has been employed by Sommer's students at the University of California (Sommer, 1969) in a series of studies designed to explore some of the aspects of territoriality. There are olfactory invasions as anyone who has ever lived in a highly industrial area can testify. The fumes creep in through closed doors and windows, and there is no escaping them.

When an animal invades the territory of another, there are a number of responses which the victim typically makes. The victim can employ appeasement techniques, and if these are ineffective, can relinquish the territory. In the wolves, for example, Lorenz (1966) describes the victim's behavior in some detail. The victim tucks his tail under his legs and bares its most vulnerable body part, the neck. The effect of this submissive behavior is that the aggressor almost automatically ceases his attack. Another kind of territorial defense would include more aggressive, agonistic behavior. A dog generally barks at strange dogs who enter its territory. A cardinal trills a warning song, whose significance is recognized by other cardinals.

The possible responses in man have not been so well categorized as in the subhumans, perhaps because they tend to vary much more with the individual. The human victim can ignore the invader, and relegate

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him to the role of a non-person. In Japan, one cultural adaptation (Sommer, 1969) which possibly explains that nation's success despite its crowding, is that in large crowds, the Japanese do not usually look at one another, but stare ahead, ignoring physical contacts as well. This "cocooning" behavior seems to have the effect of disregarding territorial invasions rather than actually preventing their occurrence.

Just as in the lower animals, the human victim can capitulate. This seldom has the effect observed in animals of stopping the invasion, and it is generally followed by relinquishment of the territory (Hall, 1966). In a library setting, the victim can respond to an invasion by piling books between himself and the invader or by shifting positions. And, finally, he can employ agonistic tactics, and like the barking dog, ask the invader to withdraw, or retaliate with his own invasion by returning a stare and forcing the invader to recognize him as a person, a response which Sommer feels is often effective in repelling an invasion (Sommer, 1969). With the vast behavioral repertoire at man's command, it is interesting to note that the response is rarely a verbal one. In 80 observations of invasions in the study room of a library, Felipe was asked to move by only one victim (Felipe and Sommer, 1966). This tends to verify Hall's contention that, "we treat space somewhat as we treat sex. It is there, but we don't talk about it." (Hall, 1959)

The final concept to be discussed involves the possible kinds of territory. In the lower animals, the size and the definition of the territory tends to remain stable for a given species of animal, and the responses of the animals to invasions tends to be highly predictable. Thus, we can predict the size of the area that a male cardinal will

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claim as territory, the sets of behaviors which will follow attempted invasions, and the invasion responses which will occur. In humans, the situation is much more complex. We describe one basic kind of territory for animals, the home territory, yet in humans any number of territories have been described. Lyman and Scott (1967) list four types of territories including public territory, home territory, interactional territory, and body territory.

Public territory includes parks and other facilities to which all individuals are presumed to have free access, although not necessarily freedom of behavior. An example of the kinds of conflict which can arise when such a territory is invaded would be the conflict at the 1968 Democratic National Convention between the students and yippies and the Chicago police. An analysis of the events of the conflict as reported in The Walker Report to the National Commission on the Causes and Prevention of Violence (Walker, 1968) reveals very clearly the dynamics and results of territorial invasion. The students and yippies who chose to camp at Grant and Lincoln Parks were using a public territory. To the police, sleeping in the park was not a permissible action, and therefore, constituted a territorial invasion.

To the yippies, however, the parks represented another type of territory, named and defined by Lyman and Scott as a home territory, a public territory which has been usurped by habituees. Regular usage of the territory confers an additional sense of ownership and the habituees are able to exercise more authority in determining who will be permitted to enter the territory as well as what their expected behaviors will be. Since both the police and the yippies could claim the

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parks as territories within their domain, and since both were enforcing different criteria of behavior within the same territory, conflicts were certain to arise. Had either faction relinquished their claim on the territory, that conflict would not have arisen.

The third territory to which Lyman and Scott refer is the interactional territory which is an area where individuals deliberately seek the company of others. A bar would be an interactional or sociopetal territory. In the university setting, the lounges of the residence halls and the snack bars and grills would probably fit the definition of the interactional territory. Just as in the case of the public territory, the types of behaviors and dress which are permissible are regulated by convention. If the functions of an inter-actional territory are proscribed, however, it can stymie the very activity which it purports to foster. An example of how this can happen occurs in a description of a mixer dance as observed by an undergraduate who was present. Originally, the mixer was designed to promote interaction among students, and thus facilitate acquaintance making. Students would dance to records or live music. The more recent mixers, according to the undergraduate, now include two or more heavy rock bands, and the resulting almost unendurable sound level coupled with the psychedelic light shows which accompanied, inhibit conversation and socializing and foster isolation.

The last, and probably most important, territory is the one termed by Lyman and Scott as body territory, which is that space most intimately linked to man. Lyman and Scott are perhaps more restrictive in their definition than most, as they limit body territory to that which is "most private and inviolate" to man. The term "personal space"

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which Sommer (1969) prefers is somewhat broader in its application. Unlike body territory, which seems to refer to the individual's integument and all it encloses, personal space can include not only the body, but the physical space, the "cocoon" or "bubble", or that distance from others at which we feel most comfortable. This physical aspect of personal space is also known as social distance. The encounter of the North American and the South American described earlier is an example of a violation of personal space or social distance. However, personal space can include more than just the physical distance required for comfort. It may represent some sort of safety zone from which perceived enemies or possible threats are restricted. It may well be that this personal space or safety zone is not stable in its boundaries, but is increased or decreased to fit the perceived conditions. The greater the perceived threat, the greater safety zone or personal space required, whether the threat is physical or psychological in nature (Horowitz, Duff and Stratton, 1964).

In addition to social distance which involves touch, personal space can also embody invasions through the other senses. A person seated next to someone playing a transistor radio too loudly can be subject to just as much stress as if he is being approached too closely, and his responses can be just as violent. Some time ago, a man riding on a Philadelphia commuter train reacted to a woman's playing her transistor radio by smashing the radio. In this instance, their actions constituted a mutual invasion of territory. Ultimately, however, it would seem that no matter what the initial type of territory was involved or what the actual invasion consists of, the ultimate territory involved in any case is body territory or personal space.

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In order to better relate the theory to the specifics of the university environment, it seemed necessary to construct a theoretical model of territory type which represents a modification of Lyman and Scott's classification scheme. The public territories of the university would include the grounds around the buildings; the benches, both inside and outside the buildings; the waiting room of the health clinic; and the waiting rooms of the various offices on the campus. These public territories would be predicted to arouse the least response to territorial invasion on the part of the student. It would be predicted that the student would relinquish the public territory more readily than if he were situated in a territory more clearly his.

Home territories would consist of classroom seats, cafeteria tables, study halls or libraries, but because their "ownership" fluctuates during the course of a day, they have been renamed transient territories. Because the question of ownership is more clearly the student's, it would be predicted that the student would be more apt to defend this territory and less likely to withdraw from it.

Related to these home territories or transient territories would be the "permanent" territories, which again have no exact analogue in the Lyman and Scott classification. These permanent territories would include the student's residence hall room and the furniture in it. Permanent territories are the student's as long as he inhabits them, but they represent a territory which must be shared with at least one other person, and once vacated, they cease to be a territory of the student's. In the student's pre-university days, there is a strong likelihood that he lived in his own room, which was part of a larger territorial system,

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his house. In his university room, his territory has shrunk to half a room, and even the territory within that half a room is not clearly allocated to him.

The personal space or body territory would be the only system of territory which would carry over for the student from his old environment to the university, and even that would undoubtedly have to be modified. Because territories are very seldom publicly acknowledged, and because in humans the boundaries are greatly influenced by the culture (Hall, 1959, 1966), the student is continually being forced to compromise territoriality as he has learned it to fit the more ambiguously defined circumstances of the school, while handicapped with the inability to openly discuss perceived violations of territory with his roommate. And the student is faced with the dilemma that the dorm room or apartment where he resides is ostensibly his, but, as it must usually be shared with at least one roommate, parts of the room may shift ownership and fit more closely the definition of home territory.

Although territories have been discussed as if they were separate and fixed entities, it is important to note that since they are defined by their function, their classification shifts as their function alters. Most important, although we speak of personal space and invasion of personal space as though this represented a distinct territory, any invasion of territory represents an invasion of personal space as well, no matter what broader territory is involved. Using the Chicago police and the yippies as an example once more, it can be remembered that the yippies and the students stood on public territory and showered the police with crude weapons and invectives. This was both an invasion of

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public territory, in that to the police, it represented an impermissible action, but it was also an invasion of personal space in that it was an auditory assault. The intensity of the feelings generated by this action was more likely attributable to the invasion of personal space rather than the invasion of public territory.

The major postulates considered in this introduction can be summarized in the following statements: (a) Territoriality serves as a buffer mechanism which maintains the interaction and social contact an individual experiences at a tolerable level. (b) Disruptions of territoriality in the form of invasions can impede an individual's functioning, yet they are seldom considered in attempting to alleviate an individual's distress. (c) The size of the territory or personal space required for comfort varies according to the degree of perceived or actual threat. (d) Differences in culture may also affect the amount of personal space required as well as the willingness to defend it. (e) The willingness of the individual to defend his territory may also depend upon the strength of ownership which he feels about the territory.

A number of general hypotheses suggesting possible approaches to the study of territoriality in the college student can be derived from the above postulates and are presented in the ensuing section.

Hypotheses

Each of the hypotheses listed below is preceded by a brief statement alluding to the variable being tested in that hypothesis. As both observations of actual invasions and student's responses to questionnaires concerning invasions were tested, the hypotheses relating to these separate sources of data will be discussed separately.

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Section A. Hypotheses Tested by Observation of Actual Invasions.

Hypothesis I. Under conditions constituting territorial invasion, the victim will exhibit changes in behavior.

Hypothesis II. Members of different races will show different response patterns under similar conditions of territorial invasion.

Hypothesis III. Members of different races will exhibit systematically different responses to invaders of different races.

Hypothesis IV. Men and women will make different patterns of responses to similar conditions of territorial invasion.

Hypothesis V. Under similar conditions of invasion, victims will show different patterns of responses in the three functionally different territories.

Hypothesis VI. Under conditions constituting territorial invasion, the pattern of responses made is dependent upon the interaction of sex and race of the victim and the invader.

Hypothesis VII. The pattern of responses made by the victim upon invasion is dependent on the interaction of the race of the victim and invader and the function of the territory.

Hypothesis VIII. The pattern of responses made by the victim upon invasion is dependent on the interaction of the sex of the victim and the functional type of the territory.

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Hypothesis IX. The pattern of responses made by the victim upon invasion is dependent on differences in the combinations of sex and race of victim and invader and the type of territory.

Section B. Hypotheses Tested by Responses to Questions Involving Hypothetical Territorial Invasions Related to Possible Roommate Conflict.

Hypothesis X. There will be differences in responses to invasions involving items with clearly defined proprietorship such as clothes compared to invasions involving property temporarily assigned to the student such as chairs or desks.

Hypothesis XI. There will be differences in the responses to invasions dependent upon the sex of the respondent.

Hypothesis XII. The ability to predict possible roommate responses to territorial invasions will be negatively correlated to the amount of reported hostility in the room.

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Definition of Terms

Since some of the terms used by investigators in the field of territoriality are unfamiliar, it seems appropriate to define some of the less frequently encountered terms.

agonistic display. An aggressive reaction to territorial invasion designed to repel the invader.

flight. Relinquishment of the territory by withdrawal from it.

invader. One who violates another's territory, either deliberately or inadvertently.

sociofugal. Inhibits social interaction. The library is a sociofugal setting.

sociopetal. Promotes social interaction. The grill is a sociopetal setting.

victim. Individual whose territory has been invaded.

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CHAPTER II

REVIEW OF THE LITERATURE

One handicap to progress in the study of territoriality and its concomittants, stress and crowding, has been that research in this area is not limited to any one discipline. For example, for the purposes of this review of the literature, sources from ecology, medicine, biology, anthropology, sociology, psychology, urban planning, and even architecture have all had to be considered. Because of this breadth, the review is necessarily incomplete. Part of the omission has been deliberate in an attempt to reduce the topic to a manageable size, but some omissions have undoubtedly occurred because the researcher is simply not equally qualified to judge all the data and has undoubtedly slighted some important studies and overlooked others.

Unlike Gertrude Stein's rose, crowding is social distance is territory is stress is invasion is personal space, and so on. The relationship between these factors is sometimes very nebulous. In one sense, crowding, social distance, territory and stress are separate entities, sometimes having little connection. Thus, there are sources of stress other than crowding, and there is evidence that the conditions which may constitute crowding in one culture may not be crowding in another environment (Schmitt, 1963).

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To further confuse the issue, although crowding is generally considered harmful, there seems to be some evidence that a certain amount of stress and crowding can actually promote survival (Allee, 1958) (Spencer, 1969). Spencer cites the tendency of underfed rats to outlive their well-fed siblings, and also refers to the inevitable decline of laboratory populations of certain animals. Harrison and Montagu (1969) argue that social interaction and the accompanying stress which ensues is necessary for man. Thus, according to them, he is caught between the need for isolation and the reduction in stress and the need for socialization. As long as a balance is maintained, the organism can function, but shifts in the balance can have disastrous consequences. A partial explanation for the paradox to which Harrison and Montagu refer may be that given by Schultz (1965) in his monograph, Sensory Restriction. He concludes that social isolation results in "stimulus hunger", a greatly increased need for contact with others. Increased social distance results in social isolation, and this isolation eventually results in a need for more stimulation and a decreased social distance.

The relationships between stress, crowding, and territory can perhaps be most easily perceived if studied as the components of a regulatory feedback system. Thus, the input stimulus, crowding or social interaction, stimulates the central nervous system which in turn triggers the release of hormones associated with stress, epinephrine (adrenalin) and norepinephrine (noradrenalin). The release of these hormones results in output changes such as changes in heart beat rate, blood pressure, which induce changes in behavioral responses such as

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increased alertness, changes in muscle tonus, and changes in eye pupil size. The organism is then presumably ready to defend itself against the input by some maneuver which removes the source of threat.

In recent review of the literature concerning psycho-endocrine research as it pertains to both animals and humans, Mason (1968) has summarized the result of research in this area. His conclusions are that for humans, at least, there is a wide variety of possible response patterns, and he suggests that in order to facilitate research in this particular area, it has become necessary to shift the emphasis from being concerned with whether most people show hormonal or behavioral responses to stressors to studying the responses of those persons who do respond to stressors. He discusses the many pitfalls of research on human subjects, including the danger of assuming that clinical ratings of the degree of arousal are adequate and accurate and he also emphasizes the importance of analyzing the patterns of the individual's response rather than the averaged responses of a group of individuals.

It would seem that at this point, we must be content with the rather general statement that stress does appear to elicit the production of hormones which trigger off certain physiological responses which in turn trigger off certain behavioral responses, all of which are subject to radical modification by the personality of the individual, the particular culture from which he comes. If stress is to be used as an index of discomfort in this study, and therefore, as a demonstration of the existence of territoriality, the observations must be made on an individual basis. The effects of the variables studied must be assessed on the basis of whether or not they affect the individual, not whether they effect the entire population studied.

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Stress, it appears, produces identifiable changes in the organism, and the logical question would be does crowding induce the same sorts of changes? There is substantial evidence among the lower animals that crowding is extremely stressful. Two classic studies of the stressful effects of crowding and over-population, those of Christian (Christian and Davis, 1956, 1964) concerning the relationship of changes of the physiology in response to increases in population, indicate that increased adrenal weight and the other symptoms of stress pathology accompany increased population density. By comparing rats in individual cubicles to matched pairs with exactly the same amount of living space in one large pen, Christian was able to demonstrate that the density of the population was not nearly so important a source of stress as the frequency of social contacts. Christian also noted a number of symptoms associated with crowded conditions which he concluded were not a direct result of the fighting which did increase, but rather that the increased fighting which was observed was a symptom of the effects of social competition.

Carefully conducted as Christian's study was, it was subject to criticism. Clough (1965) criticized Christian's results on the basis that the animals were laboratory animals and not typical of wild populations. Clough's own studies of lemmings and voles during times of peak populations showed no differences in the weight of the adrenal glands compared to those of normal populations, nor was he able to distinguish voles from very dense populations and those from sparsely populated areas on the bases of resistance to stress or adrenal weight. Clough failed to cite the other significant series of studies conducted at about the same time as Christian's (Calhoun, 1962) which overcame

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the difficulty of dealing with domesticated rats, by studying wild Norway rats confined to a large area of land by fencing. Unlike many ecologists who scrupulously avoided applying results obtained from subhuman data to humans, Calhoun maintained that the pathologies exhibited by his overcrowded rats, cannibalism, increased aggressivity, disrupted maternal care, increased nest abandonment, increased still births, might be ominous portents of the stressful effects that crowding might be expected to have upon human populations even if their food supply remained adequate.

The more recent reviews of evidence of animals seem to support Christian and Calhoun. Errington (1969) likens the responses to a seesaw. When social tensions are high, the birth rate declines, and when the social tensions are low, the birth rate increases. Wynne-Edwards (1969) attempts to clarify the relationship of crowding, territoriality and population control. Crowding which is the inevitable result of increased population induces stress, and territory which reduces the amount of social contact and hence reduces the stress is one of the buffer mechanisms.

The relationship between stress, crowding, and territoriality is by no means as perfectly drawn for man as it is for animals, for a number of reasons. For ethical reasons it has not been feasible to deliberately pen human beings into cages of limited size to observe what happens. The closest naturally existing parallel to this would be the inner city ghetto, but even there the individual can escape crowding on occasion. Direct assays of the content and size of the adrenals is possible only by sacrificing the animal, a practice which is condoned for subhumans

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but which is not permitted for human subjects. It is disconcerting and even unsettling to read the undeniably important contributions by the German anatomist, Stieve, who did note signs of degeneration of the reproductive organs of women prisoners executed during World War II, which he attributed to the effects of stress (Stott, 1962). Direct assays of the presence of either norepinephrine or epinephrine in the bloodstream are not easily obtained, and because the response is so quick and the hormones are metabolized so quickly, the assays are not likely to be accurate (Grinker, 1966). A more indirect technique, which observes the physiological responses induced by the stress hormones, hence is only one step removed, is the use of polygraphs studies which are capable of giving a variety of readings upon a single subject, but even this has its disadvantages. The subject is aware that he is participating in an experiment and it becomes difficult to separate the real effects from the reactive responses. One of the few studies dealing with personal distance which measured the galvanic skin responses, was conducted by McBride and his associates (McBride, King and James, 1965). The experimenters compared the responses of men and women sitting in various degrees of proximity to an experimenter. The GSR was greatest when the subject was approached frontally, least when approached from the rear with side approach intermediate in effect. The GSR was also affected by the distance between the subject and the experimenter. The responses to one foot and three feet were greatest, but distances greater than that did not elicit significant responses. The criticism mentioned earlier of the subject's being aware that he is participating in an experiment must certainly be taken into account in this study.

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The majority of the studies pertaining to crowding and territory in humans have been more indirect. The data comes from four major sources, correlational studies, anecdotal records, observations and interviews, each with advantages and each with limitations. Correlational studies of high density areas which are commonly used by urban planners have given mixed results with no one being very certain as to their meaning. A typical study of this type was an ambitious attempt by Winsborooger (1966) to establish the correlation between indices of public record which he assumed to be most likely to be symptomatic of the kinds of pathologies Calhoun associated with overcrowding in rats. Among the nine indices which Winsborooger chose, were infant mortality, incidence of TB, amount of public assistance required. After equating for such variables as amount of education and income, Winsborooger could find only one measure, infant mortality, which showed a direct relationship with density. The limitations of this type of study are evident. Not only did Winsborooger fail to interview any of the residents of the high density neighborhoods to verify the conclusions he drew from his studies, in removing the variables associated with poverty such as income, he may have been removing crowding as well. Jacobs (1961) in her classic, The Death of American Cities, has stressed the tendency to confuse high density which she defines as the number of dwelling units on the land with overcrowding which refers to the number of people within individual dwellings. As Jacobs notes, the two are not necessarily synonymous. Indeed, areas of low income can have fewer dwellings than more affluent high density areas, but the dwellings themselves may be vastly overcrowded. And finally, Winsborooger has not produced any evidence that the measures he selected are, in fact, indices of stress.

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A second means of measuring the effects of crowding is the anecdotal record. One of the first references to the possible effects of crowding upon humans to appear in a scientific journal (Plant, 1930) is based on anecdotal evidence. Plant did not claim to present any empirical evidence that pathologies could result from crowding, but he did suggest five possible "mental habits" which he felt might be aftermaths of crowding, among them a loss of individuality and the mental strain of having to get along with others constantly. Grootenboer (1962), a Dutch psychiatrist, also relied on case histories as evidence for the effect of crowding upon child development. Following World War II, Rotterdam had a severe housing shortage, and Grootenboer claimed to have a number of patients who displayed symptoms of babyish behavior, a non-acceptance of authority and whose background indicated that much of their aberrant behavior could be traced to their living in a home with two generations and families living in it. The resulting inconsistencies in discipline and the lack of privacy were felt by Grootenboer to be decisive in shaping the disturbed behavior in the children.

The remaining studies have either utilized observations of subjects' behaviors in natural conditions or conditions designed to simulate natural conditions or interviews and questionnaires which allow the subject to report his reactions and responses to various hypothetical situations. Both of these techniques are subject to criticism, the first, because the subject is not often consulted in attempting to explain his behaviors, and the second, because the only source of information is from the subject and is only as accurate as he wants it to be.

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A number of books dealing with the subject of human territoriality have been published in recent years. Lorenz (1966) attempted on the basis of his work with animals to analyze human behavior in terms of animal behavior. The Territorial Imperative, by Ardrey (1966) also consists of some imaginative use of animal data, but because of his failure to produce some tangible evidence directly relating to man, his book has been subjected to a great deal of criticism on the part of some scientists (Crook, 1968). Morris' book, The Naked Ape, has been criticized for many of the same reasons which apply to Ardrey's book, yet on the basis of very recent studies of man, it would appear that Ardrey and Morris may be vindicated. One of the few attempts to put men into cages was made by Altman and Haythorn (1965, 1967) who studied the spatial relations of pairs of normal males who were socially isolated for ten days compared to the relations of those subjects from matched non-isolated groups. Observations were in five-minute samples of time. Altman and Haythorn not only were able to chart the establishment of territory by the roommates over the ten day period, they were able to identify patterns of territory establishment which were linked to personality traits of the subjects. Four dimensions of personality were tested, two which were associated with interpersonal relationships, high need for affiliation and low need for affiliation, and two which were associated with ideas and objects, dogmatism and the need for high achievement. Incompatibility on the interpersonal traits tended to result in high degree of territory on the part of the roommates, whereas incompatibility on need for dogmatism or achievement did not result in any unusual territorial behavior. This supports the assumption that territory serves as a buffer reducing the number of social contacts.

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McBride (McBride and Foenander, 1963), one of the few researchers who has worked with the lower animals and then attempted to apply his results to subsequent investigations upon human aggressiveness in a study of domestic fowl found that dominance shaped the development of territory, and further found that once the dominance hierarchy was stabilized, aggressive displays diminished. Introduction of strange fowl always resulted in aggression, and they observed that the establishment of territories was an effective way of avoiding encounters with strangers. A study by Esser and others (Esser, Chamberlain, Chapple and Kline, 1965) indicates that the same relationship may hold for humans. Patients in a mental ward were observed and ranked on a dominance hierarchy had complete freedom of the ward and did not seem to establish a territory, nor did they display any overtly aggressive behavior. Patients in the middle third of the hierarchy were more restricted in their range, and were apt to set up territories in areas which enhanced their chances for interactions with others, but patients in the lower third were extremely restricted as far as their freedom to move about the ward. They set up territories in secluded areas which had a low chance for interaction.

With the exception of mental wards which have a captive group of subjects and school situations which also have captive participants, opportunities for surveillance of human subjects for long periods of time are relatively limited. Just as researchers have unflinchingly struggled to overcome the handicaps of having to rely on indirect evidence as to the effects of crowding, they have also been compelled to surmount the handicaps of studying crowding in the absence of the degree

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of crowding to which Calhoun was able to subject his rats. As a result most of the evidence dealing with humans purporting to deal with territoriality is more concerned with facets of personal space or social distance which is more restricted in its scope than territory. This has occurred because one way of circumventing the difficulty of insufficient crowding is by invading the personal space on a one-to-one basis assuming that the kind of reaction which this stimulates is indicative of the kind of reaction which crowding might be expected to engender. Thus, if it is possible to establish the effects of invasion of body territory as being stressful, it might be assumed that in the absence of compensatory mechanisms, crowding which would by definition involve a high level of personal space violations would be presumed to exert similar effects.

Another tactic which has been employed is to observe whether individuals do observe some sort of a distance convention which can be shown to be regulated by the amount of threat perceived or the type of interaction desired by the individual. The earlier studies of social distance followed the latter strategy and these studies were generally concerned with establishing the existence of social distance and the nature of its effects. Steinzor (1950) noted that interaction among members of discussion groups was not random, but appeared to be a function of the relative positions of the participants. Those persons sitting next to one another were not as likely to interact with each other as with persons sitting opposite them. Winick and Holt (1961) studied the interactions of members of therapy groups and concluded that the position of the chairs were important indicators of the relationships

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existing within the group, and Hare and Bales (1963) also noted that the seating did effect the interaction, but they suggested that this might be due in part to a greater tendency on the part of more aggressive individuals to choose seats which afforded them the best opportunity for interaction.

Once it had been established that social distance might be related to interaction, the next questions to logically arise were those dealing with the factors which modified the relationship by either facilitating it or impeding it. Sommer (1959) conducted a series of significant experiments in the staff dining hall of a mental hospital. They are significant for two reasons: (a) Unlike many of the previous studies which tended to be scatter gun in their approach, they represented systematic attacks on the questions and problems associated with interaction, stress, and the regulatory mechanisms such as territory and social distance, and (b) Sommer avoided the danger of experimental subject reactivity by moving his research to natural settings. The first in the series of studies consisted of observations of the kinds of interactions taking place and the seating arrangements most frequently associated with them. Sommer noted that there were significantly more interactions taking place between persons sitting in a corner to corner arrangement which would reduce the distance between the individuals than with those who were sitting face to face. The second stage involved requesting the subjects to perform conjoint tasks and observing the preferred seating arrangement. Normal subjects chose the corner arrangements again, but schizophrenics generally preferred more distant arrangements. Having established a theme, Sommer then studied the

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effect of sex upon seating arrangment preferences, and found that the results were no longer as simple or direct. For example, he found that women chose a high proportion of side by side seating arrangements, yet the greatest amount of interaction still occurred with the corner arrangements. Schizophrenics were much less consistent, choosing positions which were either too close to the partner or too far away.

One of the conclusions to be drawn from Sommers data is that in situations where interaction is desired the subjects tend to pick the seating arrangement which facilitates this, and in those situations where interaction is not desirable the subjects select seating arrangements which minimize interaction. Based on the studies discussed, it is possible to predict the physical approaches which are most apt to arouse the person approached. The GSR studies by McBride corroborate the observational data in that the most reactivity is induced by face to face confrontations. Argyle and Dean (1965) found that the amount of eye contact is an important factor in effecting interaction. They also found that at those distances which arouse the least reactivity, people tend to sit across from one another, an arrangement which would overcome the distancing effect. At those distances which are much closer, one to three feet, the subjects tend to sit side by side, a position which reduces the eye contact and also the interaction. Horowitz, using floor tiles to measure the scale, studied normal and schizophrenic subjects and asking the subject to signal when he felt uncomfortable because of the presence of the experimenter, delineated a "body-buffer zone" which increased for people in authority and which decreased for inanimate objects and which was also decreased between

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people who liked each other. Subjects were able to stand closer to lifesize photographs than to actual persons and were also able to stand closer to persons with their eyes closed than open. The schizophrenics required greater distances than the normal subjects. In comparing the responses of adults to childrens, Horowitz found that the amount of distance required by adults was greater than for children.

The effects of increased distance between persons interacting upon their preferred seating arrangements was studied earlier by Sommer (1961) with results contradicting Argyle and Dean's. At distances of one to three feet apart, the subjects sat opposite one another. At distances of 3-1/2 to 6 feet, they sat side by side.

Little (1965) asked subjects to manipulate figures on a board according to whether they were friends, acquaintances or strangers and according to whether they were at the office, home or street corner, and found that friends were significantly closer than acquaintances and strangers were significantly farther away than either of these two. Distances maintained between acquaintances and strangers were apt to vary more with the situation. When subjects were required to arrange actors according to the same stipulations, the results were the same. Little's study has the disadvantage of being removed from the subject's own responses, and the danger that responses may really be measuring the ability of the observer to note what he thinks may happen, not what he has observed to happen at some time in the past or how he would feel most comfortable.

Earlier in the discussion, two strategies of exploring territory somewhat indirectly were described. The evidence discussed so far has

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been descriptive of expressed preferences for distances as effected by type of interaction desired, the amount of perceived threat, the amount of eye contact, and in the case of Little, the effect of levels of acquaintance and the territory where interaction is presumed to occur. The alternate strategy, suggested by Sommer (1969) involves use of natural settings with deliberate violations of social codes of distances. The major study in this category (Felipe and Sommer, 1966) and the study which serves as the major inspiration for this current investigation, involved two different settings, a mental hospital and the study room of a library. In the mental hospital, Sommer approached male patients who were alone and attempted to remain within six inches of them for twenty minutes. His controls consisted of lone male patients whom he did not invade. Sommer was primarily concerned with the length of time the victim stayed in place. Thirty-six percent of the victims left in two minutes, half of them had left within nine minutes, compared to only eight percent of his controls. At the end of the twenty minute observation period, sixty-four percent had left, yet only one-third of the controls had departed. In addition, Sommer noted visible signs of agitation and increased anxiety on the part of the victims of the invasion.

Felipe's victims were lone female subjects in a non-social environment. In her portion of the study, observation periods were thirty minutes in length, and her treatments ranged from maintaining a distance of three inches from the subjects to maintaining a distance of two empty chairs between her victim and her. Again, she found that increased withdrawals occurred with any kind of invasion, but the

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percentage was greatest when she was sitting closest to the subject. Only one-third of those invaded from the range of three inches remained seated, compared to seventy-three percent of those invaded from any distance other than the closest, and eighty-seven percent of the controls. Although she noted some of the accompanying reactions, her primary emphasis was also upon the percentage of withdrawals. Felipe and Sommer's studies suggest several points of departure. One difficulty in obtaining data is that the invader also served as his own observer, a difficult task, because it is apt to alert the victim to the possibility of his being used in experiment and thus introduces the possibility of reactivity. Still another restriction which Felipe and Sommer imposed upon their study was the restriction of the observations to victims of like sex. In addition, there was no attempt made to discover the reactions of the victims other than broad generalizations and overt expressions.

A later study by Sommer (1967), also involving the study room of the library, presents some evidence that in the library where interaction is not desired, students tend to take positions which minimize the possibility of interaction. For example, those coming into the room alone generally sit alone, and even if the density of the room rises to a level which forces the student to pick a table which is already occupied, he generally will sit as far away from the other occupant as possible. Results of questionnaires which Sommer administered indicate that the students are aware of the significance of their choice of a seating arrangement, and some had even gone so far as to develop defensive strategies designed to repel the possibility of invasions.

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Despite the opportunities which the university offers in terms of available facilities for research, the presence of many subjects, there have been very few studies dealing directly with the relationship of the college environment of the student's territorial behavior. One very recent study (Eigenbrod, 1969) deals with the relationship of the student to his environment. Students on experimental floors of campus housing were permitted to make changes in their room furnishings and the decoration of lounges and establish a greater sense of territory. The results indicated that the student's increased control over their own environment had a positive effect on their behaviors within that environment. The floors where territory was encouraged had less damage and fewer disciplinary referrals than control floors.

There are a few studies relating to the university environment which point to its influence upon the student's behavior, but these are concerned with the effect of the classroom size and shape upon the students' participation in class (Sommer, 1969) or with preferred seating arrangements for performing different kinds of tasks involving interpersonal relations (Norum, Russo and Sommer, 1967), but as yet the studies for the most part have not dealt with the effects of the residence hall upon the student's comfort, and Sommer states that most of the information regarding architecture are based on aesthetic arguments with little real understanding of the possible effects of fitting students into cubicles (Sommer, 1969).

Few recent books purporting to deal with the concerns of the college students deal with the effect of the college environment. One study by Sommer (1968) which suggests that students are forced to invent

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ways of coping with bad environment concerned a survey of studying places at the university campus. A substantial number of students elected to study out of doors even though there were not any really suitable facilities. The reasons they cited included the need for places to study for short periods of time between classes when it was inconvenient to return to the dormitory or go to the library, but also to seek relief from the cramped dormitory facilities and library carrels. One of the values of this particular study by Sommer is that not only does it point to tangible improvements in physical facilities which the university can provide, but it affords evidence that even in the relatively uncrowded atmosphere of a college campus, the pressures of unlimited social interaction make the student uncomfortable enough to escape the environment, even momentarily.

The literature can be summarized rather briefly. Although social interaction is usually beneficial to the organism, overcrowding or unlimited interpersonal interaction appears to result in stress and accompanying physiological and behavioral responses which reduce the stress. Humans limit social interaction by territorial defenses and buffers which tend to reduce the reactivity to the presence of another and thus lessen the stress. One factor associated with territory or personal space is that it is very seldom overtly recognized, therefore humans are sometimes faced with feelings aroused by violations of territory, yet unsure as to whether it is really permissible to deal with them overtly. The university setting is sometimes discounted as to its effect upon the behavior of the student, because measures such as grade point average, college drop outs do not seem to be affected by crowding or territorial

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This study which represents a modification of the methods used by Felipe and Sommer (1966) attempted to clarify some of the effects differences in sex, race, and type of territory have upon the responses a victim is likely to make. In addition, questionnaires relating to feelings and responses engendered by hypothetical invasions of territory which might occur in a dorm room were used in order to assess the function of territory.

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CHAPTER III

METHODS

The most promising approach to determining factors effecting territoriality in college students seemed to be a modification of Felipe and Sommer's study of the effects of invasions upon the victim. The following modifications of their original design were made. Whereas Felipe and Sommer served as their own observers and invaders, it was deemed desirable to use teams of observers, in order that one person would be free to act as the invader, while the other observed the reactions of the victim. The index of stress which Felipe and Sommer used in assaying the effects of invasion upon victims was the comparison of the number of withdrawals made by victims as compared to lone controls who were not invaded. For this study, the observations were extended to include a variety of postural and verbal responses in addition to withdrawal. The observation times Felipe and Sommer used were from twenty to thirty minutes. In order to avoid the possibility of habituation, the observations were reduced to include five minutes of actual invasion preceded by a five-minute pre-invasion observation period and followed by a five-minute post-invasions observation. This had an additional benefit; knowing they needed to remain only five minutes had the effect of lowering the invader's anxiety to a tolerable level. And finally, obtaining base rates of frequencies and kinds of responses obviated the

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Further modifications involved introduction of additional variables to the design. Felipe and Sommer were concerned only with the responses made by like sex victims. In this design, interaction of sex and race were taken into consideration. In addition, assuming that Lyman and Scott's system of classification of territory is correct, the responses made in one type of territory might be expected to vary from those made in another type of territory, and it was decided to test not only Russo's original target, the library, but also a form of interactive territory, the campus grills, and an intermediate type of territory, the classroom lounges.

One important territory, the dorm room, is omitted in this part of the design because of the difficulties presented by staging invasions within a dorm room as opposed to some more anonymous territory on the university campus. Nevertheless, it was felt that this particular territory represented such an important aspect of the students environment, an aspect about which very little is known, that some attempt to measure territory within the dorm room appeared to be necessary. For that reason, a second stage was added to the design which consisted of a questionnaire describing ten hypothetical roommate conflicts involving territorial violations.

The students were asked to respond to the questions in terms not only of how they would feel and act in those situations, but as they thought their roommates would feel and act.

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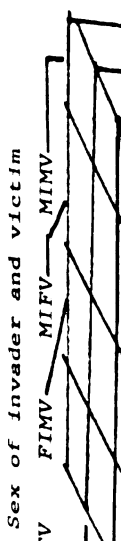

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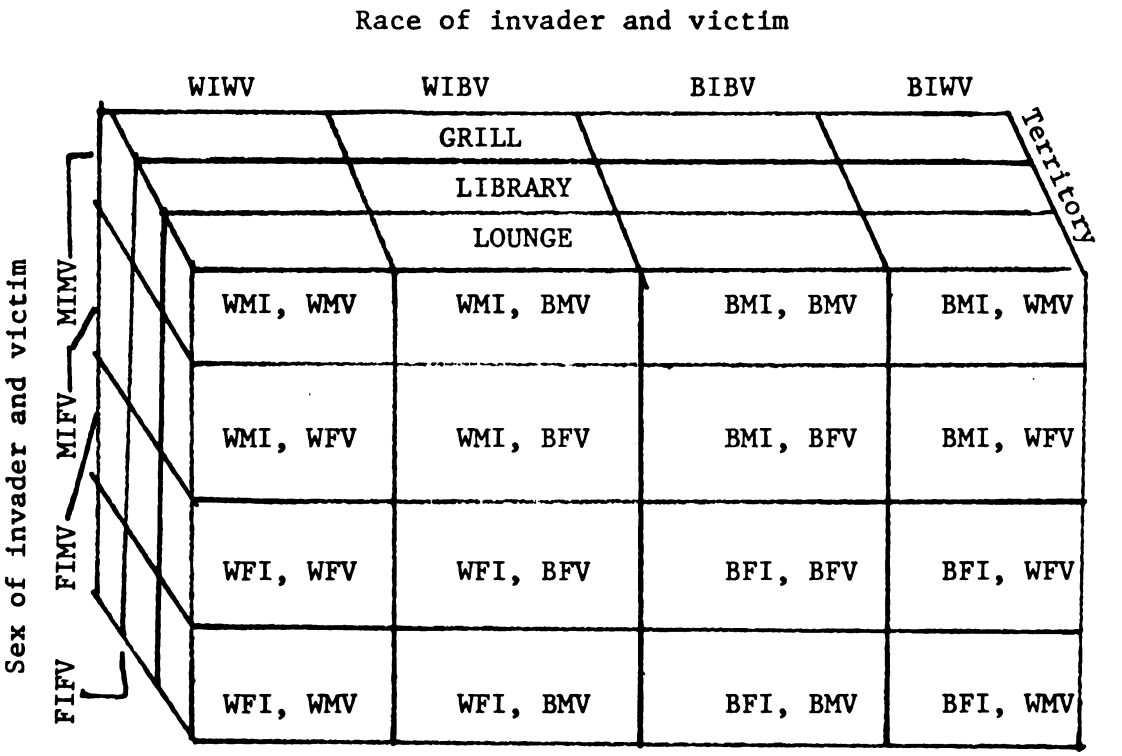
In order to distinguish the methodology associated with these two facets of the design, they will be discussed separately.

Section A. Observations of actual invasions.

The invasions were carried out by four teams of trained observers, undergraduate and graduate students, under conditions which simulated natural circumstances. As mentioned earlier, three different variables were selected for testing, and all possible combinations of these variables were employed. The result was a three-dimensional design as pictured in Figure 1.



Symbols. W = white, B = black, M = male, F = female, I = invader, V = victim.

Figure 1.--Combinations of Sex, Race, and Type of Territory

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Because each team consisted of a male and a female of the same race, each team could only make invasions which called for the invader to be of the race of the team. The result was that each team observed all possible combinations of sex and race of the invader and victim which the makeup of the team permitted, or a total of eight combinations per setting. Because two teams of each race were employed, each cell of the design had two replications.

In order to establish a measure of the inter-rater reliability, 18 of the possible 96 observations made had two observers from different teams observing an invasion. The estimate of reliability was obtained by means of Ebel's measure of reliability formula (Ebel, 1951). The following reliabilities were obtained for each of the indices pre-invasion, during invasion, and post-invasion.

TABLE 1.--Inter-rater reliability measure

Index	Pre-invasion	During	Post-invasion
Head	.83	.65	.80
Arm	.41	.07	.45
Hand	.74	.42	.89
Body	.83	.08	.35
Leg	.25	.19	.14
Foot	.23	.47	.87

As can be seen in Table 1, the measure which maintained the highest reliability among raters was head movements. Both body and hand movements which had relatively high reliabilities dropped sharply

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during the invasion proper. All reliabilities declined during the invasion with the exception of ratings of foot movement and increased in the post invasion observations.

The three types of territories studied included: a) public territory, in this case, defined as the waiting room of the campus health clinic and two large public lounges which are located in classroom buildings. The lounges of the residence halls were not used, as it seemed likely that they represented a territory more akin to an interactional territory; b) transient territory, consisting of the study tables in the main library and its branch annexes; and c) interactional territory, which was for the purposes of this study defined as the grills located in each of the campus residence halls.

In the public territory, the procedure involved singling out a victim sitting alone on a bench or sofa which was capable of accommodating more than two persons. The invasions were conducted only when the lounges were uncrowded enough to provide alternative seating for the invader. The observers generally selected the victim while the invader remained outside the territory to be invaded. The observer then described the location of the victim to the invader, and then found an inconspicuous vantage from which to record the victim's responses. Following the five-minute pre-invasion observation, the invader approached the victim and sat down next to him, maintaining a shoulder distance of about six inches. At the end of five minutes, the invader departed, and the observer continued with a post-invasion observation period of five minutes. In order to minimize the possible effects of the time of day upon the invasion, the observations were scattered throughout the day.

In addition, the territory observed was also selected in a non-fixed pattern which insured a constant number of observations for each territory but did not require that all observations for a given territory be made in a unit.

The procedures for both the transient territory and the interactive territory were essentially the same as for the public territory. The setting had to have alternative seating available, and the victim selected had to be sitting alone. Again, the observer picked an inconspicuous location which afforded good visibility and recorded visible responses on the part of the victim.

Instrumentation

Selection of the observers. The observers were graduate and undergraduate students, majoring in some field of social science or related behavioral science. Although they were trained insofar as rating, invading and selecting victims were concerned, they were not apprised of the nature of the study, and were not familiar with the rationale for the selection of either the victims, the invasion procedure, or the selection of locations. An additional qualification observers required and which was not originally considered, was the ability to cope with hostility which might be directed toward them by either victims or bystanders. One of the original eight observers dropped out early in the training period, because she was unable to handle her anxiety during invasions, at least partly as a result of having become the object of some jibes from the occupants of a table adjoining the one she was invading.

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Training of the observers. Because this study represents several departures from Felipe's procedures, and because such variables as sex and race were introduced, the anticipated reactions of the victims were largely unknown. This presented some problems in terms of constructing usable data collection sheets, setting up the training sessions and even determining the behavioral criteria to be observed. Some of these difficulties were overcome by having the observers meet separately with the investigator, at which time each observer was given a detailed set of instructions regarding their duties (Appendix B). Any questions which arose at that time concerning ambiguities of the instructions were discussed. At that point, it was not possible to predict the length of time which would be required to collect the data, nor was it possible to predict what the observers or the victims' responses might be to the invasions. At this stage, the teams were instructed to make a total of two trial observations in each of the three situations with each member serving one time as an observer and one time as an invader. The four teams then met for the first training session. At this point, it was found necessary to make certain modifications in the original study. It had been intended for the observers to make minute-by-minute observations of the victim's behavior, but this did not prove feasible, and instead, the observations were collected in five minute blocks of time. It had also been assumed that for such short invasion periods, relatively sensitive measures of responses such as changes in eye-blink and eye-contact would be necessary. However, two difficulties arose. First, in order for the observer to be close enough to note accurately these small units of behavior, he ran the risk of sensitizing the victim to

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the fact that his actions were being observed. In addition, the changes in behavior which occurred were gross enough so that less finite behaviors could be disregarded. In addition to frequency counts of classes of responses, the observers entered written comments upon responses or behaviors which could not be adequately described by frequency counts, and also described the general behavior of the victim throughout the three observation periods.

At the time of the first training session, subsequent to their having made the trial observations, the observers discussed difficulties they were having in identifying responses and the definitions of the categories of responses were agreed upon. They then observed two staged invasions and recorded the responses. Immediately after the first staged observation, the responses and their frequencies were recorded and compared for all observers, and difficulties in classifying responses were settled.

The second training session, conducted one week after the first, served primarily as a means of assessing the ease or difficulty in collecting observations. It also gave the teams a chance to compare notes and get ideas for making the invasions more naturalistic.

As the observers' instructions indicate, the behavior of the invaders was standardized in that they were not allowed to make any conciliatory responses and were told to ignore the victim as much as possible (Appendix B).

The time required to make the observations turned out to be much longer than envisioned. Although the observations only lasted fifteen minutes, the actual time required for a team to locate a victim, find

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an appropriate location for the observer averaged nearly one hour per invasion with some invasions requiring only about twenty minutes and others several hours of searching before a victim meeting the requirements could be found.

Measures of responses. The system used to record behavioral data received serious attention. Students of animal behavior are many, but it is somewhat easier to describe the behavior of subhumans because they seem to be more standard in the expression and more limited in the potential repertoire at their disposal. Very few attempts to systematically observe and record small units of human behavior are found. Hall (1963) established a notation system for recording human behavior which is distinguished by its complexity. He analyzes postural behavior along eight dimensions with appropriate symbols for each dimension, but his system seemed likely to lead to error in notation by the observers.

Scheflen (1964, 1965) has suggested that although the number of behaviors in a human's repertoire appears to be limitless, the patterns of behaviors can be analyzed in terms of the messages they convey. Scheflen has relied heavily on motion pictures as a source for recording human behavior as this allows him to repeatedly examine small time segments of behavior in order to establish both the meaning and the pattern. Although it is true that movies of invasions probably afford some of the most error free records of data, there are disadvantages which caused movies to be dismissed as possible source of data. It becomes very expensive and furthermore, the difficulties with adequate lighting and the need to conceal the camera presented more difficulties than would be solved by the introduction of the camera.

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Eventually, it was decided to break down behavior into a number of bodily responses the frequencies of which were checked in the appropriate columns of the data collection sheet (Appendix, A). The following response categories were found easiest for the observers to sort the responses into:

1. Withdrawal -- The victim vacates the territory within either the invasion period or during the five-minute period following invasion.

2. Verbal responses -- Originally it had been intended to break these responses into unfriendly and friendly, but as the only verbal responses which did occur were friendly, it did not prove necessary.

3. Facial changes -- All changes in facial expression such as frowning, smiling, grimacing, were recorded under face.

4. Head turns -- These generally involved some measure of eye contact, or turning to glance at the invader.

For purposes of simplifying the analysis of the data responses 3 and 4 were treated together.

5. Arm movements -- Any movements involving the upper arm and shoulder were counted as arm movements.

6. Hand movements -- Any movements involving the forearm and hand were counted as hand movements.

7. Leg movements -- Any movements involving the leg above the ankle were considered to be leg movements.

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8. Foot movements -- Any movements involving the foot below the ankle were considered to fit in this category.

9. Changes in overall body position -- Any movement involving the torso was recorded as a body movement.

Sample

The population of victims was drawn from the student population at Michigan State University. Because the prospective victims were selected by the observers without the subjects' awareness of their role in the experiment, it was not possible to obtain a purely random sample of even the university population. The fact that the subjects were unwitting participants leads to a concern with the ethics of subjecting them to the experimental treatment without their consent. Some precautions were taken to avoid the possibility of subjecting the subjects to undue stress. The treatment time was cut to a short period. The observers were told that if they had any feelings that the invasion was having a seriously harmful effect upon the victim, they were to explain to the victim the type of experiment in which he was involved. The precautions were unnecessary to the extent that most of the victims seemed to accept the invasions without overtly questioning the right of the invader to his actions.

The persons selected as victims had to meet these criteria:

1. If selected for an invasion, they were sitting alone, and care was taken to pick victims who looked fixed in their location. Thus victims in the grill were usually selected before they entered the grill and invaded shortly after they began eating.

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2. As the sexes of the invader and the victim were important variables in the study, the observers' data collection sheets identified which of their observations should include same sex invader and victim, and which proportion include opposite sex. The same procedures were observed with regard to fixing the proportion of like race and unlike race.

3. The prospective victims were within typical ages of college students. Persons who were obviously middle-aged or obviously younger than college age were not approached.

4. The territories were uncrowded with other lone seats available.

Methods of Analyses

Since the design formed a fixed effects model with all cells accounted for, a five-way analysis of variance was chosen to analyze the research hypotheses. This has the advantage of permitting isolation of the effects of interaction within a single cell of the design. The data were obtained as frequency counts of various responses and differences in frequencies between the three observation periods in the form of gain scores.

Because verbal and withdrawal responses occurred with such a low frequency, they did not prove amenable to this type of analysis, and instead were analyzed by means of Chi-square tests of goodness of fit.

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Section B. Questionnaires relating to territorial invasions within the dorm room.

One hundred and two men and women students were selected from among the resident hall population. The results were analyzed with the sexes treated separately. To insure maximum participation of the subjects, the interviews were conducted in person. All the roommates in a given room were interviewed and asked to rate a series of territorial invasions according to the effect the invasions would have on them (Appendix C). In addition, they were asked to rate the degree of conflict within the room on a four point scale. They were asked to rate not only their feelings in response to the invasions but how they would act upon these feelings. The assumption underlying this was that if they had a strong sense of territory and were clear about their rights to the various types of territory within their room as personified by articles of clothing or room furnishings, the correlation between having strongly hostile feelings and being free to express these feelings should be strong. In addition, one of the possible responses given indicated that although the student would like to discuss the situation with his roommate he would not feel free to do so. The frequency of the selection of that particular response might be expected to be greater for furniture about which the student might be less free to claim as territory than for invasions involving possessions which are very clearly his such as clothes.

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Sample

As mentioned earlier, students were selected from the resident hall population at Michigan State University. The students were selected at random from two residence halls on the campus. Because this part of the study represents an attempt to study territory within the dorm environment, it is in some ways a pilot to evaluate the approach chosen.

Instrumentation

Ten territorial violations involving possible roommate conflict were listed in the questionnaire. An effort was made to have the student consider several different classes of invasions, including auditory invasions, invasions involving the students' personal possessions which might be expected to arouse a stronger sense of territory, and invasions involving furniture in the room which is ostensibly the student's property but which might be expected to arouse feelings concerning territory to a lesser extent. Three different pieces of room furniture were involved in the hypothetical invasions, the bed, desk and the room chairs. Responses to these three different items would be expected to fall into a rank order if different degrees of ownership were attached to each of the three items. Five different incidents involving a form of auditory invasion were described. In one, the victim was prevented from studying because of the noise level. In its reciprocal, the student was asked to respond to a request to refrain from playing his stereo while his roommate was studying. Two other auditory invasions involved mutual competing invasions. The fifth auditory invasion, use of an alarm for eight o'clock classes, involved an invasion which neither

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the invader nor the victim was able to prevent. The bed was not only compared to other articles of furniture, but the student was asked to respond to two questions concerning things on the bed as opposed to a person's usurping the bed. One question dealt with the response involving invasion in the form of a roommate's borrowing clothes. It might be predicted that this particular question would be expected to be associated with the greatest frequency of hostile responses compared to any of the other invasions.

Method of Analysis

Correlation coefficients were obtained from the correlations of the rank of the feelings with the rank of the responses to the items of the questionnaire.

Contingency tables analyzing the percentage of responses in each possible category to each question were used to: (a) determine if sex of the respondent effects the kinds of feelings and actions reported, and (b) measure the tendency of questions referring to differing hierarchies to elicit different ranks of response items.

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CHAPTER IV

RESULTS

The results of this study can best be treated by considering first the results derived from the observations of actual invasions and then the results of the questionnaires. The results of the actual invasions may be further divided into two sub-categories: those results which lend themselves to a statistical analysis such as the differences in frequencies of behavioral responses as noted in the pre-invasion, during-invasion and post-invasion intervals of the invasion, and those results which are more difficult to evaluate in a quantitative fashion but which may be equally valuable in the information which they contribute. These latter results include the observers' written comments on the data collection sheets, hour interviews with the observers dealing not only with the responses of the victims but with the invaders' feelings as they carried out the invasions. One additional contribution to the qualitative data was obtained by interviewing one of the victims.

Statistical Results of the Actual Invasions

The data were analyzed on the Michigan State Computer Laboratory's 3600 computer both as the separate indices of responses and as the sums of the indices for each of the three periods of observation, pre-invasion, during invasion, and post-invasion. A separate analysis of variance

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TABLE 2.--

Variable	
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Location	
I-Sex	
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ISR-VR	
IS-VSR	
IR-VSR	
LISR-VS	
LISR-VR	
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LIR-VSR	
ISR-VSR	
5-WAY	
ERROR	

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table was obtained for each of the three observation periods, a total of 27 tables, which are listed in the appendix (Appendix D), with one example of the tables included in the text. Only the significant scores from the other tables will be considered in the text (Tables 2, 3, 4 and 5).

TABLE 2.--Frequency of face responses during the pre-invasion observation period for all subjects

Variable	Sum of Squares	d.f.	Reduced S.S.	Values of F > .05 p level
Total	1759.333	95	18.519	
Location	20.083	2	10.042	
I-Sex	140.167	1	140.167	9.95**
I-Race	48.167	1	48.167	
V-Sex	0.000	1	0.000	
V-Race	6.000	1	6.000	
L-IS	10.333	2	5.167	
L-IR	12.333	2	6.167	
L-VS	39.250	2	19.625	
L-VR	31.750	2	15.875	
IS-IR	170.667	1	170.667	11.15**
IS-VS	6.000	1	6.000	
IR-VS	73.500	1	73.500	4.8*
VR-VS	16.667	1	16.667	
L-IS-IR	39.083	2	19.542	
L-IS-VS	9.000	2	4.500	
L-IS-VR	9.750	2	4.875	
L-IR-VS	28.000	2	14.000	
L-IR-VR	117.250	2	58.625	3.83*
L-VS-VR	18.083	2	9.042	
ISR-VS	42.667	1	42.667	
ISR-VR	2.667	1	2.667	
IS-VSR	10.667	1	10.667	
IR-VSR	16.667	1	16.667	
LISR-VS	24.083	1	12.042	
LISR-VR	31.583	2	15.792	
LIS-VSR	50.083	2	25.042	
LIR-VSR	20.583	2	10.292	
ISR-VSR	0.667	1	0.667	
5-WAY	8.083	2	4.042	
ERROR	736.000	48	15.333	

* = F value exceeding .05 p; ** = F value exceeding .01 p.

TABLE 3.--Si
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	Variab
Face	I-Sex
	IS-IR
	IR-VS
	L-IR-V
Hand	I-Sex
	IS-IR
	IR-VS
Arm	IR-VR
Body	Locati
	L-VS-V
Leg	Locati
	IS-IR
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TABLE 3.--Significant F values for six measures of behavior during the pre-invasion period

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	I-Sex	140.167	1	140.167	9.95**
	IS-IR	170.667	1	170.667	11.15**
	IR-VS	73.500	1	73.500	4.8*
	L-IR-VR	117.150	2	58.625	3.83*
Hand	I-Sex	52.510	1	52.510	8.11**
	IS-IR	29.260	1	29.260	4.52*
	IR-VS	38.760	1	38.760	5.99*
Arm	IR-VR	162.760	1	162.760	5.77*
Body	Location	40.188	2	20.094	3.60*
	L-VS-VR	37.271	2	18.635	3.21*
Leg	Location	38.313	2	19.156	8.63**
	IS-IR	14.260	1	14.260	6.38*
Feet	None significant				

Note: Means for these significant F values given in Appendix F.

TABLE 4.-

	Var
Face	Non
Hand	IS-
Arm	Non
Body	V-R L-V
Leg	IS-
Feet	IS-

Note: Mean

TABLE 4.--Significant F values for six measures of behavior during the invasion period

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	None significant				
Hand	IS-IR	55.510	1	55.510	8.20**
Arm	None significant				
Body	V-RAce	24.00	1	24.000	6.48
	L-VS-VR	56.021	2	28.010	7.57**
Leg	IS-VS	14.260	1	14.260	5.50*
Feet	IS-VR	114.844	1	114.844	4.06*

Note: Means for these significant F values given in Appendix F.

TABLE 5.--Significant F values for six measures of behavior during the post-invasion period

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	L-IS-IR	199.983	2	99.542	4.83*
Hand	V-Sex	61.760	1	61.760	7.27**
Arm	I-Race	189.844	1	189.844	4.27*
	IS-VS	420.844	1	420.844	9.46**
	IR-VS	243.844	1	243.844	5.48*
Body	Location	31.021	2	15.510	4.59*
	I-Sex	17.510	1	17.510	4.18*
	V-Sex	61.760	1	61.760	18.27**
	V-Race	27.094	1	27.094	8.01**
	L-IS	27.146	2	13.573	4.01*
	VR-VS	29.260	1	29.260	8.66**
	LIS-VSR	22.563	2	11.281	3.33*
Leg	I-Sex	22.042	1	22.042	4.46*
Feet	None significant				

Note: Means for these significant F values given in Appendix F.

This preliminary analysis of the data indicated that, as had been predicted, the pattern of the responses of the victims was generally unique to each individual. Although some generalizations could be made across the spectrum of individuals observed, it became necessary to use measures of changes in response patterns through out the observation periods. Collapsed tables of significant gain scores for the gain scores between Pre- and During-Invasion, During- Post-invasion and Pre-Post invasion are presented in Tables 6, 7, 8, and 9. The complete analysis of variance tables are included in Appendix D.

Pre-during gain score results

Significant gain scores for differences in the response frequency changes between the pre-invasion and during invasion periods were obtained for variables for four of the six responses analyzed in this manner. There appeared to be no differences between hand and body movements in a comparison of the pre-during interim. The measure of frequency changes in facial responses produced significant gain scores dependent upon the interaction between the location and the sex of the victim, and for the interaction between the location, the race of the invader and the sex of the victim. Significant gain scores were also obtained depending on the sex of the invader. Significant gain scores were obtained in the leg movement depending upon the sex and the race of the invader and the sex of the victim. The gain score for the foot movement was also dependent upon the sex and the race of the invader and the sex of the victim.

TABLE 6.--Gain score analysis of variance for differences in face responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	2658.240	95	27.981	
Location	15.083	2	7.542	
I-Sex	133.010	1	133.010*	4.79*
I-Race	142.594	1	142.594*	5.01*
V-Sex	10.010	1	10.010	
V-Race	15.844	1	15.844	
L-IS	11.083	2	5.542	
L-IR	31.750	2	15.875	
L-VS	106.083	2	53.042	
L-VR	25.750	2	12.875	
IS-IR	114.844	1	114.844*	4.14*
IS-VS	5.510	1	5.510	
IS-VR	11.344	1	11.344	
IR-VS	11.344	1	11.344	
IR-VR	0.844	1	0.844	
VR-VS	0.510	1	0.510	
L-IS-IR	61.750	2	30.875	
L-IS-VS	27.083	2	13.542	
L-IS-VR	5.250	2	2.625	
L-IR-VS	4.750	2	2.375	
L-IR-VR	31.750	2	15.875	
L-VS-VR	58.583	2	29.292	
ISR-VS	152.510	1	152.510*	5.49*
ISR-VR	0.510	1	0.510	
IS-VSR	1.260	1	1.260	
IR-VSR	31.510	1	31.510	
LISR-VS	8.083	2	4.042	
LISR-VR	53.083	2	26.542	
LIS-VSR	73.583	2	36.792	
LIR-VSR	139.083	2	69.542	
ISR-VSR	0.094	1	0.094	
5-WAY	42.250	2	21.125	
Error	1331.500	48	27.740	

TABLE 7.--Significant gain scores for six measures of behavior between during and pre-invasion

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	L-IR-VS	174.333	2	87.167	4.25*
Arm	None significant				
Hand	None significant				
Body	None significant				
Leg	ISR-VS	20.167	1	20.167	6.36*
Feet	ISR-VSR	58.594	1	58.594	4.74*

Note: Means for these significant gain scores in Appendix G.

TABLE 8.--Significant gain scores for six measures of behavior between during and post-invasion

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	None significant				
Arm	LISR-VS	68.688	2	34.344	3.81*
Hand	L-VS	228.583	2	114.292	3.22*
Body	V-SEX	46.760	1	46.760	11.08**
Leg	None significant				
Feet	None significant				

Note: Means for these significant gain scores in Appendix G.

TABLE 9.--Significant gain scores for six measures of behavior between pre- and post-invasion period

	Variable	Mean Square	d.f.	M.S.	F ratio
Face	I-Sex	133.010	1	133.010	4.79*
	I-Race	142.594	1	142.594	5.01*
	IS-IR	144.844	1	114.844	4.14*
	ISR-VS	152.510	1	152.510	5.49*
Arm	I-Sex	66.667	1	66.667	6.908*
	IR-VS	70.042	1	70.042	7.247**
Hand	LIS-VSR	510.396	2	255.198	4.159*
Body	V-Sex	25.010	1	25.010	4.667*
	IS-IR	27.094	1	27.094	5.055*
	IS-VS	31.510	1	31.510	5.878*
	L-IS-VR	45.083	2	22.542	4.205*
Leg	L-VS	41.271	2	20.635	3.95*
	IS-VSR	38.760	1	38.760	7.41**
Feet	V-Race	58.594	1	58.594	5.89*
	IR-VSR	41.344	1	51.344	5.145*

Note: Means for these significant gain scores in Appendix G.

During-post gain score results

The gain score comparisons between the measures of behavior during and post-invasion indicated that there were no significant differences in frequencies associated with the face, but differences were noted in responses for the other six variables. Differences in the location, sex and race of the invader and the victim's sex were significant in affecting arm movement frequency changes. The hand movements were affected by the location and the sex of the victim. For the body, the sex of the victim was important and the interaction between the location and the race of the invader and the race of the victim were important. The interaction between the location and the sex of the victim was significant for the measure of changes in frequency of hand movement. For body movement gain scores, both the sex of the victim and the interaction between the location and the race of the invader and the race of the victim was significant. Only one variable proved to be significant for changes in leg movements and that involved an interaction between the territory and the sex of the victim. Only one variable was significant for foot movements, and that was dependent upon the interaction between the sex and race of the invader and the sex and race of the victim.

Pre-post gain score results

The greatest number of significant gain scores occurred between differences in measures of behavior prior to invasion and after invasion. All measures had at least one variable which showed a significant gain score, and all but one had more than one variable which appeared to be significant. Face and body each showed four variables which were

significantly affected. The sex of the invader, the race of the invader, the interaction between the sex and race of the invader, and the interaction between the sex and race of the invader and the sex of the invader were all significant response measures of the face. Body movements were affected by the sex of the victim, the interaction of sex and race of the invader, the interaction of the sex of the invader and the sex of the victim, and the interaction between the territory where invasion occurred and the sex of the invader and the race of the victim. Arm movements were affected by the sex of the invader and the interaction of the race of the invader and the sex of the victim. Leg movements were significantly affected by the interaction of the location of the territory and the sex of the victim, and the interaction between the sex of the invader and the sex and race of the victim. Feet movements were affected by the race of the victim as well as the interaction between the race of the invader and the sex and race of the victim.

Results of analysis of verbal responses and withdrawals

Two other measures of behavior were used in the study: verbal responses and withdrawal responses. They proved to have differential patterns of occurrence, but the frequencies of both behavior was so low that they could not be treated by the 5-way analysis which requires equal frequencies in all cells. Twelve out of the 96 victims made some kind of verbal response during the invasion, 5 out of the 12 were females and 7 out of the 12 were males. The differences in territory and number of responses made was four responses in the grill, three of which were made by males; six responses in the lounge, three males and three females;

and two responses in the library, one male and one female. The numbers involved are too small to lend themselves to statistical evaluation.

The withdrawal patterns which occurred during and after the invasions were as follows:

For the period of five-minute observation during the invasion, eight left, a total of 9.4% of the victims. Seven of these were women. For the five-minute period of observation after the invasion, 18.85% left. During the ten minute combined period 28.2% of the victims left. In the post-invasions withdrawals the distribution of the sexes was equal, nine men and nine women. During the invasion, four of the withdrawals occurred in the grills and four in the lounges. Of the post withdrawals, ten occurred in the grill, three in the library and three in the lounge. The distribution of withdrawals according to sex gave the following results:

TABLE 10.--Distribution of sexes of victims withdrawing during or following invasion

	Female Victim	Male Victim
Like sex	9	5
Unlike sex	7	5

X^2 = 2.00 with 3 d.f. non-significant

TABLE 11.--Distribution of races of victims withdrawing during or following invasion

	Black Victim	White Victim
Unlike race	7	3
Like	3	13

X^2 = 11.07 with 3 d.f., significant at .02 level of probability

The research hypotheses discussed in Chapter I can be tested on the basis of the analysis of variance and the gain scores analysis with the following results:

Hypothesis I. Under conditions constituting territorial invasion, the victims will exhibit changes in behavior. Rejected. Universal behavioral changes common to all victims under all conditions of invasion were not obtained.

Hypothesis II. Members of different races will show different response patterns under similar conditions of territorial invasion. Failed to reject. Significant differences in foot responses between black and white victims in pre-post comparisons were obtained.

Hypothesis III. Members of different races will exhibit systematically different responses to invaders of different races. Rejected.

Hypothesis IV. Men and women will make different patterns of responses to similar conditions of territorial invasions. Failed to reject. Significant differences in body responses were obtained in pre-post and during-post comparisons.

Hypothesis V. Under similar conditions of invasion, victims will show different patterns of responses in the three functionally different territories. Rejected.

Hypothesis VI. Under conditions constituting territorial invasion, the pattern of responses is dependent upon the interaction of sex and races of the victims and the invaders. Failed to reject. Significant pre-post gain scores involving interaction between these variables were obtained for face, arm, leg, body and feet responses. Significant pre-during comparisons were obtained for leg and feet responses.

Hypothesis VII. The pattern of responses made by the victim upon invasion is dependent on the interaction of the race of the victim and invader and the function of the territory. Rejected.

Hypothesis VIII. The pattern of responses made by the victim upon invasion is dependent on the interaction of the sex of the victim and the functional type of the territory. Failed to reject. Significant pre-post gain scores involving interaction between these variables were obtained for leg responses and significant during-post gain scores were obtained for hand responses.

Hypothesis IX. The pattern of responses made by the victim upon invasion is dependent upon differences in the combinations of sex and race of victim and invader and the type of territory. Failed to reject. Significant pre-post gain scores were obtained for interactions among these variables for hand and body responses. Significant pre-during gain scores were obtained for face responses and significant during-post gain scores were obtained for arm responses.

Observers' Analyses of Victim's Behavior during Invasion

With the exception of one observer who noted that for his team all of the verbal interchange occurred in the grills, the observers were unable to pinpoint any differences in responses occurring which they could attribute to the location of the invasion. This same observer noted a continuum of overt reactivity between the three territories, with the least reactivity occurring in the library and the most in the grill, a finding which was supported by the other observers.

None of the observers was able to detect any difference in the victim's reaction which was dependent on the victim's race, although one female black invader felt that white victims were more bothered by her presence than were black victims. Two teams noticed cross-sex differences with the male precipitating more responses from women and the females elicting more responses from males. Another team observed that males tended to make more head turns to "check the invader out." The male member of this team noted (with some regret) that none of the females he invaded spoke to him. The consensus among the observers was that people tended to get more visibly upset if they were forced to move their possessions. They also agreed that the victims did not appear to be so patently anxious if they had something to do with their hands. In the library, the victims would often appear to be studying with even more concentration than prior to invasion, but these bursts of activity would then be replaced by periods of gazing around and looking at others in the library. They also noted that if the victim had a logical excuse for withdrawing such as finishing a book or finishing their drink, they were more likely to withdraw. Often victims who were reading and turning pages rather slowly would hastily flip through the remaining pages, close the book or magazine, and withdraw. One of the victims in the grill left the table and purchased another cup of coffee and a doughnut and returned, but left the table immediately after the invader left without having eaten the doughnut or drunk the coffee. Body movements made during the invasion were never in the direction of the invader but away from the invader. Arm movements often consisted of moving the arm nearest the invader up near the victim's

face. In nearly every instance recorded by the observers, the modality and the pattern of responses changed upon invasion. If the persons had been fidgety prior to the invasion, they generally remained active, but the activity itself shifted, for example, from finger drumming to foot tapping, and then shifted back again after invasion. Another typical response change which was noted, particularly in the grill and the lounge, was that those victims who had been sitting slouched in relaxed positions, immediately sat up and continued to remain sitting upright throughout the invasion period. Still another type of response pattern occurred involving victims who had been relatively active through the pre-invasion period taking notes or even looking around. Upon invasion, a number of these victims ceased their activity, froze and remained virtually immobile through the invasion period, gradually resuming their former activity during the post-invasion observation period. Although the verbal responses were friendly, and not one victim asked an invader to leave, the body gestures which accompanied them were often incongruent, such as turning away after the initial response or indicating displeasure by glances and actions. One female victim exhibited no outward evidence that she was in any way affected by the invader's presence, yet as soon as the invader left, she grabbed her purse which had been sitting next to the invader and checked its contents. One observer felt that victims did not feel free to act as all the situations were public, and most of them tried to handle the situation by ignoring the invader. Almost invariably, as the invader left, the victim would look around or shake his head.

A very striking difference was noticed in the behavior of black students opposed to white students on the Michigan State University campus, which does not relate directly to the question of territoriality, but which is nonetheless rather interesting. Although the campus has as a population of about 41,000 students, only about 1500 are black. Thus the probability of finding a lone black student was considerably less than for finding a lone white student. Aside from this, the probability of finding black female students in any of the three territories observed was even less than would have been expected. It was virtually impossible to find any single black females, although there was a greater likelihood in the library.

Observer's own Reactions during Invasion

All eight observers agreed that they were initially very anxious. As one of them said, "I was doing something which just is not done, and I had no idea what kind of a reaction I was going to get." The male observers assumed a protective attitude toward the female invaders and while the female was invading were often concerned they might have to intervene. Another fantasy which disturbed the male observers was the possibility of inciting a fight upon an invasion. Although initially it had been proposed that the invaders would be responsible for providing a somewhat detailed observational account of the invasion, they were unable to do so. The reasoning which they gave was that they were "too close," and therefore, could not stare directly at the victim and had to rely on peripheral vision. They all had difficulty in dealing with the victims who spoke to them and had to fight the impulse to say

anything really responsive in return. "She was so nice, trying to be friendly . . . I really wanted to talk to her. I felt uneasy because I was not allowed to talk back. I felt nutty, really nervous." One female observer said she had a particularly hard time handling the invasion if she was forced to look directly at the invader. Two other observers differed on their feelings with respect to invading. One said it became fun, because he knew it was only for five minutes, but his partner said it was nervewracking and hard to feel natural.

One male observer worried that others might think he "was weird," and further observed that it was harder to invade males than females.

All observers used props or ploys for all invasions, although they were not told to, and in fact, had even stated that they might try some without props. They showed some inclination to signal the victim that the invasion was likely to be short-term by failing to remove their coats or by purchasing cokes rather than sandwiches at the grill, although this did not appear to be deliberate on their part.

Victim's Own Reaction to Invasion

The opportunity arose to interview one victim who was known to one of the observers as to her reactions to the invasion. She was not aware that she was being observed, nor was she suspicious that the encounter might have been staged. She was a white student in the library and the invasion involved a black male. She had been writing an important paper, and said that when she was invaded, her overwhelming reaction was fear and panic. She remembered being very confused that the invader had chosen to sit next to her at the table, as there were a

number of empty tables around. During the first two or three minutes of the invasion, she was unable to resume her reading, although she kept up the pretense. She was not able to resume her former concentration till several minutes after the invader had left. When the notion of territory was explained to her, she denied that that had any effect, but when she was later asked if she had considered leaving the table, she replied, "No, I had picked that table out. I made up my mind that it was my table, and I wasn't going to leave it."

Statistical Results of the Questionnaires

The feelings engendered by various territorial violations differ between the sexes, with females typically giving the less hostile responses (Tables 12, 13, 14 and 15). The actions elicited by these same situations are also different between the sexes. Males were more prone to feel angry in response to the auditory invasion while they were studying, to being dispossessed from their bed, and to the borrowing of clothes, yet their tendency to respond to the auditory invasion was not significantly different from the responses indicated by girls.

A comparison of the responses and the feelings elicited by a particular invasion suggests a degree of incongruency. For example, in a comparison of the first invasion, auditory while studying, 88 percent of the males and 71.2 percent of the females felt some degree of anger or irritation, whereas only 66 percent of the males and 59.6 percent of the females indicated that they would feel free to tell the roommate to stop, and 16 percent of the males and 13.5 percent of the females indicated that they would like to tell the roommate to stop but would not feel free to do so (Table 19).

The responses to the other invasions indicate that there is tendency for this incongruency to manifest itself in each of the invasion situations (Tables 16, 17, 18 and 19).

The results of roommate predictions indicate a tendency to predict responses similar to their own, with the same incongruency between felt hostility and expressed hostility. There was a tendency to rate the roommates responses and feelings as being slightly more hostile than their own responses and feelings (Tables 14 and 15).

There were three alternative hypotheses related to the questionnaire:

Hypothesis X. There will be differences in responses to invasions involving items with clearly defined propietorship such as clothes, compared to invasions involving property temporarily assigned to the student such as chairs or desks. Some support for the hypothesis but not statistically analyzed.

Hypothesis XI. There will be differences in the responses to invasion dependent upon the sex of the respondent. Failed to reject.

Hypothesis XII. The ability to predict possible roommate responses to territorial invasions will be negatively correlated to the amount of reported hostility in the room. Rejected.

TABLE 12.--Students' own feelings toward territorial invasions

Nature of the Invasion	Sex	Range of Hostility 1	2	3	4	X^2	d.f.
1. Auditory, studying	F	3.8	21.2	46.2	28.8	8.961*	3
	M	14.0	12.0	62.0	12.0		
2. Bed, Taking	F	11.5	15.4	32.7	40.4	9.08*	3
	M	16.0	26.0	44.0	14.0		
3. Desk	F	1.9	3.8	11.5	82.7	1.397	3
	M	0.0	2.0	10.0	88.0		
4. Clothes on Bed	F	1.9	0.0	48.1	50.0	6.1219	3
	M	0.0	8.0	54.0	38.0		
5. Phone	F	0.0	11.5	71.2	17.3	1.225	3
	M	2.0	12.0	72.0	14.0		
6. TV and Stereo	F	0.0	5.8	53.8	40.4	1.278	3
	M	2.0	8.0	52.0	38.0		
7. Clothes on Chairs	F	0.0	3.8	38.5	57.7	3.929	3
	M	0.0	0.0	54.0	46.0		
8. Borrowing Clothes	F	19.2	23.1	13.5	44.2	18.505**	3
	M	28.0	30.0	34.0	8.0		
9. No Stereo	F	0.0	1.9	13.5	84.6	0.400	3
	M	0.0	4.0	14.0	82.0		
10. Eight O'Clock Class	F	1.0	1.9	3.8	92.3	4.136	3
	M	0.0	0.0	12.0	98.0		

Code: 1 = Very angry, 2 = Angry, 3 = Irritated, 4 = Not bothered

X^2 = * = significant at .05 p, 7.8757; ** = significant at .01 p, 11.431.

TABLE 13.--Students' own responses toward territorial invasions

Nature of Invasion	Sex	Range of Hostility 5	6	7	8	X^2	d.f.
1. Auditory, Studying	F	23.1	36.5	13.5	26.9	1.475	3
	M	30.0	36.0	16.0	18.0		
2. Taking Bed	F	21.2	36.5	3.8	38.5	9.978*	3
	M	40.0	32.0	12.0	16.0		
3. Desk	F	0.0	11.5	3.8	84.6	1.640	3
	M	0.0	6.0	8.0	86.0		
4. Clothes on Bed	F	3.8	34.6	9.6	51.9	4.452	3
	M	16.0	34.0	8.0	42.0		
5. Phone and Stereo	F	11.5	65.4	9.6	13.5	2.738	3
	M	22.0	58.0	12.0	8.0		
6. TV and Stereo	F	11.5	21.2	23.1	44.2	2.924	3
	M	12.0	18.0	34.0	34.0		
7. Clothes on Chairs	F	5.8	30.8	11.5	51.9	1.454	3
	M	4.0	38.0	16.0	42.0		
8. Borrowing Clothes	F	32.7	21.2	1.9	44.2	17.551**	3
	M	50.0	36.0	6.0	8.0		
9. No Stereo	F	5.8	3.8	1.9	88.5	3.535	3
	M	2.0	10.0	6.0	82.0		
10. Classes	F	0.0	1.9	0.0	98.1	7.479	3
	M	2.0	0.0	10.0	88.0		

Code: 5 = Would tell to stop, would express anger; 6 = Would tell to stop, but not express anger; 7 = Would like to tell roommate to stop, but would not do it; 8 = Not necessary to discuss.

X^2 = * = significant at .05 p, 7.8757; ** = significant at .01 p, 11.431.

TABLE 14.--Students' predictions of roommates feelings toward territorial invasions

Nature of the Invasion	Sex	Range of Hostility 1	2	3	4	X^2	d.f.
1. Studying	F	1.9	34.6	38.5	25.0	8.782*	3
	M	12.0	32.0	48.0	8.0		
2. Taking Bed	F	7.7	19.2	44.2	28.8	9.373*	3
	M	22.0	32.0	34.0	12.0		
3. Desk	F	0.0	1.9	17.3	80.8	1.495	3
	M	2.0	4.0	18.0	76.0		
4. Clothes on Bed	F	0.0	5.8	53.8	40.4	3.712	3
	M	4.0	12.0	52.0	32.0		
5. Phone and Stereo	F	5.8	21.2	55.8	17.3	6.419	3
	M	8.0	14.0	74.0	4.0		
6. TV and Stereo	F	0.0	3.8	50.0	46.2	0.847	3
	M	0.0	8.0	50.0	42.0		
7. Clothes on Chairs	F	0.0	3.8	42.3	53.8	4.219	3
	M	4.0	6.0	52.0	38.0		
8. Borrowing Clothes	F	11.5	28.8	23.1	36.5	19.740**	3
	M	24.0	42.0	32.0	2.0		
9. TV Off	F	1.9	1.9	26.9	69.2	4.20	3
	M	4.0	8.0	36.0	52.0		
10. Classes	F	0.0	1.9	13.5	84.5	2.152	3
	M	0.0	0.0	22.0	78.0		

Code: 1 = Very angry, 2 = Angry, 3 = Irritated, 4 = Not bothered

X^2 = * = significant at 0.5 p, 7.8757; ** = significant at .01 p, 11.431.

TABLE 15.--Students' predictions of roommates responses toward territorial invasions

Nature of the Invasion	Sex	Range of Hostility 5	6	7	8	X^2	d.f.
1. Studying	F	28.8	38.5	11.5	21.2	1.016	3
	M	34.0	32.0	16.0	18.0		
2. Bed Taken	F	21.1	48.1	5.8	25.0	7.906*	3
	M	44.0	32.0	10.0	14.0		
3. Desk	F	3.8	9.6	11.5	75.0	0.281	3
	M	6.0	10.0	12.0	72.0		
4. Clothes on Bed	F	9.6	32.7	17.3	40.4	2.154	3
	M	18.0	36.0	12.0	34.0		
5. Phone and Stereo	F	25.0	48.1	13.5	13.5	2.115	3
	M	30.0	54.0	10.0	6.8		
6. TV and Stereo	F	7.7	25.0	19.2	48.1	0.593	3
	M	12.0	24.0	20.0	44.0		
7. Clothes on Chairs	F	9.6	17.3	21.2	51.9	1.226	3
	M	16.0	20.0	18.0	46.0		
8. Borrowing Clothes	F	32.7	25.0	7.7	34.6	15.56**	3
	M	62.0	20.0	12.0	6.0		
9. TV Off	F	7.7	13.5	5.8	73.1	7.056	3
	M	10.0	20.0	20.0	50.0		
10. Classes	F	0.0	5.8	7.7	86.5	2.118	3
	M	0.0	2.0	10.0	86.0		

Code: 5 = Would tell roommate to stop, would let know of anger; 6 = would tell roommate to stop, would not let know of anger; 7 = would like to tell roommate to stop, but not sure it is appropriate; 8 = not necessary to discuss with roommate.

X^2 = * = significant at .05 p, 7.8757; ** = significant at .01 p, 11.431.

Comparison of Hostile Feelings and Freedom to Respond to Territorial Invasions

TABLE 16.--Invasion of room furniture by person

	Bed		Desk	
	Female	Male	Female	Male
Feeling	59.6	86.0	11.2	12.0
Response	57.7	72.0	11.5	6.0
Hesitate	3.8	12.0	3.8	8.0

TABLE 17.--Invasion of room furniture by objects

	Bed		Chair	
	Female	Male	Female	Male
Feeling	50.0	64.0	41.5	54.0
Response	38.4	50.0	36.6	42.0
Hesitate	9.6	8.0	11.5	16.0

TABLE 18.--Borrowing clothes

	Female	Male
Feeling	55.8	82.0
Response	53.9	86.0
Hesitate	1.9	6.0

TABLE 19.--Auditory invasions

	Phone & Stereo		Studying	
	Female	Male	Female	Male
Feeling	82.7	86.0	71.2	88.0
Response	76.9	80.0	59.6	66.0
Hesitate	9.6	12.0	13.5	16.0

	TV & Stereo		No Stereo	
	Female	Male	Female	Male
Feeling	59.6	62.0	15.4	18.0
Response	32.7	30.0	9.6	12.0
Hesitate	23.1	34.0	1.9	6.0

	Classes	
	Female	Male
Feeling	6.7	12.0
Response	1.9	2.0
Hesitate	0.0	10.0

CHAPTER V

DISCUSSION

The results of this investigation support the general theory of territoriality as described in Chapter I. The variability in inter-rater reliability both for the various responses measured and for the periods of observations can be partially accounted for by differences in visibility of the invasion to the two observers. The decline in reliability in the invasion period is rather puzzling. One possibility is that the invader screened the victim from the observer's view. Some other factors which may also account for the drop might include a reflection of increased anxiety on the part of the observer at the time of actual invasion. Some measures did not lend themselves to accurate observation because of their being obscured by furniture. Thus it proved difficult to obtain accurate counts of both leg and foot movements in the grill where tables obscured the lower half of the victim's body. Still another factor mentioned by one observer was that as the frequency of the counts increased, as they typically did during the invasion, it became virtually impossible to maintain accurate counts. As those observation periods where reliability was high tended to also be the ones where the most significant results were obtained, and as those responses which tended to have high reliability also tended to be associated with the most striking differences, it may be assumed that other existing differences were obscured because of human error. One

result which is difficult to explain is that seven of the variables with significant F ratios in the pre-invasion observation period appeared to be linked with the sex or the race of the invader, which is most confusing as these differences were observed prior to the invasion. A number of explanations are possible. There is the possibility of observer bias; the female observers and the male observers may have made sex-linked errors in observing or counting frequencies. Another possible explanation is that there was a tendency for the observers of different sexes to select victims on the bases of different criteria. Thus, the male observers may have selected more reactive victims for the female invaders or vice versa. Still another explanation is that the observers may have attracted the attention of the victim and the difference represent a reactivity on the part of the victim. Perhaps of more significance than this original difference is the failure of the difference to persist upon invasion.

Another unexpected result was the fact that more significant F ratios occurred in the comparison between the pre-invasion period and the post-invasion period than between the pre-invasion period and during invasion. There are a number of plausible explanations. Hall (1966) has observed that personal space is rarely openly recognized. If we assume that his contention is correct, we might also assume that victims may be inhibited in their responses. Thus it might very well be that the victim controlled his responses until after the invader had left and he felt free to act. Another explanation which also fits in well with the territoriality theory is that if the victim fails to respond to the invader's presence he is treating the invader as a non-person, or "cocooning", which Sommer (1969) regards as an effective means of warding

off an invasion. After the invader has been repelled, the victim can then respond as is his wont. Still another possibility is the fact that all three territories invaded fell under the definition of some sort of public territory, and it may very well be that the victims were not sure what actual right they had to defend their territory by any means other than a passive kind.

Nature of defensive responses. Although defensive responses can be generally divided into two major groups, agonistic and submissive tendencies, it is well to note that all ninety-six victims in the experimental invasions responded, at least initially, with some type of submissive response. Although this initial tendency sometimes switched to non-verbal expressions indicative of pain, displeasure, or offense, the observers' reports confirm Lorenz explanation of the dynamics of wolf behavior as described in Chapter I. Lorenz maintains that submissive behavior calls for automatic cessation of aggressiveness, and it has been somewhat jokingly suggested that similar tactics by humans might have the same effects (Morris, 1967). In the case of the observers, this was certainly true. All observers stated that they invariably felt ill-at-ease if the victim smiled or attempted to be friendly. They all felt compelled to make some response beyond the minimal response which was permissible and had to keep reminding themselves that the situation was not real.

In addition to the cocooning response and the submissive or appeasement response, one other global response noted which was typical of many of the victims was an alerting response. The victim sat upright and remained in this alerted position till the invader left, a finding

which fits in very well with the results expected with release of epinephrine and norepinephrine.

Stress effects of invasion. In addition to the alerting response which seems to be related to stress, there were some other evidences that invasion was stressful to the victim. The observers' statements that victims appeared to be more at ease if their hands were occupied, and their own reported difficulty in handling invasion situations without props indicates that both the act of invading and the act of being invaded are anxiety-provoking or stressful. The concern with a task seems to alleviate some of the anxiety. Still more evidence that infringement of personal space does evoke anxiety is the victim's report that her predominant emotion upon invasion was fear.

In support of Sommer (1969) and in contradiction to Argyle and Dean (1965), who found that the frontal approach with eye contact is most stressing to the invader, the observers found that they used a face to face approach only in the grill and that was because the reaction of victims trapped by a side by side invasion in a booth was so panicky that the invader was uncomfortable in making the invasion.

Withdrawal tendencies. Withdrawing or relinquishing the territory appeared to be little affected by either the sex of the victim or the invader; however, there seemed to be a complex relationship involving the race of the victim and the invader. Although the numbers of black victims and white victims withdrawing was roughly the same, the combination of race of victim and invader did not fall into four equal-sized groups as might be expected but into two large classes plus two

significantly smaller classes. White invaders were more likely to effect a withdrawal with victims of either race than were black invaders.

The total number of withdrawals observed is comparable to the findings of Felipe and Sommer (1966). Sommer found thirty-six percent of his victims had withdrawn within two minutes of the invasion; twenty-eight percent of the victims in these invasions had left within the ten-minute period of invasion and post-invasion, and 18.85 percent had withdrawn during the five-minute invasion period.

Expression and inhibition of responses. A sense of ownership appears to enhance the victim's willingness to express displeasure at being invaded. The observers noted that the victims who were most visibly upset were invariably those who had to move their belongings. It may be that in some way the victim had a greater sense of territory and was therefore more willing to defend it, or it may be that those persons who would ordinarily be most affected by invasion are also more likely to put their belongings around them in attempting to ward off possible invasions. The results of the questionnaires also seem to reaffirm the notion that students are more apt to respond angrily to invasions involving clearly defined personal property such as clothing.

If ownership facilitated the willingness to express discomfort, other factors appear to inhibit the expression of discomfort. The invaders were inhibited from invading and worried that others would consider them "weird." They remarked that the victims often appeared upset but seemingly refrained from asking the invader to leave or leaving themselves because of the public nature of the invasions. Thus the

invaders were inhibited from invading and the victims seemed inhibited from leaving.

Specificity of territories. Both the results of the gain scores and the analysis of variance of the three observation periods indicate that the territories did indeed elicit responses specific to the territory, although not always in the direction which one would predict based on the schema proposed by Lyman and Scott. Thus the presence of a black male invader elicited greater frequency of facial responses in the Grills and Library, yet the lowest frequency of facial responses made by victims to particular invaders in the Lounges was in response to black male invaders.

The sex of the victims also appeared to result in differential responses to the same situation, with women more likely to show a decline in activity. The interaction of the location and the victim's sex did affect the frequency and kind of responses made. In general, males were more active, but females were more apt to make withdrawal during the invasion. Males were more affected by female invaders in the grill. The role of the grill as an interactional territory was certainly true for them. If approached by a female invader, they would begin preening, grooming, and courtship responses, and would try to engage the invader in a conversation. The same types of responses did not occur in the library.

The particular measure observed accounted for some of the differences. Thus males in the grill showed more facial responses to invasion, whereas in the library women showed more. Black victims showed more body responses. It is difficult to determine the significance of any of these responses. The data indicate that there is some uniformity in

responses of classes of individuals, but the significance of the responses is not clear, and a great deal more data would have to be collected in order to make any interpretations of any value.

One rather contradictory finding is that if Lyman and Scott are correct and interactive territories foster social interaction, as the observations of male behavior in the grill would seem to confirm, grill victims would be expected to be least reactive to invasions. Yet twelve of the twenty-six withdrawals occurred in the grills and only three withdrawals occurred in the library. One factor may have been a naturally greater tendency for persons to stay in the library. Another factor may have been because the victim was less inhibited in responding to invasions in the grill than in the library.

All alternative hypotheses relating to the actual invasions failed to be rejected, an indication that the theory as derived from the lower animals does indeed have a great deal of applicability to humans. Nevertheless, a number of questions are not settled by the results of this study. The number of observations for each situation is relatively low, yet the difficulties which the observers encountered in obtaining suitable victims did not make it feasible in terms of either expenses or the observers' available time to obtain additional observations. One source of information which has been neglected in all previous studies and which was utilized only by chance for one individual is the victim's reaction to the invasion. Informing the victim that he has been the involuntary participant in a research study has some problems, among them the danger of introducing reactivity and thus complicating the picture rather than clarifying it. One way of avoiding this might be

to have three-man observation teams with the third person acting as a stooge and getting some feedback from the victim through him.

The lack of filmed evidence is another handicap. Once more the question of finances played an important part in the decision to omit films, but another factor was the difficulty in concealing the equipment. For invasions staged out-of-doors or occurring in only one location, these handicaps might be circumvented.

Conclusions of the roommate study. The roommate study had originally been designed to serve as a pilot which might suggest workable ways of obtaining information of territory within the living halls while avoiding some of the problems encountered if actual invasions were staged. The original intent of the study had simply been to obtain some sort of correlative measure between the accuracy with which roommates could predict their roommates' reactions to various territorial invasions and the amount of hostility between the roommates. The underlying assumption was that if a student was unaware of his roommate's feelings with regard to infractions of territory, he might unwittingly arouse the ire of his roommate. The sample was too small and the range of expressed hostility was too narrow to give any meaningful results with regard to answering this particular question, and the questionnaires possessed all the usual flaws of self-report, including the tendency of the person responding to either underrate or overrate his reactions.

Despite these handicaps, there were some interesting findings. Males appeared to be more free to express anger, but even they had difficulty. The differential in the willingness to recognize or express anger between men and women students is difficult to evaluate. Perhaps

it signifies a lesser sense of territory among women, hence less willingness to defend it. On the other hand it may simply represent an obeisance to the societal convention that it is not proper for a lady to express anger directly. The findings do seem to confirm the generalizations that the student is uncertain of this territory within the room and is not sure how much of a right he has to express those feelings which might be aroused by an infringement upon his territory. There does seem to be a hierarchy in the feelings evoked by invasions involving chairs, desks and beds, those articles of furniture in the room to which the student presumably attaches ownership, with the bed eliciting the strongest responses. The tendency of roommates to predict their roommates' feelings and responses as slightly more hostile than their own in reaction to the same situations might represent a projection on their part of their real, less acceptable feelings, or they might be a clue to one of the factors inhibiting against territorial infringement, a fear alluded to by the observers of reprisal on the part of the victim.

There definitely seems to be a relationship between the ambiguities of territory and the students hesitancy to respond overtly to an invasion. In every situation there were numbers of students who did not feel free to act upon their negative feelings toward the invasions, and this is perhaps most strikingly illustrated in the case of the auditory invasions where almost half of the males and females who indicated feeling some degree of irritation in response to playing a television when their roommate wanted to play a stereo indicated that although they would want to tell their roommate to stop, they would not feel free to do so. A comparison of the invasion of furniture by objects which would represent a more ambiguous territorial situation than the invasion of furniture

by a person, also produced a greater hesitancy to respond openly. In the case of the chair which would be predicted to arouse a lesser degree of territoriality than the bed, the hesitancy to act was greater as would be expected.

As a side light, the questionnaires gave rise to an interesting finding with regard to the channels of communication among men students as opposed to those of women students. The interviewer, who called the numbers at random, found that only one or two of the men students he contacted had heard of the project from other students down the hall, yet after the first few phone calls to women respondents, nearly all indicated that they had already heard about the questionnaire from other girls down the hall.

Conclusions. The results of both studies confirm the theory of territoriality. People are affected by encroachment, despite the lack of evidence in such crowded environments as the city, perhaps because they become habituated or because they can escape from time to time. In terms of the college student specifically, it is apparent that they will endure a substantial amount of stress rather than discuss the matter with their roommates. Hall's advice to diplomats to become familiar with the territorial customs of those countries where they reside is probably very appropriate advice to college students, too. The students could be educated to be aware of their own feelings of territory, and the rooms might be set up in such a way as to give them a greater sense of territory and security.

As mentioned earlier, it seemed apparent even prior to the outset of this study that one factor contributing to the student's discomfort

in the university setting might be a disruption of the student's sense of territoriality. The results of this study bear this out. The data obtained from the questionnaire indicate that even when hostile feelings are aroused as many as one-half of the students who would like to discuss the situation with their roommate do not feel free to do so. This would augur well for the inclusion of some form of territorial training for the students early upon their arrival at the university. Short sessions led by student leaders could concentrate upon explanations of the nature of territory and the types of feelings which invasions might be expected to arouse. The students could be taught to deal with the fair apportionment of territory within their rooms. The stigma of "complaining" could be removed and they could be free to discuss which infractions of territory are least stressful and which are most stressful so that stress can be minimized.

Certainly the room could be furnished in such a way as to facilitate the establishment of territory for its occupants. For example, movable partitions could be provided which would allow the student a more visible, and more stable territorial base. Directives from the housing authorities could be altered so that the emphasis becomes one of "This is your room, treat it with respect" rather than the traditional "This is the university's room. Do not attempt to make it your own." The old Harvard tradition of allowing the students to furnish their rooms from a common supply of old, non-institutional furnishing reflects an intuitive understanding of the role of territory and expedites the establishment of territory by the student.

The difficulties of dealing with invasions of territory in the other territories of the university are even more formidable, but they

could be met at least partially, by education and some architectural modifications. Sommer (1969) has criticized the tendency for architects and interior designers to ignore the comfort of the individual in their concentration upon physical esthetics. The lounges in this particular study which serve as waiting rooms and study areas could be designed so as to form smaller, more private units. The use of screens, single unit seating which could be arranged by the student to insure as much privacy as desired could reduce the social interaction to a more tolerable level.

The grills would be more difficult to modify because they have conflicting functions, in that they are sociopetal, yet there is an element of selection involved. Thus the individual may wish to exercise some selectivity concerning possible interactions. A boy sitting down at a table in the grill might want a girl to sit beside him, but instead the culture says that this is not proper. Thus the situation fosters interaction, but the culture inhibits it. Still the greater use of booths as well as tables would allow the students to regulate the amount of interaction they desired. The tables would provide the greatest amount of interaction, and the booths the greatest amount of privacy. Again, small tables which could be combined to provide seating for larger groups would be preferable to larger tables.

The use of eight man tables in the library as is customary is wasteful of space. Sommer (1969) has demonstrated the tendency for students to sit isolated in the library, and observations made during the course of this study have confirmed this. The use of individual carrels is much less stressful and permits a greater number of students to study comfortably in a limited space.

In terms of therapy, the results suggest that counselors would do well to be alerted to possible instances of territorial invasions as contributors to the student's anxiety. If the student is made aware of just how these invasions cause the stress, and if he can be trained in appropriate ways of dealing both with the stress and the cause of the stress, it seems reasonable to assume that the stress will be reduced and that some of the student's discomfort will be alleviated. The student can even be trained in appropriate ways with which to defend his territory, such as agonistic displays and submissive responses, and what kinds of responses each would be likely to elicit from the invader.

Obviously this study has only touched on a few of the factors which affect territoriality in humans. The effect of age, subculture, personality differences undoubtedly also influence territoriality, and should be investigated. Very little information exists regarding the development of territoriality in young children, other than acknowledging the fact that they can tolerate closer social distances than adults. It would be useful to know how children learn the concept of territoriality and it would also be interesting to see if the factors which are most apt to affect territoriality in adults have the same effect upon children.

From the results of this study it can be seen that even invasions of a relatively inoffensive mild sort can disrupt an individual's functioning. There is some indication that the amount of reactivity shown is indicative of the degree of disruption that is occurring, and that that is affected by the sex and race of the victim as well as the sex and race of the invader, and further, that these are affected by the nature of the territory where the invasion occurs. It cannot really be

determined whether men are more reactive than women. All that can be said definitely is that certain responses will be more typical of men than women and that increases or changes in these responses is dependent upon such variables as sex, race and territory, but the direction of the variability is not so predictable.

One of the difficulties often cited in studies of human crowding is that people, unlike laboratory animals, can walk away from a bad situation, even if only for a short time, and even if they must eventually return. One of the values of this particular study is that it affords some evidence that even under these conditions of possible escape, even in the college environment where the student has ample food and adequate nesting facilities, the pressures of unrestrained interaction make the student uncomfortable, yet not free to escape the environment, even when it is physically possible to do so.

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APPENDIX A

DATA COLLECTION SHEET

Time:_____ LIBRARY

Date:_____

Team:_____

Obs.:_____

Diagram

Conditions	
Sex of Invader	Race of Invader
Sex of Victim	Race of Victim
Number of Invaders	

OBSERVATION PERIOD

	Face									
	Head Turn	Smile	Frown	Arm	Hand	Body	Leg	Feet	Verbal	Wthd.
Pre										
During										
Post										

COMMENTS: _____

_____

_____

APPENDIX B

OBSERVERS' INSTRUCTIONS

OBSERVERS' INSTRUCTIONS

Each team of observers (one male and one female per team) will be responsible for making a total of 20 observations in each of three situations: a. the university library or any of its branches, b. the university health clinic, and c. a grill. In every case one member of the team will be acting as an observer and will be responsible for observing the responses of the "victim," before he has been approached by the other member of the team (the invader), during the actual approach, and after the approach. In each case the observer is to select an inconspicuous spot which allows him visibility of both the invader and the victim. To facilitate his inconspicuous role, the data collecting sheets should be concealed in a notebook, and the observer should appear to be studying. The invader is to approach the victim, but he is not to make any overt gestures of either hostility or friendliness. Instead, he is to ignore the victim as much as possible. If the victim does attempt to engage him in some sort of interchange, he should be as noncommittal and brief a participant as possible.

Selection of the victim

Library - The setting should be relatively uncrowded. That is, there should be other seats available other than at the table of the prospective victim. The victim should be sitting alone at a table and the invader should then take a seat adjacent to the victim. If the

victim has arranged the chairs so that there is none adjacent, the invader should move a chair into this position. The invader should be sitting closely enough to the victim that although he does not physically touch the victim he is within 6 inches. The invader will remain in place 5 minutes and will then leave as though he is going to get another book.

Health Clinic and Classroom Building Lounges - In this case, the procedure will involve singling out a victim sitting alone on a bench or sofa which can accommodate more than two persons. Again, rather than sitting as far away from the victim as possible, the invader will sit next to the victim. If there is a coat in the way, the invader will move it. Again the invader will not attempt to interact in any way with the victim. The observer will observe the same procedure as before in disguising his purpose.

Grill - Use same procedure as library.

General Criteria for Selecting Victims -

1. The victim must be sitting alone. In the case of the mixer, they may be in the proximity of others, but they must not be conversing with anyone and they must be clearly unattached to any one particular person.
2. If selected for an invasion involving two invaders, the victim should be sitting in such a position that the invaders can flank him, rather than sitting next to each other.
3. The sexes of the invader and the victim are an important variable in the study, therefore, the teams must select the proportions of victims according to the instructions given for each observation as to both sex and race of the victim and the invader.

4. The prospective victims should be within the typical ages of college students. Persons who are obviously middle-aged or obviously younger than college students should not be selected as victims.

Possible Responses to be Observed:

a. Facial expressions - frowning, smiling, increased eye-blink or attempted eye contact.

b. Arm-hand responses - hand covers face, drums on table, stops writing, clenches fists.

c. Leg-foot responses - taps foot, crosses legs, uncrosses legs, tucks feet under chair.

d. Whole body movement - turns in chair (to invader, away from invader), moves chair away, sits upright, slouches.

e. Withdrawal - vacates territory.

f. Verbal responses - asks invader to leave, attempts to engage invader in friendly conversation.

g. Wall-building responses - attempts to stack books or magazines between him and invader, moves coat or other clothing between.

Times and Days of Observations - Observations should be scattered throughout possible times and days, and the number of observations made should not be so great at any one time as to introduce the factor of fatigue.

APPENDIX C

RESIDENCE HALL QUESTIONNAIRE

RESIDENCE HALL QUESTIONNAIRE

This questionnaire is part of a series of studies of the effect of the campus environment upon its student population which are being conducted to meet the requirements of a doctoral dissertation. Your answers to these questions will be confidential. Names are not necessary for the purposes of this study, and neither you nor your roommate will be identified. It is important, however, that both of you answer the questionnaire.

On the next three pages, you will be asked to describe your reactions to several hypothetical incidents involving you and your roommate. Even though you may never have actually experienced any of the situations described, try to imagine yourself in the situation and answer as accurately as you can.

If you are interested in the results of the study, you may send a card any time after April 1, 1970 to the address below, and I will be glad to discuss them with you.

Thanks very much for your co-operation.

Judy Krupka
Counseling Center
Room 207
Student Services Building, M.S.U.

1. How long have you and your roommate known each other? _____

2. Have you ever had to share a room with anyone before? _____

Rate the following ten situations using the guidelines given below:

a. According to how you feel if the situation described had happened to you.

__1__ = Very angry

__2__ = Angry

__3__ = Irritated

__4__ = Not bothered at all

b. According to how you would act if the situation described had happened to you.

__5__ = Would tell roommate to stop, would also let him/her know I was angry

__6__ = Would tell roommate to stop, but would not let him/her know I was angry

__7__ = Would like to tell roommate to stop, but feel it is not appropriate to discuss incident with roommate

__8__ = Would feel it not necessary to discuss with roommate

Incident 1. You are trying to study for an hourly exam the night before, and your roommate has friends in for a session that gets loud and heated.

a._____ b._____

Incident 2. You come in late Saturday evening and find one of your roommate's friends sleeping in your bed.

a._____ b._____

Incident 3. You were planning to stay in your room, although you hadn't planned to study, and one of your roommate's friends uses your desk for studying.

a._____ b._____

Incident 4. Your roommate keeps throwing his/her coats and sweaters on your bed.

a._____ b._____

Incident 5. You are on the phone talking to a friend and your roommate turns on the stereo loud enough to make conversation difficult.

a._____ b._____

Incident 6. You want to watch TV in your room and your roommate insists on listening to the stereo.

a._____ b._____

Incident 7. Your roommate keeps throwing his/her coats and sweaters on all the available easy chairs in the room.

a._____ b._____

Incident 8. Your roommate borrows your clothes without asking you.

a._____ b._____

Incident 9. You like to listen to the stereo or watch TV in your room, but your roommate says he/she doesn't care for the distraction when he's trying to study, so asks you not to play them in the evening.

a._____ b._____

Incident 10. Your roommate has three 8 o'clock classes, while your first class is not till ten, but he uses an alarm which is set to go off at 7 a.m.

a._____ b._____

Using the following scale, indicate as nearly as you can the nature of the relationship between you and your roommates.

Hostile Distant Friendly Close Friends

Will you be rooming with the same roommate/s winter term? _____

Using the same guidelines for rating as you did when describing your reactions to the ten hypothetical situations, attempt to predict your roommates responses to the same situations.

Incident 1. Your roommate is trying to study for an hourly exam and you and some friends get into a loud, heated discussion.

a._____ b._____

Incident 2. Your roommate comes in late Saturday evening and finds one of your friends sleeping in his/her bed.

a._____ b._____

Incident 3. Your roommate had planned to stay in the room, but not to study, and you let one of your friends use his/her desk for studying.

a._____ b._____

Incident 4. You keep throwing your coats and sweaters on your roommate's bed.

a._____ b._____

Incident 5. Your roommate is talking on the phone to a friend and you turn up the stereo loud enough to make conversation difficult.

a._____ b._____

Incident 6. You want to watch TV in your room and your roommate wants to listen to the stereo.

a._____ b._____

Incident 7. You have a habit of flinging your coats and sweaters on all the available easy chairs in the room.

a._____ b._____

Incident 8. You keep borrowing your roommates clothes without asking permission.

a._____ b._____

Incident 9. Your roommate likes to listen to the stereo or watch TV in the room, but you can't study with any distraction, so you ask him/her not to play them in the evening.

a._____ b._____

Incident 10. You have three 8 o'clock classes so you set your alarm for 7 o'clock. Your roommate does not have any classes until 10 o'clock.

a._____ b._____

APPENDIX D

ANALYSIS OF VARIANCE TABLES FOR PRE, DURING, AND POST INVASION PERIODS

ANALYSIS OF VARIANCE TABLES FOR PRE, DURING, AND POST

INVASION PERIODS

TABLE 1.--Analysis of variance for frequency of face responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	1759.333	95	18.519	
Location	20.083	2	10.042	
I-Sex	140.167	1	140.167	9.95**
I-Race	48.167	1	48.167	
V-Sex	0.000	1	0.000	
V-Race	6.000	1	6.000	
L-IS	10.333	2	5.167	
L-IR	12.333	2	6.167	
L-VS	39.250	2	19.625	
L-VR	31.750	2	15.875	
IS-IR	170.667	1	170.667	11.15**
IS-VS	13.500	1	13.500	
IS-VR	6.000	1	6.000	
IR-VS	73.500	1	73.500	4.81*
IR-VR	6.000	1	6.000	
VR-VS	16.667	1	16.667	
L-IS-IR	39.083	2	19.547	
L-IS-VS	9.000	2	4.500	
L-IS-VR	9.750	2	4.875	
L-IR-VS	28.000	2	14.000	
L-IR-VR	117.250	2	58.625	3.83*
L-VS-VR	18.083	2	9.047	
ISR-VS	42.667	1	42.667	
ISR-VR	2.667	1	2.667	
IS-VSR	10.667	1	10.667	
IR-VSR	16.667	1	16.667	
LISR-VS	24.083	2	12.042	
LISR-VR	31.583	2	15.792	
LIS-VSR	50.083	2	25.042	
LIR-VSR	20.583	2	10.292	
ISR-VSR	0.667	1	0.667	
5-Way	8.083	2	4.042	
Error	736.000	48	15.333	

TABLE 2.--Analysis of variance for frequency of arm responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	653.490	95	6.879	
Location	4.021	2	2.010	
I-Sex	52.510	1	52.510	8.11**
I-Race	11.344	1	11.344	
V-Sex	4.594	1	4.594	
V-Race	3.010	1	3.010	
L-IS	9.771	2	4.885	
L-IR	2.688	2	1.344	
L-VS	1.563	2	0.781	
L-VR	3.646	2	1.823	
IS-IR	29.260	1	29.260	4.52**
IS-VS	0.010	1	0.010	
IS-VR	14.260	1	14.260	
IR-VS	38.760	1	38.760	5.99**
IR-VR	15.844	1	15.844	
VR-VS	4.594	1	4.594	
L-IS-IR	4.771	2	2.385	
L-IS-VS	6.896	2	3.448	
L-IS-VR	1.896	2	0.948	
L-IR-VS	26.396	2	13.198	
L-IR-VR	12.563	2	6.281	
L-VS-VR	13.688	2	6.844	
ISR-VS	3.760	1	3.760	
ISR-VR	15.844	1	15.844	
IS-VSR	4.594	1	4.594	
IR-VSR	8.760	1	8.760	
LISR-VS	14.396	2	7.198	
LISR-VR	3.813	2	1.906	
LIS-VSR	8.688	2	4.344	
LIR-VSR	12.271	2	6.135	
ISR-VSR	0.844	1	0.844	
5-Way	7.937	2	3.969	
Error	310.500	48	6.469	

TABLE 3.--Analysis of variance for frequency of hand responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	2589.990	95	27.263	
Location	66.396	2	33.198	
I-Sex	25.010	1	25.010	
I-Race	2.344	1	2.344	
V-Sex	7.594	1	7.594	
V-Race	21.094	1	21.094	
L-IS	20.146	2	10.073	
L-IR	10.938	2	5.469	
L-VS	2.438	2	1.219	
L-VR	89.063	2	44.531	
IS-IR	3.010	1	3.010	
IS-VS	41.344	1	41.344	
IS-VR	29.260	1	29.260	
IR-VS	3.010	1	3.010	
IR-VR	162.760	1	162.760	5.77*
VR-VS	11.344	1	11.344	
L-IS-IR	43.271	2	21.635	
L-IS-VS	43.188	2	21.594	
L-IS-VR	20.146	2	10.073	
L-IR-VS	15.896	2	7.948	
L-IR-VR	33.521	2	16.760	
L-VS-VR	84.438	2	42.219	
ISR-VS	3.760	1	3.760	
ISR-VR	4.594	1	4.594	
IS-VSR	46.760	1	46.760	
IR-VSR	49.594	1	49.594	
LISR-VS	103.896	2	51.949	
LISR-VR	49.188	2	24.594	
LIS-VSR	150.021	2	75.010	
LIR-VSR	45.813	2	22.906	
ISR-VSR	0.010	1	0.010	
5-Way	56.646	2	28.323	
Error	1343.500	48	27.989	

TABLE 4.--Analysis of variance for frequency of body responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	628.625	95	6.617	
Location	40.188	2	20.094	3.60*
I-Sex	5.042	1	5.042	
I-Race	6.000	1	6.000	
V-Sex	8.167	1	8.167	
V-Race	9.375	1	9.375	
L-IS	0.271	2	0.135	
L-IR	3.563	2	1.781	
L-VS	27.521	2	13.760	
L-VR	3.938	2	1.969	
IS-IR	10.667	1	10.667	
IS-VS	16.667	1	16.667	
IS-VR	3.375	1	3.375	
IR-VS	0.042	1	0.047	
IR-VR	6.000	1	6.000	
VR-VS	2.667	1	2.667	
L-IS-IR	20.146	2	10.073	
L-IS-VS	4.521	2	2.260	
L-IS-VR	19.188	2	9.594	
L-IR-VS	15.146	2	7.573	
L-IR-VR	18.813	2	9.406	
L-VS-VR	37.271	2	18.635	3.21*
ISR-VS	7.042	1	7.047	
ISR-VR	6.000	1	6.000	
IS-VSR	0.167	1	0.167	
IR-VSR	15.042	1	15.042	
LISR-VS	7.146	2	3.573	
LISR-VR	8.062	2	4.031	
LIS-VSR	23.271	2	11.635	
LIR-VSR	5.896	2	2.948	
ISR-VSR	3.375	1	3.375	
5-Way	15.063	2	7.531	
Error	279.000	48	5.812	

TABLE 5.--Analysis of variance for frequency of leg responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	282.656	95	2.975	
Location	38.313	2	19.156	8.63**
I-Sex	0.844	1	0.844	
I-Race	1.760	1	1.760	
V-Sex	3.010	1	3.010	
V-Race	0.094	1	0.094	
L-IS	9.813	2	4.906	
L-IR	8.896	2	4.448	
L-VS	8.896	2	4.448	
L-VR	6.063	2	3.031	
IS-IR	14.260	1	14.260	6.38*
IS-VS	7.594	1	7.594	
IS-VR	0.260	1	0.260	
IR-VS	4.594	1	4.594	
IR-VR	1.260	1	1.260	
VR-VS	3.010	1	3.010	
L-IS-IR	2.646	2	1.323	
L-IS-VS	3.813	2	1.906	
L-IS-VR	6.896	2	3.448	
L-IR-VS	0.062	2	0.031	
L-IR-VR	4.396	2	2.198	
L-VS-VR	5.646	2	2.823	
ISR-VS	3.010	1	3.010	
ISR-VR	7.594	1	7.594	
IS-VSR	4.594	1	4.594	
LIR-VSR	0.510	1	0.510	
LISR-VS	6.396	2	3.198	
LISR-VR	3.813	2	1.906	
LIS-VSR	12.062	2	6.031	
LIR-VSR	4.396	2	2.198	
ISR-VSR	0.094	1	0.094	
5-Way	1.563	2	0.781	
Error	106.500	48	2.219	

TABLE 6.--Analysis of variance for frequency of feet responses during the pre-invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	1074.958	95	11.315	
Location	45.771	2	22.885	
I-Sex	13.500	1	13.500	
I-Race	18.375	1	18.375	
V-Sex	12.042	1	12.042	
V-Race	18.375	1	18.375	
L-IS	58.188	2	29.094	
L-IR	1.188	2	0.594	
L-VS	47.271	2	23.635	
L-VR	4.688	2	2.344	
IS-IR	1.500	1	1.500	
IS-VS	6.000	1	6.000	
IS-VR	42.667	1	42.667	
IR-VS	18.375	1	18.375	
IR-VR	3.375	1	3.375	
VR-VS	7.042	1	7.042	
L-IS-IR	6.938	2	3.469	
L-IS-VS	4.938	2	2.469	
L-IS-VR	19.771	2	9.885	
L-IR-VS	8.687	2	4.344	
L-IR-VR	16.188	2	8.094	
L-VS-VR	48.271	2	24.135	
ISR-VS	6.000	1	6.000	
ISR-VR	0.667	1	0.667	
IS-VSR	-0.000	1	-0.000	
IR-VSR	15.042	1	15.042	
LISR-VS	2.687	2	1.344	
LISR-VR	2.271	2	1.135	
LIS-VSR	48.438	2	24.219	
LIR-VSR	2.771	2	1.385	
ISR-VSR	0.000	1	0.000	
5-Way	1.938	2	0.969	
Error	592.000	48	12.333	

TABLE 7.--Analysis of variance for frequency of face responses during the invasion for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	2487.90	95	26.189	
Location	51.583	2	25.792	
I-Sex	29.260	1	29.260	
I-Race	0.510	1	0.510	
V-Sex	11.344	1	11.344	
V-Race	8.760	1	8.760	
L-IS	96.583	2	48.292	
L-IR	44.333	2	22.167	
L-VS	169.750	2	84.875	
L-VR	89.083	2	44.542	
IS-IR	65.010	1	65.010	
IS-VS	15.844	1	15.844	
IS-VR	0.844	1	0.844	
IR-VS	12.760	1	12.760	
IR-VR	14.260	1	14.260	
VR-VS	36.260	1	36.260	
L-IS-IR	27.083	2	13.542	
L-IS-VS	42.250	2	21.125	
L-IS-VR	2.250	2	1.125	
L-IR-VS	64.333	2	32.167	
L-IR-VR	26.083	2	13.042	
L-VS-VR	105.083	2	52.542	
ISR-VS	6.510	1	6.510	
ISR-VR	38.760	1	38.760	
IS-VSR	7.594	1	7.594	
IR-VSR	10.010	1	10.010	
LISR-VS	14.583	2	7.292	
LISR-VR	46.333	2	23.167	
LIS-VSR	68.250	2	34.125	
LIR-VSR	81.083	2	40.542	
ISR-VSR	12.760	1	12.760	
5-Way	4.333	2	2.167	
Error	1284.500	48	26.760	

TABLE 8.--Analysis of variance for frequency of arm responses during the invasion for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	710.156	95	7.475	
Location	3.563	2	1.781	
I-Sex	5.510	1	5.510	
I-Race	4.594	1	4.594	
V-Sex	7.594	1	7.594	
V-Race	11.344	1	11.344	
L-IS	42.521	2	21.260	
L-IR	17.063	2	8.531	
L-VS	22.563	2	11.281	
L-VR	2.438	2	1.219	
IS-IR	55.510	1	55.510	8.20**
IS-VS	3.760	1	3.760	
IS-VR	25.010	1	25.010	
IR-VS	3.760	1	3.760	
IR-VR	5.510	1	5.510	
VR-VS	10.010	1	10.010	
L-IS-IR	2.271	2	1.135	
L-IS-VS	2.021	2	1.010	
L-IS-VR	15.146	2	7.573	
L-IR-VS	4.146	2	2.073	
L-IR-VR	9.771	2	4.885	
L-VS-VR	3.521	2	1.760	
ISR-VS	17.510	1	17.510	
ISR-VR	3.760	1	3.760	
IS-VSR	3.010	1	3.010	
IR-VSR	3.760	1	3.760	
LISR-VS	21.521	2	10.760	
LISR-VR	21.396	2	10.698	
LIS-VSR	1.896	2	0.948	
LIR-VSR	2.771	2	1.385	
ISR-VSR	10.010	1	10.010	
5-Way	41.396	2	20.698	
Error	325.500	48	6.781	

TABLE 9.--Analysis of variance for frequency of hand responses during the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	3807.833	95	40.082	
Location	49.021	2	24.510	
I-Sex	2.042	1	2.042	
I-Race	92.042	1	92.042	
V-Sex	12.042	1	12.042	
V-Race	6.000	1	6.000	
L-IS	169.021	2	84.510	
L-IR	188.521	2	94.260	
L-VS	160.896	2	80.448	
L-VR	47.687	2	23.844	
IS-IR	32.667	1	32.667	
IS-VS	80.667	1	80.667	
IS-VR	30.375	1	30.375	
IR-VS	42.667	1	42.667	
IR-VR	77.042	1	77.042	
VR-VS	3.375	1	3.375	
L-IS-IR	192.771	2	96.385	
L-IS-VS	70.146	2	35.073	
L-IS-VR	2.688	2	1.347	
L-IR-VS	55.646	2	27.823	
L-IR-VR	13.271	2	6.635	
L-VS-VR	8.313	2	4.156	
ISR-VS	57.042	1	57.042	
ISR-VR	0.167	1	0.167	
IS-VSR	28.167	1	28.167	
IR-VSR	48.167	1	48.167	
LISR-VS	80.646	2	40.323	
LISR-VR	92.021	2	46.010	
LIS-VSR	23.896	2	11.948	
LIR-VSR	147.146	2	73.573	
ISR-VSR	15.042	1	15.042	
5-Way	222.646	2	111.323	
Error	1756.000	48	36.583	

TABLE 10.--Analysis of variance for frequency of body responses during the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	369.625	95	3.891	
Location	5.688	2	2.844	
I-Sex	9.375	1	9.375	
I-Race	1.500	1	1.500	
V-Sex	1.042	1	1.042	
V-Race	24.000	1	24.000	6.48*
L-IS	1.313	2	0.656	
L-IR	2.438	2	1.219	
L-VS	5.396	2	2.698	
L-VR	3.563	2	1.781	
IS-IR	2.667	1	2.667	
IS-VS	1.042	1	1.042	
IS-VR	0.167	1	0.167	
IR-VS	0.667	1	0.667	
IR-VR	0.042	1	0.042	
VR-VS	2.667	1	2.667	
L-IS-IR	7.146	2	3.573	
L-IS-VS	10.021	2	5.010	
L-IS-VR	6.271	2	3.135	
L-IR-VS	5.396	2	2.698	
L-IR-VR	4.396	2	2.198	
L-VS-VR	56.021	2	28.010	7.57**
ISR-VS	4.167	1	4.167	
ISR-VR	5.042	1	5.042	
IS-VSR	1.500	1	1.500	
LIR-VSR	5.042	1	5.042	
LISR-VS	7.771	2	3.885	
LISR-VR	2.021	2	1.010	
LIS-VSR	13.563	2	6.781	
LIR-VSR	0.271	2	0.135	
ISR-VSR	1.042	1	1.042	
5-Way	0.396	2	0.198	
Error	178.000	48	3.708	

TABLE 11.--Analysis of variance for frequency of leg responses during the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	244.490	95	2.574	
Location	6.583	2	3.292	
I-Sex	3.760	1	3.76-	
I-Race	0.844	1	0.844	
V-Sex	6.510	1	6.510	
V-Race	0.260	1	0.260	
L-IS	4.333	2	2.167	
L-IR	2.250	2	1.125	
L-VS	5.333	2	2.667	
L-VR	4.083	2	2.042	
IS-IR	1.760	1	1.760	
IS-VS	14.260	1	14.260	5.50*
IS-VR	6.510	1	6.510	
IR-VS	0.010	1	0.010	
IR-VR	0.510	1	0.510	
VR-VS	0.010	1	0.010	
L-IS-IR	11.083	2	5.542	
L-IS-VS	2.083	2	1.042	
L-IS-VR	2.583	2	1.292	
L-IR-VS	8.083	2	4.042	
L-IR-VR	5.083	2	2.542	
L-VS-VR	0.583	2	0.292	
ISR-VS	7.594	1	7.594	
ISR-VR	3.760	1	3.760	
IS-VSR	1.760	1	1.760	
IR-VSR	0.260	1	0.260	
LISR-VS	3.250	2	1.625	
LISR-VR	2.333	2	1.167	
LIS-VSR	12.583	2	6.297	
LIR-VSR	0.333	2	0.167	
ISR-VSR	0.844	1	0.844	
5-Way	0.750	2	0.375	
Error	124.500	48	2.594	

TABLE 12.--Analysis of variance for frequency of feet responses during the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	2477.240	95	26.076	
Location	121.646	2	60.823	
I-Sex	6.510	1	6.510	
I-Race	44.010	1	44.010	
V-Sex	36.260	1	36.260	
V-Race	36.260	1	36.260	
L-IS	24.646	2	12.323	
L-IR	51.646	2	25.823	
L-VS	23.521	2	11.760	
L-VR	21.021	2	10.510	
IS-IR	0.844	1	0.844	
IS-VS	12.760	1	12.760	
IS-VR	114.844	1	114.844	4.06*
IR-VS	90.094	1	90.094	
IR-VR	0.010	1	0.010	
VR-VS	0.010	1	0.010	
L-IS-IR	25.563	2	12.781	
L-IS-VS	37.021	2	18.510	
L-IS-VR	43.188	2	21.594	
L-IR-VS	67.188	2	33.594	
L-IR-VR	50.021	2	25.010	
L-VS-VR	52.646	2	26.323	
ISR-VS	23.010	1	23.010	
ISR-VR	23.010	1	23.010	
IS-VSR	0.010	1	0.010	
IR-VSR	33.844	1	33.844	
LISR-VS	3.771	2	1.885	
LISR-VR	33.271	2	16.635	
LIS-VSR	33.146	2	16.573	
LIR-VSR	20.312	2	10.156	
ISR-VSR	58.594	1	58.594	
5-Way	30.063	2	15.031	
Error	1358.500	48	28.302	

TABLE 13.--Analysis of variance for frequency of face responses after the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	1951.906	95	20.546	
Location	9.250	2	4.625	
I-Sex	0.094	1	0.094	
I-Race	25.010	1	25.010	
V-Sex	10.010	1	10.010	
V-Race	2.344	1	2.344	
L-IS	22.750	2	11.375	
L-IR	42.583	2	21.292	
L-VS	84.083	2	42.042	
L-VR	50.250	2	25.125	
IS-IR	5.510	1	5.510	
IS-VS	36.260	1	36.260	
IS-VR	0.844	1	0.844	
IR-VS	27.094	1	27.094	
IR-VR	11.344	1	11.344	
VR-VS	23.010	1	23.010	
L-IS-IR	199.083	2	99.542	4.83*
L-IS-VS	6.083	2	3.042	
L-IS-VR	0.750	2	0.375	
L-IR-VS	19.750	2	9.875	
L-IR-VR	129.000	2	64.500	
L-VS-VR	26.333	2	13.167	
ISR-VS	33.844	1	33.848	
ISR-VR	5.510	1	5.510	
IS-VSR	19.260	1	19.260	
IR-VSR	2.344	1	2.344	
LISR-VS	5.250	2	2.625	
LISR-VR	12.333	2	6.167	
LIS-VSR	30.333	2	15.167	
LIR-VSR	83.250	2	41.625	
ISR-VSR	0.260	1	0.260	
5-Way	39.583	2	19.792	
Error	988.500	48	20.594	

TABLE 14.--Analysis of variance for frequency of arm responses after the invasion observation for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	697.490	95	7.342	
Location	7.521	2	3.760	
I-Sex	0.844	1	0.844	
I-Race	10.010	1	10.010	
V-Sex	61.760	1	61.760	7.26**
V-Race	0.510	1	0.510	
L-IS	8.313	2	4.156	
L-IR	21.521	2	10.760	
L-VS	2.021	2	1.010	
L-VR	1.521	2	0.760	
IS-IR	7.594	1	7.594	
IS-VS	3.010	1	3.010	
IS-VR	4.594	1	4.594	
IR-VS	4.594	1	4.594	
IR-VR	8.760	1	8.760	
VR-VS	3.010	1	3.010	
L-IS-IR	6.813	2	3.407	
L-IS-VS	5.396	2	2.698	
L-IS-VR	6.813	2	3.406	
L-IR-VS	6.938	2	3.469	
L-IR-VR	0.771	2	0.385	
L-VS-VR	13.271	2	6.635	
ISR-VS	0.260	1	0.260	
ISR-VR	1.760	1	1.760	
IS-VSR	0.010	1	0.010	
IR-VSR	0.094	1	0.094	
LISR-VS	14.646	2	7.323	
LISR-VR	45.896	2	22.948	
LIS-VSR	5.146	2	2.573	
LIR-VSR	2.437	2	1.219	
ISR-VSR	5.510	1	5.510	
5-Way	27.646	2	13.823	
Error	408.500	48	8.510	

TABLE 15.--Analysis of variance for frequency of hand responses after the invasion period for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	4337.740	95	45.660	
Location	63.146	2	31.573	
I-Sex	19.260	1	19.260	
I-Race	189.844	1	189.844	4.26*
V-Sex	12.760	1	12.760	
V-Race	0.010	1	0.010	
L-IS	39.021	2	19.510	
L-IR	60.438	2	30.219	
L-VS	8.896	2	4.448	
L-VR	77.271	2	38.635	
IS-IR	6.510	1	6.510	
IS-VS	420.844	1	420.844	9.4**
IS-VR	12.760	1	12.760	
IR-VS	243.844	1	243.844	5.48*
IR-VR	55.510	1	55.510	
VR-VS	12.760	1	12.760	
L-IS-IR	253.896	2	126.948	
L-IS-VS	4.187	2	2.094	
L-IS-VR	40.896	2	20.448	
L-IR-VS	37.688	2	18.844	
L-IR-VR	45.646	2	22.823	
L-VS-VR	82.021	2	41.010	
ISR-VS	3.760	1	3.760	
ISR-VR	61.760	1	61.760	
IS-VSR	14.260	1	14.260	
IR-VSR	1.260	1	1.260	
LISR-VS	98.396	2	49.198	
LISR-VR	6.521	2	3.260	
LIS-VSR	138.396	2	69.198	
LIR-VSR	114.396	2	57.198	
ISR-VSR	21.094	1	21.094	
5-Way	55.187	2	27.594	
Error	2135.500	48	44.490	

TABLE 16.--Analysis of variance for frequency of body responses after the invasion period for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	502.740	95	5.292	
Location	31.021	2	15.510	4.58
I-Sex	17.510	1	17.510	5.18*
I-Race	2.344	1	2.344	
V-Sex	61.760	1	61.760	18.27**
V-Race	27.094	1	27.094	8.01**
L-IS	27.146	2	13.573	4.01*
L-IR	16.188	2	8.094	
L-VS	0.896	2	0.448	
L-VR	1.313	2	0.656	
IS-IR	3.760	1	3.760	
IS-VS	2.344	1	2.344	
IS-VR	0.510	1	0.510	
IR-VS	0.510	1	0.510	
IR-VR	7.594	1	7.594	
VR-VS	29.260	1	29.260	8.60**
L-IS-IR	2.146	2	1.073	
L-IS-VS	10.938	2	5.467	
L-IS-VR	8.521	2	4.260	
L-IR-VS	5.146	2	2.573	
L-IR-VR	13.563	2	6.781	
L-VS-VR	13.271	2	6.635	
ISR-VS	0.260	1	0.260	
ISR-VR	0.844	1	0.844	
IS-VSR	0.844	1	0.844	
IR-VSR	4.594	1	4.594	
LISR-VS	4.521	2	2.260	
LISR-VR	15.437	2	7.719	
LIS-VSR	22.563	2	11.281	
LIR-VSR	6.438	2	3.219	
ISR-VSR	0.010	1	0.010	
5-Way	1.896	2	0.948	
Error	162.500	48	3.385	

TABLE 17.--Analysis of variance for frequency of leg responses after the invasion period for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	436.625	95	4.596	
Location	21.000	2	10.500	
I-Sex	22.042	1	22.042	4.46*
I-Race	1.500	1	1.500	
V-Sex	1.500	1	1.500	
V-Race	1.042	1	1.042	
L-IS	0.083	2	0.042	
L-IR	9.250	2	4.625	
L-VS	12.250	2	6.125	
L-VR	1.083	2	0.542	
IS-IR	16.667	1	16.667	
IS-VS	2.667	1	2.667	
IS-VR	0.375	1	0.375	
IR-VS	0.375	1	0.375	
IR-VR	1.500	1	1.500	
VR-VS	6.000	1	6.000	
L-IS-IR	30.083	2	15.043	
L-IS-VS	2.333	2	1.167	
L-IS-VR	3.000	2	1.500	
L-IR-VS	9.250	2	4.625	
L-IR-VR	3.250	2	1.625	
L-VS-VR	3.000	2	1.500	
ISR-VS	1.042	1	1.042	
ISR-VR	13.500	1	13.500	
IS-VSR	16.667	1	16.666	
IR-VSR	1.042	1	1.042	
LISR-VS	6.083	2	3.042	
LISR-VR	0.250	2	0.125	
LIS-VSR	2.583	2	1.292	
LIR-VSR	6.083	2	3.042	
ISR-VSR	1.042	1	1.042	
5-Way	3.083	2	1.542	
Error	237.000	48	4.938	

TABLE 18.--Analysis of variance for frequency of feet responses after the invasion period for all subjects

Variable	Sum of Squares	d.f.	Mean Square	F ratio
Total	882.740	95	9.292	
Location	61.396	2	30.698	
I-Sex	0.844	1	0.844	
I-Race	7.594	1	7.594	
V-Sex	36.260	1	36.260	
V-Race	11.344	1	11.344	
L-IS	47.688	2	23.844	
L-IR	36.813	2	18.406	
L-VS	10.896	2	5.448	
L-VR	4.188	2	2.094	
IS-IR	0.260	1	0.260	
IS-VS	0.010	1	0.010	
IS-VR	5.510	1	5.510	
IR-VS	0.010	1	0.010	
IR-VR	0.094	1	0.094	
VR-VS	11.344	1	11.344	
L-IS-IR	40.771	2	20.385	
L-IS-VS	0.271	2	0.135	
L-IS-VR	16.146	2	8.073	
L-IR-VS	0.896	2	0.448	
L-IR-VR	2.437	2	1.219	
L-VS-VR	22.687	2	11.344	
ISR-VS	11.344	1	11.344	
ISR-VR	0.010	1	0.010	
IS-VSR	3.010	1	3.010	
IR-VSR	6.510	1	6.510	
LISR-VS	21.438	2	10.719	
LISR-VR	3.396	2	1.698	
LIS-VSR	11.396	2	5.698	
LIR-VSR	11.521	2	5.760	
ISR-VSR	8.760	1	8.760	
5-Way	8.396	2	4.198	
Error	479.500	48	9.990	

APPENDIX E

GAIN SCORE ANALYSIS OF VARIANCE

GAIN SCORE ANALYSIS OF VARIANCE

TABLE 1.--Gain score analysis of variance for differences in face responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	2658.240	95	27.981	
Location	15.083	2	7.542	
I-Sex	133.010	1	133.010	4.79*
I-Race	142.594	1	142.594	5.01*
V-Sex	10.010	1	10.010	
V-Race	15.844	1	15.844	
L-IS	11.083	2	5.542	
L-IR	31.750	2	15.875	
L-VS	106.083	2	53.042	
L-VR	25.750	2	12.875	
IS-IR	114.844	1	114.844	4.14*
IS-VS	5.510	1	5.510	
IS-VR	11.344	1	11.344	
IR-VS	11.344	1	11.344	
IR-VR	0.844	1	0.844	
VR-VS	0.510	1	0.510	
L-IS-IR	61.750	2	30.875	
L-IS-VS	27.083	2	13.542	
L-IS-VR	5.250	2	2.625	
L-IR-VS	4.750	2	2.375	
L-IR-VR	31.750	2	15.875	
L-VS-VR	58.583	2	29.292	
ISR-VS	152.510	1	152.510	5.49*
ISR-VR	0.510	1	0.510	
IS-VSR	1.260	1	1.260	
IR-VSR	31.510	1	31.510	
LISR-VS	8.083	2	4.042	
LISR-VR	53.083	2	26.542	
LIS-VSR	73.583	2	36.792	
LIR-VSR	139.083	2	69.542	
ISR-VSR	0.094	1	0.094	
5-Way	42.250	2	21.125	
Error	1331.500	48	27.740	

TABLE 2.--Gain score analysis of variance for differences in arm responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	957.333	95	10.077	
Location	12.333	2	6.167	
I-Sex	66.667	1	66.667	6.908*
I-Race	0.042	1	0.042	
V-Sex	32.667	1	32.667	
V-Race	6.000	1	6.000	
L-IS	5.083	2	2.542	
L-IR	17.333	2	8.667	
L-VS	1.083	2	0.542	
L-VR	9.750	2	4.875	
IS-IR	7.042	1	7.042	
IS-VS	2.667	1	2.667	
IS-VR	2.667	1	2.667	
IR-VS	70.042	1	70.042	7.247**
IR-VR	1.042	1	1.042	
VR-VS	0.167	1	0.167	
L-IS-IR	2.583	2	1.292	
L-IS-VS	20.583	2	10.292	
L-IS-VR	11.083	2	5.542	
L-IR-VS	33.083	2	16.542	
L-IR-VR	9.083	2	4.542	
L-VS-VR	52.333	2	26.167	
ISR-VS	2.042	1	2.042	
ISR-VR	7.042	1	7.042	
IS-VSR	4.167	1	4.167	
IR-VSR	7.042	1	7.042	
LISR-VS	51.083	2	25.542	
LISR-VR	25.083	2	12.542	
LIS-VSR	13.083	2	6.542	
LIR-VSR	9.333	2	4.662	
ISR-VSR	2.042	1	2.042	
5-Way	10.083	2	5.042	
Error	463.000	48	9.646	

TABLE 3.--Gain score analysis of variance for differences i- hand responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	5394.958	95	56.789	
Location	25.771	2	12.885	
I-Sex	88.167	1	88.167	
I-Race	234.375	1	234.375	
V-Sex	0.667	1	0.667	
V-Race	20.167	1	20.167	
L-IS	10.646	2	5.323	
L-IR	122.313	2	61.156	
L-VS	19.521	2	9.760	
L-VR	57.271	2	28.635	
IS-IR	0.667	1	0.667	
IS-VS	198.375	1	198.375	
IS-VR	3.375	1	3.375	
IR-VS	192.667	1	192.667	
IR-VR	28.167	1	28.167	
VR-VS	0.042	1	0.042	
L-IS-IR	124.021	2	62.010	
L-IS-VS	23.313	2	11.656	
L-IS-VR	3.813	2	1.906	
L-IR-VS	14.396	2	7.198	
L-IR-VR	97.896	2	48.948	
L-VS-VR	248.771	2	124.385	
ISR-VS	15.042	1	15.042	
ISR-VR	100.042	1	100.042	
IS-VSR	112.667	1	112.667	
IR-VSR	35.042	1	35.042	
LISR-VS	2.521	2	1.260	
LISR-VR	58.771	2	29.385	
LIS-VSR	510.396	2	255.198	4.159*
LIR-VSR	35.896	2	17.947	
ISR-VSR	20.167	1	20.167	
5-Way	45.021	2	22.510	
Error	2945.000	48	61.354	

TABLE 4.--Gain score analysis of variance for differences in body responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	607.240	95	6.392	
Location	2.083	2	1.042	
I-Sex	3.760	1	3.760	
I-Race	0.844	1	0.844	
V-Sex	25.010	1	25.010	4.67*
V-Race	4.594	1	4.594	
L-IS	27.083	2	13.542	
L-IR	15.250	2	7.625	
L-VS	19.083	2	9.542	
L-VR	0.750	2	0.375	
IS-IR	27.094	1	27.094	5.055*
IS-VS	31.510	1	31.510	5.878*
IS-VR	1.260	1	1.260	
IR-VS	0.844	1	0.844	
IR-VR	0.094	1	0.094	
VR-VS	14.260	1	14.260	
L-IS-IR	20.250	2	10.125	
L-IS-VS	2.333	2	1.167	
L-IS-VR	45.083	2	22.542	4.205*
L-IR-VS	12.000	2	6.000	
L-IR-VR	1.750	2	0.875	
L-VS-VR	9.333	2	4.667	
ISR-VS	4.594	1	4.594	
ISR-VR	2.344	1	2.344	
IS-VSR	1.760	1	1.760	
IR-VSR	3.010	1	3.010	
LISR-VS	22.750	2	11.375	
LISR-VR	1.750	2	0.875	
LIS-VSR	12.583	2	6.292	
LIR-VSR	10.583	2	5.292	
ISR-VSR	3.760	1	3.760	
5-Way	22.333	2	11.167	
Error	257.500	48	5.365	

TABLE 5.--Gain score analysis of variance for differences in leg responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	470.656	95	4.954	
Location	3.063	2	1.531	
I-Sex	14.260	1	14.260	
I-Race	0.010	1	0.010	
V-Sex	0.260	1	0.260	
V-RAce	1.760	1	1.760	
L-IS	10.021	2	5.010	
L-IR	4.396	2	2.198	
L-VS	41.271	2	20.635	3.95*
L-VR	11.521	2	5.760	
IS-IR	0.094	1	0.094	
IS-VS	1.260	1	1.260	
IS-VR	1.260	1	1.260	
IR-VS	2.344	1	2.344	
IR-VR	5.510	1	5.510	
VR-VS	0.510	1	0.510	
L-IS-IR	19.187	2	9.594	
L-IS-VS	0.396	2	0.198	
L-IS-VR	1.896	2	0.948	
L-IR-VS	9.188	2	4.594	
L-IR-VR	12.771	2	6.385	
L-VS-VR	1.646	2	0.823	
ISR-VS	0.510	1	0.510	
ISR-VR	0.844	1	0.844	
IS-VSR	38.760	1	38.760	7.41**
IR-VSR	3.010	1	3.010	
LISR-VS	0.146	2	0.073	
LISR-VR	2.313	2	1.156	
LIS-VSR	21.021	2	10.510	
LIR-VSR	0.146	2	0.073	
ISR-VSR	1.760	1	1.760	
5-Way	9.021	2	4.510	
Error	250.500	48	5.219	

TABLE 6.--Gain score analysis of variance for differences in feet responses from the pre to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	966.656	95	10.175	
Location	25.750	2	12.875	
I-Sex	21.094	1	21.094	
I-Race	2.344	1	2.344	
V-Sex	6.510	1	6.510	5.89*
V-Race	58.594	1	58.594	
L-IS	39.000	2	19.500	
L-IR	33.250	2	16.625	
L-VS	28.583	2	14.292	
L-VR	10.750	2	5.375	
IS-IR	3.010	1	3.010	
IS-VS	5.510	1	5.510	
IS-VR	17.510	1	17.510	
IR-VS	19.260	1	19.260	
IR-VR	2.344	1	2.344	
VR-VS	0.510	1	0.510	
L-IS-IR	16.333	2	8.167	
L-IS-VS	4.083	2	2.042	
L-IS-VR	17.583	2	8.792	
L-IR-VS	9.083	2	4.542	
L-IR-VR	12.250	2	6.125	
L-VS-VR	6.333	2	3.167	
ISR-VS	33.844	1	33.844	
ISR-VR	0.510	1	0.510	
IS-VSR	3.010	1	3.010	
IR-VSR	41.344	1	41.344	4.145*
LISR-VS	9.250	2	4.625	
LISR-VR	0.583	2	0.292	
LIS-VSR	13.583	2	6.792	
LIR-VSR	21.000	2	10.500	
ISR-VSR	8.760	1	8.760	
5-Way	17.583	2	8.792	
Error	477.500	48	9.948	

TABLE 7.--Gain score analysis of variance for differences in face responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	1996.990	95	21.021	
Location	33.083	2	16.542	
I-Sex	41.344	1	41.344	
I-Race	58.594	1	58.594	
V-Sex	11.344	1	11.344	
V-Race	29.260	1	29.260	
L-IS	43.750	2	21.875	
L-IR	28.000	2	14.000	
L-VS	127.750	2	63.875	
L-VR	95.083	2	47.542	
IS-IR	25.010	1	25.010	
IS-VS	0.094	1	0.094	
IS-VR	11.344	1	11.344	
IR-VS	25.010	1	25.010	
IR-VR	1.760	1	1.760	
VR-VS	3.760	1	3.760	
L-IS-IR	1.583	2	0.792	
L-IS-VS	31.750	2	15.875	
L-IS-VR	5.250	2	2.625	
L-IR-VS	174.333	2	87.167	4.25*
L-IR-VR	36.333	2	18.167	
L-VS-VR	36.083	2	18.042	
ISR-VS	15.844	1	15.844	
ISR-VR	21.094	1	21.094	
IS-VSR	36.260	1	36.260	
IR-VSR	0.844	1	0.844	
LISR-VS	3.250	2	1.625	
LISR-VR	1.750	2	0.875	
LIS-VSR	18.083	2	9.042	
LIR-VSR	57.000	2	28.500	
ISR-VSR	19.260	1	19.260	
5-Way	18.583	2	9.292	
Error	984.500	48	20.510	

TABLE 8.--Gain score analysis of variance for differences in arm responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	601.333	95	6.330	
Location	0.021	2	0.010	
I-Sex	24.000	1	24.000	
I-Race	1.500	1	1.500	
V-Sex	0.375	1	0.375	
V-Race	2.667	1	2.667	
L-IS	20.438	2	10.219	
L-IR	27.437	2	13.719	
L-VS	27.562	2	13.781	
L-VR	2.646	2	1.323	
IS-IR	4.167	1	4.167	
IS-VS	3.375	1	3.375	
IS-VR	1.500	1	1.500	
IR-VS	18.375	1	18.375	
IR-VR	2.667	1	2.667	
VR-VS	1.042	1	1.042	
L-IS-IR	5.771	2	2.885	
L-IS-VS	3.812	2	1.906	
L-IS-VR	17.062	2	8.531	
L-IR-VS	23.813	2	11.906	
L-IR-VR	17.146	2	8.573	
L-VS-VR	15.271	2	7.635	
ISR-VS	5.042	1	5.042	
ISR-VR	4.167	1	4.167	
IS-VSR	15.042	1	15.042	
IR-VSR	1.042	1	1.042	
LISR-VS	20.646	2	10.323	
LISR-VR	7.146	2	3.573	
LIS-VSR	9.521	2	4.760	
LIR-VSR	12.771	2	6.385	
ISR-VSR	5.042	1	5.042	
5-Way	13.271	2	6.635	
Error	287.000	48	5.980	

TABLE 9.--Gain score analysis of variance for differences in hand responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	4253.406	95	44.773	
Location	87.938	2	43.969	
I-Sex	12.760	1	12.760	
I-Race	123.760	1	123.760	
V-Sex	0.510	1	0.510	
V-Race	4.594	1	4.594	
L-IS	99.646	2	49.823	
L-IR	289.771	2	144.885	
L-VS	124.396	2	62.198	
L-VR	73.938	2	36.969	
IS-IR	15.844	1	15.844	
IS-VS	6.510	1	6.510	
IS-VR	0.010	1	0.010	
IR-VS	23.010	1	23.010	
IR-VR	15.844	1	15.844	
VR-VS	27.094	1	27.094	
L-IS-IR	64.312	2	32.156	
L-IS-VS	7.771	2	3.885	
L-IS-VR	9.646	2	4.823	
L-IR-VS	33.146	2	16.573	
L-IR-VR	46.937	2	23.469	
L-VS-VR	98.063	2	49.031	
ISR-VS	90.094	1	90.094	
ISR-VR	6.510	1	6.510	
IS-VSR	147.510	1	147.510	
IR-VSR	0.010	1	0.010	
LISR-VS	16.188	2	8.094	
LISR-VR	32.646	2	16.323	
LIS-VSR	110.271	2	55.135	
LIR-VSR	113.146	2	56.573	
ISR-VSR	15.844	1	15.844	
5-Way	79.188	2	39.594	
Error	2476.500	48	51.594	

TABLE 10.--Gain score analysis of variance for differences in body responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	544.500	95	5.732	
Location	23.813	2	11.906	
I-Sex	0.667	1	0.667	
I-Race	1.500	1	1.500	
V-Sex	3.375	1	3.375	
V-Race	3.375	1	3.375	
L-IS	1.521	2	0.760	
L-IR	0.188	2	0.094	
L-VS	19.563	2	9.781	
L-VR	6.938	2	3.469	
IS-IR	2.667	1	2.667	
IS-VS	9.375	1	9.375	
IS-VR	2.042	1	2.042	
IR-VS	1.042	1	1.042	
IR-VR	5.042	1	5.042	
VR-VS	0.000	1	0.000	
L-IS-IR	10.646	2	5.323	
L-IS-VS	10.188	2	5.094	
L-IS-VR	22.146	2	11.073	
L-IR-VS	20.271	2	10.135	
L-IR-VR	27.896	2	13.948	
L-VS-VR	7.938	2	3.969	
ISR-VS	0.375	1	0.375	
ISR-VR	0.042	1	0.042	
IS-VSR	2.667	1	2.667	
IR-VSR	2.667	1	2.667	
LISR-VS	5.812	2	2.906	
LISR-VR	7.021	2	3.510	
LIS-VSR	27.896	2	13.948	
LIR-VSR	8.396	2	4.198	
ISR-VSR	0.667	1	0.667	
5-Way	12.771	2	6.385	
Error	296.000	48	6.167	

TABLE 11.--Gain score analysis of variance for differences in leg responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	335.333	95	3.530	
Location	17.771	2	8.885	
I-Sex	1.042	1	1.042	
I-Race	5.042	1	5.042	
V-Sex	0.667	1	0.667	
V-Race	0.667	1	0.667	
L-IS	4.146	2	2.073	
L-IR	19.771	2	9.885	
L-VS	0.896	2	0.448	
L-VR	12.771	2	6.385	
IS-IR	6.000	1	6.000	
IS-VS	1.042	1	1.042	
IS-VR	9.375	1	9.375	
IR-VS	5.042	1	5.042	
IR-VR	3.375	1	3.375	
VR-VS	2.667	1	2.667	
L-IS-IR	6.063	2	3.031	
L-IS-VS	0.271	2	0.135	
L-IS-VR	3.062	2	1.531	
L-IR-VS	7.146	2	3.573	
L-IR-VR	9.438	2	4.719	
L-VS-VR	5.146	2	2.573	
ISR-VS	20.167	1	20.167	6.36*
ISR-VR	0.667	1	0.667	
IS-VSR	7.042	1	7.042	
IR-VSR	0.375	1	0.375	
LISR-VS	18.271	2	9.135	
LISR-VR	0.646	2	0.323	
LIS-VSR	6.771	2	3.385	
LIR-VSR	6.063	2	3.031	
ISR-VSR	1.500	1	1.500	
5-Way	0.437	2	0.219	
Error	152.000	48	3.167	

TABLE 12.--Gain score analysis of variance for differences in feet responses from the pre to during invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	1059.490	95	11.153	
Location	18.521	2	9.260	
I-Sex	1.260	1	1.260	
I-Race	5.510	1	5.510	
V-Sex	6.510	1	6.510	
V-Race	3.010	1	3.010	
L-IS	7.271	2	3.635	
L-IR	37.771	2	18.885	
L-VS	15.396	2	7.698	
L-VR	12.271	2	6.135	
IS-IR	4.594	1	4.594	
IS-VS	1.260	1	1.260	
IS-VR	17.510	1	17.510	
IR-VS	27.094	1	27.094	
IR-VR	3.010	1	3.010	
VR-VS	6.510	1	6.510	
L-IS-IR	56.687	2	28.344	
L-IS-VS	19.396	2	9.698	
L-IS-VR	4.521	2	2.260	
L-IR-VS	30.271	2	15.281	
L-IR-VR	20.271	2	10.135	
L-VS-VR	3.646	2	1.823	
ISR-VS	5.510	1	5.510	
ISR-VR	31.510	1	31.510	
IS-VSR	0.010	1	0.010	
IR-VSR	3.760	1	3.760	
LISR-VS	8.896	2	4.448	
LISR-VR	20.021	2	10.010	
LIS-VSR	3.146	2	1.573	
LIR-VSR	15.896	2	7.948	
ISR-VSR	58.594	1	58.594	4.74*
5-Way	17.063	2	8.531	
Error	592.500	48	12.349	

TABLE 13.--Gain score analysis of variance for differences in face responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	2613.833	95	27.514	
Location	17.333	2	8.667	
I-Sex	26.042	1	26.042	
I-Race	18.375	1	18.375	
V-Sex	0.042	1	0.042	
V-Race	2.042	1	2.042	
L-IS	53.583	2	26.792	
L-IR	0.750	2	0.375	
L-VS	31.083	2	15.542	
L-VR	24.333	2	12.167	
IS-IR	32.667	1	32.667	
IS-VS	4.167	1	4.167	
IS-VR	0.000	1	0.000	
IR-VS	2.667	1	2.667	
IR-VR	0.167	1	0.167	
VR-VS	1.500	1	1.500	
L-IS-IR	80.333	2	40.167	
L-IS-VS	77.583	2	38.792	
L-IS-VR	0.750	2	0.375	
L-IR-VS	139.583	2	69.792	
L-IR-VR	71.583	2	35.792	
L-VS-VR	160.750	2	80.375	
ISR-VS	70.042	1	70.042	
ISR-VR	15.042	1	15.042	
IS-VSR	51.042	1	51.042	
IR-VSR	22.042	1	22.042	
LISR-VS	6.083	2	3.042	
LISR-VR	65.333	2	32.667	
LIS-VSR	45.083	2	22.542	
LIR-VSR	78.083	2	39.042	
ISR-VSR	16.667	1	16.667	
5-Way	68.083	2	34.042	
Error	1431.000	48	29.813	

TABLE 14.--Gain score analysis of variance for differences in arm responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	801.333	95	8.435	
Location	12.271	2	6.135	
I-Sex	10.667	1	10.667	
I-Race	1.042	1	1.042	
V-Sex	26.042	1	26.042	
V-Race	16.667	1	16.667	
L-IS	45.896	2	22.948	
L-IR	20.271	2	10.135	
L-VS	18.146	2	9.073	
L-VR	5.396	2	2.698	
IS-IR	22.042	1	22.042	
IS-VS	0.042	1	0.042	
IS-VR	8.167	1	8.167	
IR-VS	16.667	1	16.667	
IR-VR	0.375	1	0.375	
VR-VS	2.042	1	2.042	
L-IS-IR	3.146	2	1.573	
L-IS-VS	14.021	2	7.010	
L-IS-VR	2.771	2	1.385	
L-IR-VS	0.896	2	0.448	
L-IR-VR	13.562	2	6.781	
L-VS-VR	14.021	2	7.010	
ISR-VS	13.500	1	13.500	
ISR-VR	0.375	1	0.375	
IS-VSR	3.375	1	3.375	
IR-VSR	2.667	1	2.667	
LISR-VS	68.688	2	34.344	3.81*
LISR-VR	9.187	2	4.594	
LIS-VSR	0.812	2	0.406	
LIR-VSR	0.271	2	0.135	
ISR-VSR	0.667	1	0.667	
5-Way	14.646	2	7.323	
Error	433.000	48	9.021	

TABLE 15.--Gain score analysis of variance for differences in hand responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	3216.990	95	33.863	
Location	26.083	2	13.042	
I-Sex	33.844	1	33.844	
I-Race	17.510	1	17.510	
V-Sex	0.010	1	0.010	
V-Race	5.510	1	5.510	
L-IS	48.000	2	24.000	
L-IR	35.583	2	17.792	
L-VS	228.583	2	114.292	3.22*
L-VR	6.333	2	3.167	
IS-IR	10.010	1	10.010	
IS-VS	133.010	1	133.010	
IS-VR	3.760	1	3.760	
IR-VS	82.510	1	82.510	
IR-VR	1.760	1	1.760	
VR-VS	29.260	1	29.260	
L-IS-IR	188.083	2	94.042	
L-IS-VS	40.583	2	20.292	
L-IS-VR	25.583	2	12.792	
L-IR-VS	4.083	2	2.042	
L-IR-VR	11.083	2	5.542	
L-VS-VR	42.583	2	21.292	
ISR-VS	31.510	1	31.510	
ISR-VR	55.510	1	55.510	
IS-VSR	2.344	1	2.344	
IR-VSR	33.844	1	33.844	
LISR-VS	6.333	2	3.167	
LISR-VR	73.083	2	36.542	
LIS-VSR	147.250	2	73.625	
LIR-VSR	37.000	2	18.500	
ISR-VSR	71.760	1	71.760	
5-Way	79.083	2	39.542	
Error	1705.500	48	35.531	

TABLE 16.--Gain score analysis of variance for differences in body responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	486.990	95	5.126	
Location	14.021	2	7.010	
I-Sex	1.260	1	1.260	
I-Race	0.094	1	0.094	
V-Sex	46.760	1	46.760	11.08**
V-Race	0.094	1	0.094	
L-IS	16.521	2	8.260	
L-IR	16.938	2	8.469	
L-VS	2.771	2	1.385	
L-VR	3.938	2	1.969	
IS-IR	12.760	1	12.760	
IS-VS	6.510	1	6.510	
IS-VR	0.094	1	0.094	
IR-VS	0.010	1	0.010	
IR-VR	6.510	1	6.510	
VR-VS	14.260	1	14.260	
L-IS-IR	14.021	2	7.010	
L-IS-VS	7.521	2	3.760	
L-IS-VR	5.688	2	2.844	
L-IR-VS	19.771	2	9.885	
L-IR-VR	26.021	2	13.010	
L-VS-VR	14.771	2	7.385	
ISR-VS	2.344	1	2.344	
ISR-VR	1.760	1	1.760	
IS-VSR	0.094	1	0.094	
IR-VSR	0.010	1	0.010	
LISR-VS	21.437	2	10.719	
LISR-VR	11.021	2	5.510	
LIS-VSR	6.438	2	3.219	
LIR-VSR	8.271	2	4.135	
ISR-VSR	1.260	1	1.260	
5-Way	1.521	2	0.760	
Error	202.500	48	4.219	

TABLE 17.--Gain score analysis of variance for differences in leg responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	475.490	95	5.005	
Location	6.083	2	3.042	
I-Sex	7.594	1	7.594	
I-Race	4.594	1	4.594	
V-Sex	1.760	1	1.760	
V-Race	0.260	1	0.260	
L-IS	5.250	2	2.625	
L-IR	19.750	2	9.875	
L-VS	31.583	2	15.792	
L-VR	6.333	2	3.167	
IS-IR	7.594	1	7.594	
IS-VS	4.594	1	4.594	
IS-VR	3.760	1	3.760	
IR-VS	0.510	1	0.510	
IR-VR	0.260	1	0.260	
VR-VS	5.510	1	5.510	
L-IS-IR	4.750	2	2.375	
L-IS-VS	0.250	2	0.125	
L-IS-VR	3.583	2	1.792	
L-IR-VS	4.083	2	2.042	
L-IR-VR	14.333	2	7.167	
L-VS-VR	1.583	2	0.792	
ISR-VS	14.260	1	14.260	
ISR-VR	3.010	1	3.010	
IS-VSR	12.760	1	12.760	
IR-VSR	5.510	1	5.510	
LISR-VS	18.083	2	9.042	
LISR-VR	1.583	2	0.792	
LIS-VSR	26.333	2	13.167	
LIR-VSR	8.083	2	4.042	
ISR-VSR	0.010	1	0.010	
5-Way	6.333	2	3.167	
Error	245.500	48	5.115	

TABLE 18.--Gain score analysis of variance for differences in feet responses from the during to post invasion observation periods

Variable	Reduced Sum of Squares	d.f.	Mean Square	F ratio
Total	2649.333	95	27.888	
Location	43.146	2	21.572	
I-Sex	12.042	1	12.042	
I-Race	15.042	1	15.042	
V-Sex	0.000	1	0.000	
V-Race	88.167	1	88.167	
L-IS	32.521	2	16.260	
L-IR	80.646	2	40.323	
L-VS	3.563	2	1.781	
L-VR	41.396	2	20.698	
IS-IR	0.167	1	0.166	
IS-VS	12.042	1	12.042	
IS-VR	70.042	1	70.042	
IR-VS	92.042	1	92.042	
IR-VR	0.042	1	0.042	
VR-VS	10.667	1	10.667	
L-IS-IR	130.771	2	65.385	
L-IS-VS	37.771	2	18.885	
L-IS-VR	32.771	2	16.385	
L-IR-VS	72.146	2	36.073	
L-IR-VR	54.646	2	27.323	
L-VS-VR	14.146	2	7.073	
ISR-VS	66.667	1	66.667	
ISR-VR	24.000	1	24.000	
IS-VSR	3.375	1	3.375	
IR-VSR	70.042	1	70.042	
LISR-VS	35.271	2	17.635	
LISR-VR	15.437	2	7.719	
LIS-VSR	5.688	2	2.844	
LIR-VSR	62.146	2	31.073	
ISR-VSR	112.667	1	112.667	
5-Way	69.271	2	34.635	
Error	1341.000	48	27.938	

APPENDIX F

SIGNIFICANT MEAN FREQUENCIES OF RESPONSES

SIGNIFICANT MEAN FREQUENCIES OF RESPONSES

TABLE 1.--Significant means of frequences of face responses during the pre-invasion observation

Variable		Mean	
I-Sex	Female	7.042	**
	Male	4.625	
IS-IR	FBI	5.000	
	FWI	4.083	**
	MBI	5.250	
	MWI	4.000	
IR-VS	BI-FV	6.000	
	VI-MV	4.250	**
	WI-FV	5.667	
	WI-MV	7.417	

L-IR-VR	Grill	Library	Lounge	
BI-BV	4.375	6.375	4.625	
BI-WV	6.375	5.500	3.500	*
WI-BV	8.250	3.875	6.000	
WI-WV	5.500	9.000	6.625	

TABLE 2.--Significant means of frequencies of arm responses during the pre-invasion observation

Variable		Mean	
IR-VR	BI-BV	8.167	
	BI-WV	6.500	*
	WI-BV	5.875	
	WI-WV	9.417	

TABLE 3.--Significant means of frequencies of hand responses during the pre-invasion observation

Variable		Mean	
I-Sex	Female	3.313	**
	Male	1.833	
IS-IR	FBI	2.417	
	FWF	4.208	*
	MBI	2.042	
	MWI	1.625	
IR-VS	BI-FV	1.375	
	BI-MV	3.088	*
	WI-FV	3.333	
	WI-MV	2.500	

TABLE 4.--Significant means of frequencies of body responses during the pre-invasion observation

	Location			
Variable	Grill	Library	Lounge	
	1.250	2.719	1.469	*
L-VS-VR				
BFV	2.000	1.500	1.500	
WFV	0.375	1.875	1.875	*
BMV	0.750	5.125	1.875	
WMV	1.875	2.375	0.625	

TABLE 5.--Significant means of frequencies of leg responses during the pre-invasion observation

		Location	
Variable	Grill	Library	Lounge
	0.563	2.031	0.875
IS-IR	BFI	0.542	
	WFI	1.583	
	BMI	1.500	
	WMI	1.000	

TABLE 6.--Significant means of hand responses during the invasion

Variable			
IS-IR	BFI	2.167	
	WFI	4.125	**
	BFI	3.208	
	WFI	2.125	

TABLE 7.--Significant means of body responses during the invasion

Variable			
V Race	BV	2.438	*
	WV	1.438	
L-VS-VR	Grill	Library	Lounge
BFV	3.375	1.750	1.375
WFV	1.000	2.000	1.500
BMV	1.125	3.625	3.375
WMV	2.375	1.500	0.250

TABLE 8.--Significant means of leg responses during the invasion

Variable			
IS-VS	FIFV	1.000	
	FIMV	0.750	
	MIFV	0.625	
	MIMV	1.917	

TABLE 9.--Significant means of feet responses during the invasion

Variable			
IS-VR	FI-BV	4.167	
	FI-WV	0.750	
	MI-BV	1.458	*
	MI-WV	2.417	

TABLE 10.--Significant means of face responses after the invasion

Variable				
L-IS-IR	Grill	Library	Lounge	
BFI	5.750	4.375	7.375	
WFI	6.125	5.250	4.500	
BMI	8.750	7.500	2.500	*
WMI	3.250	4.250	6.750	

TABLE 11.--Significant means of hand responses after the invasion

Variable			
V-Sex	FV	1.438	
	MV	3.042	**

TABLE 12.--Significant means of arm responses after the invasion

Variable			
I-Race	BI	8.292	*
	WI	5.479	
IS-VS	FI-FV	4.708	
	FI-MV	8.167	**
	MI-FV	9.792	
	MI-MV	4.875	
IR-VS	BI-FV	10.250	
	BI-MV	6.333	
	WI-FV	4.250	*
	WI-MV	6.708	

TABLE 13.--Significant means of body responses after the invasion

Variable				
I-Sex	FI	1.521		*
	MI	2.375		
V-Sex	FV	1.146		**
	MV	2.750		
V-Race	BV	2.479		**
	WV	1.417		
VR-VS	BFV	1.125		
	BMV	1.167		
	WFV	3.833		**
	WMV	1.667		
Location		Grill	Library	Lounge
		1.594	2.750	1.500 *
L-IS	FI	1.875	2.188	0.500
	MI	1.313	3.313	2.500 *
LIS-VSR	FI-FBV	1.750	0.500	0.250
	FI-FWV	0.250	2.000	0.500
	FI-MBV	3.750	5.250	1.250
	FI-MWV	1.750	1.000	0.000 *
	MI-FBV	0.750	3.000	0.500
	MI-FWV	0.750	1.750	1.750
	MI-MBV	1.750	5.000	6.000
	MI-MWV	2.000	3.500	1.750

TABLE 14.--Significant means of leg responses after invasion

Variable			
I-Sex	FI	0.833	*
	MI	1.792	

APPENDIX G

SIGNIFICANT GAIN SCORES

SIGNIFICANT GAIN SCORES

TABLE 1.--Significant gain scores for face responses between pre and post invasions

Variable			
I-Sex	FI	-1.479	
	MI	0.875	*
I-Race	BI	0.917	
	WI	-1.521	*
IS-IR	BFI	0.833	
	WFI	-3.792	
	BMI	1.000	*
	WMI	0.750	

ISR-VS			
BFI-FV	-1.333	BMI-FV	1.833
BFI-MV	3.000	BMI-MN	0.167
WFI-FV	-2.750	WMI-FV	-0.250*
WFI-MV	-4.833	WMI-MV	1.750

TABLE 2.--Significant gain scores for hand responses between pre and post invasions

Variable				
L-IS-VSR	Grill	Library	Lounge	
FI-BFV	5.500	-2.000	-8.250	
FI-WFV	-9.000	-2.750	-1.000	
FI-BMV	-5.500	0.250	2.250	
FI-WMV	2.750	1.000	2.000	*
MI-BFV	-0.500	4.250	0.500	
MI-WFV	2.750	0.250	4.000	
MI-BMV	2.250	-0.750	0.250	
MI-WMV	-6.5--	0.750	-3.000	

TABLE 3.--Significant gain scores for arm responses between pre- and post-invasions

Variable			
I-Sex	FI	-1.167	
	MI	0.500	*
IR-VS	BI-FV	-0.042	
	BI-MV	-0.583	**
	WI-FV	-1.792	
	WI-MV	1.083	

TABLE 4.--Significant gain scores for leg responses between pre- and post-invasions

Variable				
L-VS	Grill	Library	Lounge	
FV	0.188	0.813	0.375	*
MV	0.313	-1.000	1.000	
IS-VSR	FI-BFV	0.250		**
	FI-WFV	-0.833		
	FI-BMV	-0.750		
	FI-WMV	0.417		
	MI-BFV	-0.250		
	MI-WFV	1.667		
	MI-BMV	0.833		
	MI-WMV	-0.083		

TABLE 5.--Significant gain scores for body responses between pre- and post-invasions

Variable				
V-Sex	FV	-0.375		
	MV	0.646	*	
IS-IR	BFI	0.375		
	WFI	-0.500	*	
	BMI	-0.292		
	WMI	-0.958		
IS-VS	FI-FV	0.000		
	FI-MV	-0.125	*	
	MI-FV	-0.750		
	MI-MV	1.417		
L-IS-VR	Grill	Library	Lounge	
FI-BV	2.000	-1.000	-0.875	
FI-WV	-0.250	0.250	-0.500	
MI-BV	-0.750	1.250	1.500	*
MI-WV	0.375	-0.375	0.000	

TABLE 6.--Significant gain scores for feet responses between pre- and post-invasions

Variable			
V-Race	BV	-0.938	
	WV	0.625	*
IR-VSR	BI-BFV	-1.917	
	BI-WFV	0.500	
	BI-BMV	0.667	
	BI-WMV	0.750	
	WI-BFV	-0.333	*
	WI-WFV	0.083	
	WI-BMV	-2.167	
	WI-WMV	1.167	

TABLE 7.--Significant gain scores for face responses between pre- and during invasion observations

Variable			
L-IR-VS	Grill	Library	Lounge
BI-FV	1.000	2.250	2.500
BI-MV	7.500	1.375	2.000
WI-FV	1.875	2.875	-0.625 *
WI-MV	0.500	-1.375	4.000

TABLE 8.--Significant gain scores for leg responses between pre- and during invasion observations

Variable			
ISR-VS	FBI-FV	1.000	
	FBI-MV	0.417	
	FWI-FV	-1.333	
	FWI-MV	0.000	
	MBI-FV	-0.417	*
	MBI-MV	0.417	
	MWI-FV	0.583	
	MWI-MV	0.000	

TABLE 9.--Significant gain scores for feet responses between pre- and during invasion observation

Variable			
ISR-VSR			
FBI-FBV	1.833	MBI-FBV	-0.333
FBI-FWV	0.000	MBI-FWV	0.333
FBI-MBV	-0.833	MBI-MBV	1.500
FBI-MWV	0.167	MBI-MWV	-1.167
FWI-FBV	-0.833	MWI-FBV	-0.333
FWI-FWV	-0.333	MWI-FWV	1.000
FWI-MBV	3.500	MWI-MBV	0.333
FWI-MWV	-1.000	MWI-MWV	-3.000

TABLE 10.--Significant gain scores for arm responses during and post invasions

Variable				
LISR-VS	Grill	Library	Lounge	
FBI-F	-2.000	0.000	-1.250	
FBI-MV	-0.750	0.250	0.000	
FWI-FV	0.000	-3.000	-2.750	
FWI-MV	-3.000	0.250	0.250	*
MBI-FV	1.250	-2.750	-0.500	
MBI-MV	-2.000	0.000	-1.500	
MWI-FV	0.000	-2.750	-0.500	
MWI-MV	4.750	-0.750	0.750	

TABLE 11.--Significant gain scores for hand responses between during and post invasions

Variable				
L-VS	Grill	Library	Lounge	
FV	0.500	-4.375	-3.063	*
MV	-3.668	1.188	-2.125	

TABLE 12.--Significant gain scores for body responses between during and post invasions

Variable			
V-Sex	FV	-0.688	
	MV	0.708	**