

CONTEXTUAL FITTINGNESS OF EVERYDAY
ACTIVITY ENCOUNTERS

by

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CHAPTER I

INTRODUCTION

The Problem Area

The purpose of this study is to develop a method of analyzing the activity patterns of users with respect to the designed physical environment, in pursuit of large scale design decision guidelines. The particular setting at the campus of Virginia Polytechnic Institute and State University, Blacksburg, Virginia was used to obtain data on the behavioral variables of the users and the physical parameters of the setting.

The survey consisted of two questionnaires. The first one was aimed to obtain quantifiable information on the existing patterns of use of the physical facilities of the campus. Daily diaries of the students were used as a tool for gathering this information.¹ The second questionnaire dealt with the qualification of properties of everyday activities and corresponding physical resources in terms of user preferences.

¹Nicholas Bullock, Peter Dickens, Philip Steadman, Edward Taylor, and Tom Willoughby. Surveys of Space and Activities: Reading University. Land Use and Built Form Studies in the University of Cambridge, Vol. XL, Cambridge: University of Cambridge, 1970.

In the first part of the survey, the subjects were asked to keep a record of their activities for a duration of twenty-four hours on campus. The second part was structured on the assumption that these activities could be classified based on their contextual requirements. Each subject was asked to either accept or reject "others" from a list of personal attributes in a given hypothetical activity setting by judging their suitability to that particular setting.

The findings were used in developing (1) physical design conjectures, (2) tools and strategies for design procedures and (3) research methods used in this study. The frame of reference of the whole effort has been the improvement of the human means of implementing change.

Change is the cause as well as the consequence of human motivations for advancement. Implementation of change is a conscious action based on human deliberation as opposed to spontaneous evolution. To promote desirable man-environment relations man develops strategies and methods towards the understanding of the nature of human settings. Consequently, he implements change altering the relationships of the components of these settings. Environmental design emerges as one of the means for promoting these transformations.

Environmental design, however, is by no means the only tool for implementing change in human environments. There are at least two other major disciplines effective in creating change: management of resources and management of human behavior. These three disciplines are in essence extensions of individual human capabilities acquired

through the processes of evolution.

The understanding of generic human orders forming the contexture of our present societal processes rest on the knowledge of the physiology of our Central Nervous System. (Esser, 1972). The past decade has brought an increasingly comprehensive conceptualization of the manifold levels of brain function operating simultaneously in man. (MacLean, 1958, 1965).

The first level, biological brain, deals with physical space. The second level, emotional or social brain, deals with social brain, and with social space through mechanisms of shared experiences, individual recognition, dominance hierarchy or social status... The third and last level of the brain is the intellectual brain. Here the environment is reflected in symbolic entities, which after inner manipulation result in prosthetic. This is conceptual space.¹

Hence, the complex phenomena surrounding man's spatial imagery can be reduced to these three basic mental orders. This may represent an oversimplification in some respects yet it is a powerful tool to organize our conceptual processes. For instance, as an extension of these three orders physical, behavioral, and managerial "design professions"² present three alternative ways of dealing with environmental change.

Figure 1 represents the linear relationships of mental and societal system components discussed above. These relationships in

¹Aristide H. Esser, "Ecological Contributions to Understanding the Human Use of Space." Man-Environment Systems. II, 2 (March, 1972), 106.

²For instance, architecture, psychotherapy, and business administration respectively.

reality are highly stocastic and complex. In this sense Figure 1 does not represent an operational framework but it merely is a tool for conceptual structuring.

Traditionally, physical design processes incorporate behavior and management design aspects of a problem as constraints or values of the properties of the problem. The management of resources and behavior modification are tools for permanent and distinct means of balancing human needs and physical resources, as much as, physical design is.

GENERATIVE SUBSYSTEMS	STRUCTURES	FUNCTIONS	PROCESSES	
			CONSCIOUS	UNCONSCIOUS
Brain Stem (Reptilian)	Physical System	Vital (Biological) Needs	Physical Design (Designer, Geogr'r., etc.)	Natural Laws
Limbic System (Mammalian)	Social System	Emotional (Social) Needs	Behavioral Design (Social Worker, Psychologist, etc.)	Adaptation
Cortex (Human)	Cultural System	Intellectual (Cultural) Needs	Management Design (Manager, Administrator, etc.)	Exchange of Information

FIGURE I: MAN-ENVIRONMENT RELATIONS (Developed from Esser, 1972)

Initially, during the design process, the functional requirements of an environmental problem are used as a part of the

various constraints of the problem. After the implementation of the requirements of the proposed design solution, however, allocation and reallocation the functions of the setting is an option of the host institution's management.

Whenever the designed environment is found to be insufficient to accommodate further organizational manipulations, the architects and the planners are invited to the scene. Once again, the requirements of new functional allocations are treated as constraints of the design problem.

Going back one step, it can be deduced that one of the major stimulants of the need for functional reallocation is behavioral change. Behavioral evolution as well as conscious efforts for modification of human behavior, in fact are the cause and the consequence of managerial design. These three modes of implementation of change are in constant interaction with one another. These interactions are represented in design decision processes as properties of the environmental setting.

Operationally these properties can be categorized into three: design parameters, independent variables, and dependent variables (Levin, 1966). Design parameters include all measurable properties of the designed setting. Activities, conglomeration of activities, and their physical containers which are used as the basic component elements of the design process in any large scale design problem are in fact design parameters. Independent variables are those properties of the system which are not within the direct and indirect control of the designer. For most design problems the

human behavioral properties are the typical independent variables. Dependent variables take values, by definition entirely dependent on the values of the independent variables and the design parameters. After the values of the behavioral and physical resources are determined, the functional performance obtained from the setting yields the values for the dependent variables.

An environmental system analysed within this framework yields relationships between and within these parameters and variables. "The situation can be envisaged as a network - a collection of points. Setting up the network and 'solving' it amounts of course, to a model of the design process..."¹ The activities involved in the procedures of this model are:

1. The identification of design parameters
2. The identification of independent variables
3. The identification of dependent variables
4. The identification of relationships among parameters and variables
5. The prediction of values of independent variables
6. The identification of constraints governing dependent variables
7. The identification of constraints governing design parameters
8. The identification of values of the design parameters
9. The identification of expected values of the dependent variables

¹P. H. Levin, "The Design Process in Planning." The Town Planning Review. Vol. XXVII, No. 1 (April, 1966), p. 7.

10. The investigation of the consistency of values, relationships and constraints
11. The comparison of, and selection from, alternative sets of parameter values.¹

Hypotheses

The premise of this work is that the large scale, designed environment can be analysed by means of the guidelines outlined by the method cited above. Following from this it is hypothesized that:

1. Classification of the human activities contained in a large scale environment, in order to reach valid conjectures towards the appraisal of its properties, is feasible using human behavioral requirements as criteria,
2. Such classification of the activities and the built forms of the setting can be based on the patterns of use and the attitudes of users - towards the personal attributes of other individuals - measured with the survey methods employed.

The outline of this work closely resembles the sequence of procedures of the design method proposed by Levin. In Chapter II the properties of the built environment are identified. In Chapter III these properties are evaluated in terms of the specific

¹P. H. Levin, "The Design Process in Planning." The Town Planning Review. Vol. XXVII, No. 1 (April, 1966), p. 9.

patterns and attitudes found in the designed environment. The survey methods, instruments and results are discussed. In Chapter IV the results are interpreted to identify consistencies in user attitudes and use patterns. Finally new research strategies and the improvement of the survey methods are recommended. Despite the technical deficiencies of the survey methods, consistent and meaningful results were obtained. The results of the two questionnaires complemented one another enabling tentative generalizations to emerge.

CHAPTER II

PROPERTIES OF THE DESIGNED ENVIRONMENT

Physical Contexture of the Environment

The physical resources of the setting and the functions accommodated in them make the basic parameters of the campus of Virginia Polytechnic Institute and State University. The functions and corresponding physical resources of the campus can be conceptualized at two different levels: (1) the micro-scale "activity" unit and its physical counterpart the "place," e.g., for studying-study hall, for cooking-kitchen, for sleeping-bedroom, etc., (2) the macro-scale "functional structure" and its physical counterpart the "built form," e.g., for organized education-academic building, for eating-dining hall, etc. These can be generically defined in the following fashion:

1. Activities: These are the specific behavioral manifestations of man-environment relations constituting a form of purposeful transformation of matter or information (e.g., sleeping, eating, reading, etc.).
2. Places: These are physical entities meant to contain and accommodate "activities" and their environmental requirements (e.g., classroom, bedroom, laboratory, etc.).

3. **Functional Structures:** These are specific conglomerations of "activities" and their environmental requirements serving societal functions (e.g., educational, retail, residential, etc.).
4. **Built forms:** These are physical entities consisting of various "places" and are meant to accommodate specific "functional structures" and their spatial requirements (e.g., academic buildings, libraries, apartments, dormitories, shopping mall, etc.).

The interrelationship of these elements exhibits patterns similar to those of open systems. The activity-place structures form the common denominator for the composition of various functional structures, or built forms. Even though in current practice the activity-place structures are not standardized in the sense that they can qualify as common denominators, in essence their performance criteria enables this.¹

For instance, all academic buildings are essentially made up of offices, classrooms, laboratories, study cubicles, lounges, etc. The differences between such "places" are due to different physical requirements: size, utilities, teaching aids, light conditions, etc. All of this can be represented in terms of various standardized

¹Centre for Land Use and Built Form Studies at University of Cambridge, England and Unit for Architectural Studies, University College Environmental Research Group at University College, London, England, have been working on activity and space classification studies for close to a decade. Their findings and guidelines have been used in this work as noted in the text.

activity-place units identified with generic performance criteria. In other words, different functional structures can be looked upon, hypothetically, as compositions of activity-place units selected from an inclusive range of such units. The relative allocation of these units and their specific configurations allows the formation of a wide range of different built forms without imposing vital restrictions on the design process. In other words, theoretically, activity-place units form the basic elements of all functional structures which in turn are component elements of the total physical system. The juxtaposition of these elements creates the network of relation of the setting in terms of the utilities, routes of transit and communication systems.

Human Behavior as a Determinant
of the Environment

The cultural development of human societies is constantly moving towards "...greater diversity of function, increasing capacity to cope with complexity and change, heightened ability to profit from experience..."¹ Environmental design emerges as a means for promoting these transformations. Consequently a fuller understanding of man's motivations and goals within the functional, spatial context must be achieved. Man's encounters in his everyday surroundings are

¹John B. Calhoun, "Design for Mammalian Living," Architectural Association Quarterly. I, 3, p. 1.

determined intrinsically more or less in the same fashion as most other animals.¹ Through the evolutionary process man has inherited his biological and emotional motivations as well as expanded his ability to control the environment by means of his intellectual motivations.² "The study of the environmental process from the point of view of the particular participant..." the surveyed individual "...creates a situation dichotomized into participant, on the one hand and all other environmental components on the other."³ Within this framework the individuals' interactions with the environment are based on three basic orders: physical, social and cultural. When the limits set by the physical environment at a particular time and place are considered, the organization and conduct of human activities manifest the greatest variance and freedom of choice among all other components of the setting.

Man in his environmental context has been studied extensively by many disciplines especially during the last decade. Basically these approaches to the problem have had three alternate frames of reference: (1) man and his immediate spatial surroundings,

¹Glen McBride, "Theories of Animal Spacing: The Role of Flight, Fight and Social Distance," in Behavior and Environment, ed. by Aristide H. Esser (New York Plenum Press, 1971) p. 63.

²Aristide H. Esser, "Ecological Contributions to Understanding Human Use of Space," Man-Environment Systems, II (March, 1972), p. 106.

³Harold M. Proshansky, William H. Ittelson, and Leanne G. Rivlin, "The Influence of the Physical Environment on Behavior: Some Basic Assumptions," in Environmental Psychology, ed. by Harold M. Proshansky, William H. Ittelson, and Leanne G. Rivlin, (New York; Holt Rinehart and Winston, Inc., 1970) p. 35.

(2) man and his societal orders and, (3) man's heritage and implementation of environmental change. These represent man's specific and generic relations with his surroundings respectively.

Man and His Immediate Spatial Surroundings

Human beings like most other species has a part of his body image constellation, an internal projection of the space immediately around him. (Horowitz, et al, 1970) Sommer calls this phenomenon "personal space"¹ and Horowitz, et al. have used the phrase "buffer-zone" to represent it. "The size, shape penetrability of this buffer-zone, personal space probably depends on immediate interpersonal events, current ego and drive states and the individual's psychological and cultural history."²

Such behavior is rooted in the more vital needs of man: his biological and psychological threshold(s) of stress due to crowding (Dubos, 1970; Calhoun, 1970) or it may originate from his social and/or cultural attributes. (Sommer, 1970; Horowitz, et al., 1970)

In his study dealing with the library setting Sommer suggests that physical barriers discourage outside contact and encourage interior contact while even imaginary barriers defined by use act as spatial boundaries for structuring privacy. However, he is not an advocate of fixed physical barriers at the expense of hindering

¹Mardi J. Horowitz, et al. "Personal Space and the Body-Buffer Zone," in Environmental Psychology, ed. by Proshansky, et al., pp. 214-220.

²Robert Sommer, "The Ecology of Privacy," ed. by Proshansky, et al., in Environmental Psychology, pp. 256-266.

spontaneous informal interactions between individuals. "The ideal library would not be one with all individual study rooms or all open areas but, instead, would contain a diversity of spaces that would meet the needs of the introvert and the extrovert..."¹ Freedom of choice has been a major prescription of innumerable authors as a measure to accommodate diversity. "In any situational context, the individual attempts to organize his physical environment, so that it maximizes his freedom of choice."² This is principally motivated by man's nature. "Man in almost all instances and situations, is a cognizing and goal-directed organism."³

In pursuit of the satisfaction of man's goal-directed needs, he assumes different 'states' of behavior or functions. Westin has observed man in four distinct such states of privacy: solitude, intimacy, anonymity and reserve.⁴ Solitude is the state of privacy in which the person is alone and free from the observation of other persons. Intimacy is the state of privacy sought by members of a dyad or larger group seeking maximum personal relationship between or among its members. Anonymity, is a state in which the individual seeks freedom from identification and surveillance in public. Reserve, is the state of privacy allowing each person, even in the most intimate situation not to reveal certain aspects of himself.

¹Horowitz, "Body-Buffer Zone," p. 220.

²Sommer, "Ecology of Privacy," pp. 256-266

³*Ibid.*, p. 265

⁴A. F. Westin, Privacy and Freedom, (New York; Atheneum, 1967), p. 68-73.

The four functions Westin associates with privacy and the four states-of-privacy are self-evaluation, personal autonomy, emotional release and limited and protected communication.

Without passing value judgements on the validity of the classifications, one can observe the motivations underlying human behavior in each of these categories: vital (biological), emotional and intellectual satisfaction. For instance, the "intimacy" required in the sexual contact of two persons, as opposed to the "intimacy" required for family gatherings, as opposed to the "intimacy" needed in the sessions of a jury represent these three motivations. "The overall function of privacy thus is to increase the range of options open to the individual so that he can behave in ways appropriate to his particular purposes. In this context, the 'need for privacy' is seen as the need to maximize freedom of choice."¹

In summary, "privacy" and "personal space" are manifested as outcomes of goal oriented motivations of man towards the satisfaction of his three basic cognitive structures - biological, emotional, intellectual. Within the context of the constraints enforced by other individuals and environmental orders, man finds greatest opportunity to accomplish this, when he is provided with alternative routes of behavior: freedom of choice.

¹Proshansky, "Freedom of Choice," in Environmental Psychology, ed. by Proshansky, et al., p. 182.

Man and His Societal Orders

Territorial behavior and its undertones represent man's relation to his environment in terms of physical local and time most comprehensively.

Territoriality connotes a geographic or topographic reference to boundaries delineated by one or several sense modalities. The importance of marking one's territory stems from the necessity to render the territory recognizable in order to occupy and defend it by marking its boundaries.¹

Studies of territoriality have emerged from animal studies. In this respect, it is only appropriate to start with thoughts derived from animal studies in discussing territoriality. Calhoun's experiments with rats reveal that the rats' Central Nervous System "generates trips and terminates in manipulation of the food gathering process synchronized with availability of food resources."² Hence the isolated rat demonstrates territorial behavior in its home-range by the token of its vital (biological) drives - i.e., food gathering. However, due to the fact that the intensity of the food gathering activity diminishes with the increase of distance from the "home" of the rat, home ranges of neighboring rats overlap with each other in order to use food resources with maximum efficiency. As a consequence, territorial behavior is expressed through the

¹Franklin D. Becker and Clara Mayo, "Delineating Personal Distance and Territoriality," in Environment and Behavior, III, 4 (December, 1971) pp. 375-6.

²John B. Calhoun, "The Role of Space in Animal Sociology," in Environmental Psychology, ed. by Proshansky, et al., p. 198.

establishment of the boundaries, for one thing, and exercise of defense behavior in common zones for more than one rat, for another.

Existence of such mechanisms even for the isolated rat behavior is indicative of the existence of much more complex adjustments for the human behavioral context. McBride (1971) identifies the subsets of "society" - the highest form of orders of communal interaction - as the "group," and the subset of the group as the "individual." Separately from the time regulated orders as manifestations of biological requirements i.e., seasonal and sexual cycles, sleep, rest, eat, hygiene, etc., he suggests the existence of the cast and the role as the determinants of behavior in the group and/or the society structure. These, related to the emotional and intellectual requirements rather than the superimposition of these different biological orders within the boundary of a single behavioral setting, lead to the following consequences:¹

1. Creation of orders of territorial and social locomotions and dominance orders.
2. Emergence of differential expressions of these orders and their combinational outcomes in the dimensions of time and space.
3. Variations of the hierarchy of importance of these orders as a function of the time variable. Leyhausen (1971)

¹Glen McBride, "Theories of Animal Spacing: The Role of Flight, Fight and Social Distance," in Behavior and Environment, ed. by Aristide H. Esser (New York: Plenum Press, 1971), pp. 53-67.

distinguishes between the basic dominance orders and their time bound variations similarly, while explaining the two territorial concepts he has developed: absolute and relative.¹

Altman and Haythorne (1970) have disclosed that human subjects observed in their studies have displayed "degrees of consistent and mutually exclusive use of particular chairs, beds or sides of the table."² They have associated this behavior with personal compatibility, dogma, affiliation and personal achievement. Once again, the emotional and intellectual requirements of the individuals are expressed through the subjective orders of status and role established in the experimental setting.

So far territoriality has been identified as the unique mode of geographical behavior. In essence, territoriality is merely the generative idea behind many other concepts which require separate attention. Status hierarchy, basically akin to territorial mechanisms, for instance, is actually related to the emotional (social) cognizance of man, rather than biological. The concept of role, similarly exhibits a third mode of mental cognizance i.e., intellectual (cultural), quite differently from territoriality in detail. Roos (1970) points out to these two 'extensions' of

¹Paul Leyhausen, "Dominance and Territoriality as Complemented in Mammalian Social Structure," in Behavior and Environment, ed. by Aristide H. Esser, pp. 22-32.

²Irwin Altman and William W. Haythorne, "The Ecology of Isolated Groups," in Environmental Psychology ed. by Proshansky, et al., pp. 226-239.

the human defense behavior while complementing Hall's (1966) purely territory oriented interpretation of the sleeping habits of submariners.

In summary, the basic cognitive structures of the human mind - i.e., biological, emotional, intellectual - appear to have control over man's behavioral motivations. Various defense mechanisms springing from this framework exhibit specialized defense behavior against persons and other external forces to maintain the use of resources at three different levels: physical, social and cultural.

Man's Heritage and Implementation of Environmental Change

Change and its implementation is the basic task of the design professions. Calhoun speculates on the designer's future role in bringing about change, in his article entitled "Design for Mammalian Living";

Man stands aberrant to what he was or may become. Looking backward he shares a heritage with other mammals extending many millions of years into the past. Out of this legacy stem man's needs, capacities and potentialities for further evolution. Environmental design emerges as the means for promoting the fulfillment of this progression towards greater diversity of function, increased capacity to cope with complexity and change, heightened ability to profit from experience, and an expanding facility to be creative. Such is the direction of man's heritage and his future. Human cultural evolution has accommodated to increase in density by elaborating social roles where codes of behaving limit the number of others to whom it is appropriate for any individual to interact. Extrapolating from these insights, it would appear that a major function of the design professions is to provide an environmental structure that will promote a frequency of meaningful social interactions comparable to

that which held prior to cultural evolution. Appropriate design of the physical environment for man cannot proceed independently from that design of the social environment which fosters increased diversification of social roles of total numbers of individuals increase.¹

Greater diversity of function, increased human capacity to cope with complexity and change and heightened ability to profit from experience are realistic projections into the future. Consequently, "environmental design cannot proceed independently from that design of the social environment, which fosters increased diversification of social roles."

Skinner goes into the ideas of behavior modification and design of the culture with extensive detail in his well known book "Beyond Freedom and Dignity." He questions "the control exercised by autonomous man" and appreciates the demonstration of "the control exercised by the environment,"³ when he writes "the intentional design of a culture and the control of human behavior ...are essential if the human species is to continue developing."⁴ Herbert Marcuse deliberates on the same point while discussing art "a productive force in the material as well as cultural transformation...as such force art would be an integral factor in shaping the quality and the "appearance" of things, in shaping the reality, the way of life."⁵

¹Calhoun, "Mammalian Living," p. 1, 9.

²Ibid., p. 10.

³B. F. Skinner, Beyond Freedom and Dignity (New York: Knopf, 1971), p. 131.

⁴Ibid.

⁵An Essay on Liberation (New York: Beacon Press, 1969), pp. 8-9.

The design process accommodates the goals of behavior modification as constraints of the system rather than treating them as separate processes. In this respect the behavioral determinants are accordingly utilized in evaluating the independent variables. One of the prerequisites of the activity-place setting in terms of the user is the "suitability" of the configuration of its participants. Suitability in this sense is the degree of potential transgression of individual attributes, with specific physical, social, cultural connotations, to the subject defined by the constraints of the requirements of a particular activity he is participating in.

The three basic concepts of spatial organization: territoriality, status hierarchy and role,¹ form the contexture of the individual's attitudes towards other persons. The descriptive phraseology used in everyday language representing personal attributes² are loaded with connotations pertinent to these three levels of organization. The symbol "girlfriend" or "teacher" or "custodian" implies specific meanings to an individual due to his/her previous experiences and mental structures. These are charged with subjective

¹Esser, "Human Use of Space," p. 106.

²The list of "personal attributes" included in the second questionnaire was: girl/boy friend, best friend, roommate, work associate, classmate, fellow student, young female, young male, teacher, student from same floor of dorm, family member, student from same dorm, elderly person, cadet, stranger, the president, custodian.

dispositions depending on the intellectual, emotional and spatial contexture of the individual. For instance, a college student may refuse to interact with an university official regardless of the occasion due to emotional reasons, while another student may find his presence as a transgression only in his own "turf," i.e., in his dorm room with his girlfriend, and still another student may find his presence inappropriate only while in need of personal privacy, i.e., studying. Hence, the determinants of such behavior may be intrinsic or contextual depending on the interplay of the three organizational levels: territoriality, status and role. In this work the opinion of individuals about the appropriateness of others as described above, shall be referred to as "contextual fittingness" regardless of their intrinsic or contextual nature. Attributes of typical persons evaluated by the subjects for their contextual fittingness shall be referred to as "personal attributes."

Performance of the Environmental Contexture

The basic functions of the built environment are fourfold. These define the different aspects of the performance required from the utility of any designed environment intended for the accommodation of human related activities. The four functions can be defined as follows (Hillier, et al., 1972):

First, a building is a climate modifier, and within this broad concept it acts as a complex environmental filter between inside and outside, it has a displacement effect on external climate and ecology and it modifies, by increasing, decreasing and specifying, the sensory inputs into the human organism.

Second, a building is a container of activities, and within this it both inhibits and facilitates activities, perhaps occasionally prompting them or determining them. It also locates behavior, and in this sense can be seen as a modification of the total behavior of society.

Third, a building is a symbolic and cultural object, not simply in terms of the intentions of the designer, but also in terms of the cognitive sets of those who encounter it. It has a similar displacement effect on the culture of society. We should note that a negatively cultural building is just as powerful a symbolic object as a positively, (i.e., intentionally) cultural one.

Fourth, a building is an addition of value to raw materials (like all productive processes), and within this it is a capital investment, a maximization of scarce resources of material and manpower, and a use of resources over time. In the broader context of society, it can be seen as a resource modifier.

Each of these functions are capable of providing sufficient grounds for developing a coherent set of independent theory about man-environment relations. A specific environment for instance, can be evaluated in terms of activity modification, only, given the values of the design parameters and the independent variables.

On the other hand, a comprehensive evaluation of all four functions yields the evaluation of their mutual interrelations as well. This is due to the fact that often in design processes trade offs are made to upgrade one aspect of environmental performance at the cost of downgrading another(s). A successful accommodation of activities to meet the goals of the user may be achieved at the cost of creating waste of financial resources due to high maintenance costs or hampering of the values of individual user(s). In this respect the specific built environment

analysed in this work shall be dealt with at all four functional levels. The findings shall be used as guides for developing conjectures towards the appraisal of the design parameters.

CHAPTER III

SURVEY SAMPLES, INSTRUMENTS AND RESULTS

The survey of the setting consisted of two questionnaires. The first one dealt with the design parameters: activities and the place and time of their conduct. The second questionnaire was primarily involved with user preferences in terms of "contextual fittingness" of the users.

The patterns and durations of use of the environmental resources were calculated from the results of the first questionnaire. Based on the results of the second questionnaire the daily activities of the users were classified into three: (1) solitary, (2) social voluntary and (3) social involuntary. The corresponding built forms were classified accordingly into two: (1) single-modal and (2) multi-modal. These results, were employed in evaluating the performance of the campus with respect to the four functional performance criteria.

Appendix A contains the questionnaire forms used in the survey, sampling data, and the two computer programs, in the PL/1 programming language, specifically developed for evaluating the results of both questionnaires. Appendix B contains the "activity," "place" and "personal attribute" lists used in the questionnaires and evaluations.

The Sample

Two questionnaires were administered among the undergraduate students at Virginia Polytechnic Institute and State University, Blacksburg, Virginia. The sample population consisted only of undergraduates due to the fact that graduate students are not admitted to the dormitories as a policy of the university administration. The first questionnaire was completed during the Spring of 1972. To insure the return of an adequate number of completed forms the questionnaire was handed out and collected during regular class hours.¹ The instructors of the courses assisted by verbal reinforcement of the significance of the survey and by collecting the returned forms. This cooperation was obtained by letting the subjects fill the forms outside class hours.

The 18 different courses in which the questionnaire was administered were randomly selected from the time table of classes. The sample represented 28 different departments of the university and class sizes varying from 7 to 92 students.² The forms were distributed to 546 students out of which 227 or 41.5% of the original number responded. These forms were examined and the incomplete ones eliminated, which brought down the total number of forms evaluated to 95.

¹The pilot of the first questionnaire indicated an average return of 25%, which was for certain classes as low as 3%, when the collection of the forms was not formally structured.

²See Appendix A for the sample composition and sampling.

The second questionnaire was administered to complement the results of the first questionnaire. In this respect it was given to a sample population of 115. In all three classes in which it was administered the procedures used in the first questionnaire were utilized without change. Out of the 110 forms handed out 46 were returned within the set time limits. Out of these 44 forms, or 40% of the initial sample population, were completed and used for evaluation.

The sample was representative in terms of students' years of study and collegiate divisions. However, the female-male ratio of the sample was two times as great, i.e., two-thirds instead of one-third. The greater percentage of females compared to males returning completed forms accounted for this, i.e., 25% and 14% respectively.¹ Consequently, the percentage of males was 58 as opposed to the 70% of the university's total population.

The sample population of the second questionnaire consisted of 56% males and 44% females, which was consistent with the first questionnaire sample, yet, by virtue of this, significantly different from those of the total university population. Due to the instruments used in the second questionnaire the degree of familiarity of the population with the particular environment and its contents was important. Therefore the classes included in the survey were selected from sophomore, junior and senior level courses only. The sample

¹This was checked by keeping a record of the number of males and females surveyed.

consisted of 85% juniors and seniors for the females and 80% sophomores and juniors for the males. At least 83% of the total population had spent more than two years at the setting and 39% of all males and 53% of all females were currently living on campus. During the previous school year these percentages were 82 and 64 respectively for the same population.

Instruments

The first questionnaire was designed to deal with the patterns of the use of the campus and its facilities. The dairy-form has been found to be the most appropriate means to accomplish this with relative ease and accuracy for large sample sizes. Response categories of the subjects, i.e., age, sex, year of study, department of study, and location of residence; and the diary of activities, locations, and corresponding times obtained from each form were coded for computerized analysis. A computer program in the PL/1 programming language was written to translate this information into tables of: (1) cumulative duration of use of physical resources, (2) cumulative duration of participation in daily activities, (3) numbers of trips generated by various physical resources and (4) interface matrix of daily activities and corresponding physical resources. These provided ample quantifiable information pertaining to the patterns of usage manifested by subjects, in the particular setting.¹

¹See Appendix A for questionnaire format and computer program.

In the second questionnaire the contextual fittingness of different "personal attributes" was measured to provide a means of classifying different activities.¹ The criterion of measurement used was the subjects' tendency to reject different "personal attributes" from the context of a particular activity. In order to insure the use of those activities which the subjects could relate to intrinsically, rather than impartially, as the specific context of the rejection, the students were asked to identify the activities which they found personally fulfilling. Then they were asked to identify the most desirable setting(s) available to conduct these activities. The list of activities and locations provided in the questionnaire forms for these purposes were extracted from the results of the first questionnaire and they implied no restrictions on the choice of either the activities or the locations.² Finally, the subjects were asked to simulate in their minds the selected activity settings and evaluate "personal attributes" listed in the questionnaire forms in terms of their "contextual fittingness" to these settings.³ Accordingly the subjects "accepted" those "personal attributes" they found "fitting" by marking a "check" and "rejected" the others by marking an "X" in the space provided in the questionnaire blanks across the phrases representing each "personal attribute" listed.

¹See Appendix A for questionnaire format and computer program.

²See Appendix B for list of activities and places.

³See Appendix B for list of personal attributes.

A second PL/1 program was written to translate these results into: (1) activity-location matrices, and (2) histograms of reject-frequencies for each "personal attribute." Chi-square tests were carried out to measure the factor of correlation of "rejections" for each activity. This information was utilized to classify activities into three modes: solitary activities, social involuntary activities and social voluntary activities. Based on the distribution of these modes of activities to the corresponding locations, physical resources of the campus were classified into two: single-modal and multi-modal.

Results and Discussions

The results of the first questionnaire which dealt with the measurable properties of the physical setting and its organization were used in evaluating the design parameters and the dependent variables. The results of the second questionnaire, on the other hand, were utilized towards the qualification of the independent variables by means of the behavioral dispositions observed. The evaluation of the values of the dependent variables in the light of these dispositions yielded the criteria for appraising the design parameters.

Activity and Place Structures

The results of the first questionnaire verify that the built forms accommodated a varied number of activities at one time and

were equipped with the appropriate place types, e.g., dorm room, classroom, reading hall, etc. However, no evidence was found for establishing a one to one correspondence between either activities and places or functional structures and built forms. It was also determined that the various built forms were physically separated from one another with an average, walking, time-distance of 10 minutes.

Apparently, the basic order used in the spatial allocation of these built forms was one of separation, instead of integration. For one thing, there existed a functional separation of various built forms, e.g., library, dining halls, infirmary, etc., and clusters of built forms, e.g., "agricultural quadrangle," "upper dormitory quadrangle," etc. For another thing, academic divisions existed in the form of physical distance between and/or within built forms.

Fittingness to Context as a Measure of Activity Classification

The activities elected by the subjects in the pilot questionnaire covered only four of the major classifications obtained from the results of the first questionnaire: study, eating, leisure and sports. "Leisure" in particular was mentioned in a variety of forms. The other four, which were personal hygiene, sleep, work and travel, were left out all together. The selected

built forms were inclusive of all types except for administrative and academic.¹

The frequency of rejection of "personal attributes" from the given list of "attributes" indicated the following trends:

- (1) All frequency distribution revealed the existence of clear "reject" preferences as a function of the "personal attributes,"
- (2) Equally clear trends of "rejects" existed as a function of the activities. For instance, chi-square tests indicated that rejections were consistent, for the activities: study, reading, entertaining opposite sex, watching TV, and outdoor leisure regardless of the "personal attributes." The rest of the activities showed considerable variance in the frequency of rejections as a function of the activities.²

The cumulative frequency of rejects obtained clearly reveals positions of the subject towards others. "Personal attributes" relevant to the context of the college life styles, which are girl/boy friend, best friend, and roommate, were ranked at the higher levels of the acceptance scale. Others with definite role and status implications who are placed at those positions by decisions external to the subject: teacher, same floor student, family member, same dorm student, ROTC-cadet, the president, dorm custodian ranked at the lower levels of the acceptance scale.

¹See Appendix B for correlation of activities used in the two questionnaires.

²See Table 1.

Among the remaining those who ranked relatively higher: work associate, classmate, fellow student, young female, carried more favorable social and cultural connotations for the subjects than those which ranked lower: elderly person and stranger. These trends help in explaining the motivations behind "rejections" as a function of "personal attributes." In analysing the frequency of rejections in the context of each activity the inputs generated from the properties of encountered activities have been found to bear more significantly on the results.

TABLE 1
CHI-SQUARE TEST RESULTS USED FOR
CORRELATION OF REJECT FREQUENCIES OF
EACH ACTIVITY SETTING

Activities	Modes	χ^2	D.F = 16 X = .01
Study		(11.69)*	23.54
Entertaining Opposite Sex	Mode	(21.12)	23.54
Reading	One	(16.98)	23.54
Watching TV		(21.00)	23.54
Outdoor Leisure		(11.20)	23.54
Dancing	Mode	25.01	23.54
Drinking	Two	26.32	23.54
Eating		29.72	23.54
Casual Social		59.84	23.54
Entertainment		43.65	23.54
Partying	Mode	34.30	23.54
Goofing Off	Three	24.91	23.54
Outdoor Sports		26.17	23.54
Indoor Sports		31.44	23.54
Movies		26.50	23.54
Bicycling		40.57	23.54

*Paranthesis indicates activities with significant correlation of rejects.

Three generic descriptions were used in classifying all activities into three modes: solitude, social voluntary and social involuntary.

Mode One: Solitude: Those activities which have significantly¹ consistent reject frequencies for all "personal attributes." These activities were studying, entertaining opposite sex, reading, watching TV and outdoor leisure.

Mode Two: Social-voluntary: Those activities which are not significantly consistent in generating reject responses for all "personal attributes" and interaction with other persons was not vitally important for the execution of the activity. These activities were dancing, eating, drinking.

Mode Three: Social-involuntary: Those activities which are not significantly consistent in generating reject responses and which require social interaction at the same time. These activities were casual social, entertainment, partying, outdoor sports, indoor sports, movies, goofing off and bicycling.

Matching these activity modes with corresponding built forms yields two built form types, (1) those which house more than one mode: multi-modal, (2) those which house only one mode: single-modal. Indeed the single-modal built forms: library, academic buildings, movie theatres, clubs and pubs, dining halls, and sports facilities, generally are representative of specialized

¹See Table 1.

functions while the multi-modal built forms: apartment, fraternity house, student center, open areas and parks, dormitory and the campus are equipped to house a greater variety of activities.¹

The conventional concept of multipurpose use of places and built forms has been with architectural practice since the beginning of the "modern era." However, this concept is distinctly different than the multi-modal built form concept defined above. For one thing, "multipurpose" generally refers to individual places instead of whole built forms, while "multi-modal" is specifically used to describe built forms. For another thing, "multipurpose" connotes built-in flexibility in a designed physical environment to promote the accommodation of different activities at the same "places," at different times. Where as, "multi-modal" is defined as the simultaneous use of different places by different activities within the same built form.

For instance, the accommodation of sport activities, registration activities or student forums on the basketball floor in the Coliseum at different times of the school year, renders the main-court as a multipurpose "place." While the fact that classes are held in the same built form while the regular, main-court activities are underway may make the Coliseum a multi-modal built form, depending on the modal classification of these simultaneous activities.

¹See Table 1.

Functional Utility

Based on the four functions defined by Hillier the results of the first questionnaire were interpreted. They revealed that the single-modal and multi-modal built forms manifested certain dysfunctions in terms of the utilization of human as well as physical resources of the campus. The two observations leading to these conclusions are:

1. The ratio of time spent at multi-modal built forms for study-eat-leisure-sports activities are significantly greater than those of single-modal built forms.¹
2. Ratio of generated-trips-ratio to use-ratio are significantly greater for multi-modal built forms versus the single-modal built forms.²

Following from these and the values of the independent variables and the design parameters, values for the dependent variables can be determined. These values reveal undesirable utilization of the campus and its contents. First of all physical separation of built forms reduces feasibility of regulating climatic and ecological

¹See Table 3

²See Table 4

effects of the physical environment of the total campus setting. This is significant not so much for voluntary activities but for activities and utilities generated from necessities, i.e., travel, services, etc.

Secondly, the concentration of activities at multi-modal built forms versus the specialization of activities at single-modal built forms create a dichotomy between built forms and related uses. This dichotomy hinders unbiased selection of activities for user participation. Consequently, it inhibits the user's free choice of information and expression of individual values. This is the basic heritage of today's educational system as much as it is the basis of design of cultures proposed for the future (Skinner, 1971).

Thirdly, functionally detached zones, i.e., dormitories versus academic buildings, physical separation of academic departments, decentralization and polarization of functions are the properties of the existing physical environment. The symbolic meanings of these properties are not representative of the contemporary developments either in the philosophy of education or in the trends of social life. Today, constantly growing emphasis is placed on interdisciplinary efforts and attitudes, free universities, integration of human interaction patterns and more equalized and homogenized social structures. The environments created by man must be responsive to meanings represented by these. Specialized built forms and detached structures each standing for their own integrity, leaves no room for the symbols sought for, above.

Finally, due to the functional specialization of built forms, generation of a greater number of trips by, and underuse of the single-modal built forms have been observed. As a consequence, not only has the efficiency of the use of physical resources been considerably low, but also, travel time has been in uncalled-for quantities. These signify waste of valuable work time of users: a vitally important factor for a campus of 15,000 student population.

CHAPTER IV

CONCLUSIONS

Design Conjectures

The design parameters - the built form and its counterpart, the functional structure - as they are conceived through the practice of design professions today, are realized in the form of separate built entities. This is a consequence of the applicability gap between research and practice.¹ The use of any symbol standing for a built form i.e., the word "library," or "dormitory," or "dining hall," is symbolic of a constant set of activity and place types. The composition of these activity-place types as built forms is pragmatically accepted yet never sceptically questioned. Likewise the composition of the functional structures are untested but conventionally accepted.

It is clear that the relation between the individual activity-place units dictated by the values of the dependent and independent variables does not necessarily cluster them into "libraries," "dormitories" and "dining Halls" separated by

¹RIBA Research Committee, Members, "Strategies for Architectural Research," Architectural Research and Teaching, I (May, 1970), pp. 3-5.

extensive walking distances. The release of arbitrary constraints governing the spatial allocation of activity-place units is the only way to remedy the problem.

The 'new university' movement (Europe, 1963) has furnished a good number of universities with campuses equipped to remedy the problems mentioned above - i.e., University of East Anglia, University of Bath, University of Loughbourogh, Berlin Free University, etc. The advantages of having to design the total campus from "scratch" and the ability to invest adequate funds to construct a good portion of the designed environment at one time are the motivations as well as opportunities behind the development of this movement. On the other hand extensive research: Robbins' Report on Higher Education, Land Use and Built Form Studies, Bath-Stirling-York-East Anglia Studies,¹ has had important shares in the realization of these efforts.

Basically these designs avail to the users:

1. Integrated and compact physical environments.
2. Abolition of physical departmental barriers.
3. Allocation of physical resources as containers of human needs rather than that of misconceived 'functional structures'.
4. Built-in flexibility of use of resources as virtue of Item 1.

¹See "References" pp. 75-76.

5. Climate control and reduced travel time for service and transit activities as virtue of Item 1.

The emerging concepts of expecting more diversity, interaction and communication in the future and liberation of the university: the free-university and electro communication systems, demand greater freedom of choice. The present university structures and educational systems lean towards the control of choice. The subtle apathy implied in the rejection of the administrative officials, i.e., the president, and the custodian, even more significantly than the "stranger" by the subjects highlights this statement to a certain extent. Dictation of values as well as information which are expressed through dormitory regulations, restriction of availability of academic facilities, law enforcement is part of the task of almost all university administrations today. From the point of view of the administrator the design problem is in essence a problem of available resources, behavioral modification and supply of additional square footage.

To provide applicable and concrete recommendations to the design of meaningful physical settings the conventional built form and the functional structure concepts must be redefined. The relationship and requirements of activity-place structures as dictated by the values of the dependent and independent variables should be used as the criteria of definition.

This paves the way for the development of alternate research methods approaching the same problem with different frames of

reference. Such an endeavour should initially deal with the identification and classification of the rich stock of various built forms and functional structures available in existing built environments. Special reference to the analysis of activity and space classifications in the university setting is already well underway.¹ The development of the psycho-social and cultural modification aspects of the various activity place structures, however, is not emphasized in the same manner as the psycho-psychological and economical aspects are. In the macro design scale specific efforts in defining all performance criteria for activity-place structures must precede the strategies and tactics of three dimensional allocation of resources. Theoretical as well as empirical research is essential to evolve a new system of definitions for the current design parameters.

Design Model

Levin's design model provides a basic and sound framework for the evaluation of built environments as well as for reaching new design decisions. However, for the purposes of bringing about major innovations to design professions, the sequence proposed by

¹Centre for Land Use and Built Form Studies in the University of Cambridge, Cambridge, England and Unit for Architectural Studies, University College Environmental Research Group at University College, London, England, have been working on activity and space classification studies for close to a decade. Their findings and guidelines have been used in this work as noted in the text.

Levin may not be entirely valid. For instance, in this study the design parameters of the designed environment were found to be initially ill-defined by the decision making mechanisms of the host institution. This conclusion was reached well after the majority of Levin's design steps were already executed. However valuable this conclusion may be for the purposes of appraisal, it is not suitable for the design process. This is due to the fact that it forces the designer, who has had already defined the design parameters, to go back and redefine them and reiterate the whole process once more after discovering that his initial definition was not correct.

Most probably this shortcoming of the model springs from the fact that it was derived from observations of the actual design steps taken in real life planning problems. In the practice of current physical design professions the definitions of the design parameters are rarely altered. They are merely re-evaluated for each design problem, unless a major innovation in design philosophy is one of the tasks of the particular endeavor.

Consequently, the definition and evaluation of the variables and their relationships to the general area of design parameters should be the step prior to their definition to give "freedom of movement" to the innovator. In other words, in the design process the parameters should not only be evaluated but they also should be redefined.

In view of all this Levin's design model can be modified into the following format:

1. Taking cognizance of the environmental properties: This step does not involve any identification or definition processes.
2. Taking cognizance of the constraints of the design parameters in order to define the outermost boundaries of its scope.
3. Identification and definition of dependent and independent variables and their relationship to the general scope of design parameters.
4. Evaluation of variables.
5. Definition and evaluation of design parameters.
6. Evaluation of consistencies, relationships and alternate values and definitions of design parameters.

These modifications enable the designer to define and evaluate the parameters to accommodate the constraints set by the variables of the setting. The several items cited separately in Levin's model are condensed into major steps in this proposal. This is intended to allow the nature of each design problem dictate the particular sequence in which these intermediate design activities should be conducted. This flexibility is demanded by the special requirements of various design problems.

The Survey

Further articulation of the methods described in this work is necessary to provide more concrete guidelines as well as developing new strategies. The instruments used in the first questionnaire

which were initially developed by the Land Use and Built Form Studies Group were found to be extremely successful. The results obtained from more tightly structured diary forms as opposed to the free form diaries were nowhere near as accurate and complete.¹ Hence the considerable amount of time required for the evaluation of the results still remains as the only major handicap.

The first questionnaire presented a greater number of problems yet with less difficulty to remedy them:

1. Obtrusiveness: The results of the questionnaire rely heavily on the conscious generalizations made by the subjects while rejecting "personal attributes" which in reality may not, necessarily, comply with the unobtruded behavior of the subjects.
2. Variety and scale of instruments: The degree of "rejection" as well as the variations of "contextual fittingness" in the activity settings were not accommodated. Behaviors like "avoidance," "ignoring," etc, could be defined as overtones of "rejection" for the purposes of this survey.
3. Sample size and biases: The sample size especially in the second questionnaire was not adequate to justify valid generalizations. Despite various efforts, the elimination of self-selection was not possible all together.

¹Nicholas Bullock, Peter Dickens, Philip Steadman, Edward Taylor, and Tom Willoughby, Surveys of Space and Activities; Reading University, Land Use and Built Form Studies in the University of Cambridge, Vol. XL (Cambridge: University of Cambridge, 1970).

Especially, self-selection expressed through the difference between the ratios of returns for the two sexes was significant.

The following measures are recommended to improve both questionnaires:

1. The development of techniques for more efficient evaluation of the free-form diaries is necessary.
2. Semantic differential scales can be used in measuring "contextual fittingness" to yield more detailed results.
3. To expand further the scope of the "contextual fittingness" concept the physical and organizational properties of the setting and their acceptability by the user must also be measured.
4. The sample size needs to be increased and the survey to be reiterated at different intervals of time and at different settings. The many-sided evaluation of the results must be carried out classifying subjects of each survey by sex, year of study, field of study, and other appropriate criteria. This is expected to identify sampling biases originating from the use of academic courses as a basis for the definition of the sample population.

Firsthand information obtained from the users of a built environment supplies valuable feedbacks to the design process. The patterns of use and user preferences observed at Virginia Polytechnic Institute and State University clearly provide insights

for research and design. However, it must be realized that such insights will not lead to practical end results without further research at other similar settings. The particulars of the specific environment dealt with tend to lead to limited and biased results. In order to reach valid generalizations and feasible solutions all possibilities of the method proposed in this study must be exploited and the properties of potential research settings elaborated.

On the other hand, environmental management and behavioral modification aspects of implementing change must be recognized as well. Change is as much an outcome of managerial and behavioral manipulations as it is of the physical alterations in the context of a designed environment. Consequently, designers are confronted today, more than any time in the past, with the task of expanding the scope of the definition of environmental problems and also the coordination of interdisciplinary efforts.

TABLE 2

ACTIVITY-BUILT FORM INTERFACE MATRIX: CLASSIFICATION OF
ACTIVITIES AND BUILT FORMS

ACTIVITIES: Numbers Indicate Different Activity Modes.
(See previous page for the definitions of the "Modes")

Modes Built-Forms	Studying	Entertain'g Opposite Sex	Reading	Watching TV	Outdoor Leisure	Dancing	Drinking	Eating	Casual Social	Entertaining	Partying	Goofing Off	Outdoor Sports	Indoor Sports	Movies	Bicycling
Multi-modal																
Dormitory	1	1	1	1					3		3					3
Apartment	1	1	1	1		2	2	2	3		3	3	3			3
Fraternity		1				2	2		3		3					
Student Center				1		2	2		3	3				3		
Open Areas & Parks		1			1					3		3	3			
Single-modal																
Academic Bldg.	1															
Library	1		1													
Dining Hall								2								
Pub and Club						2	2									
Movie Theatre										3					3	
Sports Facilities										3			3	3		

TABLE 3

RELATIVE, CUMULATIVE AMOUNT OF TIME SPENT AT EACH ACTIVITY AND BUILT FORM

Modes	Built-Forms	Ratio of Time Spent for Each Activity Total Day-Hours ^b								Total	Coefficient of Conv. to Tot. Available Time ^c Basis	Corrected Totals
		Study	Eat	Leisure	Sports	Personal Hygiene	Sleep	Work	Travel			
Multi-modal	Dormitory ^a	13.2	0.0	5.0	0.0	2.3	18.5	0.0	2.7	41.7	1.00	41.7
	Apartment ^a	5.1	2.6	4.1	0.1	2.3	14.2	0.3	2.0	30.7	1.00	30.7
	Fraternity	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.20	0.2
	Student Center	0.0	0.1	6.0	0.0	0.0	0.0	0.0	0.4	6.5	1.40	9.2
	Open Areas & Parks	1.0	0.0	0.3	0.5	0.0	0.0	0.0	0.1	1.9	1.00	1.9
Single-modal	Academic Bldg.	10.2	0.8	0.3	0.0	0.0	0.0	0.0	0.8	12.1	1.71	20.6
	Library	1.1	0.0	0.1	0.0	0.0	0.0	0.5	0.1	1.8	1.45	2.6
	Dining Hall	0.3	2.4	0.2	0.0	0.3	0.0	0.4	0.3	3.9	3.84	15.0
	Pub and Club	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	3.00	0.6
	Movie Theatres	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4	4.00	1.6
	Sports Facilities	0.2	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.6	1.50	0.9
TOTALS		31.2	6.0	16.6	0.9	4.9	32.7	1.2	6.5	100.00		115.0

^aValues are corrected to compensate for the bias created by dormitory and apartment based students who use only one of these built forms for domestic purposes while they share all other built forms.

^bTotal Day-Hours: Twenty-four Hours.

^cTotal Available Time: The sum of all periods of time the facility is available for general student use during twenty-four hours.

TABLE 4

RELATIVE NUMBER OF TRIPS GENERATED BY BUILT FORMS
AND THEIR RATIO TO RELATIVE TIME SPENT FROM TABLE 3

Study-Eat-Leisure-Sports Activities Common with the
Results of the First Questionnaire, Only

Built-Forms	"R": Ratio of Time Spent ^b to Total Day-Hours ^c	"X": Coef. of Conversion to Total Available Time ^d Basis	XR Corrected Ratios	"T": Ratio of # of Trips Gene- rated by Built Forms ^e to Total # of Trips Gen'd. ^f	XR ÷ T
Dormitory ^a	18.2	1.00	18.2	15.8	0.82
Apartment ^a	11.9	1.00	11.9	12.7	1.07
Fraternity	0.1	1.20	0.1	0.1	1.00
Student Center	6.1	1.40	8.6	4.7	0.55
Open Areas & Parks	1.8	1.00	1.8	1.0	0.56
Academic Bldg's.	11.3	1.71	19.3	6.8	0.28
Library	1.2	1.45	1.7	0.4	0.42
Dining Hall	2.9	3.84	11.1	4.8	0.23
Pub and Club	0.2	3.00	0.6	0.3	0.50
Movie Theatres	0.4	4.00	1.6	0.8	0.50
Sports Facilities	0.6	1.50	0.9	0.3	0.33
TOTALS	54.7		75.8		

^aValues are corrected to compensate for the bias created by dormitory and apartment based students. ^bThe average amount of time spent by a student at each built form. ^cTwenty-four hours. ^dCumulative time, each built-form is available for general student use during a day. ^eThe sum of the number of trips generated by each built form during a day. ^fThe sum of all trips generated by all built forms during a day.

FREQUENCY: CONTEXTUAL FITTINGNESS

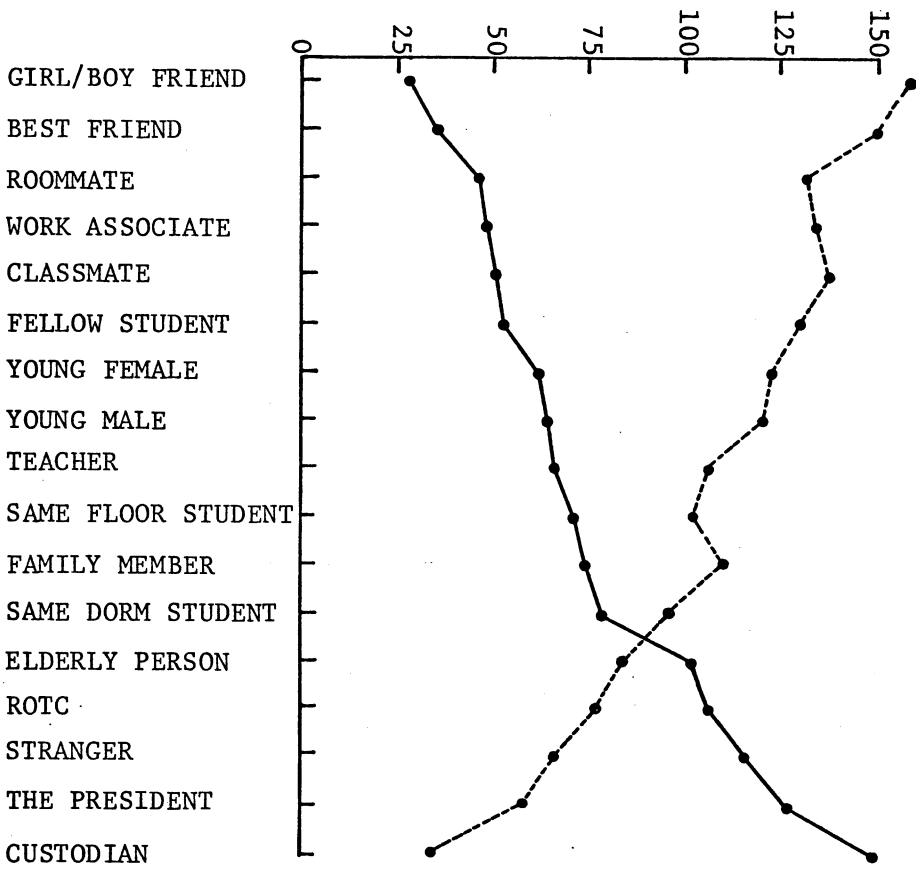


FIGURE 2: CUMULATIVE FREQUENCY OF REJECTS AND ACCEPTS

Solid line: Frequency of rejects
 Broken line: Frequency of accepts

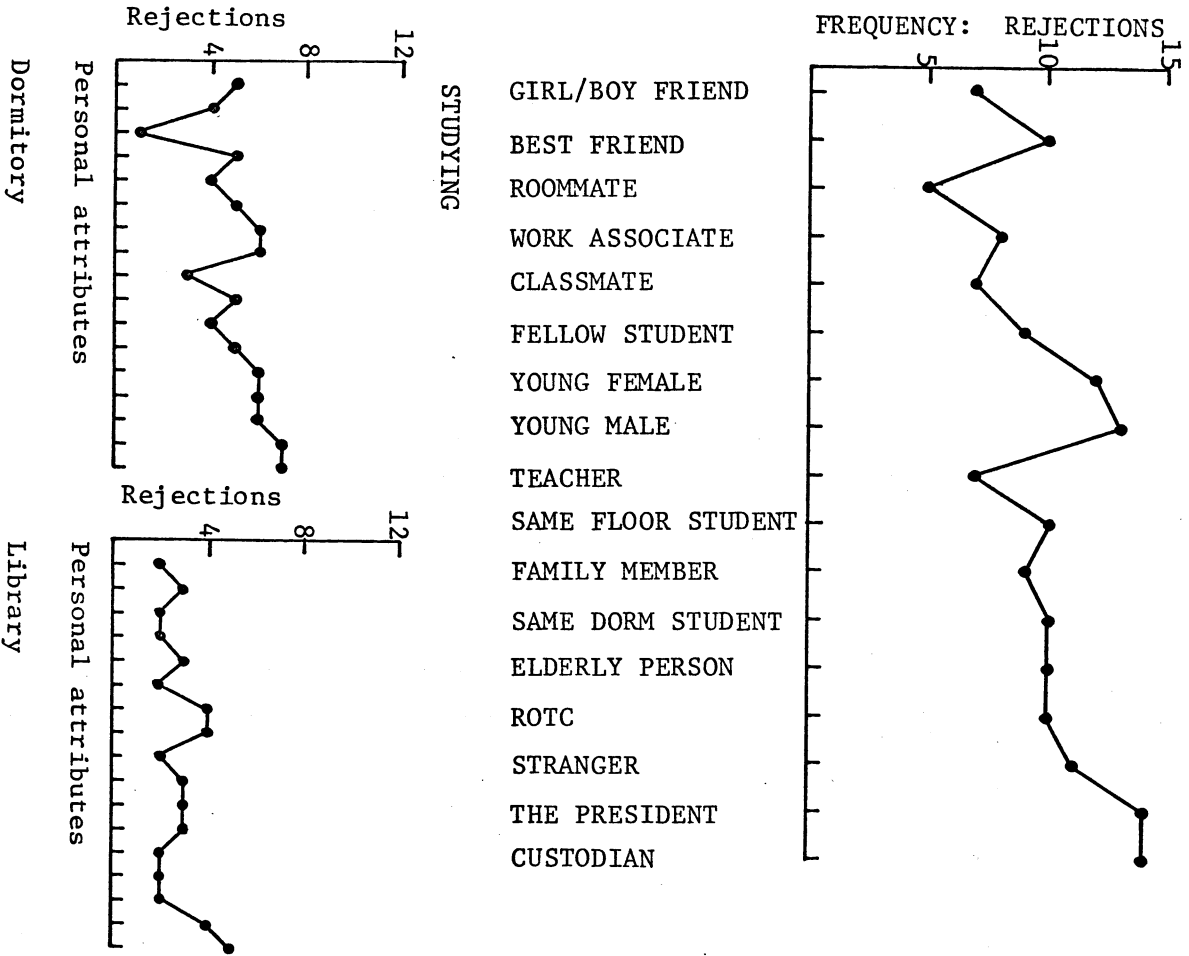


FIGURE 3: ACTIVITY-REJECT FREQUENCIES: STUDYING

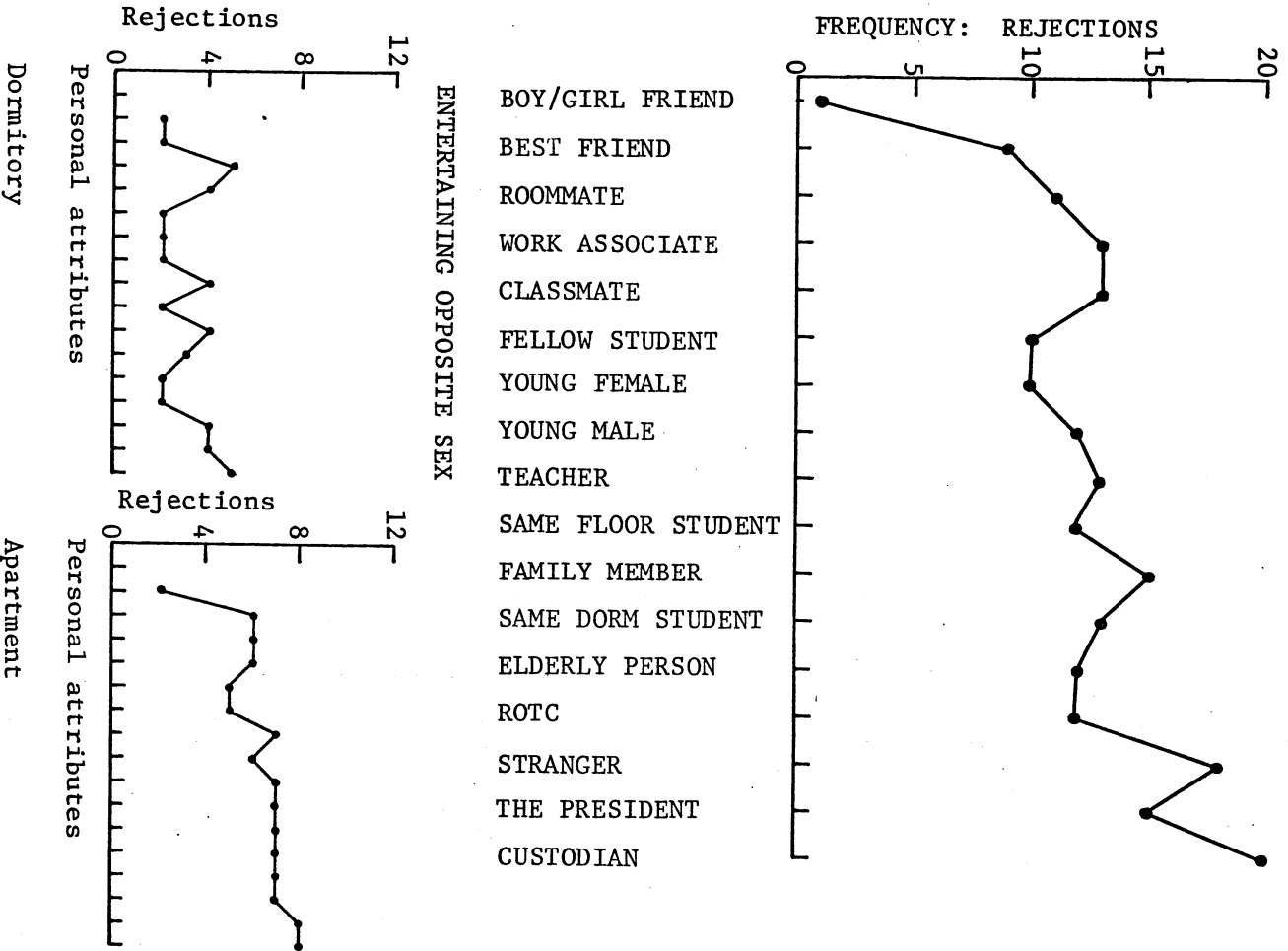


FIGURE 4: ACTIVITY-REJECT FREQUENCIES: ENTERTAINING OPPOSITE SEX

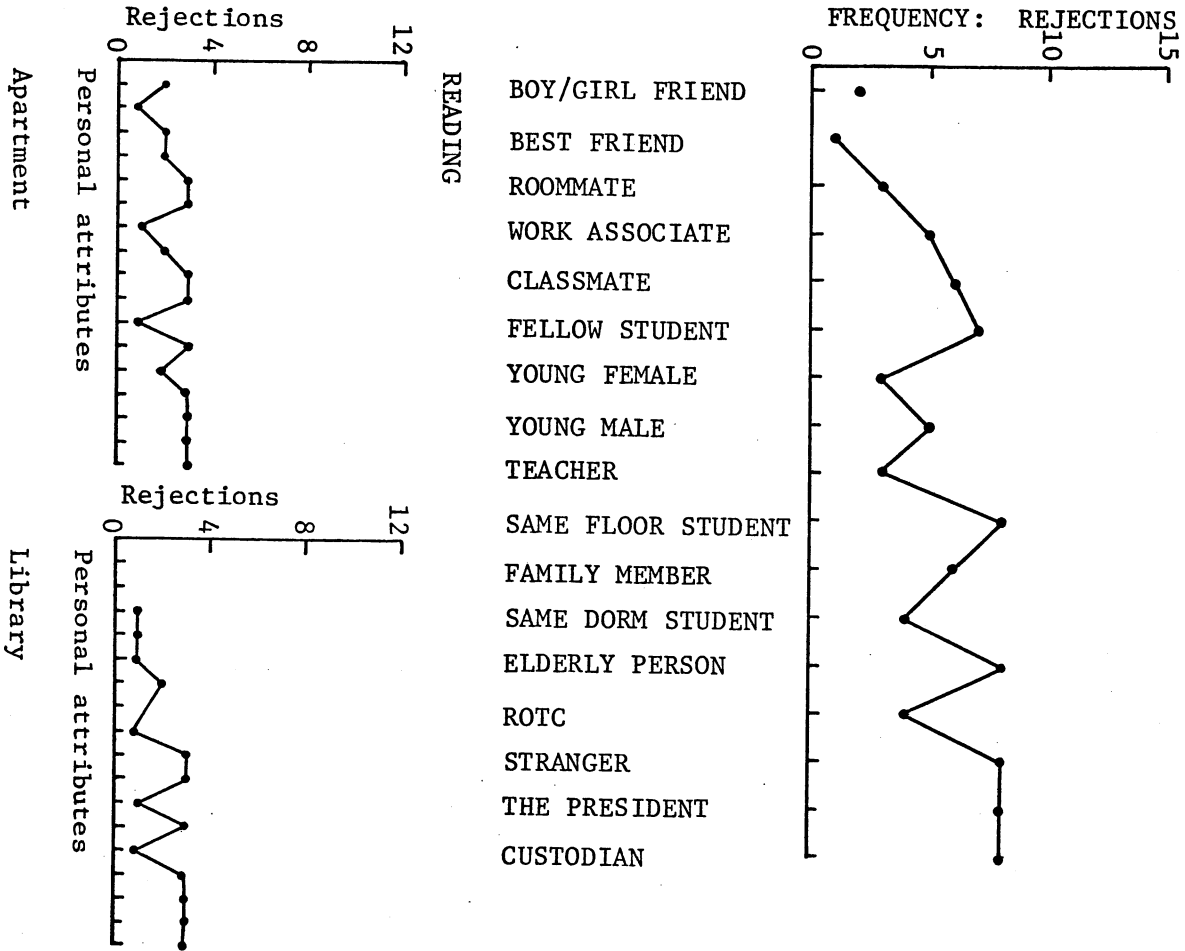


FIGURE 5: ACTIVITY-REJECT FREQUENCIES: READING

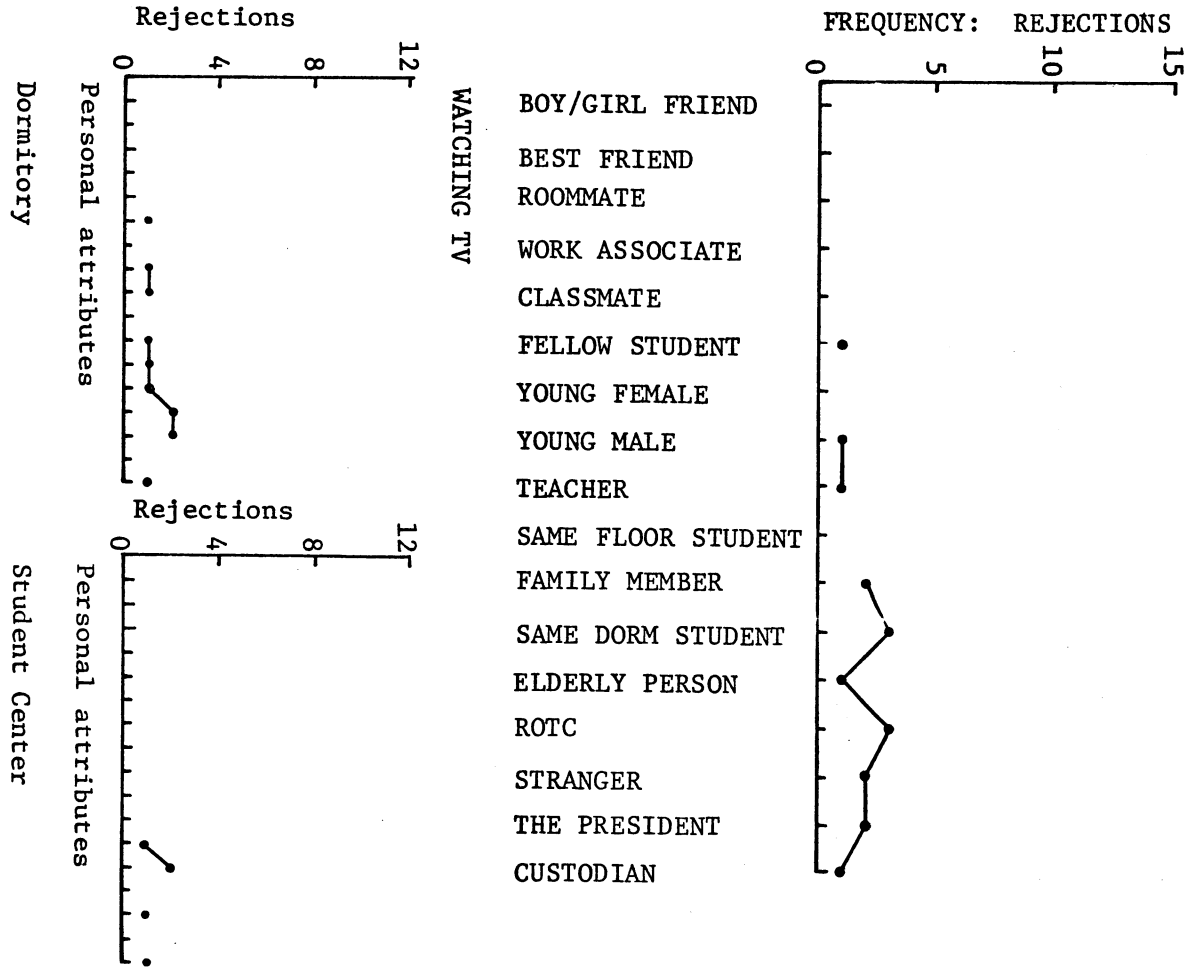


FIGURE 6: ACTIVITY-REJECT FREQUENCIES: WATCHING TV

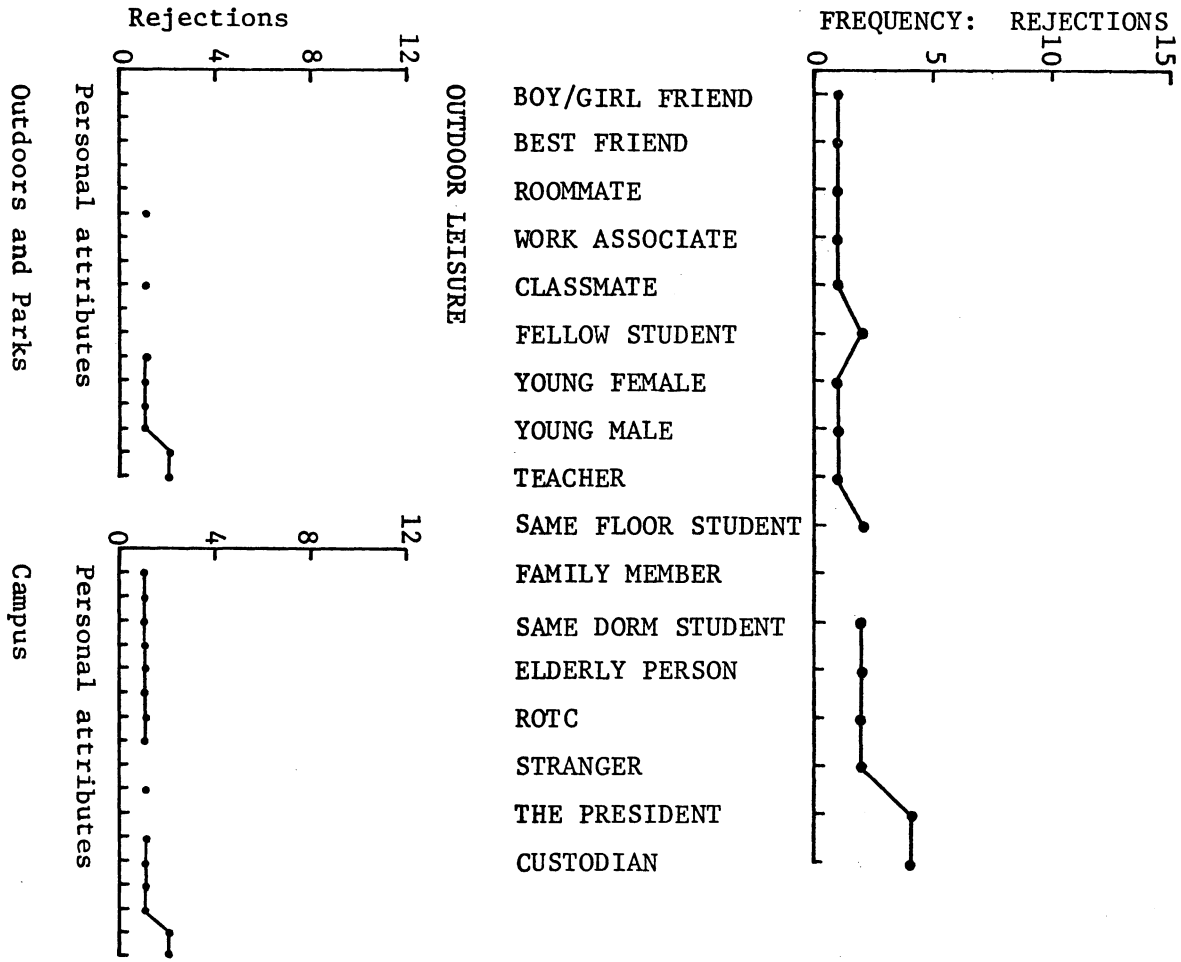


FIGURE 7 : ACTIVITY-REJECT FREQUENCIES: OUTDOOR LEISURE

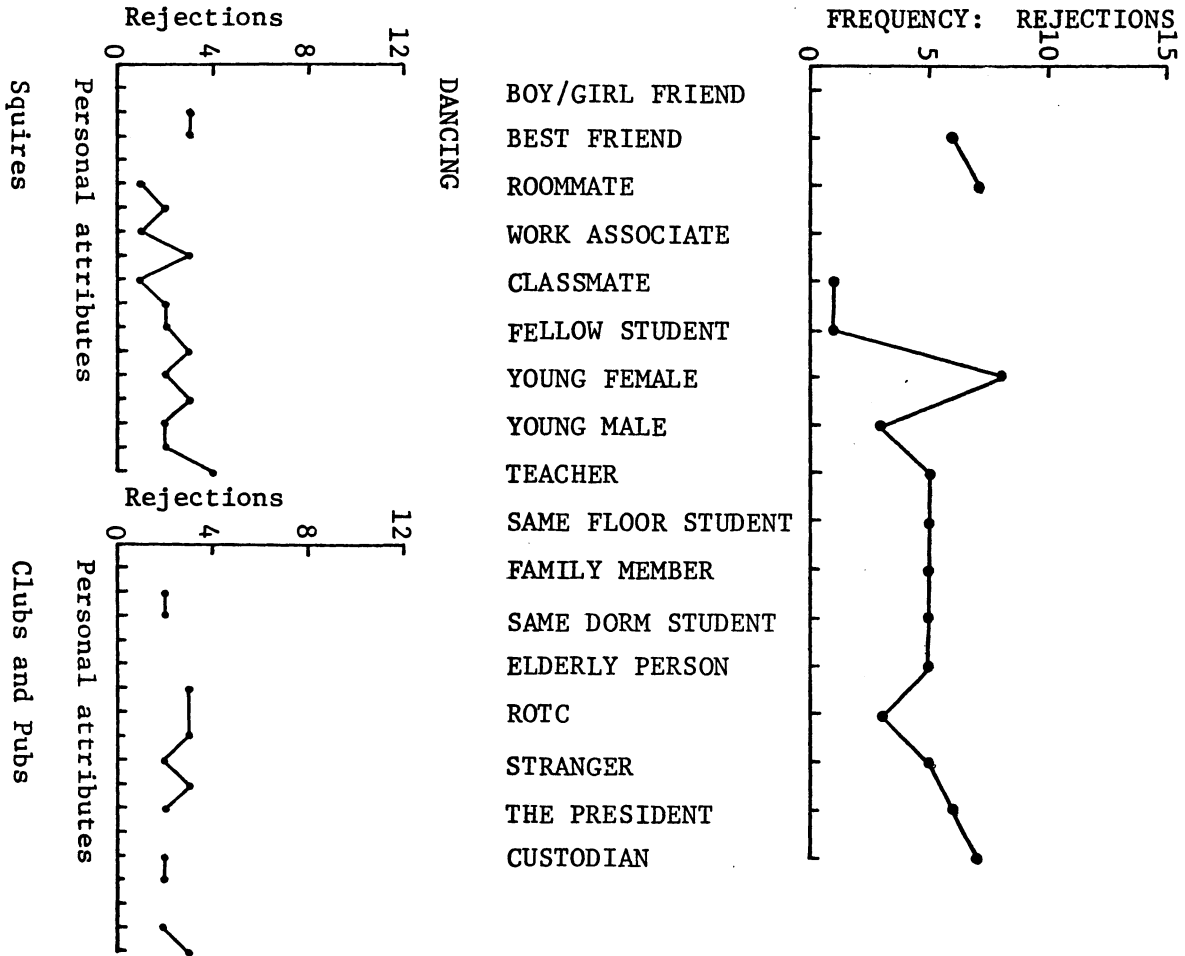


FIGURE 8 : ACTIVITY-REJECT FREQUENCIES : DANCING

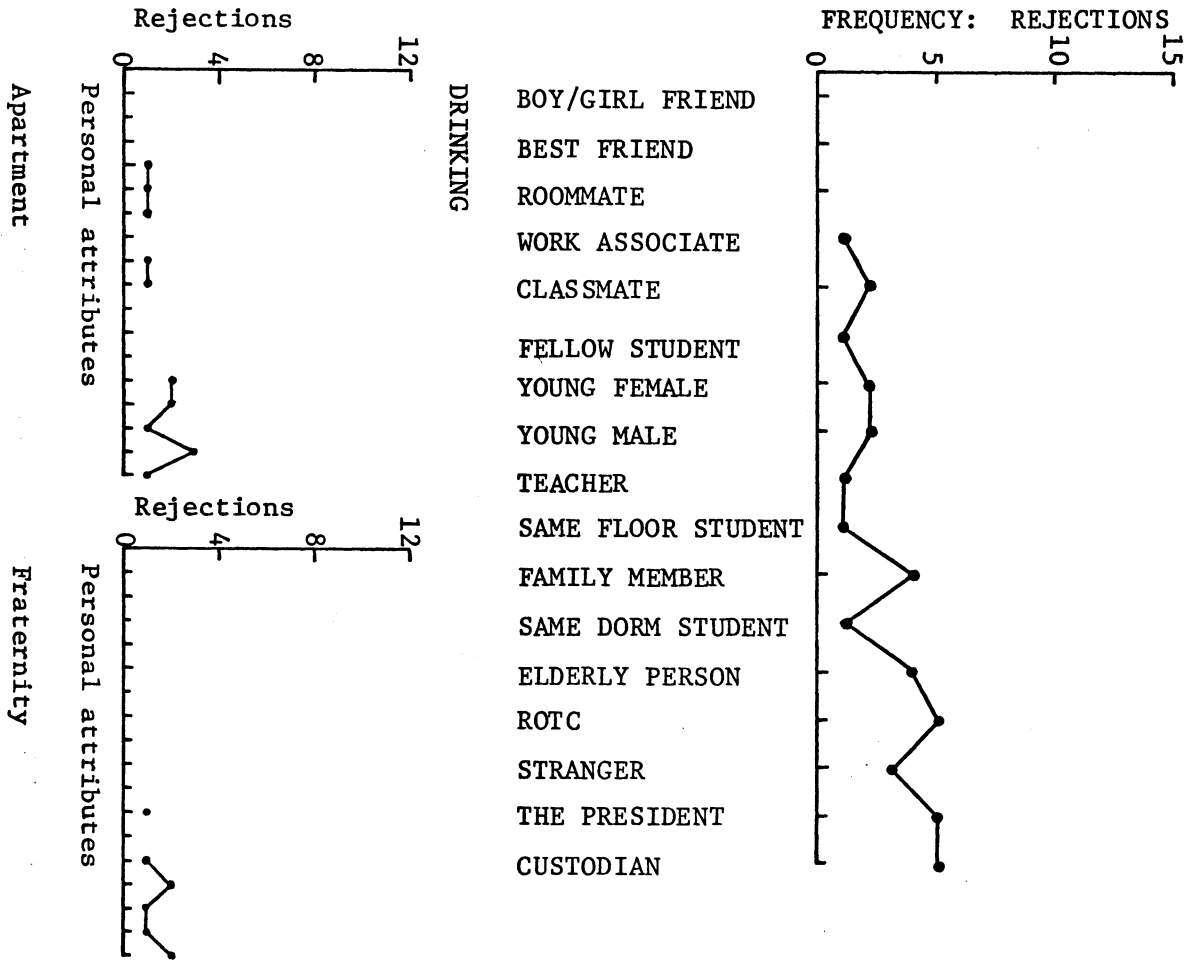


FIGURE 9: ACTIVITY-REJECT FREQUENCIES: DRINKING

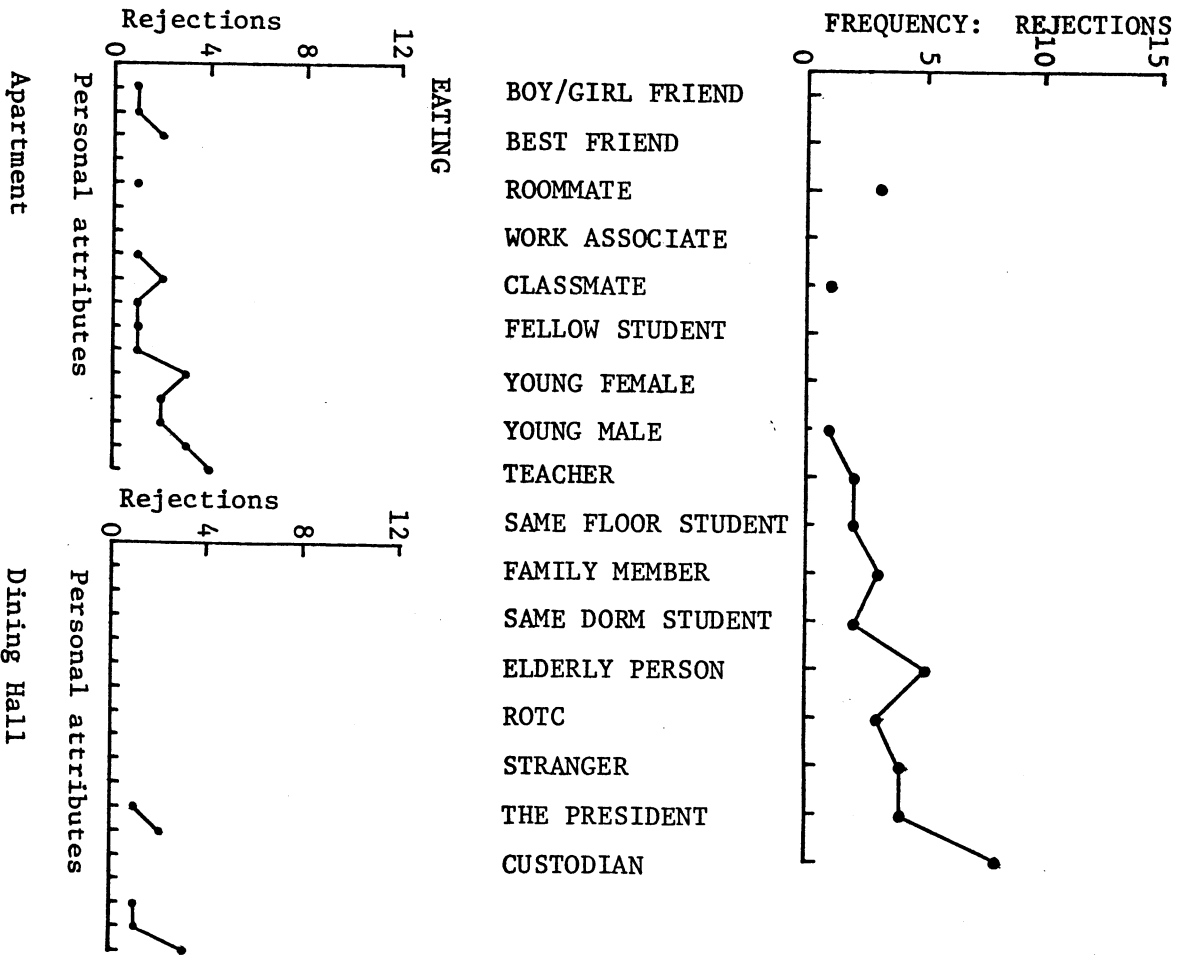
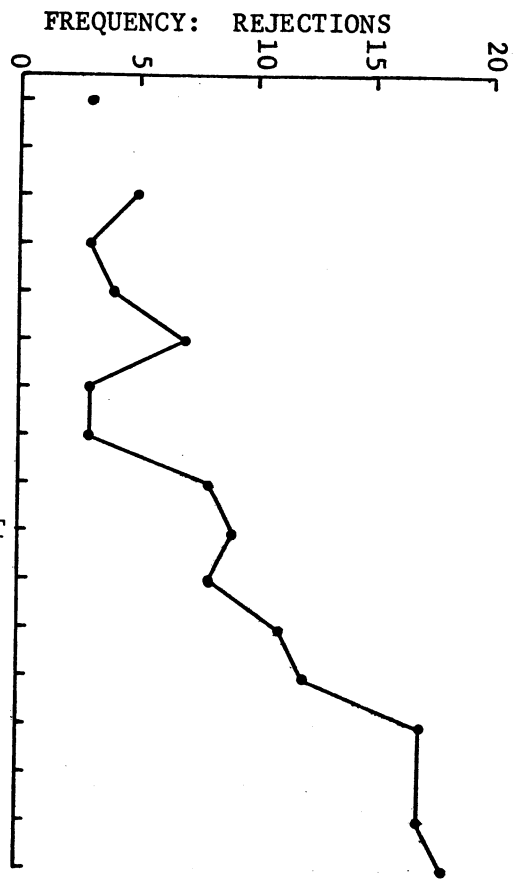
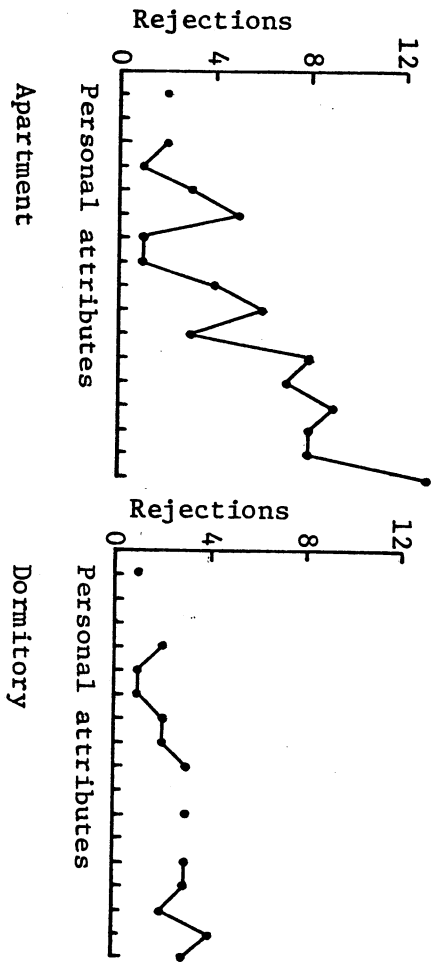


FIGURE 10: ACTIVITY-REJECT FREQUENCIES: EATING

CASUAL SOCIAL



- BOY/GIRL FRIEND
- BEST FRIEND
- ROOMMATE
- WORK ASSOCIATE
- CLASSMATE
- FELLOW STUDENT
- YOUNG FEMALE
- YOUNG MALE
- TEACHER
- SAME FLOOR STUDENT
- FAMILY MEMBER
- SAME DORM STUDENT
- ELDERLY PERSON
- ROTC
- STRANGER
- THE PRESIDENT
- CUSTODIAN

FIGURE 11: ACTIVITY-REJECT FREQUENCIES: CASUAL SOCIAL

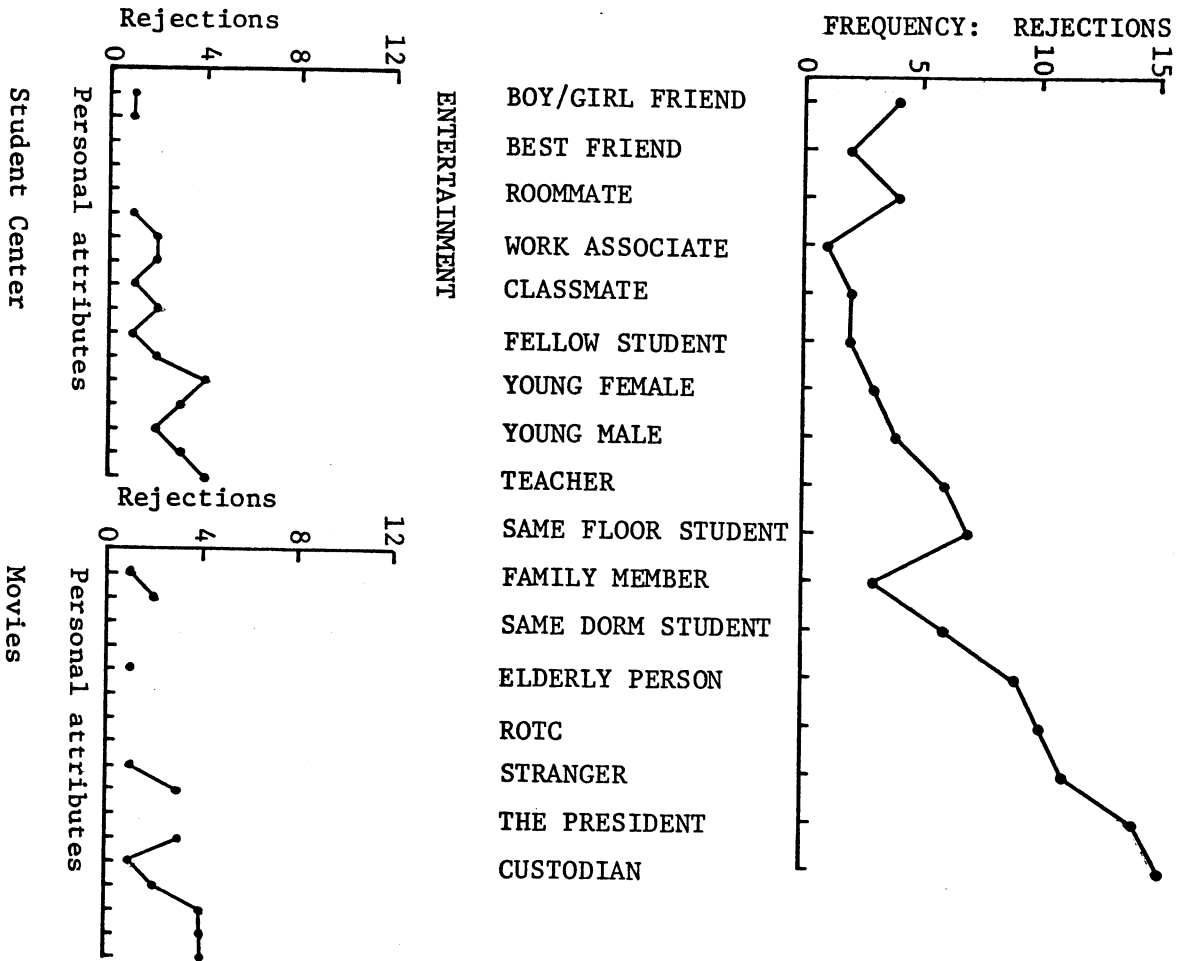
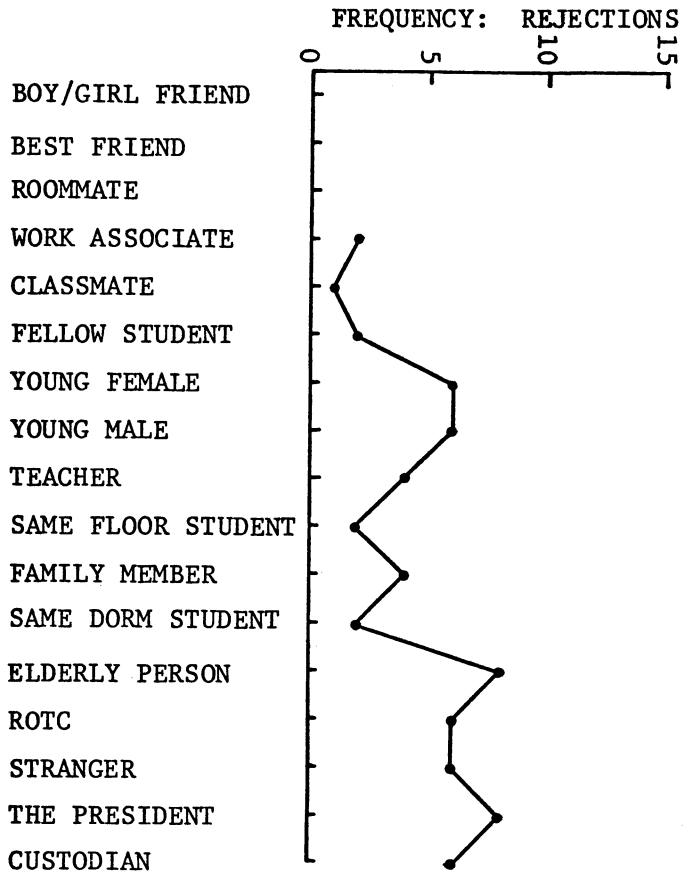


FIGURE 12: ACTIVITY-REJECT FREQUENCIES: ENTERTAINMENT



PARTYING

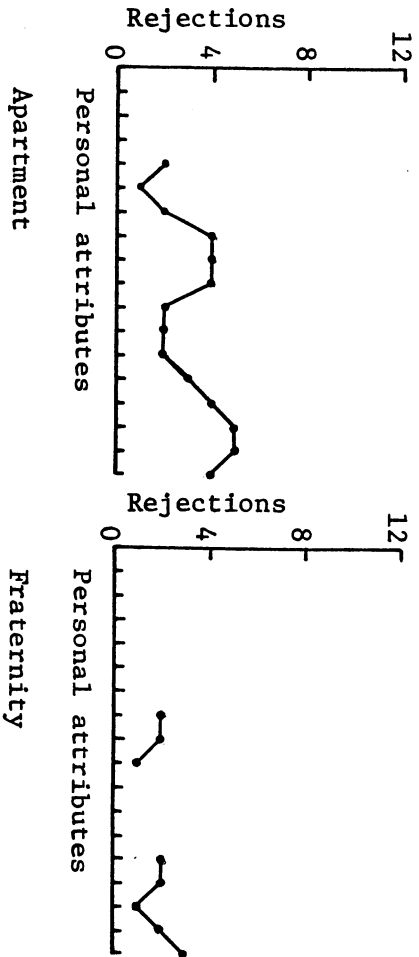


FIGURE 13: ACTIVITY-REJECT FREQUENCIES: PARTYING

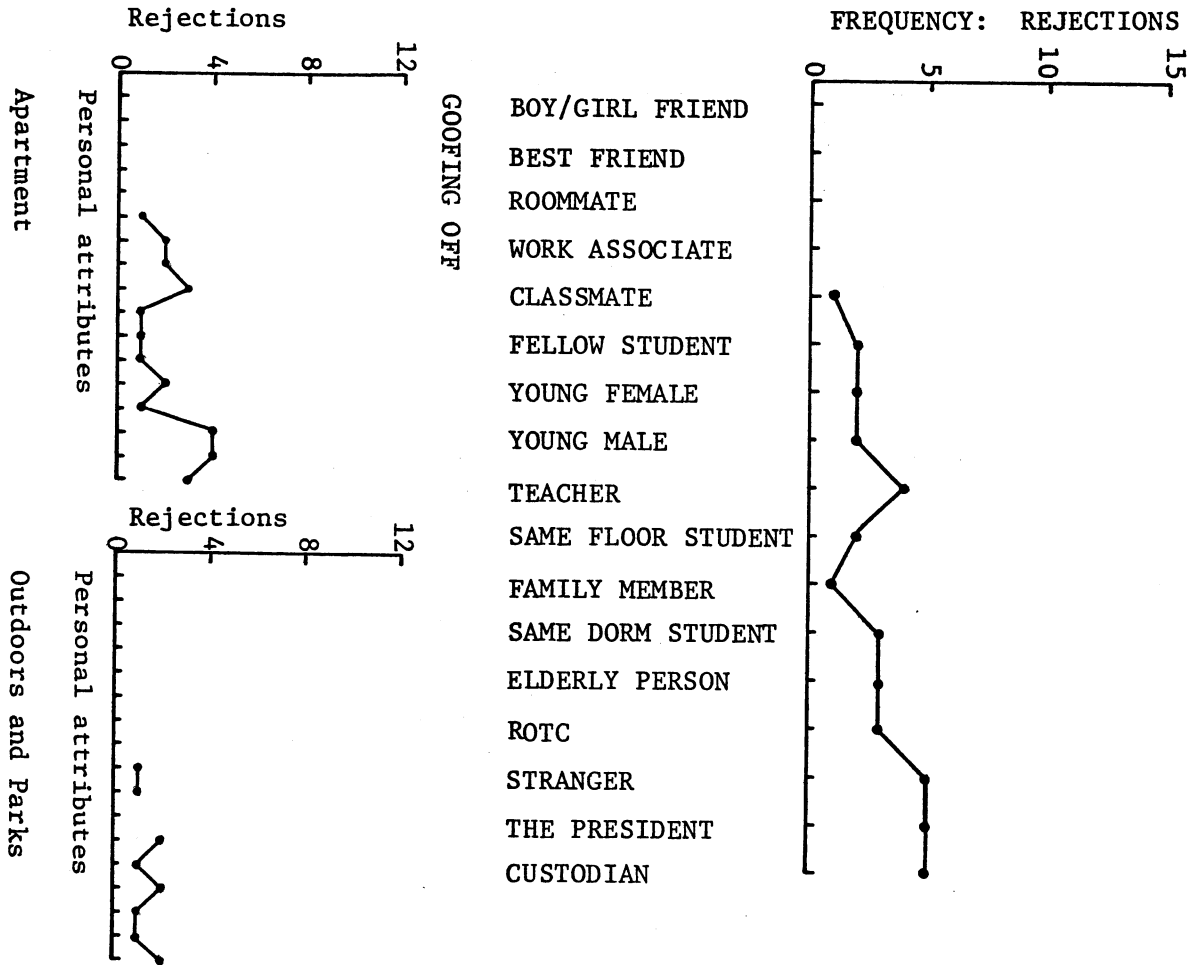


FIGURE 14: ACTIVITY-REJECT FREQUENCIES: GOOFING OFF

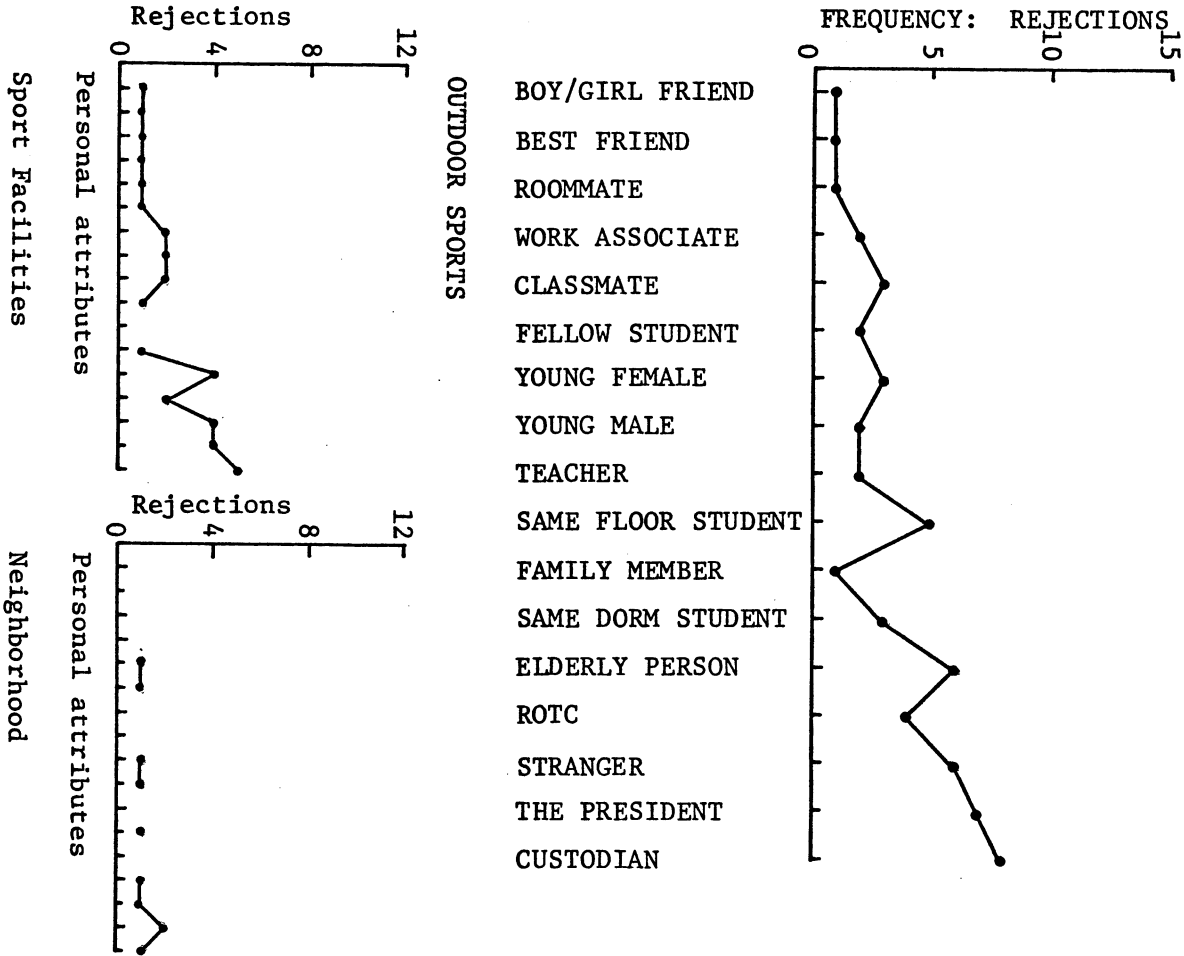


FIGURE 15: ACTIVITY-REJECT FREQUENCIES: OUTDOOR SPORTS

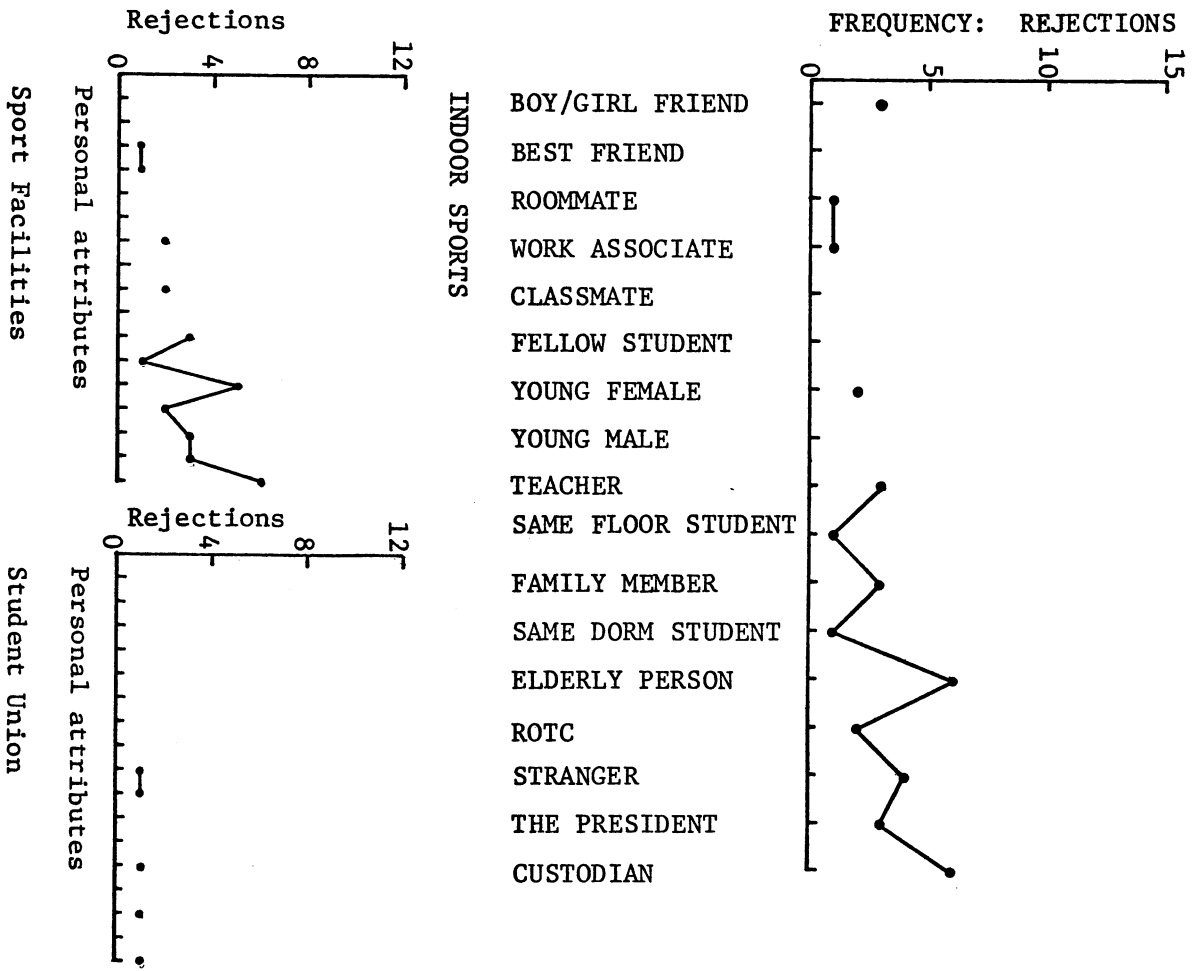
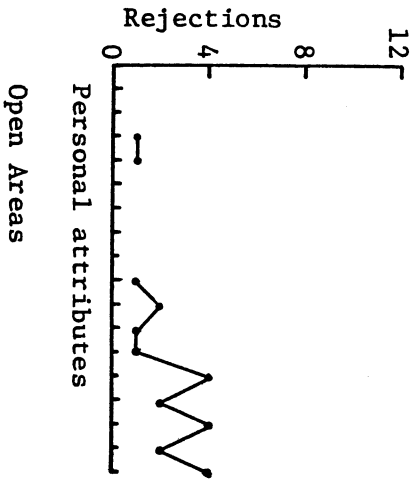


FIGURE 16: ACTIVITY-REJECT FREQUENCIES: INDOOR SPORTS



BICYCLING

- BOY/GIRL FRIEND
- BEST FRIEND
- ROOMMATE
- WORK ASSOCIATE
- CLASSMATE
- FELLOW STUDENT
- YOUNG FEMALE
- YOUNG MALE
- TEACHER
- SAME FLOOR STUDENT
- FAMILY MEMBER
- SAME DORM STUDENT
- ELDERLY PERSON
- ROTC
- STRANGER
- THE PRESIDENT
- CUSTODIAN

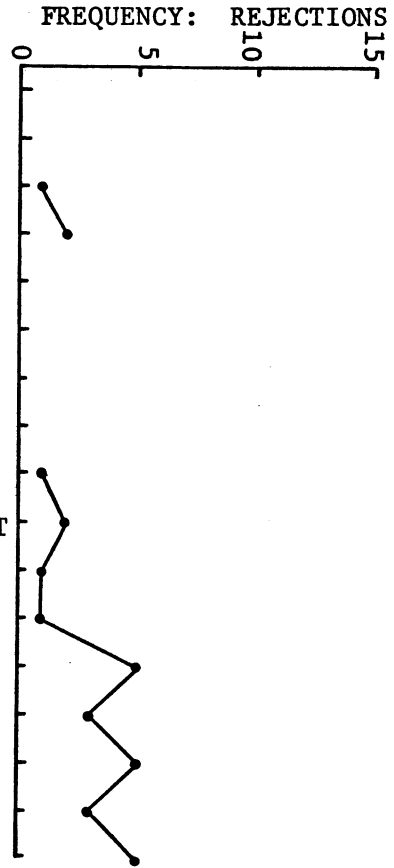


FIGURE 18: ACTIVITY-REJECT FREQUENCIES: BICYCLING

SUMMARY

The purpose of this study is to develop a method of analyzing the activity patterns of users with respect to the designed physical environment, in pursuit of large scale design-decision goals. The particular setting at Virginia Polytechnic Institute and State University campus, Blacksburg, Virginia was used to obtain data on the behavioral variables of the users and the physical parameters of the setting.

The survey consisted of two questionnaires. The first one was aimed to obtain quantifiable information on the existing patterns of use of the physical facilities of the campus. Daily diaries of the students were used as a tool for gathering this information.¹ The subjects were asked to indicate activities encountered, locations of these activities and the time each activity was commenced, for a period of 24 hours during a regular week day. Free-format diary forms were used with success in obtaining detailed and accurate information. This information was used in calculating, (1) the percentages of use of the physical resources of the campus, (2) the percentages of duration of the participation in each activity, (3) interface matrix

¹Nicholas Bullock, Peter Dickens, Philip Steadman, Edward Taylor, and Tom Willoughby. Surveys of Space and Activities: Reading University. Land Use and Built Form Studies in the University of Cambridge, Vol. XL, Cambridge: University of Cambridge, 1970.

of use of the physical resources and the activities encountered,
(4) the number of trips generated by the physical resources.

The second questionnaire dealt with the qualification of the properties of everyday activities and corresponding physical resources in terms of user preferences. Natural course of activities depend on environmental as well as human requirements. In other words, participants and their compatibility with each other sheds light to the contexture of the activity setting. The compatibility of participants is influenced by the role or the status of the individual participants as well as the contexture of the activity they are involved in. For instance, the superior of a university official can enter the subordinate's office without knocking, yet he cannot do so when entering his home if he is not also a friend. While manners and customs seem to be very important, the root of the matter is the basic human behavioral orders which can be represented by the concepts of territoriality, status and role.¹ Consequently, in specific activity settings individuals may transgress each other's behavioral orders with their attributes, appearance or presence.

The subjects in this study were asked to identify those persons who seem as misfits and others who do not by either rejecting or accepting them in the context of an activity they had selected

¹Aristide H. Esser, "Ecological Contributions to Understanding the Human Use of Space." Man Environment Systems. II, 2 (March, 1972), 106.

earlier. To aid this a list of everyday phraseologies representing 16 different personal attributes was supplied with the questionnaire forms. This information was compiled into reject-frequency histograms for each activity. Based on correlation between the frequency of rejections of the "person," all activities were classified into three modes: solitude, social-voluntary and social-involuntary. Consequently, depending on the activities they accommodate, the physical resources were classified into two: multi-modal and single-modal.

The findings of the survey were evaluated by identifying the properties of the campus setting under three basic groups,¹ (1) independent variables: biological, emotional and intellectual motivations² underlying the preferences of the users, (2) design parameters: the values of the properties of the physical organization and management of the resources of the campus generated by the inputs of its design process, (3) dependent variables: the performance expected from the physical environment through the four function model of climate modification, activity modification, cultural modification and resource modification³ as an outcome of the design inputs.

¹P. H. Levin, "The Design Process in Planning." The Town Planning Review. Vol. XXVII, No. 1 (April, 1966), 5-20.

²Aristide H. Esser, "Ecological Contributions to Understanding the Human Use of Space." Man Environment Systems. II, 2 (March, 1972), 106.

³Bill Hillier, John Musgrove, and Pat O'Sullivan. "Knowledge and Design." Vol. II of Environmental Design: Research and Practice. Edited by William J. Mitchell, 2 Vols. Los Angeles: University of California, 1972. Sec. 29-3.

Based on the findings, this work recommends the further development of the proposed method and implementation of new research methods. The following specific measures are necessary to increase the validity of the results obtained:

1. Expand instruments of measurements to include other aspects of appropriateness, i.e., the fittingness of the physical and organizational aspects of the environment.
2. Improve sampling techniques by increasing sample size and by periodic surveying.
3. Improve evaluation techniques by classifying sample population by individual attributes of subjects.

New research must be initiated in effort to redefine design parameters to eliminate dysfunctions detected in the dependent variables. Such research must take as its premise the abolition of the untested, conventional design elements, i.e., the functional structures and the built forms, used in the organization of activities in large scale planning processes.

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APPENDIX A

SURVEY TOOLS

The Pilot Study

The two premises used in designing the pilot questionnaire were:

1. Obtaining a detailed description of the daily activity and resource-use patterns at Virginia Polytechnic Institute and State University Campus.
2. Obtaining conjectures about attitudes of the users in the context of the activity-resource patterns observed.

The underlying assumptions of the performance expected from the pilot questionnaire were to:

1. Gain insights into the feasibility and validity of the survey techniques.
2. Test the validity of the results and their significance in providing adequate data to meet the requirements of the survey.

The questionnaire forms consisted of three parts: (1) general information on the sample population, (2) diaries of the subject's daily activities, (3) user attitudes towards the built environment in

terms of the properties containing the behavioral dispositions.

The questionnaire forms were handed out during two regular class hours. The first class was held in the Department of Agronomy on a Tuesday, May 2, 1972, at 9:00 a.m. Twenty-four males and two females received the questionnaire forms and a brief explanation on how to fill them. A deadline was set for the return of the forms, three-and-a-half days ahead.

The second class in which the survey was administered was held on a Wednesday, May 3, 1972, at 2:00 p.m. in the Department of Home Economics. Forty-five females and four males received forms and an extensive oral explanation. The students were asked to bring back the forms to the next meeting of the same class. The instructor aided the return rate by verbally reinforcing the significance of the survey.

The rate of return in the second class was 40% while only one out of twenty-six responded from the first class. Hence the procedures used in the second class were adopted for use in the main questionnaire.

The wording and the form of the questionnaire was rated as "good" by 64% and "fair" by 27% of the sample population on a three point scale. None of the students found it difficult to comprehend and respond to any of the questions and 82% also had no other criticisms to make. All of the remaining 18% criticized the question concerning the social security number of the subjects.

The results of the survey indicated that the first and second parts of the questionnaire were basically successful. A remark concerning the typical daily activities versus the activities occurring during a specific day, however, made by one of the subjects alerted the surveyors to the fact that these two distinct approaches existed in the responses. Consequently, this distinction was built into the main questionnaire.

The results of the third section, on the other hand, were too obtrusive to enable valid analysis. Even if distinct tendencies were obvious in terms of user preferences it was felt strongly that the "meaning" was not conveyed to the subjects successfully.

Sample Questionnaire: Pilot - Continued

HOW OFTEN DO YOU USE A VEHICLE IN TOWN: everyday

most of the time	sometimes
only on week days	only on weekends
seldom	never

Dear Sample Human:

The purpose of this section of the questionnaire is to build up a picture of the way you spend your time and the kind of facilities that you use both in town and in the university. The blank you will fill is in the form of a diary. For a whole day we would like to know as accurately as possible, what you do, where and when you do it.

Please enter:

1. In the left hand column: The time at which you start an activity.
2. In the center column: Describe the activity. If the activity is travel from one building to another, fill in means of travel, i.e., walking, cycling, car, etc.

Sample Questionnaire: Pilot - Continued

3. In the right hand column: The location, building name if on campus, address if off campus. If the activity is travel, fill in name or address of destination.

When one activity is terminated, fill in the next activity (see example below). Do this for 24 hours.

TIME	ACTIVITY	LOCATION
7:40	Woke up	Pritchard Hall
7:50	Got up, washed, etc.	Pritchard Hall
8:10	Down for breakfast	Dietrick Hall
8:30	Returned to room to study	Pritchard Hall
8:45	Cycled	To Cowgill Hall
etc.		

The contents of the individual diaries will of course be treated confidentially. Each diary will be identified by your student numbers filled out in the first part and this information shall be destroyed as soon as the results are coded.

YOU CAN FILL DIARY ANY DAY OF THE WEEK EXCEPT ON WEEKENDS AND HOLIDAYS. PLEASE INCLUDE AS MUCH DETAIL AS YOU CAN IN DESCRIBING YOUR ACTIVITIES.

You will find return instructions on your diary blanks (next three pages).

Sample Questionnaire: Pilot - Continued

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

ACTIVITY-SPACE SURVEY QUESTIONNAIRE PART TWO: DAIRY BLANK

please read instructions carefully before starting

STUDENT NUMBER:**DATE:**

TIME**ACTIVITY****LOCATION**

please return this questionnaire to the instructor in whose class
it was handed out to you

Sample Questionnaire: Pilot - Continued

Congratulations:

If you have completed the first two parts of this questionnaire you have very little to go.

1. You will find a map of the VPI Campus on the next page.
2. Please get yourself a soft pencil to mark on this map.
3. Outline on the map with bold lines a zone that represents best the portion of the campus and/or the town which you see as your territory, as a user of this campus. If you are not familiar with the use of the word 'territory' in this sense then mark those areas on the campus you most identify with or feel confident in.

Thank you!

FEEDBACK

Did you think the wording of this questionnaire was:

good fair bad

Did you think the form of this questionnaire was:

good fair bad

Did you find difficulty in understanding any particular question or section? Please explain why.

Did you find it difficult in responding to any particular question or section? Please explain why.

Please add any other comments and criticisms.

Main Questionnaires

Two main questionnaires emerged from these observations concerning the (1) daily use diaries of subject, and (2) user preferences of activity contextures through attitudes towards "other person." The procedures improved by means of the pilot questionnaire, however, enabled the successful completion of the survey.

The results of the "typical-day" returns and the "specific-day" returns revealed that there was not adequate evidence to find significant differences between the two results. Hence, all results were included in the evaluation process, hypothesizing that they were representative of a "typical" day regardless of the fact that the subjects had filled out the events of a "specific" day as well as a "typical" day. To achieve this uniformity was indeed one of the aims in administering the questionnaires on randomly selected week days.

Sample Questionnaire: One

DEAR STUDENT OF VPI:

The purpose of this questionnaire is to explore the significance of student requirements in planning the physical plant of our campus. In other words it employs user (student) needs as a serious criteria for planning.

The success of this study depends greatly on your cooperation. Please read instructions carefully and fill with proper care. Do not put down anything on any page to reveal your identity.

YOUR COOPERATION IS GREATLY APPRECIATED!

RETURN INSTRUCTIONS:

Please return this questionnaire to the survey-crew member next time you meet for the same course in which it was handed out to you. Please fill in 'location' and 'time' of the course for your own convenience:

Time: _____

Location: _____

Sample Questionnaire: One - Continued

PART A

INSTRUCTIONS: Please check appropriate boxes.

AGE (IN YEARS): _____ SEX: male female

CURRENT ADDRESS: _____

MARITAL STATUS: single married other

IF MARRIED DOES YOUR SPOUSE WORK: no part-time
full-time other _____

WHAT DEPARTMENT ARE YOU CURRENTLY ENROLLED IN: _____

HOW MANY CREDIT HOUR ARE YOU CURRENTLY ENROLLED FOR: _____

WHAT IS YOUR CURRENT QCA: _____

WHAT YEAR ARE YOU IN: freshman sophomore
junior senior
graduate other _____ARE YOU ENROLLED: full-time part-time
other _____DO YOU HOLD: teach-assist res-assist
non-acad. employ otherDO YOU GENERALLY TRAVEL IN
BLACKSBURG BY: walking bicycle car
motorcycle van otherDO YOU GENERALLY TRAVEL ON
CAMPUS BY: walking bicycle car
motorcycle van otherHOW OFTEN DO YOU RIDE A
VEHICLE: everyday most-of-the-time
sometimes only on weekdays
only on weekends seldom

Sample Questionnaire: One - Continued

PART B

INSTRUCTIONS: The purpose of this section of the questionnaire is to build up a picture of the way you spend your time and the kind of facilities that you use both in town and in the university. The blank you will fill, is in the form of a diary (See example on next page). For a whole day we would like to know as accurately as possible, what you do, where and when you do it.

Please enter the following in the "diary blanks" provided at the back:

- | | |
|---------------------------|---|
| In the left hand column: | The time at which you start an activity. |
| In the center column: | Describe the activity. If the activity is travel from one building to another, fill in means of travel i.e., walking, cycling, car, etc. |
| In the right hand column: | The location, building name if <u>on</u> campus, address if <u>off</u> campus. If the activity is <u>travel</u> , fill in name or address of destination. |

When one activity is terminated, fill in the next activity (see example on next page). Do this for a whole day.

Sample Questionnaire: One - Continued

PART B

EXAMPLE DIARY: If you were an architect currently in practice in Blacksburg, most probably you would fill out the diary blank in the following manner.

TIME	ACTIVITY	LOCATION
7:15	woke up, got dressed, etc.	
7:55	ate breakfast	
8:10	drove car	
8:25	started work	
12:00	drove car	
12:20	ate lunch	
1:20	drove car	Cowgill Hall
1:30	attended lecture on 'modern architecture'	Cowgill Hall
2:15	walked	
2:30	started work	
6:15	walked	Cowgill Hall
6:35	read magazines in library	Cowgill Hall
etc.		

You can fill your blanks in two distinctly different manners.

Please check one:

1. A TYPICAL WEEKDAY
2. A SPECIFIC DAY (i.e., any day between today and the
time you turn in this form)

Sample Questionnaire: One - Continued

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

ACTIVITY-SPACE SURVEY QUESTIONNAIRE
PART B: DIARY BLANK

please read instructions carefully before starting

DAY OF WEEK:

DATE:

TIME

ACTIVITY

LOCATION

Sample Questionnaire: Two - Continued

B. The list of "activities" in ATTACHMENT 1 and "locations" in ATTACHMENT 2 are provided for your convenience in completing this form. They are not meant to limit your selections in any fashion.

Instructions:

1. List in the first row of ATTACHMENT 3, labeled "activities" three or more everyday activities you find personally "fulfilling" in some way.
2. In the next row, labeled "locations" enter two or more locations where you would prefer to conduct each of these activities.
3. Assume that you are conducting the activity you have selected. Those "persons" who in your opinion are not suitable to be in the context of that activity must be rejected. Each following row contains a phrase representing a "person's attributes." Please put a cross (X) against those "persons" you would like to reject and a check (✓) against those you would accept in the context of the activity.

Sample Questionnaire: Two - Continued

ATTACHMENT 1

ACTIVITIES

1. walking
2. jogging
3. bicycling
4. motorcycling
5. driving
6. study
7. reading
8. attending lectures
9. lab work
10. work discussion
11. tutorial
12. external visit (academic)
13. eating
14. drinking
15. snacking
16. casual social (small group)
17. party
18. bar games (billards, etc.)
19. club meetings
20. TV
21. outdoor leisure
22. outdoor sports
23. hobbies
24. dancing
25. entertaining opposite sex
26. entertainment (movies, theatre, etc.)
27. goofing off
28. personal hygiene (washing, dressing, etc.)
29. domestic activities
30. sports
31. sleeping
32. shopping
33. charitable and religious
34. using health services
35. non-academic work

Sample Questionnaire: Two - Continued

ATTACHMENT 2

LOCATIONS

DOMESTIC	apartment dorm room dorm floor apartment block dorm building open area around dorm/apartment neighborhood etc. (specify name of building or give address)
ACADEMIC	departmental building(s) laboratory building(s) etc. (specify name of building)
SPORTS	gymnasium coliseum stadium etc.
RECREATION	squires donaldson brown center lyric fraternity house(s) etc.
ADMINISTRATIVE	burruss patton etc.
OTHER COMMON	library dining halls (specify name of building) infirmary laundry etc.
OPEN	drill field duck pond tennis courts open area around dorms/apartments etc.

Sample Questionnaire: Two - Continued

ATTACHMENT 3

ACTIVITIES	drinking	
LOCATIONS	grieks	home
girl/boy friend	X	✓
family member	X	✓
best friend	✓	✓
roommate	✓	X
student from same floor	X	X
student from same dorm	X	X
classmate	X	✓
your work associate	X	X
Tech student	✓	X
ROTC cadet	X	X
teacher	✓	✓
custodian of dorm	✓	X
stranger	X	X
elderly person	X	X
young male	X	X
young female	✓	X
the president	✓	X
other (specify)		

Sample Questionnaire: Two - Continued

ATTACHMENT 3

ACTIVITIES

LOCATIONS

girl/boy friend

family member

best friend

roommate

student from
same floor

student from
same dorm

classmate

your work
associate

Tech student

ROTC cadet

teacher

custodian
of dorm

stranger

elderly

person

young

male

young

female

the

president

other

(specify)

TABLE 5

DEPARTMENTS AND CLASSES RANDOMLY
SELECTED FOR THE SURVEY

Code	Academic Department	Title of Course	Date	Time
First Questionnaire				
11	Accounting	Principles of Accounting	May 10	10:00 a.m.
12	Art	History of Art	May 10	11:00 a.m.
13	Building Construction	Housing and Land Development	May 10	11:00 a.m.
14	Chemistry	General Chemistry	May 10	12:00 p.m.
15	Agricultural Engineering	Power Mechanics	May 10	1:00 p.m.
21	Agricultural Education	Vocational Teaching	May 15	9:00 a.m.
22	Engineering Mechanics	Structural Mechanics	May 15	10:00 a.m.
23	Civil Engineering	Hydraulic Engineering Design	May 15	11:00 a.m.
24	English	Survey of English Literature	May 15	12:00 p.m.
25	Civil Engineering	Transportation Engineering	May 15	1:00 p.m.
26	Agricultural Education	Subject Matter in Agricultural Education	May 15	6:00 p.m.
31	Mining Engineering	Mining Plant Engineering	May 16	12:30 p.m.
32	Mining Engineering	Mining Systems	May 16	2:00 p.m.

TABLE 5 - Continued

Code	Academic Department	Title of Course	Date	Time
41	Management Housing and Family Development	Human Development II	May 17	8:00 a.m.
42	Human Nutrition and Foods	Therapeutic Nutrition	May 17	9:00 a.m.
43	Human Nutrition and Foods	Protein and Energy in Human Nutrition	May 17	11:00 a.m.
44	Nuclear Science and Engineering	Fundamentals of Nuclear Reactors	May 17	1:00 a.m.
51	General Arts and Sciences	Introduction to Geography	May 18	8:00 a.m.
Second Questionnaire				
101	Performing Arts and Communica- tions	Introduction to Music	August 1	8:00 a.m.
102	Psychology	Psychology of Personality	August 1	9:00 a.m.
103	Business Administration	Business Law	August 1	1:50 p.m.

TABLE 6

RATE OF RETURNS OF COMPLETED
QUESTIONNAIRE FORMS

Department and Class Code	Numbers Handed Out	Numbers Returned	Rate of Returns
First Questionnaire			
11 Accounting	37	8	22%
12 Art	65	10	15%
13 Building Construction	37	17	46%
14 Chemistry	92	35	38%
15 Agricultural Engineering	25	10	40%
21 Agricultural Engineering	28	13	46%
22 Engineering Mechanics	29	18	62%
23 Civil Engineering	14	7	50%
24 English	33	15	45%
25 Civil Engineering	26	18	69%
26 Agricultural Engineering	8	6	75%
31 Mining Engineering	30	8	27%
32 Mining Engineering	18	5	28%
41 Management Housing and Family Development	29	8	28%
42 Human Nutrition and Foods	25	18	72%
43 Human Nutrition and Foods	7	6	86%
44 Nuclear Science and Engineering	29	8	28%
51 General Arts and Sciences	14	7	50%
Second Questionnaire			
101 Performing Arts and Communications	30	8	27%
102 Psychology	40	26	65%
103 Business Administration	40	12	30%
Totals: First Questionnaire	546	227	41.5%
Second Questionnaire	110	46	42%
Grand Totals	656	273	42%

TABLE 7

PARAMETERS OF THE SAMPLE POPULATION
AND THE TOTAL UNIVERSITY POPULATION

	Total Popula- tions	% of Males	<u>Ratio to Total Population by Year of Study</u>				
			Freshman	Sophomore	Junior	Senior	Other
First Questionnaire							
Sample	227	58%	27%	30%	23%	19%	1%
Total	14,471	71%	26%	23%	24%	12%	15%
Second Questionnaire							
Sample	44	56%	3%	24%	44%	29%	
Total	14,471	71%	26%	23%	24%	12%	15%

Data Conversion

Two computer programs were written, QUEST AND QUESTA, especially designed to accommodate the data obtained from the questionnaires. The listings of these programs are provided at the end of this section. The coding of the available data was done as indicated in Table 8.

TABLE 8

CODING QUESTIONNAIRE RESULTS
ON CARD SOURCE

Data	Range of Values	Storage Space
First Questionnaire		
Subject I. D. Number	0000-9999	4 x 1
Sex	1-2	1 x 1
Location of Residence	00-99	2 x 1
Major Field of Study	00-99	2 x 1
Activity(s)	0-9	1 x 40
Location(s)	00-99	2 x 40
Time(s)	0000-9999	2 x 40
Second Questionnaire		
Subject I. D. Number	000-999	3 x 1
Sex	1-2	1 x 1
Location of Residence	00-99	2 x 1
Major Field of Study	00-99	2 x 1
Activity(s)	00-99	2 x 4
Location(s)	00-99	2 x 8
Accept or Reject Response	0-2	1 x 17

PL/1 Program for the First Questionnaire:

```

Lines   Statements

QUEST:  PROC OPTIONS(MAIN);

1   QUEST:  PROC OPTIONS(MAIN);
2   DECLARE (A,D,IA,IO,IE,ID,IZ,I,L,J,JE,JI,JK,JJ,JL,
           JM,JN,KI,KK,T,KL,KJ,LM,LN,MI,MJ,MK,PP,QQ,
           RR,SS,NI,NL,NK,IC,IF)FIXED INIT(0),
           IB FIXED DECIMAL(2) INIT(0),
           CUMSU(3)FIXED INIT((3)0),
           P(8) FIXED INIT((8)0),
           (ACUMSUM(0:9),ADUMSUM(0:9))FIXED
           INIT((10)0),
           (N(26))FIXED INIT((26)0),
           (MIN(50),HOUR(50))FIXED INIT((50)0),
           (PCUMSUM(0:99),PDUMSUM(0:99),IAT(0:99),
           ICO(0:99),
           IAE(0:99),ITE(0:99))FIXED INIT((100)0),
           (TIMCDUM(0:9,0:99),TIMECUM(0:9,0:99),
           TIMEDUM(0:9,0:99))
           FIXED INIT((1000)0);
3   DECLARE (IX,JK,PE,QU,RE)FIXED INIT(0),
           (SE,TE)FIXED INIT(0);
4   DECLARE RES(00:99) CHARACTER(14) VARYING;
5   DECLARE 1  DAT(26),
           2  TA,
           3  AC(50) FIXED DECIMAL(1),
           3  TI(50) FIXED DECIMAL(4),
           3  PL(50) FIXED DECIMAL(2),
           2  ATT(4) FIXED DECIMAL,
           2  SE,
           (3  AE(15),
           3  CO(15),
           3  AT(15),
           3  TE(15)) FIXED DECIMAL(2),
           3  SU(3)  FIXED DECIMAL(1),
           2  IND FIXED DECIMAL(5);
6   GET EDIT(RES)((100)A(15));
7   GET LIST((N(IE) DO IE=1 TO 26));
8   GET LIST ((P(JE) DO JE=1 TO 8));
9   PUT LIST ('SAMPLE ID NUMBERS');
10  PUT SKIP(2);
11  L100: DO I=1 TO 26;
12      GET LIST((AC(I,IA) DO IA=1 TO N(I)));
13      GET LIST((TI(I,IC) DO IC=1 TO N(I)));
14      GET LIST((PL(I,IF) DO IF=1 TO N(I)));

```

PL/1 Program for the First Questionnaire:
Continued

Lines	Statements
15	GET LIST((DAT(I).ATT(IZ) DO IZ=1 TO 4));
16	GET LIST (DAT(I).SE,DAT(I).IND);
17	PUT LIST (IND(I));
18	IF DAT(I).ATT(1)<P(1) THEN
19	IF DAT(I).ATT(1)>P(2) THEN
20	IF DAT(I).ATT(2)<P(3) THEN
21	IF DAT(I).ATT(2)>P(4) THEN
22	IF DAT(I).ATT(3)<P(5) THEN
23	IF DAT(I).ATT(3)>P(6) THEN
24	IF DAT(I).ATT(4)<P(7) THEN
25	IF DAT(I).ATT(4)>P(8) THEN GO TO L200;
27	ELSE GO TO L410;
28	ELSE GO TO L410;
29	ELSE GO TO L410;
30	ELSE GO TO L410;
31	ELSE GO TO L410;
32	ELSE GO TO L410;
33	ELSE GO TO L410;
34	ELSE GO TO L410;
35	L200: D=D+1;
36	DAT(D)=DAT(I);
37	J=N(I);
38	L300: DO L=1 TO J;
39	IB=TI(D,L)/100;
40	MIN(L)=TI(D,L)-(IB*100);
41	HOUR(L)=IB*60;
42	TI(D,L)=HOUR(L)+MIN(L);
43	L420: END L300;
44	L410: END L100;
45	PUT SKIP(4);
46	PUT LIST('PROCESSED ID NUMBERS');
47	PUT SKIP(2);
48	PUT EDIT (((DAT(ID).IND) DO ID=1 TO D))((5)F(20));
49	LBL1: DO IX=1 TO D;
50	J=N(IX);
51	LBL6: DO JX=1 TO J;
52	IF JX=J THEN GO TO LBL3;
54	ELSE GO TO LBL4;
55	LBL3: IF TI(IX,JX)>TI(IX,1) THEN QU=1440-TI(IX,JX)+TI(IX,1);
57	ELSE QU=TI(IX,1)-TI(IX,JX);
58	GO TO LBL5;

PL/1 Program for the First Questionnaire;
Continued

Lines	Statements
59	LBL4: IF JX=1 THEN IO=TI(IX,JX)-1;
61	ELSE IO=TI(IX,JX-1);
62	IF TI(IX,JX)>IO THEN
63	IF TI(IX,JX+1)>TI(IX,JX) THEN QU=TI(IX,JX+1)-TI(IX,JX);
65	ELSE QU=1440-TI(IX,JX)+TI(IX,JX+1);
66	ELSE QU=TI(IX,JX+1)-TI(IX,JX);
67	LBL5: PE=DAT(IX).PL(JX);
68	RE=DAT(IX).AC(JX);
69	IF QU<0 THEN GO TO LBL8;
71	ELSE GO TO LBL9;
72	LBL8: PUT DATA(IX,JX,QU);
73	QU=0;
74	LBL9: TIMECUM(RE,PE)=TIMECUM(RE,PE)+QU;
75	TIMEDUM(RE,PE)=TIMEDUM(RE,PE)+1;
76	END LBL6;
77	END LBL1;
78	L500: DO JK=00 TO 99;
79	DO JJ=0 TO 9;
80	PCUMSUM(JK)=PCUMSUM(JK)+TIMECUM(JJ,JK);
81	PDUMSUM(JK)=PDUMSUM(JK)+TIMEDUM(JJ,JK);
82	IF TIMEDUM(JJ,JK)=0 THEN TIMCDUM(JJ,JK)=0;
84	ELSE TIMCDUM(JJ,JK)=TIMECUM(JJ,JK)/TIMEDUM(JJ,JK);
85	END L500;
87	PUT PAGE:
88	PUT LIST ('TOTAL TIME SPENT PER LOCATION PER ACTIVITY');
89	PUT SKIP(2);
90	L510: DO JM=0 TO 99;
91	PUT EDIT (RES(JM))(SKIP,A(17));
92	DO JL=0 TO 9;
93	PUT EDIT (TIMECUM(JL,JM))((10)F(7));
94	END L510;
96	PUT PAGE:
97	PUT LIST ('AVERAGE TIME SPENT PER LOCATION PER TRIP');
98	PUT SKIP(2);
99	L520: DO JM=0 TO 99;
100	PUT EDIT (RES(JM))(SKIP,A(17));
101	DO JL=0 TO 9;
102	PUT EDIT (TIMCDUM(JL,JM))((10)F(7));
103	END L520;
105	PUT PAGE:

PL/1 Program for the First Questionnaire:
Continued

Lines	Statements
106	PUT LIST ('TIME SPENT PER LOCATION');
107	PUT SKIP(2);
108	PUT LIST ('NUMBER OF TRIPS PER LOCATION');
109	PUT SKIP(2);
110	L530: DO JI=0 TO 99;
111	PUT EDIT(PCUMSUM(JI),RES(JI),PDUMSUM(JI))(SKIP, F(7),COL(20),A(17),COL(40),F(7));
112	END L530;
113	L600 DO KK=00 TO 99;
114	DO KL=0 TO 9;
115	ACUMSUM(KL)=ACUMSUM(KL)+TIMECUM(KL,KK);
116	ADUMSUM(KL)=ADUMSUM(KL)+TIMEDUM(KL,KK);
117	END L600;
119	PUT PAGE;
120	PUT LIST('TIME SPENT PER ACTIVITY');
121	PUT SKIP(2);
122	PUT LIST('NUMBER OF TRIPS PER ACTIVITY');
123	PUT SKIP(2);
124	L610: DO KI=0 TO 9;
125	PUT EDIT (ACUMSUM(KI),ADUMSUM(KI))(SKIP,F(7), COL(40),F(7));
126	END L610;
127	PUT PAGE;
128	PUT LIST('NUMBER OF TIMES AN ACTIVITY AND PLACE ARE RELATED');
129	PUT SKIP(2);
130	L620: DO LN=0 TO 99;
131	PUT EDIT(RES(LN))(SKIP,A(17));
132	DO LM=0 TO 9;
133	PUT EDIT(TIMEDUM(LM,LN))((10)F(7));
134	END L620;
136	L800: DO MI=1 TO D;
137	DO MJ=1 TO 15;
138	PP=DAT(MI).SE.AT(MJ);
139	IAT(PP)=IAT(PP)+1;
140	QQ=DAT(MI).SE.CO(MJ);
141	ICO(QQ)=ICO(QQ)+1;
142	RR=DAT(MI).SE.AE(MJ);
143	IAE(RR)=IAE(RR)+1;
144	SS=DAT(MI).SE.TE(MJ);
145	ITE(SS)=ITE(SS)+1;
146	END L800;

PL/1 Program for the First Questionnaire
Continued

Lines	Statements
148	PUT PAGE;
149	PUT LIST('FREQUENCY OF SUBJECTIVE EVALUATION OF LOCATIONS WITH RESPECT TO CONFIDENCE ATHOMENESS AESTHETICALITY AND TERRITORIALITY');
150	PUT SKIP(1);
151	L810: DO MK=00 TO 99;
152	PUT SKIP(1);
153	PUT EDIT (IAT(MK))((4)F(5));
154	PUT EDIT (ICO(MK))((4)F(5));
155	PUT EDIT (IAE(MK))((4)F(5));
156	PUT EDIT (ITE(MK))((4)F(5));
157	PUT EDIT (RES(MK))(A(17));
158	END L810;
159	L900: DO NL=1 TO D;
160	DO NK=1 TO 3;
161	CUMSU(NK)=CUMSU(NK)+DAT(NL).SE.SU(NK);
162	END L900;
164	PUT SKIP(4);
165	PUT LIST('CORRELATION FREQUENCY OF TERRITORIALITY WITH ATHOMENESS CONFIDENCE AND AESTHETICALITY RESPECTIVELY');
166	PUT SKIP(2);
167	PUT EDIT((CUMSU(NI) DO NI=1 TO 3))((10)F(5));
168	END QUEST;

PL/1 Program for the Second Questionnaire

Lines	Statements
	QUESTA: PROC OPTIONS(MAIN);
1	QUESTA: PROC OPTIONS(MAIN);
2	DECLARE (I,J,K,L,M,N,P,Q,R,S,T,U,V)FIXED INIT(0), ACTIVITY(28) CHARACTER(3), LOCATN(35) CHARACTER(8), PERSON(17) CHARACTER(14), FREQA(28)FIXED INIT((28)0), (ACCEPT(17),REJECT(17))FIXED INIT((17)0), APMATX(28,35)FIXED INIT((980)0), (A(28,35),R(28,35))FIXED INIT((980)0), (AAPPMAT(28,35,17),RAPPMAT(28,35,17)) FIXED UNIT ((16660)0);
3	DECLARE 1 SEP(186), 2 AC FIXED DECIMAL(2), 2 PL FIXED DECIMAL(2), 2 PR(17)FIXED DECIMAL(1), 2 ID FIXED DECIMAL(3);
4	GET LIST (SEP);
5	GET EDIT(ACTIVTY)(COLUMN(1),(19)A(4),COLUMN(1), (9)A(4));
6	GET EDIT(LOCATN)(COLUMN(1),(8)A(9),COLUMN(1), (8)A(9),COLUMN(1),(8)A(9), COLUMN(1),(8)A(9),COLUMN(1), (3)A(9));
7	GET EDIT(PRSON)(COLUMN(1),(5)A(15),COLUMN(1), (5)A(15),COLUMN(1),(5)A(15), COLUMN(1),(2)A(15));
8	PUT LIST ('PROCESSED ID NUMBERS');
9	PUT SKIP(4);
10	PUT DATA(ID);
11	PUT PAGE;
12	L100: DO I=1 TO 186;
13	FREQA(AC(I))=FREQA(AC(I))+1;
14	APMATX(AC(I),PL(I))=APMATX(AC(I),PL(I))+1;
15	L160: DO J=1 TO 17;
16	IF PR(I,J)=1 THEN GO TO L120;
18	IF PR(I,J)=2 THEN GO TO L130;
20	ELSE GO TO L150;
21	L120: ACCEPT (J)=ACCEPT(J)+1
22	AAPPMAT(AC(I),PL(I),J)=AAPPMAT(AC(I),PL(I),J)+1;
23	GO TO L150;
24	L130: REJECT(J)=REJECT(J)+1;
25	RAPPMAT(AC(I),PL(I),J)=RAPPMAT(AC(I),PL(I),J)+1;

PL/1 Program for the Second Questionnaire
Continued

Lines	Statements
26	L150: END L160;
27	END L100;
28	PUT LIST('FREQUENCY OF SELECTED ACTIVITIES');
29	PUT SKIP(2);
30	PUT DATA (FREQA);
31	PUT SKIP(4);
32	PUT LIST('FREQUENCY OF ACCEPTING PERSONS');
33	PUT SKIP(2);
34	PUT DATA(ACCEPT);
35	PUT SKIP(4);
36	PUT LIST('FREQUENCY OF REJECTING PERSONS');
37	PUT SKIP(2);
38	PUT DATA(REJECT);
39	PUT PAGE;
40	PUT LIST ('ACTIVITY LOCATION MATRIX');
41	PUT SKIP(2);
42	PUT EDIT (ACTIVTY)(COLUMN(10),(28)A(4));
43	PUT SKIP(2);
44	L170: DO L=1 TO 35;
45	PUT EDIT(LOCATN(L))(SKIP,A(8));
46	PUT EDIT (((APMATX(K,L))DO K=1 TO 28))(COLUMN(9), (28)F(4));
47	END L170;
48	L140 DO P=1 TO 17;
49	PUT PAGE;
50	PUT LIST('ACTIVITY LOCATION PERSON ACCEPTED MATRIX');
51	PUT LIST(PERSON(P));
52	PUT SKIP(2);
53	PUT EDIT (ACTIVTY)(COLUMN(10),(28)A(4));
54	PUT SKIP(2);
55	DO N=1 TO 35;
56	PUT EDIT (LOCATN(N))(SKIP,A(8));
57	PUT EDIT (((AAPPMAT(M,N,P)) DO M=1 TO 28))(COLUMN(9), (28)F(4));
58	END L140;
60	L180: DO U=1 TO 17;
61	PUT PAGE;
62	PUT LIST('ACTIVITY LOCATION PERSON REJECTED MATRIX');
63	PUT LIST(PERSON(U));
64	PUT SKIP(2);
65	PUT EDIT (ACTIVTY)(COLUMN(10),(28)A(4));
66	PUT SKIP(2);
67	DO R=1 TO 35;

PL/1 Program for the Second Questionnaire
Continued

Lines	Statements
68	PUT EDIT (LOCATN(R))(SKIP,A(8));
69	PUT EDIT(((RAPPMAT(Q,R,U)) DO Q=1 TO 28)) (COLUMN(9),(28)F(4));
70	END L180;
72	END QUESTA;

APPENDIX B

ACTIVITY BUILT FORM CLASSIFICATIONS

Available Data

The cognizance of the physical setting of the Virginia Polytechnic Institute and State University and its facilities was taken prior to the collection of data from the users. The files and records of the campus facilities were obtained from the Office of Physical Plant Planning of the university.

A total sum of 168 existing buildings made the physical setting of the campus. The space inventory studies executed by the university personnel were obtained. It was discovered that an up-to-date record of existing square footages and accomodated activities of these built forms were available.

The classification system of these functional divisions and the built forms were based on the guidelines set by the State Council of Higher Education for Virginia, "Instruction for Reports of Change for Room and Building Inventory Data." Table 9 represents the "functional use classifications" recommended by the State Council and its application at Virginia Polytechnic Institute and State University.

Due to its emphasis on inventory aspects rather than design of facilities this information was not readily useable for the

purposes of this study. First of all, the classification was based on official and normative criteria necessitating from administrative purposes. Secondly, the pragmatic overlap between a physical room or built form and the functions or activities it contained were not clearly separated by the terminology used. For instance, "library" represents a physical entity while "instruction" is a function. Finally, the classifications were not done from the users' point of view. The activities of the administration were represented with greater weight than the users' were.

Consequently, other sources were used to classify activities and built forms of the campus. The system devised by the Center for Land Use and Built Form Studies based on research work similar to this study was used with modifications.

Survey Results

The results of the first questionnaire yielded basically a very similar breakdown of activities. The classification system of the Center for Land Use and Built Form Studies was applied with no difficulties whatsoever.

The results of the first questionnaire were compiled into the intermediary grouping (column 2 in Table 10) and evaluations were based on the primary grouping (column 1 in Table 10). The results of the second questionnaire yielded activities both in the primary and secondary groupings. In order to correlate the

findings of the two questionnaires the final classification of the results of the two questionnaires were matched in Table 11.

The built forms observed in the results of both questionnaires included most of the facilities of the campus. The town facilities were not cited in the questionnaires as much. The various built forms and locations used in both questionnaires are categorized in terms of functional resemblance in Table 12.

The final evaluation of the survey results were made on the basis of the activities and built forms listed in Tables 11 and 12.

TABLE 9

FUNCTIONAL USE CLASSIFICATIONS

State Council of Higher Education for Virginia	Virginia Polytechnic Institute and State University Space Inventory Studies
Instruction	General Classroom
Libraries	Teaching Laboratories
Research	Faculty Offices
Administration and General Organized Activities	Library
Related to Instruction	Physical Education
Extension and Public Services	Special Class - Laboratories
Physical Plant Operation and Maintenance	General Use
Auxiliary Enterprises	Research Offices
Non-Institutional Agencies	Other Research
Non-assigned and Non-assignable Areas	Extension Offices
	Administrative Offices
	Non-Official Administration
	Non-Official Extension
	Organized Activities
	Physical Plant
	Auxiliary Enterprises
	Non-Institutional
	Unassigned or Non-assigned

TABLE 10

CLASSIFICATION SYSTEM OF ACTIVITIES
FOR THE FIRST QUESTIONNAIRE

(1) General Title	(2) Subtitle	(3) Specific Activity
Travel	Travel	Hitch-Hiking Motor-bike Scooter Motor boat Car accident
Walking	Walking	Walking
Bicycling	Bicycling	Bicycling
Driving	Driving	Car-van Car-van driver Car-van passenger Parking
Bus	Bus	Bus
Train	Train	Train
Academic Work	Academic Work	Academic Work (unspecified)
	Formal Teaching	Lecture Seminar Practical Test/internal Examination Orchestral class
	External Visit	External visit Looking round a museum (work related)
	Laboratory Work	Studio work Research Working with lab. equip- ment/experimenting Preparing for lab. work, experiments Punching computer cards Listening to taped lectures Using language lab. (non-scheduled)

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Academic Work (continued)	Laboratory Work (continued)	Playing a musical instrument (work related) Playing piano (work related) Playing organ (work related) Singing (work related) Painting (work related) Listening to music (work related)
	Work Related Errands	Collecting computer results Using Xerox machine Collecting samples for an experiment
	Tutorial	Tutorial/supervision
	Arranging Academic Work	Arranging tutorial/supervision Waiting for tutor/member of staff Looking for tutor/member of staff Turning up at teaching event to find it cancelled Looking at notice boards Handing in work
	Work Discussion	Work discussion (but not as in 122) Talking with tutor/member of staff
	Private Study	Private study Reading (work) Writing/making notes Drawing Numerical exercises/problem sheets Typing

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Academic Work (continued)	Use of Library	Using library Using reference books in library Looking for books in library Taking books from library Reserving books in library Working as librarian
Eating	Eating	Eating Breakfast Lunch Tea Snack Supper/Dinner Formal dinner Celebration meal Eating take-away meal Queuing for meals Drinking tea/coffee alone Fish and chips Take away meal
Leisure	Drinking	Drinking alone Drinking with friends (alcohol, soft drinks)
	Casual Social	Talking with friends Drinking coffee/tea with friends (Non) Platonic discussion Calling on friends Being visited by friends Watching slides with friends Projecting slides Looking at photographs Seance Cards Chess Monopoly
	Party	Party Dancing Formal dinner dance

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Leisure (continued)	Party (continued)	Discotheque
	Bar Games	Billiards Table tennis Pinball
	Entertainment	Cinema Theatre/pantomime Concert Attending open lecture Dynamic reading demon- stration
	Club Meetings	Club meeting (work related) Staff/student meeting Club meeting (but not as in 190)
	Club Business	Organizing an exhibition Running a dance Drama committee meeting Play audition Writing to members of a club Putting up posters Union society business meeting Selling tickets Union business Distributing leaflets, diaries Hall business activities
	Leisure Activities	Writing letter Writing (non-work) Listening to music Listening to radio Listening to tape Listening to records Reading (non-work) Reading newspaper Reading a novel Mucking about

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Leisure (continued)	Leisure Activities (continued)	Goofing off Thinking Doing crosswords Smoking pot Playing with pets (cats/dogs) Feeding animals Typing practice Knitting Bible study Prayer Filling in diary Telephoning
	Watching TV	Watching TV
	Outdoor Leisure	Walking (for pleasure) Driving around (for pleasure) Cycling (for pleasure) Walking the dog Bird watching Fishing Sight-seeing Gardening (pleasure) Potting plants (pleasure)
	Hobbies	Photography Taking photographs Developing/printing photographs Working on car Working on bike Working on record player/ tape recorder/radio Recording with tape recorder Playing musical instru- ments (non-work) Music lesson Painting (non-work) Drawing and graphical design (non-work) Needlework

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Leisure (continued)	Hobbies (continued)	Miscellaneous
	Dance, Drama	Brass rubbing Dancing Singing with choir (non-work) Opera rehearsal Jazz dance class Acting
Domestic	Personal Hygiene	Washing Having a bath/shower Washing hair Drying hair Cutting hair Having hair cut (non-professional) Changing clothes Making up (cosmetics) Physical exercise Getting ready to go out Changing for sport
	Domestic Activities	Tidying up and cleaning house/flat/room Ironing Laundrette (non-commercial) Washing clothes Sewing Cleaning shoes Mending clothes Trying on clothes Making bed Washing up Cooking Preparing food Laying table Making sandwiches Making coffee Packing/unpacking Loading/unloading car Looking for mail

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Domestic (continued)	Domestic Activities (continued)	Picking up mail Posting mail Decorating house/flat/ room Rebuilding house/flat/ room Repair jobs around the house Looking after children Taking/fetching children to/from School/kinder- garten Dressing children Feeding children Bathing children Playing with children Babysitting Nursing somebody
Sport	Sport	Football/rugby Athletics Running Hockey Horse riding Basketball Swimming Training session Canoeing Skiing Shooting Golf Squash Badmington Frisbies Training in gym Judo/Karate Volleyball Watching sport 10 pin bowling
Sleep	Sleep	Sleep Lights out

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Shopping	Unspecified Shopping	Shopping and the use of other services
	Convenience Shopping	Groceries and provisions Vegetables/fruits Meat/fish Milk Bread/cake Confectionary Cigarettes/tobacco Cigarettes from machine Newspapers Household goods Chemists Toilet requisities Stationery Post Office Shoe repair Laundrette Dry cleaning Getting change Collecting brochures
	Other Shopping	Clothing Shoes Hiring evening dress Non-food shopping Paint (for decorating) Hiring television Gardening equipment Buying bicycle equipment, spares Other shopping Books Records Sports equipment Flowers Jewellers Toys Artists supplies Pet shops Horticultural supplies Buying things in music shops Buying typewriter

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Shopping (continued)	Other Shopping (continued)	Hairdressing salon Buying photographic supplies or equipment
	Using Gas Station-Garage	Gas station Garage for repairs to car Buying a car
	Using Other Services	Betting shop Photo studio Driving lesson Arranging driving lesson
	Banking	Banking
Other	Using Professional Services	Insurance Professional services and other services
	Using Government Services	Seeing government offi- cials, aliens officer Taxing car Going to Police Station
	Charitable Works	Good works and social work Visiting old age pensioners Giving music lesson Community activities
	Religious Activities	Religious activities Church service Friends' meeting
	Using Health Services	Visiting doctor/dentist Making appointment with doctor/dentist Being operated on Visiting people in hospital/clinic Taking a baby to the clinic
	Errands	Picking up Diary Picking up grant cheque Paying university fees

TABLE 10 - Continued

(1) General Title	(2) Subtitle	(3) Specific Activity
Other (continued)	Errands (continued)	Registering for the university Visiting University officials Fire drills (dorms) Interview (Appointments Office, etc.)
	Arranging Travel	Looking at bus and train schedules Buying train/bus tickets
	Non-academic Work	Working for money, (non-academic) Serving at bar

TABLE 11

CORRELATION OF THE ACTIVITIES FROM
THE RESULTS OF THE TWO QUESTIONNAIRES

First Questionnaire	Second Questionnaire
Study	Study
Eating	Eating
Leisure	Entertaining Opposite Sex Reading Watching TV Outdoor Leisure Bicycling Dancing Drinking Casual Social Entertainment Partying Goofing Off Movies
Sports	Outdoor Sports Indoor Sports
Personal Hygiene	None
Sleep	None
Work	None
Travel	None

TABLE 12

CLASSIFICATION OF THE BUILT FORMS OBTAINED
FROM THE RESULTS OF THE TWO QUESTIONNAIRES

General Title	Built Form (or Location)
Dormitories	Ambler Johnston Barringer Brodie Campbell Eggleston Femoyer Hillcrest Johnson Lee Major Williams Miles Monteith Newman O'Shaugnessy Pritchard Rache Shanks Thomas Vawter
Apartments	Apartments (Immediate Outdoor Surroundings) Apartments (Blacksburg) Apartments (Out of Town)
Fraternity	Fraternity
Student Center	Squires Student Center
Open Areas and Parks	Ag. Court Campbell Court Drill Field Duck Pond Eggleston Court Large Outdoor Dorm Court Small Outdoor Dorm Court Tennis Court The Mall Upper Quad Other
Academic Buildings	Agnew Bio-Chemistry

TABLE 12 - Continued

General Title	Built Form (or Location)
Academic Buildings (continued)	Cheatham Cowgill Davidson Derring Greenhouse Holden Hutcheson McBryde Norris Old High School Pamplin Price Randolph Robeson Sandy Saunders Seitz Smyth Wallace Whittemore Williams
Library	Carol Newman Library
Dining Halls	Dietrick Owens Shultz Other Restaurants
Pubs and Clubs	Greeks Pub Squires Student Center University Club
Movie Theatres	Lyric Studio I Squires Student Center
Sports Facilities	Coliseum Lane Stadium Gymnasium Other

TABLE 12 - Continued

General Title	Built Form (or Location)
Retail*	Downtown Other
Campus, Outdoors*	Campus, Outdoors

*These were not included in the results of the questionnaires due to insignificant use by subjects.

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the scanned document**

CONTEXTUAL FITTINGNESS OF EVERYDAY
ACTIVITY ENCOUNTERS

by

Omer Akin

(ABSTRACT)

This is a pilot study for the development of a method of analysing activity patterns of users with respect to the designed physical environment. Empirical data in the form of daily-diaries and preferences of college students is used in identifying the functional properties of a university setting. Based on the interaction requirements of the participants of the activities accommodated, individual built forms are classified into two categories: (1) single-modal, and (2) multi-modal. In congruence with this, the results of the diaries of users indicated dysfunctions in the utilization of physical and human resources. The pragmatic use of the conventional built form concept is identified as the cause of the dysfunctions observed.