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Seating patterns and patient behavior in an experimental dayroom.

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SEATING PATTERNS AND PATIENT BEHAVIOR IN AN EXPERIMENTAL DAYROOM

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INTRODUCTION

Man the builder has until recently ignored the impact of his environmental alterations on himself (Proshansky, Ittelson, and Rivlin, 1970). Behavioral scientists, for example, have viewed the environment as the passive background of behavior which is determined by programming that man carries around within himself, rather than as a dynamic shaper of human events (Barker, 1968). Until a half dozen years ago, scientific investigation of man-environment systems was restricted to a handful of designers and scientists. Since that time, however, scientists of varied backgrounds have joined the developing group of investigators in this area, and the hybrid discipline of environmental design research is emerging (Sanoff and Cohn, 1970).

The environmental sciences are at present without a theoretical foundation (Canter, 1970; Hufschmidt, 1966; Proshansky *et al.*, 1970). In lieu of theory, the following defining characteristics have been advanced by Proshansky *et al.* (1970) as a functional definition of the environmental sciences: they are concerned with the man-ordered environment, they have emerged from pressing social problems, they are multidisciplinary in nature, they include the study of man as a vital part of every problem.

The demand on the environmental sciences for applied research is considerable. A number of designers have come to realize that their traditional methods for problem solving and their understanding of the man-environment system are inadequate, and that their training has not equipped them to pursue adequate solutions (Sanoff and Cohn, 1970). Hoping to improve their lot, they have looked for assistance from the behavioral sciences. But behavioral scientists, concerned traditionally with man's response to the social environment rather than the physical one, have been slow to respond (Winkel, 1970). Psychologists particularly have been reluctant to guide their research in this direction (Wohlwill, 1970), and traditional psychological problems, such as perception and cognition, as they relate to environment have often been pursued by researchers in other disciplines (Golledge, 1971; Lowenthal, 1970; Saarinen, 1971).

Unfortunately, as yet, the body of precisely defined environmental knowledge is slight and unable to afford tenable guidelines for those who design man's environment (Parr, 1965). Acquired scientific facts typically describe low-order psychophysiological reactions to extreme environments unlikely to be encountered by practicing environmental designers (Dyckman, 1966; Ventre, 1966). We know considerably more, comments Blackman (1966), about the human

response to submarine and space capsule environments than we do of man's reaction to the suburban environment.

Izumi (1965) offers a diagram useful in understanding the meshing of human and nonhuman components in the architectural fabric. Imagine a rectangle (Figure 1) to represent environmental design as related to buildings, with a diagonal separating the human and nonhuman factors. At the left, are buildings designed essentially to contain objects, machinery, equipment and other inanimate objects. At the right, are buildings designed solely to contain human beings, as for example, nursing homes, penitentiaries, psychiatric hospitals, and housing in general. Between these extremes are buildings used to contain both people and objects in varying proportions. These include libraries, laboratories, stores, and offices. As we move from left to right in the diagram, the evaluation of buildings becomes progressively more weighted toward performance as a social setting and against visually aesthetic properties (Deasy, 1970; Sommer, 1969). Nevertheless, many contemporary buildings fail to achieve behavioral requirements, because of all the types of information on which architectural decisions rely, the category of activity is often the most deficient (Watson, 1970).

The importance of psychosocial factors in architectural design is also positively related to the intensity of building

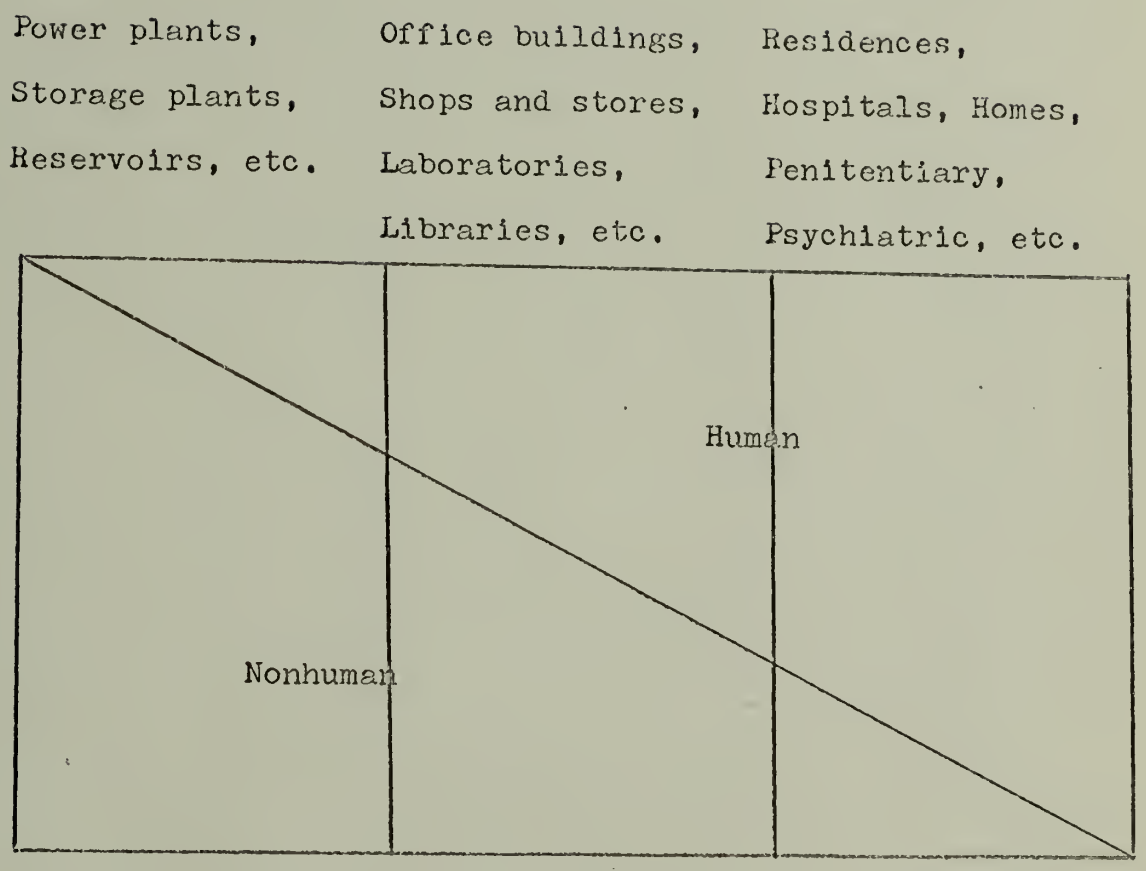

Fig. 1. The field of design (Izumi, 1965).

use and inversely related to the number of choices available to building users (Izumi, 1965). All of these considerations point to the importance of examining the design of hospitals in the light of man's psychological and social needs. It is indeed ironic that of all building forms, the hospital is one of the most resistant to change; "visual patterns persist like vestigial characteristics long after their functional needs have changed" (Lindhein, 1966).

A number of research studies concerned with investigating hospital environments have adopted a model approximating that described by Barker (1968). These studies typically have compared behavior over macroscopic settings in the hospital which are a complex of physical, social, and cultural factors. The studies of LeCompte and Willems (1970) and of Rosengren and DeVault (1963) in medical hospitals are in this tradition, as are the studies of psychiatric wards by Moos (1968, 1969) and Raush, Dittmann, and Taylor (1959) and Raush, Farbman, and Llewellyn (1960). Other studies in hospital environments have selected, at the level of independent variable, specific features of physical design and experimentally abstracted these physical components from the total macroscopic setting. The need for this type of research has been pointed to by Field (1971) and Watson (1970), who have underscored the need for the physical design of hospitals to meet the requirements of their dynamic activity

systems. The present study is of this latter type. Examples of this type of study in medical hospitals are the comparison of nurses' behavior in radial and nonradial wards by Trites, Galbraith, Sturdavant, and Leckwart (1970), and the study of behavioral differences on carpeted and uncarpeted wards by Greco (1965). Let us now consider the research in psychiatric hospitals which has been specifically concerned with the relationship of physical design to behavior.

The physical environment of psychiatric hospitals has been the focus of vigorous criticism (Agron, 1970; Osmond, 1957; Sivadon, 1970). Osmond (1957) describes a well known British mental hospital which "welcomes its new arrivals in a richly painted and gilded hall. Among the intertwining leaves covering the walls, goblin-like creatures are concealed. Sometimes a whole head can be seen, sometimes only an eye gleams malevolently at the new arrival." A number of authors have stressed the need for environmental research dealing with the therapeutic and antitherapeutic effects of psychiatric hospital settings (Bailey, 1966; Foley and Lacy, 1967; Griffin, Mauritzen, and Kasmar, 1969; Stainbrook, 1966).

Significant first steps have been made by researchers concerned with investigating the physical environment of psychiatric hospitals in relation to patient behavior. A continuing series of environmental studies in psychiatric

hospital settings has been conducted over the last decade by researchers in the Environmental Psychology Program of the City University of New York. These investigators have used "behavioral maps" (Ittelson, Rivlin, and Proshansky, 1970) to relate patient behavior to specific physical locations in the hospital setting. Ittelson, Proshansky, and Rivlin (1970b) reported significantly more passive, withdrawn behavior by psychiatric patients in both a city and a state hospital compared to patients in a private hospital. These same investigators (1970a, 1970c) also found an increase in passive, withdrawn behavior in hospital bedrooms as a function of increasing occupancy. Rivlin, Proshansky, and Ittelson (1969) have conducted one of the few studies where the behavioral effects of an experimentally induced change in a psychiatric ward setting have been systematically observed.

A number of investigators have pointed to the perceptual ambiguity and distortion induced by the physical design of many psychiatric hospitals. Spivack (1967) has testified to the auditory and visual perceptual distortions caused by the elongated tunnels and corridors prevalent in many psychiatric facilities. Izumi (1965) and Osmond (1957, 1966) have discussed the fearful reactions to perceptual ambiguity experienced by schizophrenic patients.

Kasmar, Griffin, and Mauritzen (1968) examined the

impact of interview rooms of contrasting aesthetic appeal on the mood and perception of outpatients at the U.C.L.A. Neuropsychiatric Institute. Sivadon (1970) has reported favorable therapeutic success at the Marcel Riviere Institute in France, where the architecture, size, and spatial relationship of buildings, in addition to the structure of outdoor grounds have been designed in terms of specific therapeutic objectives.

Although psychiatric patients spend considerable time in dayroom settings (Rivlin et al., 1969), there is evidence to indicate that these settings tend to inhibit social and functional behaviors while coercing passive isolation (Harmatz, Mendelsohn, and Glassman, 1970; Ittelson et al., 1970b; Mendelsohn, 1969; Sommer, 1969; Sommer and Ross, 1958). Two environmental studies have underscored the relationship between seating patterns in hospital dayrooms and patients' social behavior. In a Saskatchewan hospital, Sommer and Ross (1958) altered the seating arrangement from an unsocial to a social pattern. Chairs which had previously been arranged shoulder-to-shoulder along the walls of the dayroom were moved closer together in small groups around tables. With the new furniture arrangement, social interactions among patients were doubled in frequency. In a New York City hospital, Rivlin et al. (1969) converted the seating in an unsocial corner of a solarium on a psychiatric

ward to a more social arrangement. The reorganization created increases in conversation between occupants of this part of the room besides increasing overall use of the area.

The use made of environmental spaces is of interest to psychologists, architects, and planners alike (Hall, 1969; Sommer, 1969; Wohlwill, 1970), and one facet of environmental research has been concerned specifically with this question. Altman (1970) has indicated the need for considerable empirical work on territoriality in humans, and has pointed to the relatively small amount of research in this area. Human territorial behavior has been investigated in small rooms where pairs of individuals were isolated for ten day periods (Altman and Haythorn, 1967), on a small warship (Roos, 1968), and on a psychiatric ward especially designed for research (Esser, Chamberlain, Chapple, and Kline, 1965). In order to study the utilization of available space in a museum, Bechtel (1967) developed an electrical system called the hodometer to automatically record the number and location of footsteps across the museum floor. Calhoun's animal studies (1962, 1966) offer impressive evidence of the negative effects of crowding on behavior. Cognition and perception of the geographic environment have drawn considerable attention by both psychologists and geographers (Golledge, 1971; Lowenthal, 1970; Lynch, 1960; Lynch

and Rivkin, 1959; Stea, 1970; Stea and Downs, 1970). Cultural differences in the perception and use of space have been studied extensively by the anthropologist Edward Hall (1969).

A number of researchers have been particularly concerned with the use made of space by individuals engaged in conversation; they have studied what have been called "the limits of comfortable conversation." Sommer (1961, 1965, 1969) has demonstrated in a variety of settings that individuals interacting at tables prefer corner-to-corner and face-to-face seating arrangements to side-by-side arrangements. Mehrabian and Diamond (1971) demonstrated in an experimental setting that side-by-side seating was clearly detrimental to conversation. Haase and DiMattia (1970) have shown that interacting over the corner of a desk is the preferred counseling relationship for both counselors and clients. Face-to-face conversation becomes difficult, however, when the distance between participants exceeds a certain limit--Sommer (1961) refers to this limit as 5.5 feet while Hall (1969) indicates 7 feet.

Some researchers (Hall, 1969; Osmond, 1957, 1959; Sommer, 1969) have distinguished between spaces which facilitate social interaction and spaces which inhibit such interaction. Osmond (1957, 1959) defined as "sociopetal," spaces which encourage or foster the growth of stable inter-

personal relationships. Osmond lists as examples of sociopetal spaces, tepees, igloos, and Zulu kraals, while railway stations, jails, hotels, and hospitals are typically sociofugal spaces. Sommer (1967) has noted that the isolation of schizophrenics in mental hospitals can be increased by sociofugal settings which restrict social contact, or reduced by sociopetal settings which facilitate social behavior. Hall (1969) has indicated that sociopetal space is not universally good. He contents the most desirable space is flexible space where individuals may or may not be socially involved depending on the occasion.

The Present Study

The present study investigated the effects of contrasting patterns of seating arrangement on the behavior of psychiatric patients in an experimental hospital dayroom. Seating patterns in the experimental dayroom were varied from structured sociopetal, sociofugal, and mixed arrangements to an unstructured setting where patients arranged seating themselves. The experimental dayroom afforded a setting where the effects of specific and controlled manipulations in seating patterns could be observed on small groups of patients.

Although a number of authors have criticized the physical environment of psychiatric hospitals as antitherapeutic, there is little empirical data of sufficient rigor and specificity to permit hospital planners to make design

decisions on the basis of scientific knowledge (Altman, 1970; Dyckman, 1966; Sanoff and Cohn, 1970). Design decisions are often based on the assumption that they will produce greater functional efficiency without any basis for assessing whether this is really true (Lindheim, 1966). The purpose of the present study was to generate data of sufficient rigor and specificity concerning the relationship of seating patterns to patient behavior in hospital dayrooms to be useful to hospital planners in designing dayroom settings.

Adequate design decisions are also dependent on data which will permit inferences about direct cause and effect relationships. Much environmental research has failed to afford such data because: 1. many studies have been correlational in nature; 2. experimental studies have often been confounded by employing a number of unseparated and simultaneous experimental manipulations or by allowing uncontrolled features of the setting to vary during the study; 3. either environment or behavior has not been precisely defined. The present study attempted to generate data which would allow statements of cause and effect relationships by isolating experimental manipulations in a controlled setting, and by precisely defining both environmental manipulations and observed behavior.

The results in Sommer and Ross's (1958) study were attributed essentially to the change in seating patterns, but a number of other simultaneous changes in the ward

environment confound the clarity of this interpretation. For example, after seating patterns were changed to the more social arrangement, nurses "encouraged" the patients to sit at the tables and an occupational therapist began working on the ward. It seems probable that these two changes in the social setting of the ward may have induced some of the increased social participation among patients. Also, the tables on the ward were made more attractive by the introduction of flowers, vases, and more magazines during the second phase of the study. Again it appears possible that the change in the attractiveness of the ward may have contributed to the observed effects. Since seating patterns were changed in only one direction, i. e., no reversal procedure was employed, a "Hawthorne effect" was possible (cf. Higgs, 1970). The same possible confounding influences of social pressure, ward attractiveness, and Hawthorne effect which were present in Sommer and Ross's study were also present in the study of Rivlin et al. (1969). In the present study such confounding factors were removed by manipulating seating patterns in a controlled experimental dayroom where hospital personnel did not participate in the setting and where furnishings and attractiveness of the room remained the same over experimental conditions. The possible confounding influence of a Hawthorne effect was avoided by assigning each experimental group to only one seating pattern.

Hospital designers and administrators need to know the range of behavioral changes to be anticipated with contrasting seating arrangements (Blackman, 1966). The experiment by Sommer and Ross recorded only the frequency of verbal interaction. Although mention was also made of increases in reading and knitting, these behaviors were not recorded. In the study by Rivlin et al. (1969) a wider range of behaviors was recorded, but the relationship of behavioral changes to seating patterns are unclear because a variety of other alterations were made in the setting at the same time seating was changed. The present study specified the type of social behavior observed, in addition to recording the nonsocial activities which occurred.

A secondary focus of this study was to gather data on the use made of space in a dayroom setting. Behavioral measures were employed which reflected how the patients occupied and used the physical space in the experimental settings. These measures were of two types: 1. geographical location of patients in the setting; 2. body disposition (e.g., walking, sitting in a chair).

Hypothesis 1 predicted that the Sociofugal setting would show less social interaction than either the Sociopetal or the Mixed settings. Hypothesis 2 stated that the effects predicted in Hypothesis 1 would be greater for verbal interaction than for nonverbal interaction. These

hypotheses were based on the results of studies which altered dayroom seating patterns (Rivlin et al., 1969; Sommer and Ross, 1958), theoretical discussions of the social impact of sociopetal and sociofugal spaces (Hall, 1969; Osmond, 1957, 1959; Sommer, 1967, 1969), and studies dealing with the limits of comfortable conversation (Haase and DiMattia, 1970; Hall, 1969; Mehrabian and Diamond, 1971; Sommer, 1961, 1965, 1969).

Hypothesis 3 predicted that the Sociofugal setting would demonstrate less nonsocial activity than would either the Sociopetal or the Mixed settings. This hypothesis was based on the study of Sommer and Ross (1958).

Hypothesis 4 stated that the Sociopetal setting would show more mobility, more standing, and more walking than would each of the other three settings. Hypothesis 5 predicted that in the Free setting more patients would place chairs at the walls than at the tables. These hypotheses were based on Sommer and Ross's (1958) observation that a number of patients continued to move chairs back to the walls for a long period of time after the experimentally induced change, and on Sommer's (1969) observation that people prefer sitting with their backs to walls.

METHOD

Design

In a hierarchical design (Myers, 1966), 120 subjects were randomly assigned to twenty six-member groups, and five groups were randomly assigned to each of four experimental conditions. The experimental design is illustrated in Figure 2. The experimental conditions were as follows: Sociofugal arrangement--chairs were arranged shoulder-to-shoulder along the walls of the room; Sociopetal arrangement--chairs were arranged in two groupings around two small tables in the middle of the room; Mixed arrangement--chairs were arranged both shoulder-to-shoulder along opposite walls and in a grouping around a small table in the middle of the room; Free arrangement--chairs were stacked near the door and the patients were told to arrange them in the room in any manner they wished. Figure 3 depicts visually the four experimental conditions.

Subjects

Subjects were 120 hospitalized male psychiatric patients recruited from four unlocked wards at the Northampton Veterans Administration Hospital. Pilot observations had indicated that unsocial patients were not inclined to talk

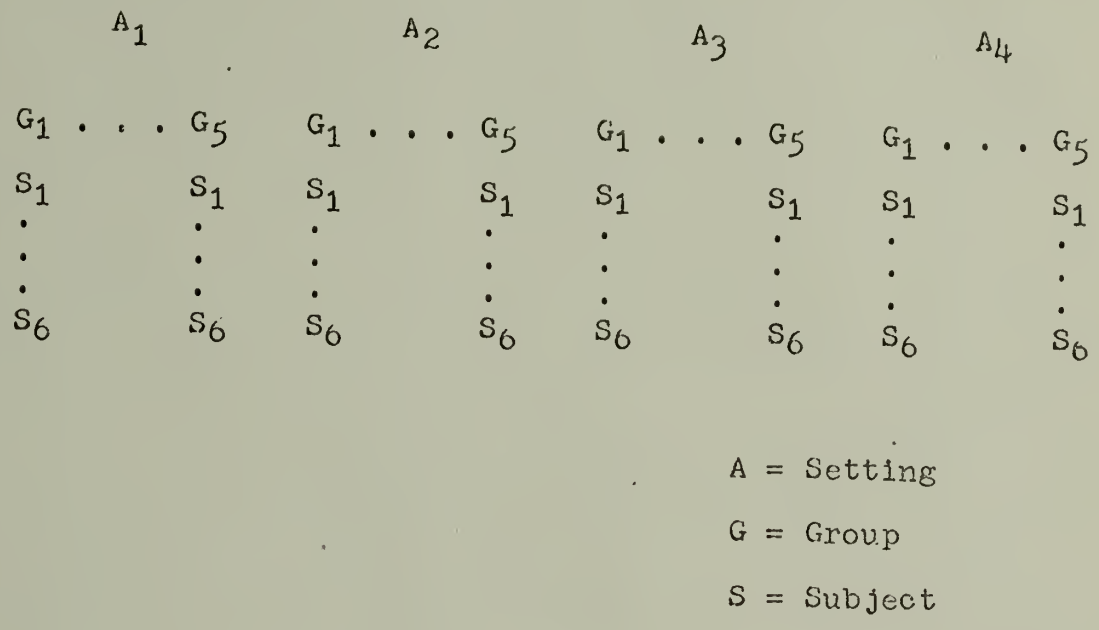

Fig. 2. Experimental design.

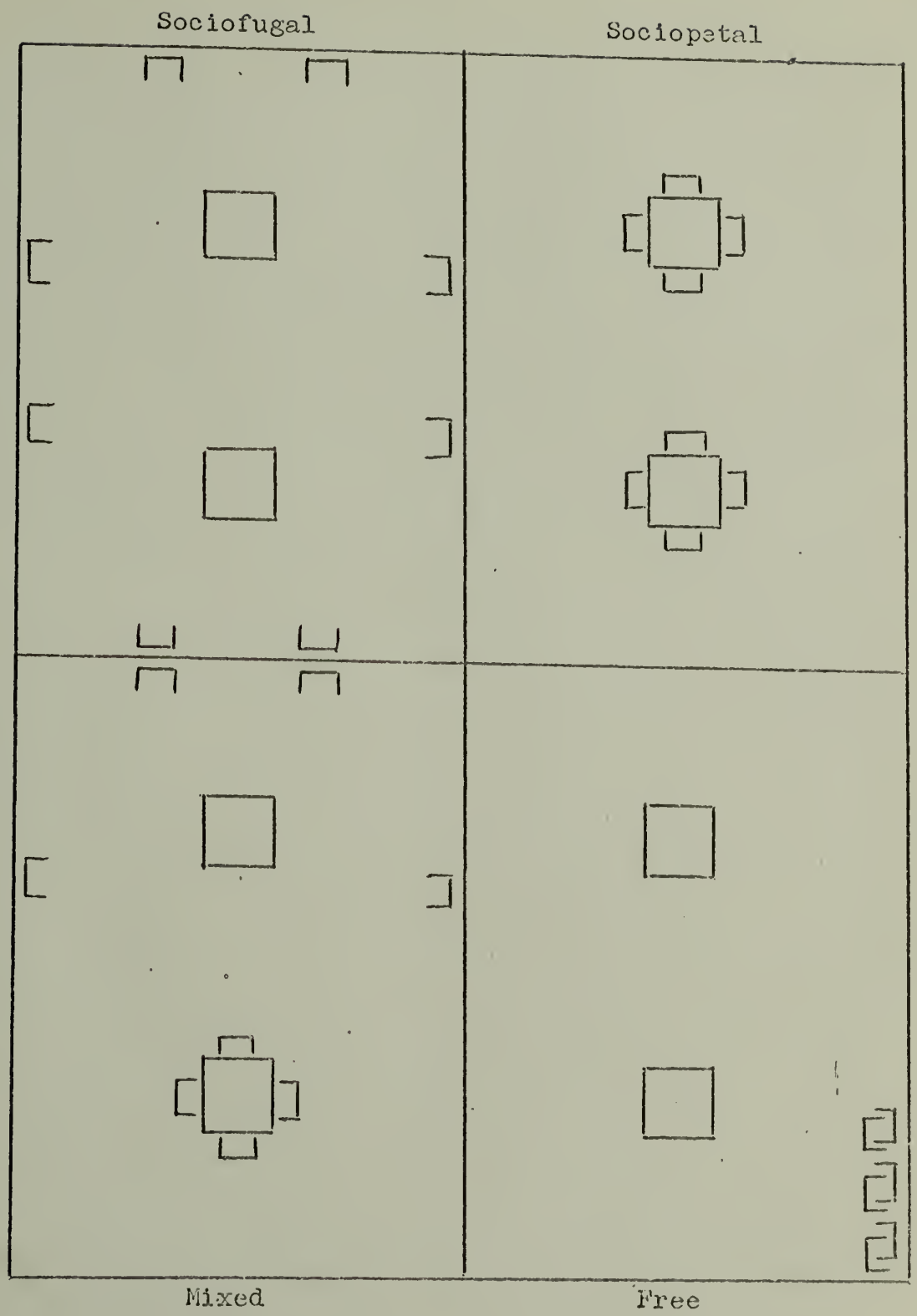

Fig. 3. Seating patterns in the four treatments.

in any of the experimental settings. Therefore, the most social patients were selected for this study by having the head nurse on each ward rank order the patients in terms of "how much time they spend talking with other patients on the ward." The list of patients on each ward was divided at the median, and subjects for the study were chosen by randomly selecting patients from the upper half of the distribution. This procedure necessarily limits inference from the present findings to the dayroom behavior of relatively social patients.

Materials

The experimental dayroom was furnished as follows: eight chairs, two tables (36" X 36"), one circular stand, and eight standing ashtrays. The following materials were placed on the stand: one pictorial magazine, one daily newspaper, two joke books, four decks of playing cards, one cribbage board, poker chips, checkers, one jigsaw puzzle, coffee, tea, donuts. The room was also furnished with a chair and a table for the experimenter. A transistor radio on the experimenter's table played light music during the session.

Procedure

To minimize interactions between types of hospital wards and the experimental settings, each experimental group was formed by taking three subjects from each of two different wards. Each group participated in one experimental

condition for a 45-minute session. Systematic errors due to time of day and time of month were avoided by matching conditions for time of day, and by running one group from each condition (in a random order) before repeating any condition. Chairs were arranged in their experimentally defined positions before each session. Subjects entered the experimental setting as a group, and as soon as they entered the room, they were given the following instructions.

> We're interested in improving dayrooms for patients. We'd like patients to have a place where they can chat with one another, play some games, and generally do the things they'd like to do. We've set up this room especially for you to do those kinds of things. You're asked simply to remain in this room for one hour. While you're here you may have something to eat, chat with one another, play games, or do whatever else you'd like to do. The furniture has been specially arranged as it is. Please don't rearrange it. (Subjects in the Free condition were told they may put the furniture wherever they'd like in the room.) During the hour I'll be taking some notes, and I'd appreciate it if you wouldn't talk with me then. I won't be looking at particular people. I'm interested in how people in general would like to use a room like this. After the hour I'll be interested in your opinions about this room, and I'll be happy to answer any questions you have then. Some of you may not know one another. I'd like for each of you to give your first name and where you're from. (When patients finished introducing themselves.) Fine. I'll let you know when the hour is up.

Behavioral observations. The observer was located in a corner of the room, six feet from the nearest chair. A heavy 6' X 3' table served both as a barrier between the observer and the patients and as a work space for the

observer. In a time sampling procedure, each subject's behavior was recorded at 75 second intervals, moving from one subject to another in a predetermined rotating manner. Behavioral observations were made during the first 45 minutes of the hour, resulting in 36 observations per subject.

Behavior was recorded under each of three major dimensions: 1. Activity; 2. Body Disposition; 3. Location. The Activity and Body Disposition dimensions were divided into the subcategories shown in Figure 4. The behavior subcategories are based on the work of Harmatz et al. (1970), Hunter, Schooler, and Spohn (1962), Ittelson et al. (1970b), and Mendelsohn (1969). Precise descriptions of the behaviors included under each subcategory are contained in the scoring manual which is included in the Appendix. The Location dimension designated where the patient was located in the room at each interval. For scoring Location, the room was divided into eight geographical areas as shown in Figure 5. The boundaries shown in the figure are imaginary boundaries formed by the card tables in the middle of the room and the fireplace on the side wall. The observer recorded each patient's location on maps corresponding to the experimental setting included at the bottom of each score sheet. The map was also used for recording chair placements under the Free condition. Precise rules for scoring location are included in the scoring manual.

- Activity
  - Social
    - Nonaggressive
      - Verbal
        - Conversation
        - Games
        - Food
        - Cigarettes
        - Other Mands
      - Nonverbal
        - Games
        - Food
        - Cigarettes
        - Exchanging Other Objects
    - Aggressive
      - Verbal
      - Nonverbal
  - Nonsocial
    - Directed Activity
      - Games
      - Food
      - Supplied Reading
      - Other Reading
      - Writing
    - Passive
  - Bizarre
  - Other
- Body Disposition
  - Walking
  - Standing
  - Sitting in Chair
  - Sitting on Floor
  - Lying on Floor
  - Other

Fig. 4. Behavior subcategories.

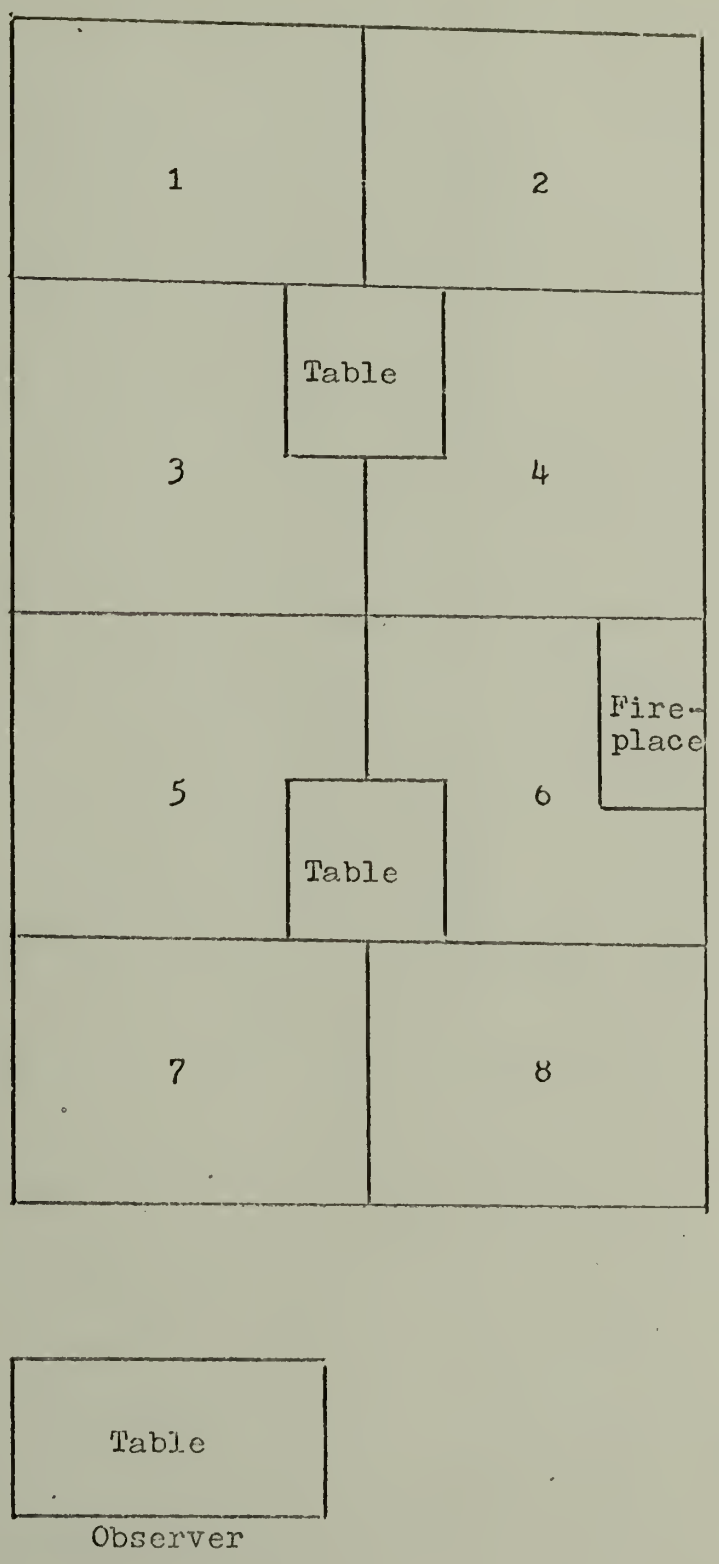

Fig. 5. Division of room into eight geographical areas.

PATIENTS	ACTIVITY: SOCIAL: NONAGGRESSIVE: VERBAL: CONVERSATION	GAMES	FOOD	CIGARETTES	OTHER MANDS	NONVERB.: GAMES	FOOD	CIGARETTES	EXCHANG. OTHER OBJECTS	AGGR.: VERBAL	NONVERBAL	NONSOCIAL: DIR. ACT.: GAMES	FOOD	SUPPLIED READING	OTHER READING	WRITING	PASSIVE	BIZARRE	OTHER	BODY DISPOSIT.: WALKING	STANDING	SITTING IN CHAIR	SITTING ON FLOOR	LYING ON FLOOR	OTHER
A														X								X			
B																	X					X			
C												X										X			
D																	X					X			
E															X							X			
F																	X			X					

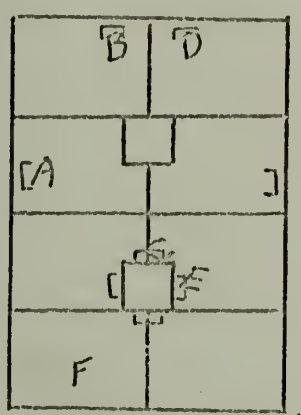

Fig. 6. Example score sheet.

Following is an example of the procedure for scoring the behavior of the group at one interval. At the instant patient A is observed, he is sitting in a chair and reading one of the magazines supplied in the setting. For Activity, he is scored under Supplied Reading, for Body Disposition, he is scored under Sitting in Chair, and for Location, an "A" is marked on the corresponding chair on the map. Figure 6 shows an example of the score sheets which were used at each interval. The scoring of patient A's behavior is illustrated in the figure, as is the scoring of the behavior of the following five patients. As soon as patient A is scored under all three dimensions, patient B is observed who is sitting passively in a chair. After patient B is scored, patient C is scored who is playing cards by himself at a table. In like manner patients D, E, and F are scored who are sitting passively, reading a newspaper brought into the room, and pacing respectively.

Each subject was given a score in each Activity and Body Disposition subcategory consisting of the total number of scores marked for the subject under that subcategory during the session. For example, if patient A were observed reading supplied magazines at eight intervals during the session, his score under Supplied Reading would be 8. The Location data yielded a measure of mobility by counting the number of times a subject crossed from one geographical area to another over the 36 observations in a session.

Additional measures. Three additional measures were collected after the behavioral observations were completed. First, subjects were given a map of the room and told:

> Here is a picture of this room. The tables and the fireplace are in the picture, but there are no chairs. Draw in eight chairs on the map to show the way you would most like to have them arranged. After you have drawn the chairs, put an "X" on the map to show wherever you would most like to be in the room yourself.

Second, subjects were asked to complete a semantic differential concerned with their perception of the experimental settings. The following concepts were included on the semantic differential scale: This Room, The Dayroom on My Ward, The Other Patients in This Room, The Other Patients on My Ward, The Observer in This Room. The following scales were used: three evaluative scales (clean-dirty, good-bad, fair-unfair), three potency scales (large-small, heavy-light, strong-weak), three activity scales (active-passive, hot-cold, fast-slow), and two novelty scales (new-old, unusual-usual). The standard instructions of Osgood, Suci, and Tannenbaum (1957) were used.

Finally, the following unobtrusive measures (Webb, Campbell, Schwartz, and Sechrest, 1966) were taken: 1. cigarette butts left in the room were counted; 2. the quantity of coffee consumed was measured; 3. the length of time patients remained in the experimental setting after the session had ended was recorded.

Treatment of Data

Reliability. The reliability of the behavioral rating procedure was determined before experimental data were collected by having two independent observers rate the same group of subjects at the same time. Two additional checks on reliability were carried out during the course of the study to assure that the rating procedure remained constant over the study. Once during the second quarter of observations and once during the last quarter of observations an independent observer rated the same group of subjects along with the principal experimenter. The score for percent of agreement between observers was calculated in the following manner. For each dimension, the number of instances both observers agreed in each rating was divided by the total number of ratings. This method of calculating reliability demanded that the observers agree at each particular instance when a behavior was scored, and avoided the spurious results which might arise from simply comparing total scores for each dimension. The reliability scores for the three dimensions in each of the reliability sessions ranged from 97% to 100%. A detailed analysis of the reliability data is presented in the Appendix.

Transformation. The experimental data in six behavior categories exhibited significant heterogeneity of variance over conditions by Hartley's (1950) test, with the rela-

tionship between the means and the standard deviations of the treatments approximately proportional. Dixon and Massey (1957) report that counting or frequency data typically result in a proportional relationship between treatment means and treatment variances or standard deviations. Dixon and Massey (1957) and Myers (1966) recommend a logarithmic transformation for the case where the treatment means and standard deviations are proportional. Myers (1966) recommends that the logarithmic transformation be $Y' = \log (Y + 1)$ when some experimental scores are low, as in the present data. For purposes of statistical analysis, the data in all behavior categories were transformed according to this formula. The means reported in the text are the means of the untransformed data.

The heterogeneity of variance between treatments was markedly decreased by the logarithmic transformation. Of the six behavior categories which had shown significant heterogeneity of variance before transformation, only the category of nonverbal behavior continued to demonstrate significant heterogeneity of variance after transformation. The heterogeneity of variance in this category was markedly decreased by the transformation, however, since it remained significant, the statistical analyses involving nonverbal behavior should be interpreted cautiously. A detailed presentation of the logarithmic transformation is included

in the Appendix along with the raw experimental data before transformation.

Statistical analysis. Statistical analyses of behavior categories in the Activity and Body Disposition dimensions were of the following two types. Planned comparisons (Hays, 1963) were used to test the experimental hypotheses, and the analysis of variance was used for post-hoc analyses. The estimated variance for both the *t* and the *F* tests was the variability between groups within treatments (Myers, 1966). The location data was analyzed by the Chi Square test, where groups were used as subjects. The unobtrusive measures were tested by the Mann-Whitney *U* test, where groups were again used as subjects.

RESULTS

Seating Patterns

Table 1 shows the mean session score per group under the principle categories of the Activity dimension for the four experimental conditions. The subcategories Food, Cigarettes, and Other Mands under Verbal behavior, which were scored very infrequently, were pooled to form the larger category Other Verbal behavior. The subcategories Food, Cigarettes, and Exchanging Other Objects under Nonverbal behavior, which also were scored very infrequently, were pooled to form the larger category of Other Nonverbal behavior.

Hypothesis 1. This hypothesis predicted that the Sociofugal setting would show less social interaction than would either the Sociopetal or the Mixed settings. The mean group social interaction in the Sociofugal setting was 38.0 compared to 110.4 in the Sociopetal setting and 82.2 in the Mixed setting. The difference of 72.4 between the Sociofugal and the Sociopetal settings was statistically significant at the .01 level with a one-tailed test (t = 2.60, df = 16). The difference of 44.2 between the Sociofugal and Mixed settings was significant at the .025 level with a one-tailed test (t = 2.35, df = 16). Hypothesis 1 was therefore strongly supported.

Table 1

Mean Group Scores Under the Activity Dimension

	Social					Nonsocial	
	Verbal			Nonverbal			
Condition	Conversation	Games	Other	Games	Other	Activity	Passive
Sociopetal	61.8	14.6	1.2	32.2	.6	47.2	77.8
Mixed	40.8	9.6	.4	30.6	.8	55.8	87.6
Sociofugal	32.0	.6	.6	4.2	.6	53.2	123.2
Free	16.8	5.0	.4	18.0	0.0	55.4	120.6

Hypothesis 2. This hypothesis stated that the differences predicted in hypothesis 1 would be greater for verbal interaction than for nonverbal interaction. Let us look first at verbal interaction. The mean group verbal interaction in the Sociofugal setting was 33.2, compared to 77.6 in the Sociopetal setting and 50.8 in the Mixed setting. The difference of 44.4 between the Sociofugal and the Sociopetal setting was statistically significant at the .01 level with a one-tailed test (t = 2.61, df = 16). The difference of 17.6 between the Sociofugal and the Mixed setting was statistically significant at the .025 level with a one-tailed test (t = 2.19, df = 16). Let us now consider nonverbal interaction. The mean group nonverbal interaction in the Sociofugal setting was 4.8, compared to 32.8 in the Sociopetal setting and 31.4 in the Mixed setting. The difference of 28.0 between the Sociofugal and the Sociopetal setting, and the difference of 26.6 between the Sociofugal and the Mixed setting were in the predicted direction, though neither difference was statistically significant.

The strongest test for hypothesis 2 is to test the difference score between verbal and nonverbal interaction for each group. The mean group difference score for the Sociofugal setting was 28.4, compared to 44.8 for the Sociopetal setting and 19.4 for the Mixed setting. The

difference between the Sociofugal and the Sociopetal setting is in the predicted direction but lacks statistical significance. The difference between the Sociofugal and the Mixed setting is opposite to the predicted direction and is also not statistically significant. Hypothesis 2 was therefore partially supported in that there was a significant treatment effect for verbal interaction and no treatment effect for nonverbal interaction. However, the test of the difference scores between verbal and nonverbal interaction was not significant. Figure 7 shows graphically the relationship between the Sociopetal, Sociofugal, and Mixed settings in verbal and nonverbal interaction.

Hypothesis 3. This hypothesis stated that the Sociofugal setting would demonstrate less nonsocial activity than would either the Sociopetal or the Mixed settings. The mean group nonsocial activity in the Sociofugal setting was 53.2, while that in the Sociopetal setting was 47.2 and that in the Mixed setting was 55.8. The difference of 6.0 between the Sociofugal and the Sociopetal setting was in the opposite direction of that predicted and was not statistically significant. The difference of 2.8 between the Sociofugal and the Mixed setting was in the predicted direction, but also was not statistically significant. Thus, hypothesis 3 was not confirmed; there were no differences between the experimental settings in nonsocial activity.

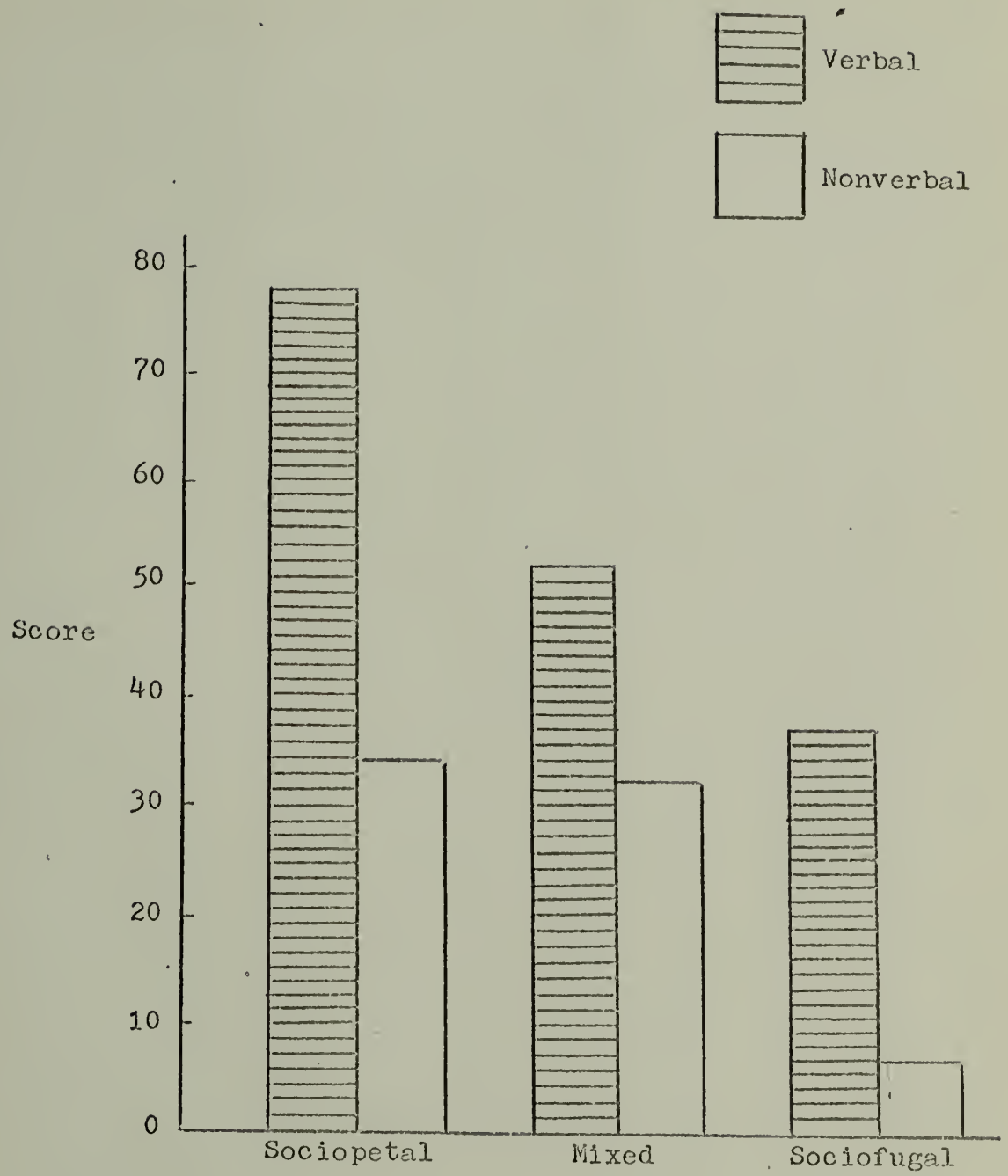

Fig. 7. Mean group scores for verbal and nonverbal interaction.

Free setting. A surprising finding was that the Free setting showed markedly less social interaction than the Sociopetal and Mixed settings, and only slightly more social behavior than the Sociofugal setting. Although no strong predictions had been advanced concerning this setting, a general expectation had been that allowing patients to arrange their own seating would facilitate social interaction. The Free setting did not differ from the other settings in nonsocial activity. The lack of differences between the experimental settings in nonsocial activity compared to social interaction is illustrated clearly in Figure 8 which compares the four settings in terms of social and nonsocial activity.

Verbal interaction. It is of interest to look separately at the subcategories under verbal behavior. Conversation accounted for 83% of the total verbal behavior in the experiment, compared to 16% for Games and only 1% for all other verbal behavior. There was significantly more Conversation over the total experiment than all other types of verbal behavior combined ($F = 20.85$, $df = 1/16$, $p < .001$). The treatment effect for Conversation was statistically significant at the .05 level ($F = 3.40$, $df = 3/16$). The Sheffe Multiple Comparison Procedure (Sheffe, 1959) was used to examine which treatments differed significantly from one another. This procedure indicated that the mean

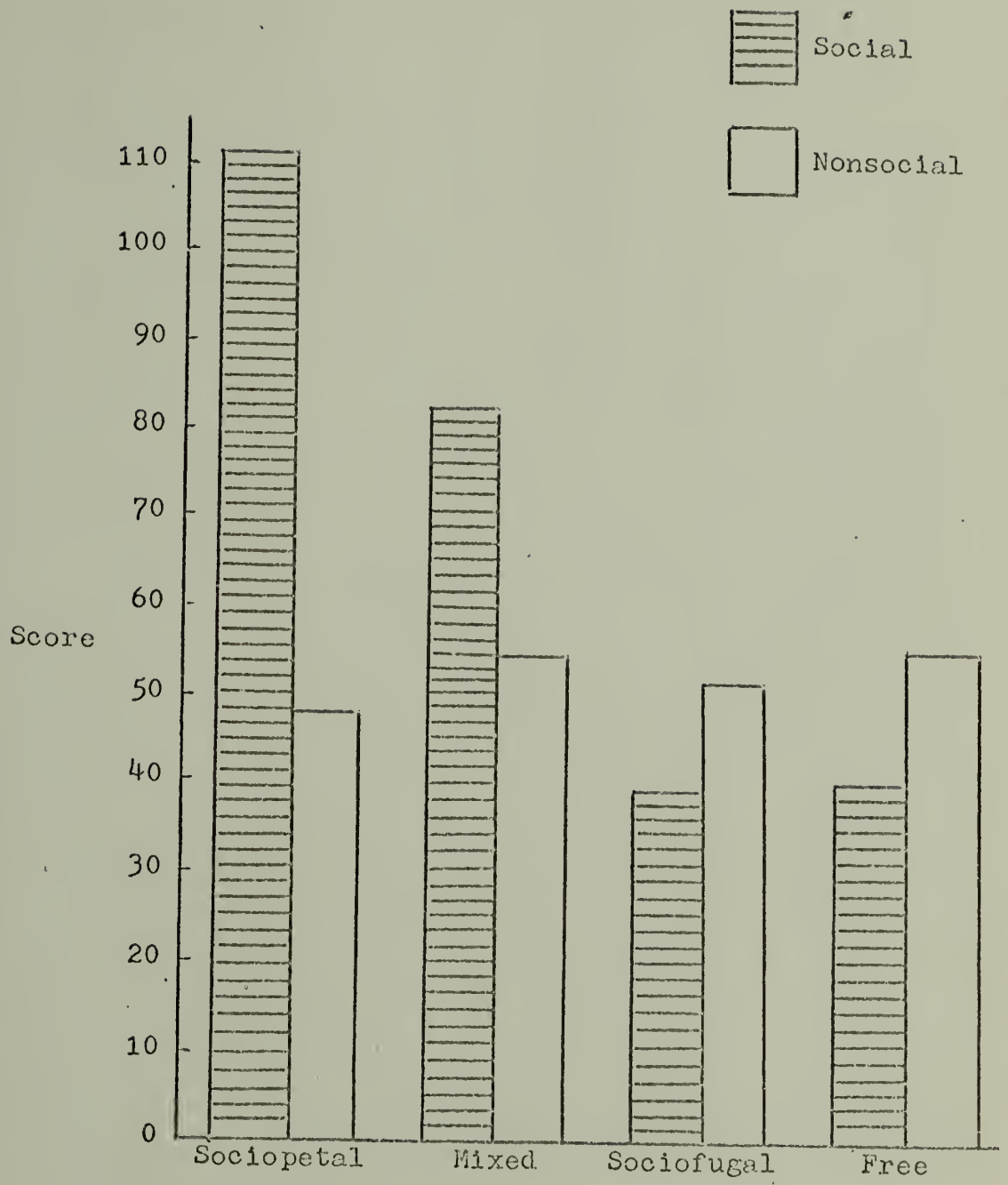

Fig. 8. Mean group scores for social and nonsocial activity.

Conversation for the Sociopetal and Mixed conditions was significantly greater than the mean Conversation for the Sociofugal and Free conditions (F = 3.09, df = 3/16, $p <$ .10). (Sheffe recommends an α level of .10 in using his multiple comparison procedure.) There was not a significant treatment effect for Verbal Games, and there was too little other verbal behavior to warrant separate statistical analysis. The analyses of variance for Conversation and Games are shown along with the Sheffe procedure for Conversation in the Appendix.

Conversation. The difference between experimental treatments in Conversation may be further analyzed in terms of the number of persons engaged in the conversation. It is possible to compare the treatment settings in terms of two-person conversation and conversation between three or more persons. These data are available for the last three groups in each condition, in which the observer drew vectors between subjects involved in conversation. The mean group score over the total experiment for two-person conversation was 27.1, compared to 13.2 for conversation between three or more persons. This difference is statistically significant at the .05 level (F = 7.17, df = 1/8), and is in accord with the findings of Sommer and Ross (1958) who found very little conversation between three or more persons in an actual dayroom. The treatment effect

for conversation between two persons was not significant; however, interestingly, that for three or more person conversation was significant at the .05 level ($F = 4.66$, $df = 3/8$). The Sheffe procedure was used to examine which treatments differed significantly from one another in conversation between three or more persons. The Sociopetal setting showed significantly more such conversation than did the Sociofugal setting ($F = 3.77$, $df = 3/8$, $p < .05$) or the Free setting ($F = 4.26$, $df = 3/8$, $p < .025$). Also, the mean score for three or more person conversation for the Sociopetal and Mixed settings was significantly greater than the comparable score for the Sociofugal and Free settings ($F = 3.50$, $df = 3/8$, $p < .05$). Figure 9 shows graphically the relationship between the four treatments in terms of two-person conversation and conversation between three or more persons. The analyses of variance for two-person conversation and three or more person conversation are shown in the Appendix along with the Sheffe procedure for three or more person conversation.

Other categories. There were no noteworthy differences between the experimental conditions in the subcategories of nonverbal interaction or the subcategories of nonsocial activity. The scores for the subcategories under nonsocial activity are included in the Appendix. It is interesting that no bizarre or aggressive behavior occurred in any set-

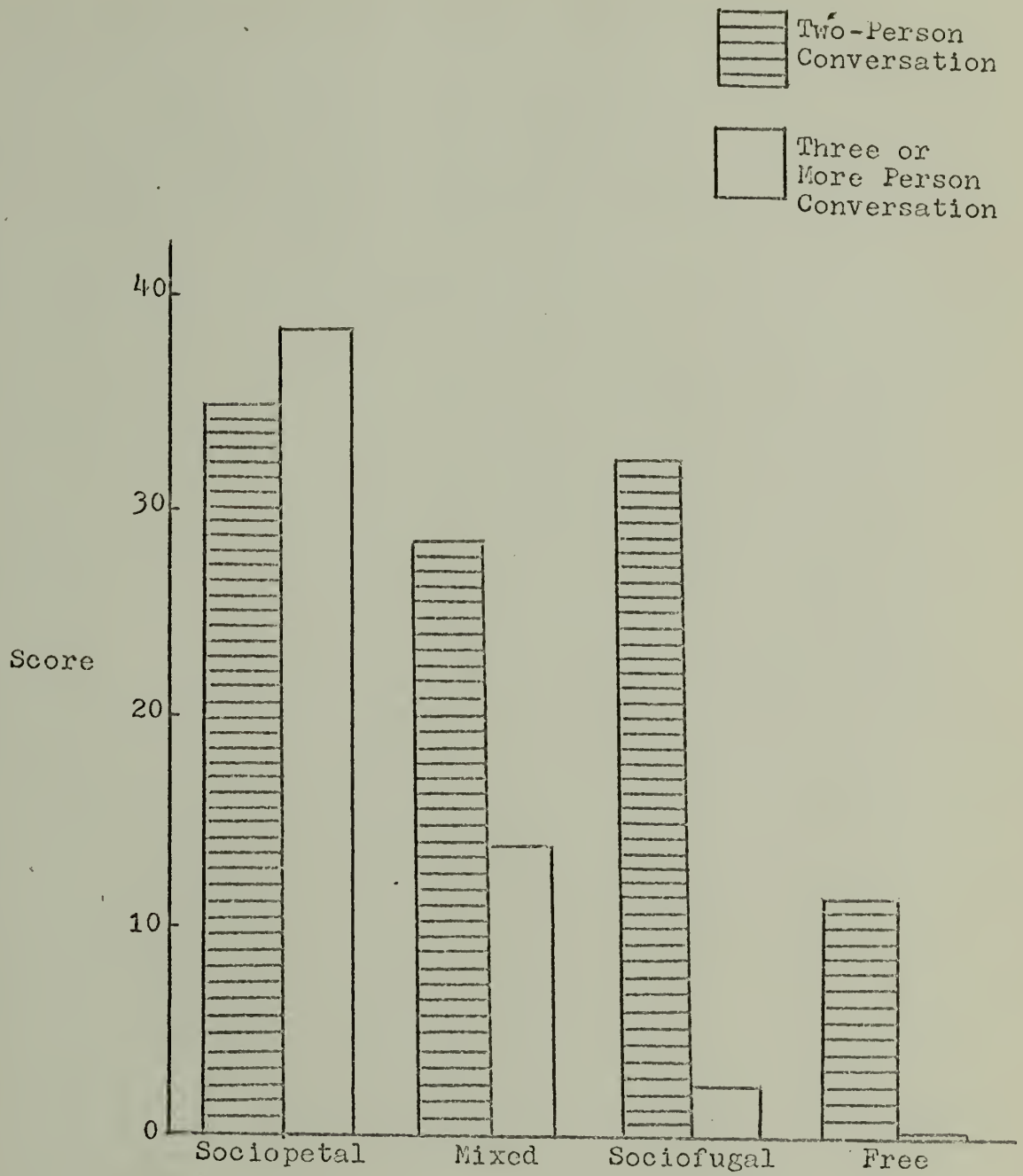

Fig. 9. Mean group scores for two-person conversation and conversation between three or more persons.

ting throughout the study. This finding may be surprising to those who hold popular, dramatic stereotypes of psychiatric patients. It is, however, consistent with findings by Harmatz et al. (1970) and with pilot observations made by the present investigator on both open and closed psychiatric wards in this hospital.

Sequence. An important question concerning activity in the experimental settings is whether changes in activity level occurred over time in the session, and especially whether such change differed over settings. The answer is that no such change occurred in any of the experimental settings. The stability of the level of behavior in all of the important behavior categories is shown clearly in tabular form in the Appendix.

Unobtrusive measures. Table 2 presents the mean group score on the unobtrusive measures for the four experimental conditions. The scores for the Sociopetal and Mixed settings are greater than those for the Sociofugal and Free settings on all of the unobtrusive measures. The differences between these settings were statistically significant by the Mann-Whitney U Test on the Cigarette measure ($U = 1.5$, $n_1 = 7$, $n_2 = 8$, $p < .001$) and on the Coffee measure ($U = 8.5$, $n_1 = 7$, $n_2 = 8$, $p < .02$).

Semantic differential. The semantic differential failed to discriminate between experimental treatments on

Table 2

Mean Group Scores on the Unobtrusive Measures

Conditions	Cigarette Butts	Ounces of Coffee	Minutes Remaining Behind
Sociopetal	13.3	56	5.5
Mixed	10.3	67	2.3
Sociofugal	7.3	45	.1
Free	6.3	48	1.3

any of the concepts used in this study. There were also no significant differences between concepts when subjects were pooled over treatments. The mean factor scores on each concept are presented for the four experimental treatments in the Appendix. The lack of differences between conditions on the semantic differential was surprising in light of the marked behavioral differences between settings. Proshansky et al. (1970) note that people are generally unaware of how their environment impinges on their lives, and it appears that patients in this study may not have been cognizant of the dramatic control the experimental settings exerted over their behavior.

Use of Space

Table 3 shows the mean session score per group under the subcategories of the Body Disposition dimension along with the mean group mobility score for the four experimental conditions. (Unused categories are not shown.)

Hypothesis 4. This hypothesis predicted that the Sociopetal setting would show more mobility, more standing, and more walking than would each of the other three settings. As is clear in Table 3, there were only very slight and statistically insignificant differences between settings in any of these categories. Hypothesis 4 was therefore not supported.

Table 3

Mean Group Scores for Body Disposition and Mobility

Condition	Walking	Standing	Sitting in Chair	Other	Mobility
Sociopetal	7.4	17.0	188.6	2.0	20.4
Mixed	3.2	17.2	191.8	2.6	12.2
Sociofugal	4.8	26.6	183.6	.6	13.4
Free	8.6	14.4	188.6	8.6	20.0

Hypothesis 5. This hypothesis predicted that in the Free setting more patients would place chairs at the walls than at the tables. Figure 10 depicts the modal chair placements over all groups in the Free setting. There were 12 chairs placed at the walls in contrast to 17 chairs at the tables. This difference is in the opposite direction of the predicted effect, and was not statistically significant by the Chi Square Test.

Hypotheses 4 and 5 had been based on Sommer and Ross's (1958) observation that a number of patients moved their chairs from a sociopetal to a sociofugal arrangement for a long period of time after the initial change in seating, and on Sommer's (1969) general statement that people prefer sitting with their backs to a wall. The assumption that patients prefer sociofugal spaces to sociopetal ones may be further examined by a post-hoc analysis of the location data and of the maps patients were asked to draw after each session.

Location. The division of the experimental room into eight geographical areas permits us to compare patient use of the four areas in the middle of the room (areas 3, 4, 5, and 6 in Figure 5) to patient use of the four areas at the ends of the room (areas 1, 2, 7, and 8 in Figure 5). The Chi Square Test is appropriate here because of the differential expectations for sitting in either middle or periph-

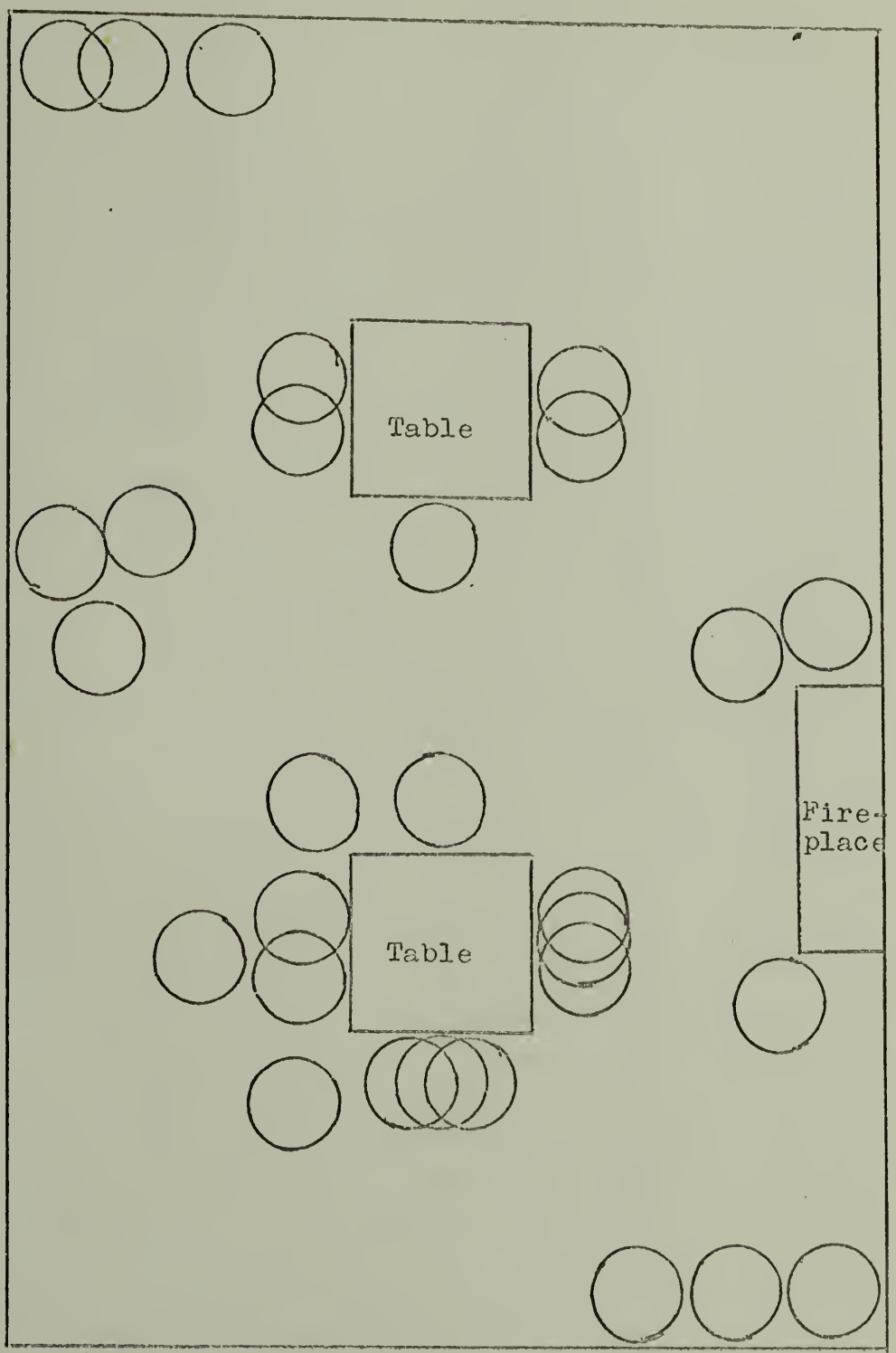

Fig. 10. Modal chair placements over all Free groups.

eral space depending on chair placements over the experimental settings. Groups were used as subjects because the use of space by patients in the same group cannot be assumed to be independent. Groups were given a nominal score of Middle or Peripheral depending on whether more use was made of the middle areas in the room than would be expected[1] on a chance basis or more use was made of the peripheral areas in the room than would be expected by chance. Since no differences were found between settings in the location data, groups were pooled over all settings.

Let us consider first the location data for sitting in chairs. Eighteen groups were described as Middle, in contrast to only two groups as Peripheral. This difference is statistically significant ($\underline{X}^2 = 11.05$, $\underline{df} = 1$, $\underline{p} < .001$). Looking next at the location data for Standing, we find all twenty groups received a Middle score. Examining finally the location data for Walking, we see that fifteen groups were described as Middle and two groups as Peripheral. This difference is again statistically significant ($\underline{X}^2 = 8.4$, $\underline{df} = 1$, $p < .01$).

These findings show a very marked tendency over all

[1]The expected frequencies for use of space expressed as a ratio of middle areas to peripheral areas are as follows. For sitting in chairs the expectancies are 3/1 for the Sociopetal setting, 8/5 for the Mixed setting, 1/1 for the Sociofugal setting, and 1/1 for the Free setting. For standing and walking, expected use by chance is equal for middle and peripheral areas.

body dispositions for patients to use the middle areas in the room rather than the peripheral areas more than would be expected on a chance basis. These findings are not unambiguous since the food and other materials were located in the middle of the room. However, the present data do show that a tendency to use peripheral spaces, as would be predicted from Sommer and Ross (1958) and Sommer (1969) was clearly not observed.

Maps. The maps patients were asked to draw after each session provide data for a further examination of patients' preferences for seating patterns. Each patient's preferred arrangement of chairs was given a nominal score of Sociopetal or Sociofugal depending on whether it was dominated by sociopetal or sociofugal seating. Over all settings 69 patients preferred sociopetal room arrangements, and only 20 patients preferred sociofugal room arrangements. This preference for sociopetal rather than sociofugal arrangements was statistically significant at the .001 level ($\underline{X}^2 = 25.8$, $\underline{df} = 1$). This finding lends further evidence that patients in the present study preferred sociopetal spaces to sociofugal ones.

Patients' post-session maps may also be looked at in terms of experimental conditions to see if a patient's preferences were affected by the setting he experienced. When looked at this way, there is in fact evidence that

patients' maps were influenced by the experimental settings. Table 4 shows the type of room seating arrangement preferred by patients in each experimental condition. The differences between settings for preferred room arrangements are statistically significant at the .001 level ($\underline{X}^2 = 16.6$, $\underline{df} = 3$). Patients who had been in the Sociopetal arrangement were the most inclined to draw sociopetal patterns, while those exposed to the Sociofugal pattern were the most inclined to draw sociofugal arrangements.

Patients' preferences for their own location on the maps (Table 5) were markedly influenced by the conditions they had been exposed to. Patients from the Sociopetal and Mixed settings were markedly inclined to put themselves in sociopetal arrangements. In contrast, patients from the Sociofugal and Free arrangements were very inclined to put themselves in sociofugal arrangements. The differences between settings in preferred locations for self are also statistically significant ($\underline{X}^2 = 23.68$, $\underline{df} = 3$, $\underline{p} < .001$).

Tables 4 and 5 show a striking reversal for Free subjects in their preference for the arrangement of the room and their preference for their own location in the room. It may be that preference for the arrangement of the room was influenced by the actual seating pattern in the room, which was mostly sociopetal in the Free condition. Preference for one's own location in the room, in contrast, may

Table 4

Preferred Room Arrangements on Post-Session Maps

Experimental Conditions	Sociopetal[1]	Sociofugal
Sociopetal	25	0
Mixed	17	4
Sociofugal	11	11
Free	16	5

[1]"Sociopetal" refers to maps dominated by sociopetal seating patterns, while "sociofugal" refers to maps dominated by sociofugal seating patterns.

Table 5

Preferred Locations for Self on Post-Session Maps

Experimental Conditions	Sociopetal[2]	Sociofugal
Sociopetal	18	4
Mixed	10	4
Sociofugal	2	14
Free	6	14

[2]"Sociopetal" refers to a patient who drew himself in a sociopetal arrangement, while "sociofugal" refers to a patient who drew himself in a sociofugal arrangement.

have been influenced by the social climate in the room, which in the Free setting was typically cold.

DISCUSSION AND CONCLUSIONS

The most basic and most important finding of this study was that seating patterns exerted a powerful control over the amount of social interaction among patients in a dayroom setting. In contrast, seating arrangements had no effect on nonsocial activity.

The Sociofugal setting, as was predicted, demonstrated significantly less social interaction than did either the Sociopetal or Mixed settings. It appears that social interaction will occur in settings where at least some seating is arranged in a sociopetal manner, while a setting which is totally sociofugal will dramatically suppress social participation. An unexpected finding was that the Free setting showed markedly less social interaction than the Sociopetal and Mixed settings, and only slightly more social behavior than the Sociofugal setting. The prediction that the differences between settings in social behavior would be greater for verbal than for nonverbal interaction was partially supported. The treatment effect was significant for verbal interaction and insignificant for nonverbal interaction, but the interaction between these two types of behavior lacked significance.

These findings in a controlled setting lend strong

support to the position (Hall, 1969; Osmond, 1957, 1959; Sommer, 1967, 1969) that sociopetal spaces facilitate social interaction, while sociofugal spaces inhibit such interaction. The present results also support the findings of studies (Sommer and Ross, 1958; Rivlin et al., 1969) which examined the change in social behavior when seating in actual hospital dayrooms was changed from a sociofugal to a sociopetal arrangement.

The differences between experimental settings in verbal interaction were accounted for almost entirely by Conversation, which alone contributed 83% of the total verbal behavior. There was a significant treatment effect for Conversation, with average Conversation in the Sociopetal and Mixed settings significantly greater than average Conversation in the Sociofugal and Free settings. The differences between seating patterns in Conversation were further analyzed by distinguishing between conversation involving two persons and conversation involving three or more persons. There was significantly more conversation between two persons than between three or more persons. Interestingly, while there was no treatment effect for two-person conversation, there was a significant treatment effect for three or more person conversation. Sommer and Ross (1958) also found more two-person conversation than conversation between more

than two persons, but this was primarily because they found very little three or more person conversation in either the sociopetal or the sociofugal setting. The significant treatment effect in the present study for conversation between three or more persons may indicate that subjects in this study were more socially inclined than those in Sommer and Ross's study or that the experimental dayroom facilitated conversation to a greater extent than did the actual dayroom used by Sommer and Ross. There is support for both of these possibilities and we will return to this point a little later.

The prediction that the Sociofugal setting would show less nonsocial activity than the Sociopetal and Mixed settings was not supported. There were no differences between settings in nonsocial activity. Unlike the findings of Sommer and Ross which point to an increase of activity in general in a sociopetal setting, the present findings point to a specific influence on social activity alone. The present results may indicate that Sommer and Ross's finding that more knitting and reading of magazines occurred in the sociopetal arrangement was based on factors other than seating. For example, Sommer and Ross point out that an occupational therapist worked on the ward only during the sociopetal phase of their experiment. They also note that the tables which were brought into the dayroom

as part of the sociopetal arrangement afforded patients a place to rest magazines which they previously lacked. These two factors may have been more important in increasing nonsocial activity in the dayroom than was the alteration of seating patterns.

An interesting finding involving the unobtrusive measures was that significantly more cigarettes and coffee were consumed in the Sociopetal and Mixed settings than in the Sociofugal and Free settings. It may be that cigarette and coffee consumption increased as a function of the greater social participation in the Sociopetal and Mixed settings. Raush et al. (1959, 1960) found that hospital settings in which food was present were characterized by greater interpersonal comfort and more positive social participation than were settings where there was no food. An alternative interpretation is that the greater consumption of coffee and cigarettes indicate a higher level of tension in the Sociopetal and Mixed settings. However, the tendency for patients to remain behind in these settings longer than in the others, and patients' generally favorable comments about these settings tend not to support the latter view.

A general finding from the data reflecting use of space was that patients, in contrast to what was expected, preferred more central spaces in the room to more peripheral ones.

The prediction that the Sociopetal setting would show more mobility and more standing and walking than the other settings was not confirmed. There were no differences between settings in any of these categories. The prediction that in the Free setting more patients would sit near the walls than at the tables was also not confirmed. In fact, more patients sat at the tables than at the walls, though this difference was not significant. Both of these predictions had been based on Sommer and Ross's observation that after chairs had been moved to the sociopetal dayroom arrangement, a number of patients continued to move them back to the walls for a long period of time, and on Sommer's (1969) speculation that people prefer sitting with their backs to a wall. The present findings may indicate that to some extent the patients in Sommer and Ross's study were resisting any change in the dayroom setting rather than reacting to the sociopetal seating pattern in itself.

The present study affords further evidence that patients preferred more central locations in the room to more peripheral ones. The location data showed that patients very strongly preferred the space in the middle of the room to peripheral parts of the room. This preference for the middle of the room was true for all body dispositions. The location of the food and materials in

the center of the room probably accounted in part for the tendency to use this space. Nevertheless, there was no observable tendency to use peripheral space, as would be predicted from Sommer and Ross (1958) and Sommer (1969).

Further evidence that patients preferred sociopetal to sociofugal seating arrangements was derived from patients' preferred chair arrangements as drawn on the post-session maps. Patients overwhelmingly drew arrangements which were dominated by sociopetal seating patterns. These findings are in accord with the view of Sivadon (1970) who contends that people prefer central spaces to peripheral ones.

The post-session maps also showed that patients' preferences were affected by the seating patterns they had been exposed to. Patients who had been in the Sociopetal arrangement were the most inclined to draw sociopetal patterns, while those exposed to the Sociofugal pattern were the most inclined to draw sociofugal arrangements. Patients' preferences for their own location on the maps were markedly influenced by the settings they had been exposed to. Patients from the Sociopetal and Mixed settings were very inclined to put themselves in sociopetal arrangements. In contrast, patients from the Sociofugal and Free arrangements were heavily inclined to put themselves in sociofugal arrangements.

The finding that dayroom seating arrangements exert significant control over patients' social behavior is most important in the light of the tendency of many professional mental health workers and of the public to attribute the psychiatric patient's behavior entirely to psychodynamic factors within himself. The most common response of ward nurses in this hospital on being told of this study was that chair arrangements would not affect patients' social functioning. "The patients may sit at the tables," one nurse responded confidently, "but they won't talk to one another." Sommer and Ross indicated a similar pessimism of hospital staff in the Saskatchewan hospital. Because of the strong tendency to underestimate the impact of furniture arrangements on behavior, when dayroom seating arrangements are thought about at all, it is with everyday staff needs rather than long range therapeutic goals in mind. Typically, chairs are arranged in straight rows along the walls because this arrangement facilitates nurses surveying the ward and janitors sweeping the floor. The importance of dayroom seating patterns is enhanced in light of the fact that patients spend an overwhelming amount of their time in the dayroom sitting in chairs and typically show little mobility or flexibility in their use of chairs.

A particularly interesting finding in this study

was that allowing patients to arrange the room themselves, rather than facilitating social behavior, greatly diminished it. This result may in part be due to the difficulties in social relationships which brought patients to the hospital, but it is probably also a function of past training in the hospital environment itself. Sommer and Ross (1958) have labelled as "institutional sanctity" the feeling of both staff and patients in a hospital setting that the usual arrangement of furniture is necessarily good and unalterable. But in fact institutional sanctity goes far beyond the rigidity of furniture arrangements and pervades the character of the entire institution (cf. Goffman, 1961). Psychiatric patients have been consistently trained to be "outer-directed," while training for self-directed social encounter and environmental management--imperative adaptive skills outside of total institutions--has been greatly neglected. Patients in the present study were simply unprepared to use the opportunity to arrange the room themselves for profitable advantage. Environmental designers might play an important role in training psychiatric patients for self-direction by creating hospital environments which allow graded experiences for successful environmental manipulation (cf. Cumming and Cumming, 1962). A small experimental dayroom like that in this study might be used for training

psychiatric patients in adaptive social and environmental skills. It is possible, for example, that patients who first gained experience in the Sociopetal setting might later make improved use of the Free setting.

We have been concerned so far with a quantitative analysis of conversation over environmental settings, but there are also important qualitative differences between the types of conversation which developed in the Sociopetal and the Sociofugal settings. The following descriptive analysis of the sociopetal and sociofugal conversations is based on anecdotal comments recorded on the score sheets by the observer.

The sociopetal conversation was typified by an evenness of pace or flow, whether it involved two or more than two persons. It tended to continue unless an individual deliberately cut himself off from the conversation by leaving the group, lifting a newspaper in front of himself, or looking sharply to one side. This conversation, particularly when it involved more than two persons, was characterized by a great deal of energy or involvement, and was often marked by a high level of psychological closeness, trust and intimacy. Typical topics of conversation included: home visits, personal problems, service experiences, and finances. The sociopetal conversation was in many ways characterized by a quality of rapport

which would have delighted any group leader. For example, in one sociopetal session, one patient talked about schizophrenia and another responded, "I feel the same way, friend." In another sociopetal group, a patient talked about his adolescent son who had died recently, as another patient commented seriously, "That's sad."

The sociofugal conversation, in contrast, was marked by an unevenness of pace, proceeding in a sporadic manner. It was inclined to break off if the participants did not deliberately maintain it by sitting noticeably forward, resting on an elbow when conversing to one side, and maintaining constant eye-contact. Typically, this conversation lacked the spontaneity and involvement of the sociopetal conversation; it often resembled a question and answer period in which one loquacious individual directed questions at an audience inclined to talk only when spoken to. Topics of discussion in this conversation were rarely personal or intimate. Patients typically talked about food, baseball, dayroom activities, and past acquaintances in the hospital. The sociofugal conversation resembled the banter of casual acquaintances conversing simply to pass the time in a public setting.

A common finding of environmental researchers is that people typically pay little attention to their everyday physical environment and are especially unaware of the

powerful control their environment exerts on their behavior (Proshansky, Ittelson, and Rivlin, 1970). This was clearly the case with patients in the present study. When questioned after the session, only a very few patients had impressions of how the environment had affected them. A semantic differential devised to test how patients felt about the experimental settings showed no differences between conditions despite the dramatic behavioral differences which were observed. One patient recommended that I have an interior decorator tell me how a dayroom should be furnished.

The simulated dayroom used in this study was chosen primarily to obtain a high degree of experimental control, and in this regard it was successful. However, to evaluate fully the effectiveness of this approach a further question must be asked--was it successful as a dayroom. A first indication of success is that findings by Sommer and Ross in an actual dayroom were replicated in this experimental setting. A second indication of success was the generally favorable comments by patients about the room. Another important sign of success was the relatively high level of social behavior which characterized the experiment. The level of social interaction in all except the Free setting was greater than would be expected in an actual dayroom in this hospital. The level of social

behavior was certainly due in part to the selection of the most social patients for this study, but there are a number of characteristics of the experimental settings which probably encouraged social participation. A considerable number of patients commented on their comfort and enjoyment in having the free refreshments available (cf. Raush et al., 1959; Raush et al., 1960). Some patients noted that they appreciated the privacy of the setting. Since there was an observer in the room, patients were probably referring to the feeling of privacy which is created when an area is protected from outside spatial intrusion--a characteristic typically missing in hospital dayrooms (Watson, 1970). These factors, along with the small size of the groups, probably helped to create a comfortable and familiar atmosphere in which conversation might develop.

Some qualifications and limitations to these findings should be noted. First, sociopetal seating patterns cannot be expected to create social behavior among individuals who are not socially inclined. Pilot observations in the Mixed arrangement of closed ward patients, without the food or games and without instructions to interact socially, indicated that social participation did not occur whether patients sat at the table or not. Sociopetal spaces do, however, play an important role in facilitating social

interaction among socially inclined individuals. Sociofugal spaces, on the other hand, drastically inhibit social exchange, even between individuals who are socially inclined. Second, generalization from the present settings to actual dayrooms must be cautious in light of the relatively small amount of time patients spent in the experimental settings, the size of the groups, and the novelty of the experience. Another limitation is that a few patients indicated that they did not feel comfortable in the experiment, and it is possible that comfort may in part have been a function of the type of setting.

Future research dealing with dayroom seating patterns might examine the effects of seating over a longer period of time with larger groups of patients. One might ask, for example, whether the differences between contrasting settings will increase or diminish over extended periods of time, or if there is an optimal population density in dayrooms. An important challenge for future research is the creation of self-report measures which reflect emotional responsiveness to varied settings reliably, and which correlate with behavioral measures. The sociopetal-sociofugal dimension should be investigated analytically to determine its most critical components. For example, it is unclear whether conversation is affected more by the orientation of chairs or by the distance between chairs.

Another important question concerns which factors in the Free setting contributed most to the low social output--e.g., ambiguity, lack of self-direction, discomfort.

How might the findings of this study be translated into practical and useful terms for the hospital designer interested in dayroom furniture arrangement? The most general implication is that the choice of seating patterns will affect the amount and quality of social intercourse in the dayroom. A greater amount of conversation and more personal conversation will occur in sociopetal arrangements than in sociofugal ones. Also, multi-person conversations are more likely to develop in sociopetal settings than in sociofugal ones. Allowing patients to arrange their own dayroom furniture appears to be unprofitable without prior training in self-direction through graded experiences in environmental management. The change of hospital dayrooms from sociofugal patterns to sociopetal ones is practical and inexpensive, and the effects can be readily evaluated. Past tendencies to ignore the behavioral impact of physical settings and to perceive hospital environments as unalterable should not be allowed to present an insurmountable obstacle to productive and therapeutic environmental change.

SUMMARY

This study investigated the effects of contrasting patterns of seating arrangement on the behavior of psychiatric patients in an experimental hospital dayroom. The experimental dayroom afforded a setting where the effects of specific and controlled manipulations in seating patterns could be observed on small groups of patients. The following seating arrangements were studied: Sociofugal--chairs were arranged shoulder-to-shoulder along the walls of the room; Sociopetal--chairs were arranged around two small tables in the middle of the room; Mixed--chairs were arranged both along the walls and around a small table in the middle of the room; Free--patients were told to arrange the chairs themselves in any manner they wished. The most important finding of this study was that seating patterns exerted a powerful control over the amount and quality of social interaction among patients in the dayroom. The Sociopetal and Mixed arrangements demonstrated a greater amount of social interaction and more personal interaction than did the Sociofugal and Free arrangements In Contrast, seating arrangements had no effect on nonsocial activity. An unexpected finding was that patients preferred more central spaces in the room to more peripheral ones.

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APPENDIX

Manual for Scoring Behavior

ACTIVITY

Social

Non-aggressive

Verbal

Conversation--verbal interaction between patients which is not a request or a response to a request concerning an object in the room.

Games--comments which are part of an ongoing game.

Food--requests or responses to requests concerning food in the room.

Cigarettes--requests or responses to requests concerning cigarettes or matches in the room.

Other Mands--requests or responses to requests concerning other objects in the room.

Nonverbal

Games--include playing, waiting turn, setting up game, waiting to begin as someone else sets up game.

Food--passing food or food implements (cups, spoons, napkins) between patients.

Cigarettes--passing cigarettes or matches between patients.

Exchanging Other Objects--passing other objects between patients.

Aggressive

Verbal--score only verbal threats or verbal abuse.

Nonverbal--score only physical assault or threatening gestures (facial gestures are not scored).

Nonsocial

Activity

Games--include playing and setting up game.

Food--include eating, chewing, drinking, lifting cup or donut to mouth, returning cup or donut from mouth to table, preparing food (e.g., pouring water, opening coffee, stirring coffee).

Supplied Reading--reading the material supplied in the room (i.e., looking at the page or turning the page).

Other Reading--reading any material brought into the room by any patient (i.e., looking at the page or turning the page).

Writing--writing, drawing, or erasing.

Passive--sleeping or doing nothing (doing nothing is broadly defined to include walking, standing, tying a shoe, combing one's hair, jiggling keys, lighting or smoking one's own cigarette).

Bizarre--include talking or making sounds to self, self-inflicted, deliberate injury, clearly unusual mannerisms or gestures.

Other--noteworthy activity which does not fit into any other category (e.g., talking to observer, moving a chair).

BODY DISPOSITION

Walking--include directed walking and aimless pacing.

Standing--standing on the floor.

Sitting on Chair--sitting on any part of a chair.

Sitting on Floor--self-explanatory.

Lying on Floor--self-explanatory.

Other--body dispositions which do not fit into any other body disposition category (e.g., squatting, jumping, running.

LOCATION

At each interval place the letter designating the observed patient on the map either: (a) on the chair in which he is sitting, or (b) in the geographical area in which he is located if he is not sitting in a chair. The geographical area for unseated patients is determined by the location of the patient's feet. If the patient's feet are partially in one geographical area and partially in another, score the area with the lowest numerical value as marked on the map. If a chair is moved to a new location, mark the new location on the map. Minor changes in location or orientation of chairs are to be ignored.

Reliability of Behavioral Measures

Reliability was determined in three separate sessions. The first reliability check was carried out in a pilot session under the Mixed arrangement. In this pilot session each subject was recorded over 25 intervals. To assure that the rating procedure remained constant, two additional checks on reliability were carried out during the course of the study. The first of these additional checks was conducted during the second quarter of observations (session 9), and a second such check during the last quarter of observations (session 20). The settings observed, which were randomly selected, were the Mixed arrangement for the first additional check and the Free arrangement for the second check. The first additional check was conducted over 16 intervals, and the second check was carried out for 36 intervals. Table A shows the reliability scores in percent of agreement for each session separately and over all three sessions.

We may look also at the reliability of the subcategories in the major dimensions. The reliability for each subcategory was calculated by dividing the number of instances both observers agreed in using that subcategory by the number of instances both observers agreed in using the subcategory plus the number of instances either observer scored that subcategory when the other observer did not. For example, observer A might record 75 instances

Table A

Reliability of Major Behavior Dimensions in Percent of Agreement

	Dimensions		
Session	Activity	Body Disposition	Location
1	97.3	100.0	100.0
2	96.9	96.9	97.9
3	97.2	100.0	98.6
Overall	97.2	99.4	98.9

of Supplied Reading, while observer B recorded 73 such instances. If the two observers agreed on 68 of these scores (observer A recording 7 instances not recorded by observer B, and observer B scoring 5 instances not scored by observer A, the reliability score for Supplied Reading would be 68/(68 + 7 + 5) or 85%.

Because the number of times a specific subcategory was scored in one session was often small, we will look at the reliability of subcategories only across all three sessions. Table B shows the reliability scores in percent of agreement along with the number of observations on which each score was based. (Reliability scores were not calculated for subcategories where the number of observations was less than 10). As can be seen, the reliability scores of the behavior subcategories, with the exception of nonsocial Food, are all above 90%. It should be noted that the behavior subcategories within the category of nonsocial Activity were not statistically analyzed separately. The reliability score of nonsocial Activity, which is analyzed statistically, is 93% based on 104 observations.

Table B

Reliability of Behavior Subcategories
in Percent of Agreement

	Activity				
	Conversation	Supplied Reading	Writing	Food	Passive
Reliability	92.4	97.9	90.5	77.3	96.1
Number of Observations	49	48	21	22	308

	Body Disposition		
	Walking	Standing	Sitting in Chair
Reliability	95.8	94.4	99.3
Number of Observations	24	18	410

Transformation of behavioral data

To test for heterogeneity of variance between the treatments the Hartley test was chosen, in which the statistic F-max is calculated by dividing the largest by the smallest treatment variance. Table C shows the difference in the F-max score before and after the logarithmic transformation.

Table D demonstrates the effect of the logarithmic transformation on a sample of 15 scores. The difference in the group standard deviation, variance, mean, and distribution before and after the transformation are shown. As is demonstrated in this Table, the logarithmic transformation also has the effect of making a positively skewed distribution more normal. The behavioral scores in the present study were positively skewed and the distribution of scores was made more normal by the transformation.

Table C

F-max Score Before and After Transformation

Behavior Category	Before Transformation	After Transformation
Social	3.82	2.37
Verbal	7.74*	2.82
Nonverbal	24.54*	5.40*
Conversation	7.31*	3.10
Passive	2.20	1.45
Walking	25.09*	2.71
Standing	4.75*	1.62
Mobility	4.53*	1.48

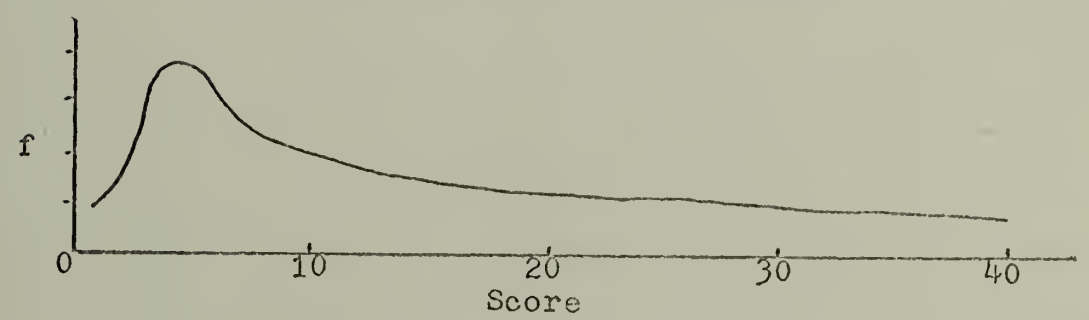
*Significant at .05 level

Table D. Effect of Logarithmic Transformation on a Sample of Fifteen Scores

Statistic	Before Transformation	After Transformation
Mean	9.07	5.93*
Standard Deviation	10.74	1.29*

*Reconverted to original scale

Distribution Before Transformation



Distribution After Transformation

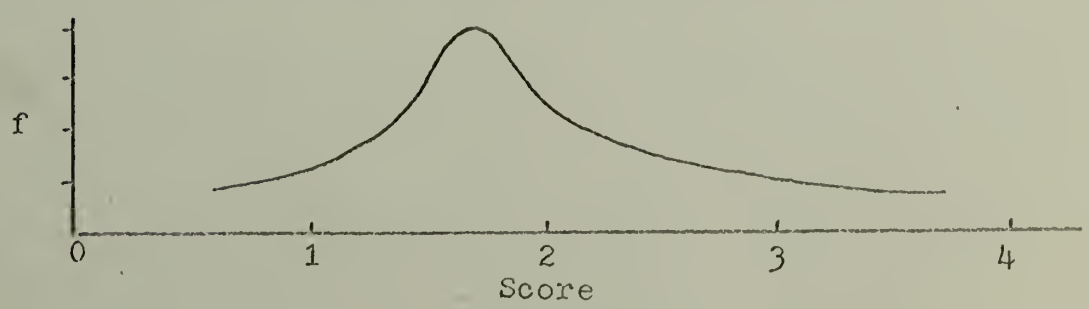


Table E

Mean Group Scores for Nonsocial Activities

Conditions	Games	Food	Supplied Reading	Other Reading	Writing
Sociopetal	2.2	15.8	29.2	0.0	0.0
Mixed	8.4	15.8	31.6	0.0	0.0
Sociofugal	.4	14.2	38.6	0.0	0.0
Free	9.6	15.0	26.2	2.8	1.8

Table F

Mean Group Scores for Conversation Over Time in Session

Conditions	Quarters of Session			
	1	2	3	4
Sociopetal	14.4	16.6	15.6	12.6
Mixed	10.8	7.4	7.6	15.0
Sociofugal	7.2	8.6	7.6	10.8
Free	5.6	3.4	3.6	4.2

Table G

Mean Group Scores for Nonverbal Games Over Time in Session

	Quarters of Session			
Conditions	1	2	3	4
Sociopetal	8.4	8.0	7.2	7.0
Mixed	7.2	11.8	1.8	.6
Sociofugal	0.0	.8	3.2	.2
Free	3.6	3.6	3.6	7.0

Table H

Mean Group Scores for
Nonsocial Activity Over Time in Session

Conditions	Quarters of Session			
	1	2	3	4
Sociopetal	12.6	8.2	14.4	11.8
Mixed	18.2	15.0	12.8	9.4
Sociofugal	14.4	14.4	14.8	15.4
Free	14.4	12.0	14.6	14.6

Table I

Mean Group Scores for Mobility Over Time in Session

Conditions	Quarters of Session			
	1	2	3	4
Sociopetal	5.8	6.4	3.2	4.8
Mixed	3.4	3.2	3.2	2.2
Sociofugal	4.0	3.4	2.8	3.0
Free	5.2	5.2	4.8	4.6

Table J

Analysis of Variance for Conversation and All Other Verbal Behavior

Source of Variance	df	Mean Square	F
Total	239		
Between S	119		
Between G	19		
A	3	7.39	4.70*
G/A	16	1.57	
Within S	120		
C	1	66.85	20.85**
AC	3	2.19	.68
GC/A	16	3.21	6.62***
SC/G/A	100	.48	

*$p < .025$

**$p < .001$

***$P < .001$

A = Treatments

C = Behavioral Measures (Conversation and All Other Verbal Behavior)

G = Groups

S = Subjects

Table K

Analysis of Variance for Verbal Games

Source of Variance	df	Mean Square	F
Total	119		
Between G	19		
A	3	1.37	.58
G/A	16	2.37	8.95*
S/G/A	100	.26	

*$p < .001$

A = Treatments

G = Groups

S = Subjects

Table L

Analysis of Variance for Conversation

Source of Variance	df	Mean Square	F
Total	119		
Between G	19		
A	3	8.20	3.40*
G/A	16	2.41	2.46**
S/G/A	100	.98	

*$p < .05$

**$p < .025$

A = Treatments

G = Groups

S = Subjects

Table M

Sheffe Multiple Comparison Procedure for Conversation

Comparison	F
Sociopetal - Mixed	.27
Sociopetal - Sociofugal	1.95
Sociopetal - Free	2.70
Mixed - Sociofugal	1.68
Mixed - Free	2.43
Sociofugal - Free	.75
Sociopetal - (Mixed + Sociofugal + Free)/3	-1.30
Free - (Sociopetal + Mixed + Sociofugal)/3	-2.40
(Sociopetal + Mixed) - (Sociofugal + Free)	3.09*
Sociofugal - (Sociopetal + Mixed)/2	-2.10
Sociopetal - (Sociofugal + Free)/2	2.68

*$p < .10$

Table N

Analysis of Variance for Two-Person Conversation and Conversation Between Three or More Persons

Source of Variance	df	Mean Square	F
Total	143		
Between S	71		
Between G	11		
A	3	10.64	3.95
G/A	8	2.69	
Within S	72		
C	1	9.87	7.17*
AC	3	.82	.60
GC/A	8	1.38	2.94**
SC/G/A	60	.47	

*$p < .05$

**$p < .01$

A = Treatments

C = Behavioral Measures (Conversation Between Two Persons and Conversation Between Three or more Persons)

G = Groups

S = Subjects

Table 0

Analysis of Variance for Two-Person Conversation

Source of Variance	df	Mean Square	F
Total	71		
Between G	11		
A	3	4.41	1.72
G/A	8	2.56	3.29*
S/G/A	60	.78	

*$p < .005$

A = Treatments

G = Groups

S = Subjects

Table P

Analysis of Variance for Conversation Between Three or More Persons

Source of Variance	df	Mean Square	F
Total	71		
Between G	11		
A	3	7.05	4.67*
G/A	8	1.51	4.10**
S/G/A	60	.37	

*$p < .05$

**$p < .001$

A = Treatments

G = Groups

S = Subjects

Table Q

Sheffe Multiple Comparison Procedure for Conversation Between Three or More Persons

Comparison	F
Sociopetal - Mixed	1.64
Sociopetal - Sociofugal	3.77*
Sociopetal - Free	4.26**
Mixed - Sociofugal	2.13
Mixed - Free	2.62
Sociofugal - Free	.49
Sociopetal - (Mixed + Sociofugal + Free)/3	-.97
Free - (Sociopetal + Mixed + Sociofugal)/3	-2.33
(Sociopetal + Mixed) - (Sociofugal + Free)	3.50*
Sociofugal - (Sociopetal + Mixed)/2	-2.64
Sociopetal - (Sociofugal + Free)/2	3.59*

*$p < .05$

**$p < .025$

Table R

Mean Subject Score on Semantic Differential for "This Room"

Condition	Evaluative	Potency	Activity	Novelty
Sociopetal	2.42	3.92	3.95	3.88
Mixed	2.68	4.49	4.07	5.04
Sociofugal	2.33	3.60	3.78	3.77
Free	2.86	4.00	4.28	4.39

Table 8

Mean Subject Score on Semantic Differential for "The Dayroom on My Ward"

Condition	Evaluative	Potency	Activity	Novelty
Sociopetal	2.40	3.46	3.92	4.83
Mixed	2.66	4.04	4.04	4.95
Sociofugal	2.55	3.52	4.20	4.52
Free	2.83	3.20	3.44	4.22

Table T

Mean Subject Score on Semantic Differential for "The Other Patients in This Room"

Condition	Evaluative	Potency	Activity	Novelty
Sociopetal	2.60	4.01	4.18	4.04
Mixed	2.75	3.96	4.11	4.90
Sociofugal	2.39	3.53	4.57	4.35
Free	2.84	4.09	4.07	4.23

Table U

Mean Subject Score on Semantic Differential for "The Other Patients on My Ward"

Condition	Evaluative	Potency	Activity	Novelty
Sociopetal	2.69	3.83	4.16	4.63
Mixed	2.90	3.93	4.25	4.66
Sociofugal	2.85	3.08	4.05	4.27
Free	2.76	3.81	3.95	3.97

Table V

Mean Subject Score on Semantic Differential for "The Observer in This Room"

Condition	Evaluative	Potency	Activity	Novelty
Sociopetal	2.06	3.63	3.46	3.90
Mixed	2.57	3.88	4.17	4.85
Sociofugal	2.15	3.66	3.33	3.76
Free	2.55	3.89	3.85	3.92

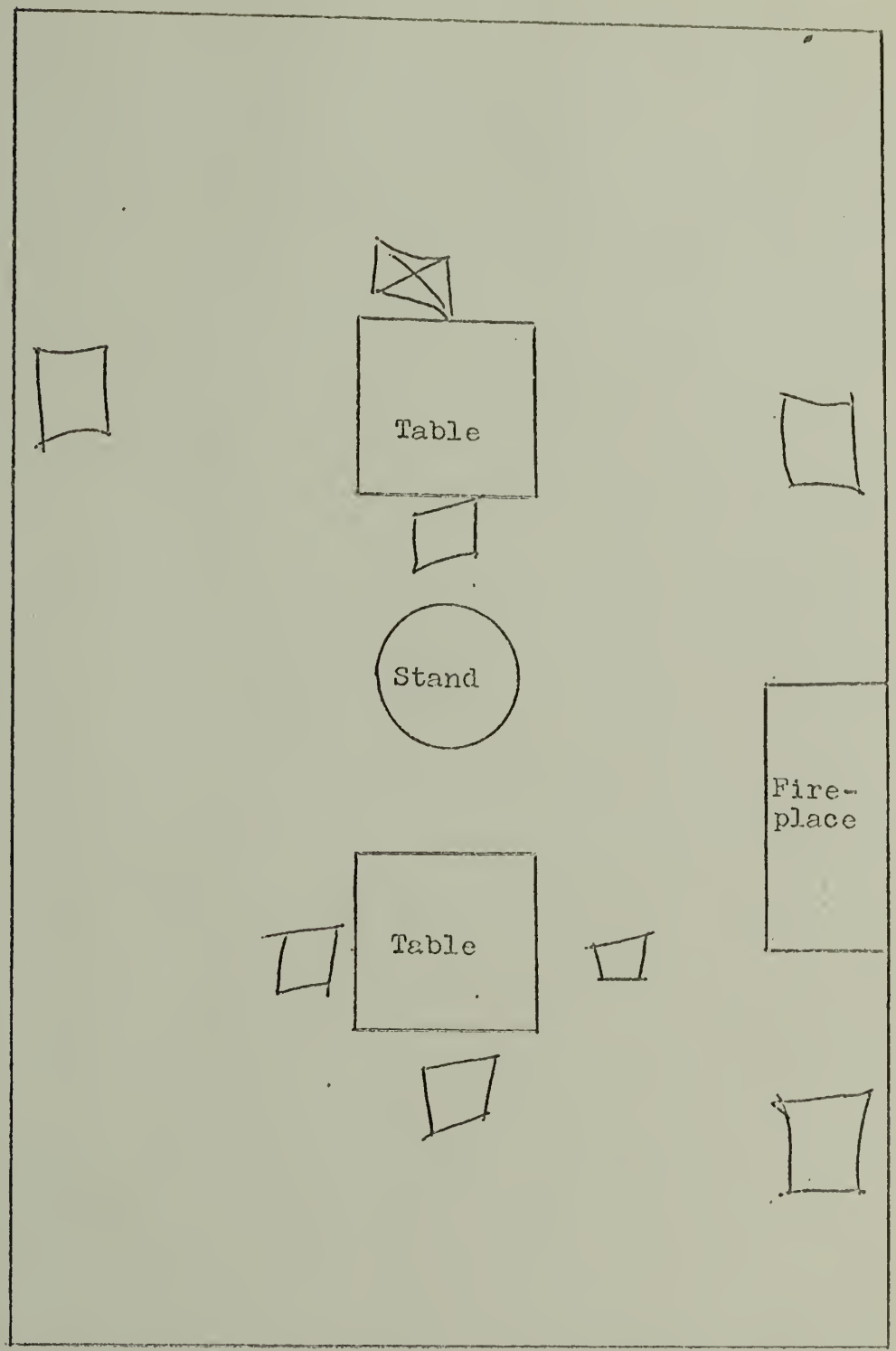


Fig. A. Sample response on post-session map.

Table W
Social Activity Scores

Sociopetal Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
1	A	5	0	0	0	0
1	B	7	0	0	0	0
1	C	6	3	0	12	0
1	D	5	2	0	12	0
1	E	0	0	0	0	0
1	F	4	0	0	0	0
2	A	0	0	0	0	0
2	B	20	0	0	0	0
2	C	0	0	0	0	0
2	D	0	0	0	0	0
2	E	20	0	1	0	0
2	F	1	0	1	0	0
3	A	19	0	0	0	0
3	B	12	0	0	0	0
3	C	17	0	0	0	0
3	D	10	0	2	0	2
3	E	21	0	0	0	0
3	F	21	0	0	0	0

Table W (cont.)

Sociopetal Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
4	A	0	0	0	0	0
4	B	0	0	0	0	0
4	C	11	18	0	33	1
4	D	9	16	0	34	0
4	E	3	19	0	35	0
4	F	1	15	0	35	0
5	A	30	0	0	0	0
5	B	7	0	0	0	0
5	C	3	0	1	0	0
5	D	23	0	1	0	0
5	E	26	0	0	0	0
5	F	28	0	0	0	0

Table W (cont.)

Mixed Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
1	A	2	0	0	0	1
1	B	2	0	1	0	1
1	C	2	0	0	0	0
1	D	0	0	0	0	0
1	E	11	0	0	0	0
1	F	12	0	0	0	0
2	A	13	7	0	26	0
2	B	9	5	0	26	0
2	C	14	2	0	24	0
2	D	9	2	0	26	0
2	E	0	0	0	0	0
2	F	0	0	0	0	0
3	A	6	0	0	0	0
3	B	7	0	0	0	0
3	C	11	0	0	0	0
3	D	17	0	0	0	1
3	E	14	0	0	0	0
3	F	2	0	0	0	0

Table W (cont.)

Mixed Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
4	A	2	4	0	4	0
4	B	2	1	0	3	0
4	C	5	9	0	12	0
4	D	7	8	1	13	0
4	E	4	5	0	13	0
4	F	3	5	0	6	1
5	A	0	0	0	0	0
5	B	5	0	0	0	0
5	C	3	0	0	0	0
5	D	12	0	0	0	0
5	E	14	0	0	0	0
5	F	7	0	0	0	0

Table W (cont.)

Sociofugal Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
1	A	1	0	0	0	0
1	B	0	0	0	0	0
1	C	0	0	0	0	2
1	D	0	0	0	0	0
1	E	4	0	1	0	1
1	F	4	0	0	0	0
2	A	22	0	0	0	0
2	B	2	1	0	1	0
2	C	0	0	0	0	0
2	D	0	0	0	0	0
2	E	5	0	0	0	0
2	F	23	0	1	0	0
3	A	0	0	0	0	0
3	B	0	0	0	0	0
3	C	0	0	0	0	0
3	D	4	0	0	0	0
3	E	0	0	0	0	0
3	F	0	0	0	0	0

Table W (cont.)

Sociofugal Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
4	A	0	0	0	0	0
4	B	0	0	0	0	0
4	C	0	0	0	0	0
4	D	0	0	0	0	0
4	E	27	0	0	0	0
4	F	25	0	0	0	0
5	A	1	0	0	0	0
5	B	20	1	0	10	0
5	C	15	1	0	10	0
5	D	7	0	0	0	0
5	E	2	0	0	0	0
5	F	8	0	1	0	0

Table W (cont.)

Free Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
1	A	6	0	0	0	0
1	B	6	0	0	0	0
1	C	2	0	0	0	0
1	D	8	0	0	0	0
1	E	7	0	0	0	0
1	F	0	0	0	0	0
2	A	5	0	0	0	0
2	B	0	0	0	0	0
2	C	3	3	1	9	0
2	D	1	0	0	0	0
2	E	0	0	1	0	0
2	F	9	0	0	10	0
3	A	0	0	0	0	0
3	B	0	0	0	0	0
3	C	0	0	0	0	0
3	D	0	0	0	0	0
3	E	0	0	0	0	0
3	F	0	0	0	0	0

Table W (cont.)

Free Condition

Group	Subject	Verbal			Nonverbal	
		Conversation	Games	Other Verbal	Games	Other Nonverbal
4	A	0	12	0	33	0
4	B	1	3	0	3	0
4	C	2	0	0	0	0
4	D	3	2	0	3	0
4	E	0	0	0	0	0
4	F	0	5	0	32	0
5	A	0	0	0	0	0
5	B	0	0	0	0	0
5	C	0	0	0	0	0
5	D	0	0	0	0	0
5	E	14	0	0	0	0
5	F	17	0	0	0	0

Table X
Nonsocial Activity Scores

Sociopetal Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
1	A	0	0	0	0	0	31	0
1	B	0	5	6	0	0	12	6
1	C	0	2	3	0	0	13	0
1	D	0	4	0	0	0	17	0
1	E	0	2	1	0	0	33	0
1	F	0	5	3	0	0	22	2
2	A	11	1	14	0	0	10	0
2	B	0	3	1	0	0	12	0
2	C	0	5	0	0	0	31	0
2	D	0	2	11	0	0	23	0
2	E	0	9	0	0	0	7	0
2	F	0	5	16	0	0	13	0
3	A	0	1	0	0	0	16	0
3	B	0	4	6	0	0	14	0
3	C	0	0	15	0	0	4	0
3	D	0	4	11	0	0	9	0
3	E	0	0	0	0	0	16	0
3	F	0	1	1	0	0	13	0

Table X (cont.)

Sociopetal Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
4	A	0	5	0	0	0	29	2
4	B	0	0	26	0	0	10	0
4	C	0	4	0	0	0	1	0
4	D	0	4	0	0	0	0	0
4	E	0	1	0	0	0	0	0
4	F	0	0	0	0	0	0	0
5	A	0	0	0	0	0	6	0
5	B	0	4	13	0	0	12	0
5	C	0	6	19	0	0	7	0
5	D	0	2	0	0	0	10	0
5	E	0	0	0	0	0	10	0
5	F	0	0	0	0	0	8	0

Table X (cont.)

Mixed Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
1	A	0	5	1	0	0	26	1
1	B	0	3	0	0	0	30	0
1	C	0	2	6	0	0	26	0
1	D	0	3	9	0	0	17	0
1	E	0	6	7	0	0	12	0
1	F	0	3	7	0	0	14	0
2	A	0	1	0	0	0	1	0
2	B	0	2	0	0	0	3	0
2	C	0	0	0	0	0	0	0
2	D	0	0	0	0	0	2	0
2	E	0	0	25	0	0	11	0
2	F	0	0	21	0	0	15	0
3	A	0	3	0	0	0	27	0
3	B	0	1	23	0	0	5	0
3	C	0	4	0	0	0	21	0
3	D	0	2	0	0	0	8	8
3	E	0	0	19	0	0	3	0
3	F	0	4	4	0	0	26	0

Table X (cont.)

Mixed Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
4	A	8	4	0	0	0	16	0
4	B	1	4	0	0	0	24	2
4	C	10	1	0	0	0	8	0
4	D	0	7	1	0	0	5	2
4	E	7	2	7	0	0	3	0
4	F	1	1	0	0	0	24	0
5	A	0	5	6	0	0	25	0
5	B	0	3	12	0	0	16	0
5	C	15	5	10	0	0	3	0
5	D	0	2	0	0	0	22	0
5	E	0	2	0	0	0	20	0
5	F	0	4	0	0	0	25	0

Table X (cont.)

Sociofugal Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
1	A	0	4	3	0	0	28	0
1	B	0	0	12	0	0	24	0
1	C	0	4	12	0	0	18	0
1	D	0	11	0	0	0	25	0
1	E	0	5	0	0	0	25	0
1	F	0	0	0	0	0	32	0
2	A	0	2	0	0	0	12	0
2	B	0	0	0	0	0	33	0
2	C	2	3	21	0	0	10	0
2	D	0	1	27	0	0	8	0
2	E	0	0	0	0	0	31	0
2	F	0	3	0	0	0	9	0
3	A	0	1	30	0	0	5	0
3	B	0	0	12	0	0	24	0
3	C	0	2	30	0	0	4	0
3	D	0	3	24	0	0	5	0
3	E	0	2	0	0	0	34	0
3	F	0	2	0	0	0	34	0

Table X (cont.)

Sociofugal Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
4	A	0	0	0	0	0	36	0
4	B	0	1	0	0	0	35	0
4	C	0	3	0	0	0	33	0
4	D	0	1	0	0	0	35	0
4	E	0	4	0	0	0	5	0
4	F	0	2	0	0	0	9	0
5	A	0	8	15	0	0	12	0
5	B	0	2	0	0	0	5	0
5	C	0	0	0	0	0	12	0
5	D	0	1	7	0	0	21	0
5	E	0	2	0	0	0	32	0
5	F	0	4	0	0	0	20	3

Table X (cont.)

Free Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
1	A	0	1	0	0	0	29	0
1	B	0	7	0	0	0	23	0
1	C	0	2	1	0	0	31	0
1	D	0	5	0	0	0	19	4
1	E	0	0	0	0	0	29	0
1	F	0	0	0	0	0	30	6
2	A	0	6	1	0	4	14	6
2	B	0	4	0	0	0	32	0
2	C	0	3	6	0	0	14	0
2	D	0	2	6	0	0	24	3
2	E	0	4	0	0	0	31	0
2	F	0	3	1	0	0	10	3
3	A	0	6	19	0	0	11	0
3	B	0	1	5	0	0	30	0
3	C	36	0	0	0	0	0	0
3	D	0	5	16	0	0	15	0
3	E	0	0	35	0	0	1	0
3	F	0	3	0	0	0	33	0

Table X (cont.)

Free Condition

Group	Subject	Games	Food	Supp. Read.	Other Reading	Writing	Passive	Other
4	A	0	0	0	0	0	3	0
4	B	10	4	0	0	0	16	2
4	C	0	0	0	14	5	15	0
4	D	2	3	0	0	0	25	0
4	E	0	0	35	0	0	1	0
4	F	0	3	0	0	0	1	0
5	A	0	1	0	0	0	35	0
5	B	0	9	5	0	0	22	0
5	C	0	0	0	0	0	36	0
5	D	0	2	0	0	0	34	0
5	E	0	1	0	0	0	21	0
5	F	0	0	1	0	0	18	0

Table Y
Body Disposition and Mobility Scores

Sociopetal Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other	Mobility
1	A	0	1	35	0	2
1	B	4	4	22	6	7
1	C	3	8	25	0	16
1	D	3	2	31	0	0
1	F	1	6	27	2	14
2	A	0	1	35	0	0
2	B	0	5	31	0	6
2	C	1	8	26	0	1
2	D	19	4	13	0	18
2	E	0	8	28	0	0
2	F	0	7	29	0	1
3	A	0	1	35	0	1
3	B	0	4	32	0	5
3	C	1	0	35	0	0
3	D	1	0	35	0	3
3	E	0	0	36	0	1
3	F	3	4	29	0	8

Table Y (cont.)

Sociopetal Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other Mobility	
4	a	0	3	31	2	3
4	B	0	0	36	0	0
4	C	0	3	33	0	5
4	D	1	4	31	0	3
4	E	0	1	35	0	0
4	F	0	0	36	0	0
5	A	0	2	34	0	0
5	B	0	4	32	0	4
5	C	0	5	31	0	2
5	D	0	2	34	0	0
5	E	0	0	36	0	0
5	F	0	2	34	0	2

Table Y (cont.)

Mixed Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other Mobility	
1	A	3	2	30	0	1
1	B	0	3	33	0	0
1	C	0	3	33	0	0
1	D	0	1	35	0	0
1	E	1	3	32	0	0
1	F	0	2	34	0	0
2	A	0	0	36	0	0
2	B	0	0	36	0	0
2	C	0	0	36	0	0
2	D	0	0	36	0	0
2	E	0	0	36	0	0
2	F	1	1	34	0	2
3	A	0	0	36	0	2
3	B	0	1	35	0	0
3	C	1	2	33	0	3
3	D	1	0	27	8	4
3	E	0	0	36	0	0
3	F	1	2	33	0	0

Table X (cont.)

Mixed Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other	Mobility
4	A	1	7	28	0	3
4	B	1	2	31	2	6
4	C	0	0	36	0	0
4	D	1	15	18	2	4
4	E	0	24	12	0	3
4	F	1	3	32	0	5
5	A	1	3	32	0	4
5	B	1	1	34	0	3
5	C	0	5	31	0	3
5	D	0	1	35	0	0
5	E	1	4	31	0	4
5	F	1	1	34	0	1

Table Y (cont.)

Sociofugal Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other	Mobility
1	A	3	5	28	0	0
1	B	2	34	0	0	0
1	C	1	2	33	0	0
1	D	2	2	32	0	0
1	E	4	7	25	0	0
1	F	0	0	36	0	0
2	A	1	3	32	0	1
2	B	1	3	32	0	2
2	C	0	3	33	0	1
2	D	1	1	34	0	1
2	E	0	1	35	0	0
2	F	1	0	35	0	0
3	A	2	2	32	0	5
3	B	0	0	36	0	0
3	C	0	24	12	0	3
3	D	2	5	29	0	2
3	E	0	7	29	0	5
3	F	1	3	32	0	5

Table Y (cont.)

Sociofugal Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other Mobility	
4	A	0	0	36	0	0
4	B	0	0	36	0	0
4	C	0	0	36	0	0
4	D	0	0	36	0	0
4	E	2	2	32	0	1
4	F	0	1	35	0	2
5	A	1	1	32	0	1
5	B	0	10	26	0	2
5	C	0	11	25	0	2
5	D	0	0	36	0	0
5	E	0	3	33	0	0
5	F	0	3	30	3	6

Table Y (cont.)

Free Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other	Mobility
1	A	0	1	35	0	2
1	B	0	6	30	0	6
1	C	3	2	31	0	7
1	D	1	3	28	4	9
1	E	0	0	36	0	0
1	F	0	1	29	6	3
2	A	1	3	26	6	2
2	B	1	1	34	0	0
2	C	0	0	36	0	0
2	D	0	1	32	3	3
2	E	6	3	27	0	7
2	F	1	4	28	20	5
3	A	0	0	36	0	0
3	B	22	13	1	0	24
3	C	0	0	36	0	0
3	D	1	0	35	0	0
3	E	0	1	35	0	2
3	F	0	1	35	0	1

Table Y (cont.)

Free Condition

Group	Subject	Walking	Standing	Sitting in Chair	Other	Mobility
4	A	0	0	36	0	0
4	B	4	9	23	4	12
4	C	1	1	34	0	3
4	D	1	4	31	0	4
4	E	0	0	36	0	0
4	F	1	3	32	0	2
5	A	0	9	27	0	3
5	B	0	1	35	0	1
5	C	0	1	35	0	0
5	D	0	1	35	0	2
5	E	0	0	36	0	0
5	F	0	3	33	0	2