SECTION 3

Environment and Behavior

Papers in this section represent a different theoretical perspective than those in the last section. Here, the concern is with linking environments directly to important overt behaviours (and thus bypassing any concern with intervening perceptual or cognitive process). Behavior is defined in a broad sense to include a range of human activities from momentary feelings to relatively stable social patterns or life styles. These papers cut across traditional disciplinary lines in a way that has become characteristic of behavioural science efforts concerned with environmental problems. In addition, many of them contain cogent discussions of the potential uses and misuses of behavioural data and conclusions in the design process.

The first four papers present field studies concerned with the effects on behaviour of various aspects of restricted, institutional environments. The papers by Stokols and Marrero and by Rosenbloom provide new examples of the effects of local architectural features on patterns of social behaviour. In a fine example of field research, Stokols and Marrero examine racial polarization in a youth training school. They found an interesting mixture of positive and negative effects of a change to a more sociopetal furniture arrangement in the school's day room. Rosenbloom studied the effects of sociopetal versus sociofugal furniture arrangements, as did Stokols and Marrero, but also studied the use of portable barriers to create open or enclosed spaces within a college student lounge. Enclosing the space resulted in the formation of groups that were smaller, stayed longer, and interacted with each other less, than groups in the open space.

Presthold, Taylor, and Shannon observed inmates and staff of a women's prison as they moved from an old, crowded, dilapidated facility to an elaborate, new complex--with somewhat discouraging results. The design of the "ideal" modern prison resulted in fewer contacts between staff and inmates and in this way probably hindered the rehabilitative ability of the institution. Finally, Sims used a more exploratory interview technique to study environmental effects on the effectiveness of a halfway house for parolled prisoners. He suggests that, indeed, privacy, appearance, noise, and other building

and site features are important influences on both the programme and its relationship to the surrounding neighborhood.

The next seven papers are concerned with the influence of larger units of the environment--units ranging from neighbourhoods to regions within a state. Fish compares neighbourhoods that differ in the degree to which the residents were homogeneous or heterogeneous in socioeconomic status. She reports that heterogeneity relates to satisfaction with place of residence and to a variety of social behaviour patterns.

Grabow and Salkind, in investigating the "hidden structure" of childrens' play, show that children not only know their urban neighborhood in some detail, but also use its elements creatively in play, often ignoring the more conventional play structures provided. Taylor and Hall discuss the effect of various aspects of community design on subjective noise ratings. They provide interesting data on the apparent inability of residents to adapt to freeway traffic noise and on the inadequacy of building design alone to reduce noise impact.

Passino and Lounsbury report some fairly dramatic sex differences in responses to a proposed community-wide environmental change: a nuclear power plant. In a somewhat more qualitative study of a neglected type of planned community, Alanen traces the evolution of a planned company town over a period of 60 years. Current residents show great satisfaction with, and a sensitive awareness of, the design elements originally used in planning the town. A similar type of social-evolutionary study of a small, no-growth, industrial city is reported by Greenbie, who then suggests an ethological model, with suggested policies for the city's future growth that preserve the positive, stable aspects of its present social and environmental situation. In the final paper of this group, Jobes discusses the problems of implementing planned resource development on a regional level and reports a survey of residents' attitudes towards land use and development.

The last three papers of this section are concerned with methods of obtaining data needed for input to design decisions. Reischl and Reischl discuss a radio-telemetry system for the simultaneous collection of information about both environmental parameters and a variety of physiological measures of human functioning. Stahl describes the development and preliminary evaluation of a simulation model of human behaviour in high-rise building fires. His paper has broad implications for the usefulness of such methodologies in other areas as well, and may provide the means to avoid some costly design mistakes. And in the final paper of this section, Biel describes his very interesting Journey to Work Game, in which players examine their own choices among transportation modes and routes along their journey to work. In this way, players observe the effects of transportation policy and urban location on commuting behaviour.

THE EFFECTS OF AN ENVIRONMENTAL INTERVENTION ON RACIAL POLARIZATION IN A YOUTH TRAINING SCHOOL[1]

Daniel Stokols and David G. Marrero
Program in Social Ecology
University of California, Irvine

ABSTRACT

The effects of a shift from sociofugal to sociopetal (Osmond, 1957) furniture arrangements on racial polarization in a youth training school were assessed through a quasi field-experiment. The occupants of a control and an experimental dayroom were observed over repeated measurement periods for one month before and one month after the furniture rearrangement. Results provided partial support for the major hypotheses, indicating that within the experimental dayroom, levels of positive interracial contact and favorable evaluations of staff increased while, at the same time, disruptive behavior increased and levels of overt aggression, racial polarization (spatial), ratings of general satisfaction and of fellow inmates remained unchanged. The implications of these findings for future interventions in correctional settings are discussed.

There appears to be growing sentiment among members of the criminal justice professions that traditional and time-worn modes of correctional rehabilitation have been monumentally ineffective. This increasingly self-critical sentiment is reflected in the recent writings of both prison officials and researchers in the field of criminology.

Martinson (1974) reviews the findings from 231 studies that evaluated correctional treatment methods during 1945-1967 and concludes that none provides any evidence for the effectiveness of educational and counseling programs in reducing recidivism rates among juvenile and adult offenders. Sykes (1958) contends that the correctional environment poses a continual threat to the inmate's identity and self-concept. Wright (1973) portrays prisons in America as fortresses of racial prejudice and violence. And, while critics such as Sykes and Wright have focused upon the appalling social conditions existing within contemporary prisons, Nagel (1973) presents a comprehensive critique of the dilapidated and dysfunctional physical conditions existing within the majority of correctional facilities built since the Nineteenth Century.

The present research coincides with a burgeoning interest in the field of corrections concerning the impact of physical and social conditions in prisons on the health and behavior of inmates. Specifically, the effects of an architectural intervention on patterns of racial polarization are examined within a youth detention facility.

Previous research on correctional treatment has not examined the effects of prison design on racial polarization. Yet, despite the lack of scientific data concerning the specific relationship between prison architecture and inmate behavior, an increasing amount of research on environment and behavior is being implemented in non-correctional settings. The findings from this research provide a potential basis on which to develop and test correctional interventions designed to reduce behavioral and psychological problems among prison inmates.

Increased awareness of ecological problems throughout the world contributed to the emergence in 1970 of environmental psychology, or the systematic study of the ways in which physical and social dimensions of the environment affect individual and group behavior (Craik, 1970; Proshansky, Ittelson, and Rivlin, 1970; Wohlwill, 1970). Environmental-psychological research places a strong emphasis on the use of naturalistic, longitudinal methods of observation as a means of examining the longterm behavioral effects of natural and man-made environments.

Among the issues investigated by environmental psychologists are the effects of noise, crowding, and architectural features on human task performance and social interaction. One of the most extensively studied problems in the field is the manner in which architectural arrangements affect patterns of social behavior. Three programs of research are particularly relevant to this concern: Sommer's (1969, 1972, 1974) research on the interior arrangements of institutional facilities, the work of Festinger, Schachter, and Back (1950) on the relationship between residential proximity, friendship formation, and attitude change, and the research of Deutsch and Collins (1956) on the reduction of racial prejudice through desegregation of housing projects.

Sommer has conducted numerous studies concerning the effects of furniture arrangements in a variety of settings including hospital wards, airport lounges, and health-care facilities for the aged. Much of this research has been based upon Osmond's (1957, 1959) distinction between "sociopetal" and "sociofugal" environments. The arrangement of the former environments (e.g., dormitory lounges) tends to encourage social interaction whereas that of the latter settings (e.g., libraries) operate to limit interpersonal encounters. The general pattern of findings from Sommer's research is that levels of group cohesion and invdividual well-being can be heightened in institutional settings by shifting from linear, sociofugal arrangements of furniture to clustered, sociopetal designs. The basic explanation for such findings is that sociopetal environments foster eye contact, increase the likelihood of conversation, and thereby contribute to the development of sustained interaction patterns among occupants of the setting.

The research conducted by Festinger, Schachter, and Back focused on the dimension of residential proximity as an antecedent of friendship formation and attitude change. The study was carried out on the campus of the Massachusetts Institute of Technology. Residents of a married-student housing complex were interviewed to determine whether their closest friends were in fact those neighbors whose apartments were nearest to their own. The results of the study revealed a strong association between the distances separating the front doors of various apartments and the friendship choices reported among residents of the housing complex. Moreover, residential proximity was found to be highly correlated with attitude similarity among the residents.

The research of Deutsch and Collins explored the effects of racial desegregation in New York and Newark apartment buildings on the prejudicial attitudes of white residents. The study compared the attitudes of residents living in both segregated and integrated buildings and found that the latter group displayed a reduction in racial prejudice following the desegregation of their apartment complex. These results were explained in terms of "equal-status contact theory." It was reasoned by the authors that proximity with same-status members of a previously-devalued group provided the prejudiced person with an opportunity to observe outsiders in activities which were similar to his/her own routine (e.g., engagement in parental roles). Such experiences enabled individuals to view others as more similar to themselves and, therefore, less deserving of scorn.

All of the above studies emphasize the positive value of interpersonal proximity in promoting prosocial behavior and suggest at least one type of architectural intervention that might be applied in correctional settings as a means of decreasing racial polarization: namely, the substitution of sociopetal furniture arrangements in recreational areas for those that are sociofugal in nature. This type of environmental change was employed as the experimental intervention in the present study. In line with earlier research, the major experimental hypotheses were as follows:

Subsequent to a shift from sociofugal to sociopetal furniture arrangement, the users of the sociopetal area will display (H1) less aggression, (H2) more positive interracial contact and reduced racial polarization, and (H3) more favorable ratings of satisfaction with the institution in general and, more specifically, with staff and peers, than those occupants of a comparable area in which sociopetal arrangements have not been implemented.

METHOD

Setting

The present research was conducted at the California Youth Training School (YTS) in Chino, California. The residents of YTS are incarcerated for charges ranging from minor offenses (e.g., incorrigibility) to major crimes (e.g., armed robbery, assault with a deadly weapon, and murder).

The school consists of three living units, each housing 400 persons. Each unit is divided into four teams, a team being comprised of two companies with 50 residents apiece. Each team is characterized by the particular orientation of its program, for example, drug rehabilitation, intensive treatment, security (protective custody), and college program.

Individual companies are assigned to their own dayrooms which are equipped with such facilities as a television set, ping-pong table, tables, chairs and water fountain. Each team also has access to an outdoor recreational yard with a volleyball net, punching bags and weight lifting equipment. Data from the present study were gathered during the evening hours when the majority of residents from each of two companies occupied the dayrooms assigned to their team.

Subjects

Subjects for this study were chosen from Companies C and D of Living Unit I. Residents of C company comprised the experimental population and those of D company, the control population. Companies C and D were selected as the research groups due to their similarities on a number of dimensions. First, most of the residents from these companies were involved in the YTS college program. Second, the physical arrangements of the dayrooms for these companies and the staff policies regarding inmates' usage of these areas were identical. And, third, the ages of the inmates in Companies C and D were comparable (between 18 and 24) and the membership of both companies represented a cross-section of four racial or ethnic groups, i.e., Blacks, Mexican-American, Caucasian and Oriental. Each company reflected approximately the same ethnic ratio, which, while subject to fluctuation, displayed consistency throughout the study. The average ethnic composition of company C, for example, was 24 Blacks, 14 Mexican-Americans, 8 Caucasians and 4 Orientals. D company's composition was nearly identical.

Despite these similarities, Companies C and D were unavoidably different in certain respects. Most notably, the frequency of aggressive interracial encounters had been higher in Company C than in Company D, for several months prior to the initiation of this research. This difference, in fact, was the basis on which Company C was designated as the experimental group, and Company D as the control.

Independent variables

The study incorporated a single between-groups factor, furniture rearrangement, and one within-group factor, time. The experimental group received a restructuring of the semifixed

features in the room designed to encourage positive interracial interaction and reduce racial polarity (See Figures 1 and 2). The experimental intervention was based upon both theoretical considerations (i.e., the distinction between sociofugal vs. sociopetal architecture) and (2) patterns of racial territoriality observed in the dayrooms during a period of baseline data collection.

Specifically, it seemed clear from our initial observations that the dayrooms for Companies C and D were divided into ethnic and racial territories. For example, in both dayrooms, Blacks typically occupied the rows of chairs directly in front of the T.V., whereas the Caucasians, Mexican-Americans and Orientals generally claimed separate groupings of chairs

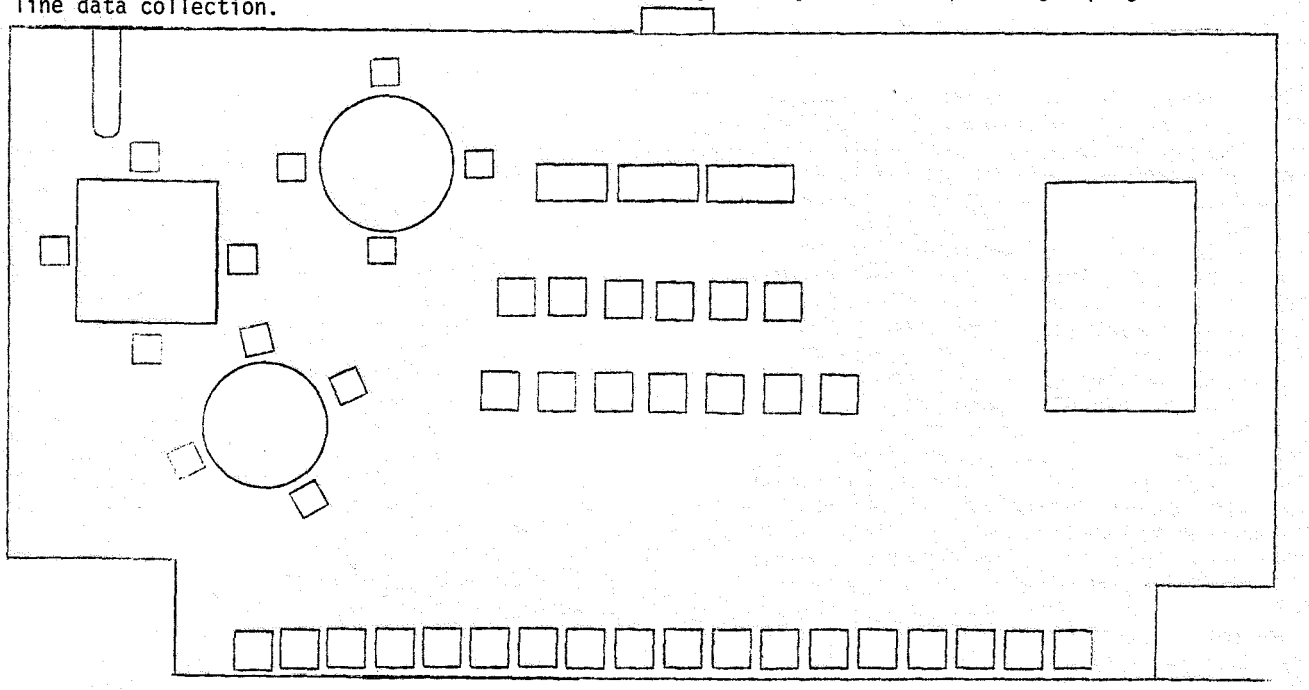

FIGURE 1: SOCIOFUGAL ARRANGEMENT OF THE DAYROOM (DIAGRAM DEPICTS THE ARRANGEMENT OF DAYROOM C PRIOR TO THE INTERVENTION, AND OF DAYROOM D THROUGHOUT THE STUDY)

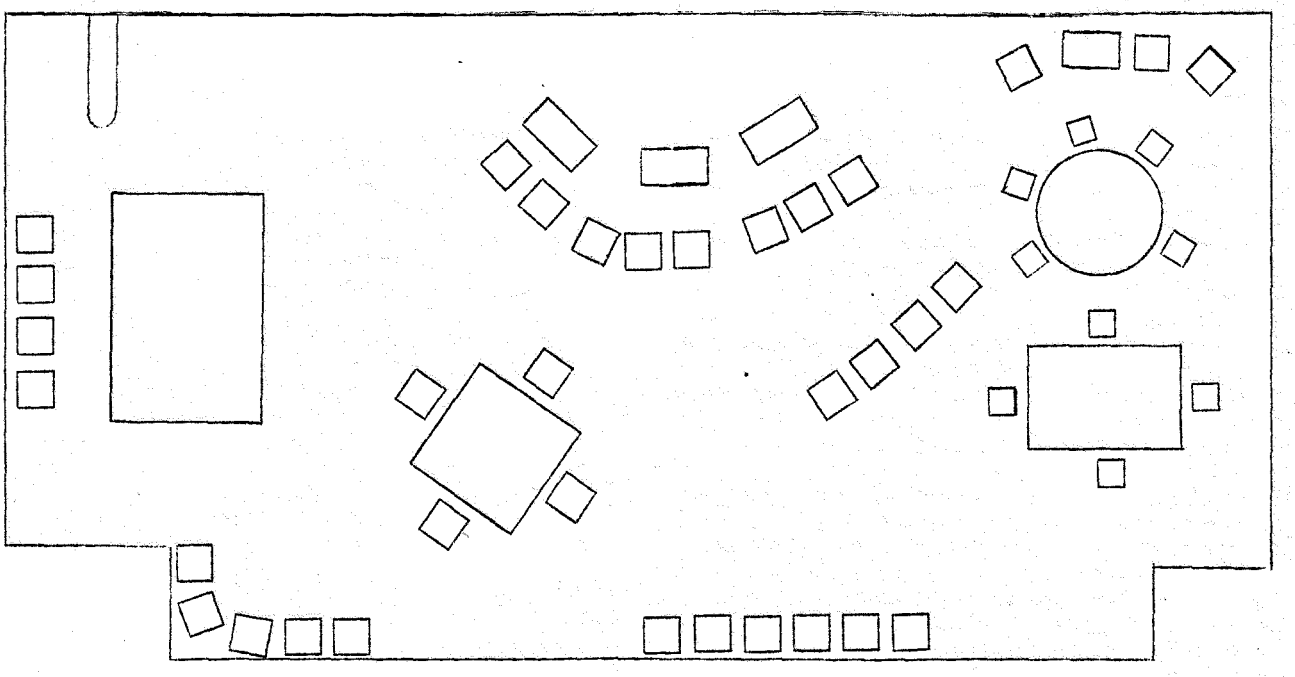

FIGURE 2: SOCIOPETAL ARRANGMENT OF FURNITURE IMPLEMENTED IN EXPERIMENTAL DAYROOM C

lined up against the rear wall of the room (See Figure 1). It was further evident that such racial territories were consistently maintained and that territorial violations were infrequent.

At the same time, however, it was noted that certain areas of the dayroom were racially neutral and relatively non-polarized. For example, the tables and chairs used for game-playing and the ping-pong tables were utilized by all groups. It was in this "free", public space that interracial contacts occurred, albeit infrequently.

Thus, it appeared that some degree of "relaxed competition" in the context of various game activities was permitted to cross racial/ethnic boundaries. Taking advantage of this point, the experimental intervention incorporated sociopetal furniture arrangements in which soft-backed chairs were clustered around game-playing tables and chairs, and the three straight rows of chairs in front of the T.V. were broken down into two semi-circular rows (See Figure 2). The purpose of the former change was to heighten the possibility that spectators would gather around the game activities and strike up conversation with game participants. And the purpose of the latter change was to reduce the level of racial polarization in areas that were previously dominated by one or two racial groups.

The rearrangement of Dayroom C was implemented by members of the research team and the YTS staff at a time when the residents of Companies C and D were attending classes, and their respective dayrooms were unoccupied. It should be noted that at no time were the dayroom staff in Companies C and D given specific information concerning the experimental hypotheses.

Procedure

All observations were conducted between November 1974 and March 1975, on Monday and Wednesday evenings from approximately 7:15 PM to 9:30 PM. The recreation room was divided into four equal-area quadrants based upon copies of the dayroom blueprints. One observer was assigned to each quadrant and was responsible for recording data occurring only in that quadrant. This four-observer method was designed to maximize an observer's ability to view and record all relevant behavior within a perceptually-manageable spatial area. Information gathered from all four quadrants was then composited as a whole.

During each observation period a total of eight observers (four per company) were employed. All observations were done from the control center (i.e., where the staff are normally located) and from the hallways nearest the control center. Observers were positioned there to be as unobtrusive as possible, though they were visible to the inmates and able to interact with them. Inquiries from the inmates concerning the purpose of this research were answered by observers with the response that they were architecture students studying the use of furniture and activities in the dayroom in order to facilitate the design of better recreational rooms in the future. At no time were the inmates given specific information about the experimental hypotheses. While the presence of visible observers may have resulted in Hawthorne effects, these effects seemed equally likely to occur in Dayrooms C and D and thus, were not expected to exert differential effects on the behavior of inmates in these two rooms.

An observation period was divided into four measurement intervals (designated t_1, t_2, t_3, and t_4) each of which consisted of two phases. The first was the spatial mapping phase. During this phase each observer drew upon a floor-plan replication any fixed or semifixed objects (e.g., tables, chairs) positioned in his/her quadrant. The observer then charted the relative position and race of any inmate occupying the quadrant. The mapping phase lasted for five minutes.

Because some inmates would enter or leave the quadrant during the mapping phase, the maps were "fixed" at four minutes and thirty-seconds to avoid repeating or overlapping measures. Those entering a quadrant after four and a half-minutes had passed were not recorded on the map for that quadrant.

Following each five-minute mapping phase, the second phase involving a fifteen-minute period of behavioral observation was initiated. Specifically, behaviors that were judged to be aggressive, either physically or verbally, were recorded as were any positive interracial contacts. Both rates of incidence and racial composition were recorded. Each fifteen-minute observation phase was divided into three five-minute frames to allow for determination of when a particular incident occurred within a fifteen minute span.

In summary, the mapping and behavioral observation phases took twenty minutes and constituted one measurement interval. Each evening of data collection included four measurement intervals which, together, lasted for one hour and twenty minutes. During this time, Companies C and D were observed simultaneously.

Dependent Measures

The principal dependent measures in this study were observational indices of aggressive and positive interracial contact, racial polarity, archival records of disruptive behavior, and questionnaire scales pertaining to inmates evaluation of YTS staff, peers, and general living conditions within the institution.

Interracial contact. Verbal and physical behaviors construed as unequivocably aggressive were recorded as well as any positive interracial encounters. Three categories of interracial contact were charted: verbal interaction between inmates and staff, verbal interaction between inmates, and physical encounters between

inmates.

Within each behavioral category, the number and ethnicity of the interactants were recorded as well as the quality of the interaction. Thus, a notation of "-2B1W" under category "Phys-In" indicated that two Black inmates and one White inmate were engaged in an aggressive physical encounter.

Aggressive acts were defined as those which were blatantly hostile in tone, e.g., one inmate physically assaulting another in a clearly non-joking manner; or a verbal assault with raised voice (yelling) and expressive body gestures (clenched fists, extreme proximity, etc.). Positive interracial contacts were defined as any non-aggressive interaction between the members of two or more racial groups.

All aggressive encounters were charted, regardless of racial composition. Positive interactions, both verbal and physical, were recorded only if they occurred interracially. Among the kinds of positive interaction recorded were extended conversations (tabulated as one incident per time interval), game-playing activities, and friendly backslapping.

The levels of aggressive and non-aggressive interaction were analyzed separately. Within each observation period, the number of negative and positive contact occurring in each quadrant of the dayroom were summed to yield interaction total-scores for t_1, t_2, t_3, and t_4. These scores were utilized as the main units of data analysis regarding interracial contact.

Racial Polarity. Racial polarization was defined as the spatial clustering and separation of ethnic groups within the dayroom.

The index of polarity for each dayroom quadrant was derived by calculating the extent to which the percentages of Blacks, Mexican-American, Caucasians, and Orientals found in the quadrant deviated from the actual ratio of these groups reflected among the total number of inmates occupying the dayroom during the observation period. Thus, if the membership of a particular quad was 90% Black and 10% Oriental, whereas the composition of the dayroom was 40% Black, 30% Mexican-American, 20% Caucasian, and 10% Oriental, the polarity index for the quad would be 100 (i.e., the total absolute value of all deviation scores: B-B, M-M, C-C, and O-O).

For each of the four mapping phases within an observation period, a polarity score for each quadrant of the dayroom was derived. The four quadrant scores within each fifteen-minute interval were averaged to yield a mean index of racial polarity at t_1, t_2, t_3, and t_4. These mean-scores served as the primary units of analysis in assessing patterns of racial polarization within the dayrooms.

Disruptive behavior. All forms of disruptive behavior occurring within Companies C and D before and after the experimental intervention were counted from available institutional records. These records were compiled by staff, who, in connection with their regular duties, formally reported the occurrence of unusually disruptive events. Among the behaviors listed as disruptive were assaults on staff or inmates, possession of weapons, stealing, attempted escape, bribery, malingering, and failure to follow safety or sanitation rules.

Questionnaire data. The fourth set of dependent measures employed in this study included separate clusters of seven-point semantic differential scales. These scales pertained to inmates' overall satisfaction with living conditions at YTS as compared to the conditions at similar correctional facilities; their feelings toward the staff; and their evaluations of fellow inmates. A supplementary set of open-ended items probed residents' opinions about the best and worst features of their living situation, and the types of design changes they would like to have implemented in their dayroom settings.

The questionnaire scales were administered individually to randomly selected samples of residents in Companies C and D both prior and subsequent to the experimental intervention.[3] The open-ended items were administered only after the intervention had been implemented. The semantic-differential data were tabulated as follows: For each person, item responses were averaged within clusters to yield separate summary scores on the dimensions of residential satisfaction, staff ratings, and evaluation of peers. Subsequently, individuals' summary scares within each racial group were averaged to yield four group means (Black, Mexican-American, Caucasian, Oriental) on each dimension of response. These group summary-scores served as the major units of data analysis.

Research Schedule

Prior to the commencement of the research, observers attended a series of instructional sessions designed to acquaint them with the observational protocols. Subsequently, a preliminary series of observations was conducted in the dayroom settings to assess the statistical reliability of the behavioral measures used in the study. Reliability data was collected during five observational sessions conducted during November, 1974.

The collection of baseline data commenced during late January, 1975 and extended through February, 1975. The experimental intervention was implemented in Dayroom C on March 3, 1975. Observational recordings were made during four pre-intervention and four post-intervention sessions. It should be noted that in Dayroom C, the experimental rearrangement of furniture remained relatively constant throughout the four-week period of post-intervention observations.

Questionnaires and structured interviews were administered on February 26th, 1975 (pre) and on March 19, 1975 (post).

RESULTS

All behavioral and questionnaire data were analyzed in terms of repeated-measures multivariate analysis of variance (MANOVA) with one between-groups factor, furniture arrangement.

An assumption underlying the use of MANOVA procedures was that all summary scores within each experimental group and within each time frame were statistically independent. To assess the degree of statistical dependence among data cases within each cell of the design, specific control procedures were employed in analyzing both the behavioral and questionnaire data.

In the analysis of the behavioral data, a preliminary repeated-measures MANOVA (measurement intervals X furniture arrangement) was performed to determine whether the four summary scores obtained during each evening of observation (t_1, t_2, t_3 and t_4) were confounded by temporal trends. The results of this analysis indicated the absence of linear, quadratic, or cubic effects on the data, as well as any interaction effects involving these temporal components and the between-groups factor. Subsequently, the summary scores derived within each of the original, eight observation periods were collapsed into four assessment phases for the primary repeated-measures analysis (phase X furniture arrangement) involving an assessment of inmates' pre- and post-intervention behavior (Phases I and II being comprised of pre-intervention data from periods 1-4, and Phases III and IV of post-intervention data from periods 5-8). This procedure insured that data collected during at least two different evenings were included within each time frame of analysis.

In the analyses of the questionnaire data, summary mean-scores for four ethnic groups (Black, Mexican-American, Caucasian, and Oriental) were computed on the basis of data collected from individual inmates in Companies C and D both before and after the experimental intervention. The ethnic mean-scores then were analyzed in terms of a three-way (ethnicity X furniture arrangement X time) repeated-measures MANOVA. No main effects or interaction effects involving the ethnicity factor were obtained. On the basis of this analysis, the ethnic group summary-scores were treated as independent data cases within each time frame and treatment group. The primary analysis of the data, thus, involved a two-way (furniture arrangement X time) repeated-measures MANOVA[5].

Analyses of Behavioral Data

Reliability of behavioral measures. To assess inter-observer reliability on measures of racial polarization and interracial contact, two independent observers were assigned to the same dayroom quadrant[6]. The degree of correlation between the observers' recordings of aggression, positive interaction, and polarization during each measurement interval was computed. Correlation coefficients for each measure during each interval were averaged to yield summary reliability scores for each observational period. The mean reliability scores obtained during each of the five observation periods then were averaged to yield overall reliability coefficients for each measure.

The reliability coefficients for the summated index of verbal and physical aggression were 1.00, .95, .99, 1.00, and .98 yielding an overall reliability coefficient of .98. For the measure of positive interracial encounters, the coefficients were .77, .90, .91, .86, and .92 yielding on average reliability coefficient of .87. And, for the index of racial polarization, individual reliability scores were .90, .89, .93, .85, and .84 with an overall reliability coefficient of .90.

Reliability data for the disruptive-behavior measure were not available.

Verbal and physical aggression. According to the first experimental hypothesis, levels of aggression in Dayroom C would exhibit a post-intervention decrease and, in Dayroom D, would remain at the same level during the pre- and post-intervention phases. Contrary to expectation, the occurrence of overt aggression was quite infrequent and not noticeably different in the two dayrooms. In Dayroom C, one aggressive incident occurred during Phase I, two during Phase II, and two during Phase III. In Dayroom D, only one such incident was observed during Phase I, and one during Phase IV. The minimal occurrence of aggressive behavior contributed to an elevated coefficient of reliability (.98) on the summary index of aggression, but precluded statistical analysis of the data.

Positive interracial contact and racial polarization. The second experimental hypothesis predicted that within Dayroom C, the frequency of positive interracial encounters following the experimental intervention. The levels of interaction and polarization in Dayroom D, however, were expected to remain unchanged subsequent to the intervention. In MANOVA terms, a significant treatment X linear-trend interaction effect was expected on the two measures.

The mean levels of positive interracial contact and racial polarization during all observation periods of the study are presented in Tables 1 and 2, respectively. The collapsed mean scores for the two measures during Phases I, II, III, and IV of the investigation are shown in Figures 3 and 4.

TABLE 1: MEAN LEVELS OF POSITIVE INTERRACIAL CONTACT IN DAYROOMS C AND D DURING PRE-INTERVENTION AND POST-INTERVENTION PHASES OF THE INVESTIGATION[a]

Dayroom	Observation Period							
	Pre-1	Pre-2	Pre-3	Pre-4	Post-1	Post-2	Post-3	Post-4
C	8.25	8.00	2.75	12.75	9.00	5.50	11.75	6.75
D	1.25	1.75	.75	0.00	6.75	9.00	3.00	3.25

a. Larger means indicate higher levels of positive interaction.

TABLE 2: MEAN LEVELS OF RACIAL POLARIZATION IN DAYROOMS C AND D DURING PRE-INTERVENTION AND POST-INTERVENTION PHASES OF THE INVESTIGATION[a]

Dayroom	Observation Period							
	Pre-1	Pre-2	Pre-3	Pre-4	Post-1	Post-2	Post-3	Post-4
C	68.10	75.30	106.20	69.00	94.10	85.70	59.80	46.90
D	73.50	87.40	127.60	101.60	101.30	85.60	82.80	68.60

a. Larger means indicate higher levels of racial polarization.

These data suggest that the levels of interracial contact and racial polarization were markedly different within Dayrooms C and D both before and after the experimental intervention.

Evidence for the significance of between groups differences on measures of interaction and polarization is presented in Table 3 (multivariate F (2,13) = 63.28, $p < .001$). Significantly higher levels of positive interracial contact (F (1,14) = 135.85, $p < .001$) and lower levels of racial polarization (F (1,14) = $p < .007$) were exhibited by the occupants of Dayroom C than by those of Dayroom D.

The above findings do not indicate whether the behavioral differences observed among members of Dayrooms C and D were attributable to experimental or non-experimental sources of variation. Results from the within-groups analyses, though, provide a more specific assessment of the effects of the experimental intervention (see Table 3).

The within-groups analyses revealed a significant, multivariate linear trend indicating that levels of interracial contact increased while those of racial polarization decreased throughout all phases of the research (F (2,13) = 8.12, $p < .005$). Significant univariate linear trends were evident for interracial contact (F (1,14) = 4.94, $p < .043$) and racial polarization (F (1,14) = 7.81, $p < .014$).

The observed linear trends were qualified by a significant quadratic trend (multivariate F (2,11) = 6.50, $p < .014$) and a marginally-significant treatment X quadratic interaction effect (multivariate F (2,11) = 3.14, $p < .08$). Inspection of the univariate results revealed a significant quadratic trend on the index of polarization, such that levels of polarization in Dayrooms C and D increased prior to the experimental intervention and decreased subsequent to it (F (1,13) = 17.06, $p < .001$). Moreover, a significant treatment X quadratic interaction effect on levels of interracial contact was found, indicating that a gradual rise in interaction levels occurred in Dayroom C whereas an initial rise and subsequent decline in levels of interaction occurred in Dayroom D (F (1,13) = 7.18, $p < .019$).

The interactive effect of the furniture-arrangement factor and the quadratic component provides some evidence that the between-groups differences between Dayroom C and D were attributable in part, at least, to experimental sources of variance.

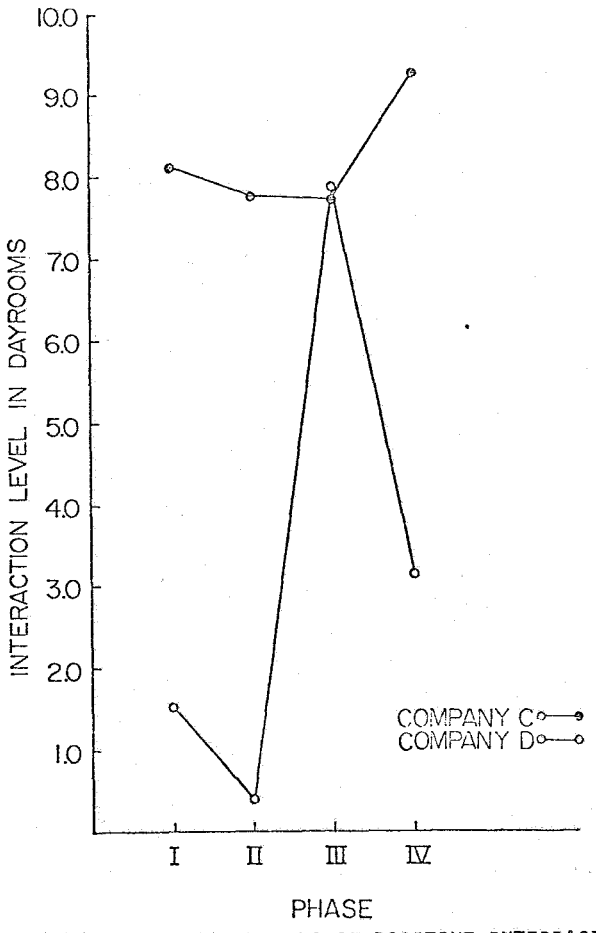

FIGURE 3: MEAN LEVELS OF POSITIVE INTERRACIAL CONTACT DURING EACH PHASE OF THE INVESTIGATION

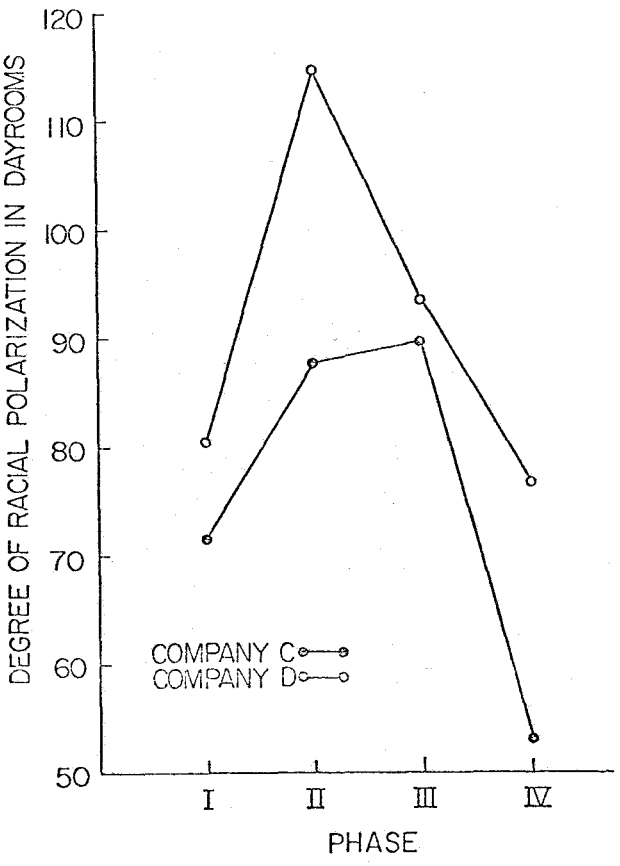

FIGURE 4: MEAN LEVELS OF RACIAL POLARIZATION DURING EACH PHASE OF THE INVESTIGATION

TABLE 3: MULTIVARIATE ANALYSIS OF VARIANCE ON REPEATED MEASURES OF POSITIVE INTERRACIAL CONTACT AND RACIAL POLARIZATION OVER PHASES I, II, III, AND IV OF THE STUDY

Source	Univariate df	Positive Contact MS	Positive Contact F	Polarization MS	Polarization F	Multivariate F
Between Groups						
Expsl. Treatment (E)	1	95.06	135.85****	987.21	9.80***	63.28****
Error Between	14	.70		100.76		
Within Groups [a]						
Linear Component (L)	1	930.25	4.94**	29523.64	7.81**	8.12***
E x L	1	360.99	1.92	2.23	<1.00	<1.00
Error Within (Linear)	14	188.35		3778.07		
Quadratic Component (Q)	1	63.67	1.97	21758.48	17.06****	6.50**
E x Q	1	231.53	7.18**	2.23	<1.00	3.14*
Error Within (Quadratic)	13[b]	32.26		1275.26		

a. Tests of cubic component and related interactions yielded statistically insignificant results.

b. Tests of quadratic component and related interactions performed using the linear score as a covariate.

* p<.10 ** p<.05 *** p<.01 **** p<.001

Disruptive behavior. Since the reliability of this measure was indeterminate, no statistical analyses were performed on the related data. Nonetheless, because of its unobtrusiveness, the disruptive-behavior index was viewed as a useful supplement to the observational measures used in this research.

The total numbers of recorded disruptive behaviors occurring within Companies C and D before the experimental intervention (between January 30-March 2, 1975) were 37 and 38, respectively. Subsequent to the intervention (between March 3-April 5, 1975), 48 disruptive events were recorded in Company C and 35 in Company D. These data suggest that the rearrangement of furniture within Dayroom C led to a rise in the incidence of disruptive behavior among members of Company C.

Interestingly, the magnitude of change in disruptive behavior between pre- and post-intervention periods was quite different for the Black, Mexican-American, Caucasian, and Oriental groups. Within Company C, the amounts of change in disruptive behavior between pre and post assessment periods were +15, -5, +1 and 0 for the above groups respectively. Within Company D, the corresponding change scores were 2, -4, -3, and 0. Thus, the post-intervention rise in disruptive behavior was greatest among the Black members of Company C.

Analyses of questionnaire Data

The third experimental hypothesis predicted that within Company C, levels of inmates' general satisfaction with their living situation, ratings of staff, and ratings of fellow inmates would rise subsequent to the experimental intervention. Elevations in these behavioral levels were not expected to occur within Company D. Thus, a significant treatment X linear-trend interaction effect was expected on the three questionnaire measures.

The mean levels of satisfaction, ratings of staff, and evaluation of peers, before and after the experimental intervention, are presented in Table 4. These data indicate that within Company C, ratings of satisfaction and staff increased while ratings of peers decreased following the intervention. Among the residents of Dayroom D, however, ratings of satisfaction and staff declined while evaluation of peers increased.

TABLE 4: MEANS ON QUESTIONNAIRE ITEMS PERTAINING TO INMATES' SATISFACTION WITH THEIR LIVING SITUATION, RATINGS OF STAFF, AND RATINGS OF PEERS DURING PRE- AND POST-INTERVENTION PHASES OF THE INVESTIGATION

Questionnaire Scale	Company			
	C		D	
	Pre (N=18)	Post (N=15)	Pre (N=18)	Post (N=13)
Satisfaction with YTS Relative to Other Correctional Facilities	2.52	3.70	3.86	2.57
Ratings of Staff on Companies C and D	3.72	4.20	4.49	3.83
Ratings of Fellow Inmates Companies C and D	4.57	4.12	4.45	4.66

a. Larger means indicate higher ratings on the attributes listed.

TABLE 5: MULTIVARIATE ANALYSIS OF VARIANCE ON REPEATED MEASURES OF INMATE SATISFACTION, RATINGS OF STAFF AND OF FELLOW INMATES DURING PRE- AND POST-INTERVENTION PHASES OF THE INVESTIGATION

Source	Univariate df	Inmates' Satisfaction		Inmates' Rating of Staff		Inmates' Rating of Fellow Inmates		Multivariate F
		MS	F	MS	F	MS	F	
Between Groups								
Exptl. Treatment (E)	1	.04	<1.00	.08	2.00	.09	<1.00	<1.00
Error Between	6	.31		.04		.16		
Within Groups								
Linear Component(L)	1	.30	<1.00	.06	<1.00	.12	<1.00	<1.00
E x L	1	7.90	2.76	2.62	9.28*	.88	2.17	3.87
Error Within (Linear)	6	2.86		.28		.41		

* p<.05

The significance of the above trends were assessed through a repeated-measures MANOVA, the results of which are presented in Table 5. No main effects of the experimental treatment on the subjective-report measures were found. The within-groups analyses, though, revealed a significant treatment X linear-trend interaction effect on inmates' ratings of staff (F (1,6) = 9.28, p .023), such that ratings of staff increased significantly within Company C and decreased significantly within Company D.

This finding should be interpreted with caution in view of the non-significance (p .112) of the multivariate F for the treatment X linear interaction effect. It should be noted, however, that the statistical tests of these effects were somewhat conservative in that ethnic-group means rather than individual scores served as the units of analysis (thereby yielding a marked reduction in degrees of freedom for error).

DISCUSSION

The results of this study indicate that rates of verbal and physical aggression remained unexpectedly low and were virtually unaffected by the experimental intervention. The low incidence of aggression in Dayrooms C and D may have been due to the overly restrictive nature of the observational criteria (hence, weak to moderate forms of aggression may have gone unnoticed), or to the fact that acts of overt aggression were simply uncommon in Companies C and D. In the latter case, it is possible that inmates restrained their aggression either temporarily while outside observers were present or more permanently due to the negative consequences of participating in aggressive incidents (e.g., withdrawal of recreational privileges).

Unobtrusive measures obtained from institutional records, however, suggest that various forms of disruptive behavior increased in Company C following the experimental intervention.

Additional evidence for the behavioral impact of furniture rearrangement is reflected in the significant linear-trend and treatment X quadratic-trend interaction effect on levels of positive interracial contact. Occupants of Dayroom C displayed elevated levels of interracial contact following the intervention whereas those of Dayroom D exhibited a post-intervention reduction of interracial contact. Together, the archival and observational data suggests that the shift from sociofugal to sociopetal arrangements was accompanied by greater frequencies of both disruptive as well as prosocial, interracial behavior.

The abrupt elevation of interracial contact within Dayroom D at Phase III was initially quite puzzling. A subsequent perusal of institutional records pertaining to disruptive events during the research period revealed that on the day of observation period 6, an attempted escape from YTS occurred. This incident, which was of mutual interest to members of all ethnic groups, may have provided a basis for interracial conversation which ordinarily would not have occurred. The effects of the incident on interracial contact would not have been as pronounced in Dayroom C where levels of interracial contact were characteristically higher (hence, the significant between-groups main effect on this data).

An alternative explanation is that the abrupt rise in interracial contact within Dayroom D at Phase III was attributable to a "grapevine" effect of the experimental intervention. That is, information concerning the rearrangement of Dayroom C may have prompted increased levels of interracial conversation among the members of Company D concerning the alleged purposes of this intervention. Increased levels of conversation about the restructuring of Dayroom C would have been most pronounced while this change was still novel (i.e., at Phase III rather than at Phase IV).

Turning to the racial polarization data, levels of polarity were significantly higher in Dayroom D than in Dayroom C and, in both companies, levels of polarization decreased significantly subsequent to the experimental intervention. It is unclear from these findings whether the significant treatment-control difference and the quadratic trend reflected in the polarization data are attributable to experimental or non-experimental sources of variance. It is possible that the reduction of polarity in Dayroom C resulted from the furniture rearrangement there, and that the decreased polarity in Dayroom D resulted from a grapevine effect whereby information about the changes in Dayroom C provided the inmates in Dayroom D with a basis for increased conversation and interracial contact. It seems more likely, however, that the parallel reduction of polarization in Dayroom C and D following the intervention was the result of non-experimental, coincidental factors in view of the nearly identical rates of change reflected in Figure 4.

Finally, the semantic differential data provide evidence that the shift from a sociofugal to a sociopetal arrangement of furniture in Dayroom C prompted more favorable ratings of the staff by members of Company C and less favorable staff evaluations by residents of Company D. This pattern of results may be due to the fact that inmates perceived the environmental intervention as a sign of the staff's interest in the quality of their living situation, whereas the absence of physical changes in Dayroom D may have provided the basis for attributing negligence and lack of concern to the staff by members of Company D. Such attributions would have been especially likely to the extent that inmates in Company D felt relatively deprived vis-a-vis the members of Company C.

Overall, the results of this study provide only partial support for the experimental hypotheses. On the one hand, levels of aggression, racial polarization, and subjective ratings of general satisfaction and fellow inmates were not affected by the experimental maniuplation. On the other hand, levels of positive interracial contact and ratings of the staff reflected the influence of the furniture rearrangement.

There are a number of factors which might explain the above pattern of results. Reasons for the infrequency of observable aggression were mentioned earlier. The persistence of racial polarization subsequent to the experimental intervention may be related to the existence of strong, clearly-defined social norms concerning ethnic territoriality. Earlier studies have documented the strength and pervasiveness of territorial norms within correctional settings (cf., Esser, 1973: Polsky, 1962; Sundstrom and Altman, 1974; Wright, 1973). In such settings, ethnic territoriality apparently serves as a mechanism for reducing intergroup conflict, avoiding intragroup conflict, avoiding intragroup peer pressure, and establishing self-identity in relation to one's referent group. The racially-polarized structure of the dayroom, then, would have been of high functional utility to the inmates and, therefore, relatively unchangeable through a sociopetal furniture arrangement. Consistent with this reasoning, the post-intervention rise in disruptive behavior, particularly among the most dominant subgroup of the experimental population, may have reflected the social strains arising from an arbitrarily imposed threat to the existing and highly-stabilized territorial system.

By contrast, levels of positive interracial contact would have been less resistant to the influence of the experimental intervention since the major proportion of casual interaction among different ethnic groups occurred within the "transition areas", or non-polarized sections of the dayrooms, (e.g., areas around the game tables). The sociopetal furniture arrangement implemented in Dayroom C was designed specifically to increase the size of transition areas within the room for it was assumed that in such areas, social norms dictating ethnic territoriality would be least salient to the occupants. Thus, although it was unlikely that clustering the chairs in front of the T.V. would encourage Whites to enter a previously all-Black territory, the addition of extra chairs within existing transition areas may have increased the likelihood of interracial conversation there.

The questionnaire data, as well as the behavioral results, suggest that the environmental intervention employed in this study was too limited in scope to effect major changes along attitudinal and spatial dimensions of racial polarization. While inmates' ratings of the staff seemed to improve as a function of the experimental intervention, their general satisfaction with living conditions at YTS and their feelings toward peers remained unaffected by the environmental change.

Inmates' responses to open-ended questions administered at the conclusion of the research may help to explain the generally low levels of reported satisfaction, and the absence of increased satisfaction following the intervention. Two of the open-ended items asked respondents to list the least-liked features of their dayroom, and the kinds of changes in the dayroom they would prefer most. The most frequently cited problems among members of Companies C and D were (1) excessive noise in the dayroom, (2) inadequate ventilation in the dayroom, and (3) the uninteresting, bland appearance of the dayroom. As for the preferred changes, the following were cited most often: (1) installation of curtains and carpeting, (2) replacement of old furniture with new pieces, and (3) separation of active and quiet activities so as to reduce the noise problem. In general, these data suggest that the rearrangement of furniture failed to ameliorate several important environmental problems, all of which contributed to low levels of satisfaction among the wards.

The lack of treatment effects on the peer-evaluation and racial polarization data, and the rise in disruptive behavior during the course

of this study, further suggest that the impact of the present intervention was limited by its failure to address the social and psychological bases of racial prejudice. While the provision of increased opportunities for eye contact and conversation among inmates apparently promotes heightened levels of positive interracial contact, it presumably does not ensure the reduction of prior prejudice, present polarization, and future violence. To achieve the latter goals, in the present setting at least, it may be necessary to implement an intervention incorporating both physical and social components (c.f., Kohlberg, Kauffman, Scharf, and Hickey, 1974; Sherif and Sherif, 1953). A follow-up study currently is planned which will investigate the separate and combined effects of architectural and social-structural changes designed to reduce racial polarization in a correctional facility.

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FOOTNOTES

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[2] *Requests for reprints should be sent to Daniel Stokols, Program in Social Ecology, University of California, Irvine, Irvine, California 92717.*

[3] *Random selection of wards for the interview sessions was accomplished by assigning all residents within each company a number and drawing a pre-determined quantity of numbered slips of paper from a container. Those inmates whose numbers matched the ones appearing on the selected slips of paper were interviewed.*

[4]*To test the statistical significance of temporal trends within observation periods, group summary scores on each behavioral measure at* t_1, t_2, t_3, *and* t_4 *were transformed into weighted linear, quadratic, and cubic scores (using the polynomial coefficients, -3, -1, 1, 3; 1, -1, 1, -1; and -1, 3, -3, 1 respectively). A within-subjects MANOVA then was performed on the transformed scores (cf., Cole and Grizzle, 1966). In the primary repeated-measures analyses, transformed scores were derived from the group means on each measure at Phases I, II, III, and IV to assess temporal trends before and after the experimental intervention.*

[5]*In the analyses of the questionnaire data, only linear trends were assessed.*

[6]*A different quadrant was utilized to provide reliability data during each of the five preliminary observation sessions. Three of these quadrants were drawn from the dayroom of Company C and two from that of Company D.*