Partitioning and Perceived Crowding in a Public Space

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The importance of understanding the impact of population density on people is well recognized by behavioral scientists and design professionals alike. Recent projections of world population growth and urbanization patterns have prompted the former group to examine the conditions under which density affects human behavior (Freedman et al., 1971; Proshansky et al., 1970; Stokols, 1972; Zlutnick and Altman, 1972), and the latter group to consider the implications of this research for

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architecture and urban design (Michelson, 1970; Newman, 1972; Perin, 1971).

The purposes of the present discussion are twofold. The first is to assess the stability of certain findings from laboratory research on human crowding in the context of a field-experimental setting. Its second and more general aim is to examine the potential utility of behavioral research for architectural design in light of the results obtained in the reported study.

BACKGROUND

Initial investigations concerning the behavioral and psychological effects of density on humans yielded complex and inconsistent findings (Freedman, 1973; Stokols, 1972). Whereas the research of Calhoun (1962), Christian et al. (1960), and others convincingly demonstrated the detrimental impact of density on animal communities, subsequent demographic and experimental studies indicated that the effects of density on people are highly variable and dependent upon a host of situational and personal factors. The data from this research suggested, for example, that the positive or negative consequences of density may be mediated through such variables as socioeconomic status (Winsborough, 1965), cultural conditions (Schmitt, 1957 and 1966), temperature (Griffitt and Veitch, 1971), competition (Stokols et al., 1973), and sex norms (Freedman, 1970; Freedman et al., 1971; Freedman et al., 1972; Ross et al., 1973).

In response to the complexity of preliminary research findings, at least three theoretical perspectives on human crowding have evolved: *stimulus overload, behavioral constraint, and ecological formulations* (Stokols, 1974). From each perspective, perceived crowding is distinguished from physical density and viewed as a stressful experience. Moreover, an attempt is made to specify the situational circumstances under which density exerts negative effects of behavior.

Stimulus overload analyses, for example, portray density as a stressor variable to the degree that it exposes individuals to

excessive levels of stimulations (Baum and Valins, 1973; Desor, 1972; Esser, 1972; Milgram, 1970; Saegert, 1973; Simmel, 1950; Valins and Baum, 1973; Wirth, 1939; Zlutnick and Altman, 1972). Behavioral constraint formulations view density as stressful to the extent that it imposes restrictions on behavioral freedom (Proshansky et al., 1970; Stokols, 1972). And from an ecological perspective, high density becomes disruptive to the degree that it promotes or is accompanied by a shortage of resources within a particular setting (Hanson and Wicker, 1973; Wicker, 1973).

Much of the research deriving from stimulus-overload formulations has focused upon the role of architectural factors in mediating the perception of crowding and spatial behavior (Baum and Valins, 1973; Baum et al., forthcoming; Bickman et al., 1973; Desor, 1972; Valins and Baum, 1973), whereas investigations based upon behavioral constraint and ecological analyses have emphasized personal (Cozby, 1973; Dooley, 1974; Schopler and Walton, 1974) and social-structural (Epstein and Karlin, 1974; Fisher, 1974; Hanson and Wicker, 1973; Stokols, et al., 1973) determinants of the crowding experience.

Because one of the major objectives of the present study was to assess the relevance of behavioral science approaches to architectural design, stimulus-overload research pertaining specifically to the relationship between design factors and crowding was utilized by the authors as a basis for developing experimental hypothesis. Milgram (1970) has defined overload as a situation in which the amount and rate of environmental inputs impinging on an organism exceed its capacity to cope with them. According to this analysis, the individual must make specific behavioral adjustments if he/she is to operate effectively in high-stimulation environments. He/she may, for example, choose to disregard low-priority inputs, allocate less time to each input, or develop an aloof orientation toward strangers as a means of protection against sensory overload. Failure to enact these protective strategies should increase one's susceptibility to feelings of crowding, confusion, and fatigue.

Hypotheses derived from overload analyses of crowding have been investigated in a number of recent studies. Desor (1972),

utilizing a role-playing technique in which subjects were asked to place as many miniature people in a scale-model room as it could accommodate without being crowded, predicted that more stick figures would be placed in a room containing partitions, than in one without such "screening" devices. This prediction was confirmed by the data. Similarly, Baum, Riess, and O'Hara (forthcoming) observed that subjects walking through a building corridor were more likely to stop and drink at a screened rather than unscreened water fountain, when a confederate stranger was positioned nearby. Also, Baum and Valins (1973) reported that students at SUNY, Stony Brook, rated corridor-design dorms as more crowded than suite-design dorms, presumably because the former provide less shielding from unwanted social interaction than the latter.

All of these studies suggest the efficacy of incorporating architectural features in buildings which provide occupants protection from overstimulation. Based upon their findings, the use of movable or fixed partitions appears to offer an effective strategy for reducing the experience of crowding and other forms of social interference within public and private settings.

Although previous research seems relevant to the development of design criteria, it provides only a partial basis on which to predict the effects of architectural interventions in naturalistic settings. A large proportion of this research has been conducted with college student participants in short-term laboratory settings and, as such, may not be generalizable to other populations and situations. Moreover, certain experimental procedures—such as the Desor (1972) role-playing technique—which have been employed in several studies as an assessment of perceived crowding (Baum and Valins, 1973; Cozby, 1973; Solar, 1973; Valins and Baum, 1973) may yield data that markedly deviate from those obtained among actual occupants of naturalistic settings.

An additional limitation of earlier research is its reliance on unidimensional, nonlongitudinal measures of felt crowding. The experience of crowding may reflect different levels of intensity ranging, for example, from the relatively slight inconvenience of

being cramped at a crowded concert, to the stark fear of being in close proximity to a violence-prone person. In the former case, one's need for more space may be much less pressing and easier to resolve than in the latter, where it is overlaid with a variety of emotional and physiological imbalances (Stokols, 1974). These rather dissimilar instances of crowding serve to suggest that the intensity and persistence of crowding experiences can be assessed most adequately through the use of multidimensional measures taken at different points in time.

In an effort to address the aforementioned methodological issues, the present study utilized a field-experimental design in which the occupants of a public setting were exposed to different levels of areal partitioning. Repeated assessments of behavioral tension were gathered while subjects remained in the area, and semantic-differential ratings of crowding were obtained upon their departure from the setting. In line with earlier research, the main experimental hypothesis was that occupants of a maximally partitioned area would feel less crowded and manifest less behavioral tension than occupants of moderately and minimally partitioned areas. In addition, the data were analyzed to assess the patterns of correlation between behavioral tension and perceived crowding within each experimental condition and to determine whether male and female occupants of the setting differed in their perceptions of crowding and manifestations of tension.

METHOD

SUBJECTS

A total of 92 subjects, comprised of 30 females and 62 males, participated in the study. These individuals were recruited on three different days from groups of people waiting in line at an office of the California State Department of Motor Vehicles (DMV). Completion of a voluntary questionnaire upon leaving the office constituted participation in the study.

Data from only those persons who entered the DMV office alone were utilized in all analyses. A total of 11 participants who entered with children or companions were thereby eliminated from the experimental groups. In the analyses of questionnaire data, then, 81 subjects were utilized. The number of subjects in each of the three experimental conditions was 29, 26, and 25 individuals, respectively. The sex composition of the sample was 24 females and 57 males.

For the repeated-measure analyses of behavioral data, videotape scores were obtained on those persons who remained in the waiting area for three full observation periods. Thus, while 81 subjects furnished questionnaire data, only 62 provided usable behavioral data. These individuals were distributed among the experimental conditions in groups of 24, 19, and 19. The sex composition of this sample was 17 females and 45 males.

INDEPENDENT VARIABLES

The experiment incorporated a single between-groups factor, partitioning, with three levels: minimal partitioning in which no room dividers were placed within the study area; moderate partitioning in which ropes and standards were positioned in the room; and maximal partitioning in which solid wooden partitions were installed in the area.

The study area was created by placing two external partitions (each was eight feet high by eight feet long) adjacent to an existing wall and fixed counter of the DMV office, forming a waiting area of approximately 130 square feet (see Figure 1). These partitions were placed at a slight angle to the walls of the building in order to maximize the viewing area of a stationary video camera.

Three experimental trials were conducted on successive Mondays over a four-week period. Each trial commenced at 10:00 a.m. and lasted for one hour and 25 minutes. Although the videotapes were only one hour in length, the additional 25 minutes gave subjects observed near the end of the tape an opportunity to complete a questionnaire.

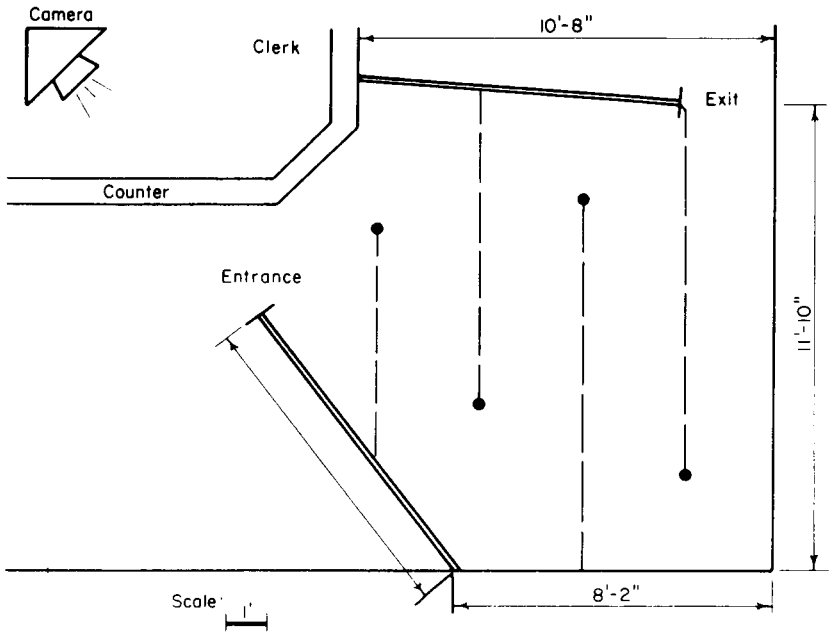

Figure 1: Diagram of the DMV waiting area.

The first trial was designated as the control and consisted of only the partitioned-off study area with no other internal dividers. The floor area was uncluttered and persons waiting for service could form a line in any manner they chose.

The second and third trials involved manipulations within the waiting area. In the second, a series of ropes and standards were positioned in a maze-like fashion so as to direct the movement of individuals waiting in line.

The aisles created by the ropes required the subjects to proceed back and forth through the aisles until they reached the exit where a sign was placed, directing them to wait there for the next available counter. Each aisle was 8 feet long and 30 inches wide with the ropes being approximately 40 inches high. A total of 4 aisles was created by this arrangement. A similar design was used for a third trial with the exception that 5-foot high portable partitions were used in place of the ropes. These

partitions were placed in exactly the same positions as were the ropes. Each wall was 8 feet in length and 2 inches in thickness and was supported by 10-inch legs fastened at the bottom of each wall. Again, 4 aisles, 30 inches in width, were created.

Two within-group factors were examined in the analyses: sex of subject and time spent in the waiting area. The temporal factor was incorporated only in the analyses of behavioral data.

PROCEDURE

A southern California office of the DMV was selected as an experimental setting for three reasons. First, it was known that extensive use of the office by citizens of the surrounding community resulted in the occurrence of crowded conditions during most days of the week. Second, since a high percentage of southern California families own at least one car, the likelihood of obtaining a representative cross-section of the local population was high. And third, agency personnel expressed interest in the study as a source of information regarding users' satisfaction with DMV facilities.

Administration of Questionnaires

Participants in the study arrived at the DMV office seeking a variety of services, including the registration of newly purchased vehicles, the provision of yearly automobile license tags, and change of legal ownership. Persons desiring these services during the course of each trial were required to wait in the study area prior to receiving service.[1] When the subject exited this area and approached an available counter, he/she was given a questionnaire by the counter clerk. The clerks were instructed to tell each subject, "We are conducting a survey to assist us in improving our services and would appreciate it if you would fill out this questionnaire. You are under no obligation to do so." Since the time spent receiving registration service was usually five minutes or longer, subjects had time to complete the questionnaire on the spot if they so desired. Some filled out the form at a counter located near the building exit. Subjects were instructed not to put their names on the questionnaire and to

give the completed form to an experimenter, referred to by the clerks as "the person standing near the door."

After each person had filled out the questionnaire, he/she was asked two questions by the experimenter. The first was, "How many people, including yourself, are living in your present residence?" The second question was, "How many bedrooms are there in the residence?" After recording the answers, the subject was given a 3x5 card on which a number, corresponding to the same number on each page of the questionnaire, was written. The subject was told to hand the card to the person standing just outside the door. This person was another experimenter who recorded the physical appearance of the subject, indicating such readily identifiable characteristics as style of clothing, for later matching of survey responses to behavior in the waiting area recorded by the videotape equipment.

Compilation of Behavioral Data

The video camera was placed inside a large cardboard box. The holes in the box normally used for handles served as the opening for the camera lens. The box was situated on top of a filing cabinet and appeared to be a piece of uncrated office furniture. Out of the 92 subjects involved in the study, only one noticed the camera or made any comment about it.

The duration of each experimental session was divided into three time periods for data-recording purposes. This was accomplished by marking three reference areas on the video-monitor screen, corresponding to (1) subjects' initial entry into the experimental setting, (2) the midpoint of their movement through the setting, and (3) the immediate area prior to their exit from the setting. Subjects were observed in groups of three, and each individual was observed for three fifteen-second intervals at each reference point.

As each group of three moved into a reference area, the videotape was stopped and every subject assigned a number, in chronological order. The tape was then started, with the raters being instructed to observe the first subject. After fifteen seconds had elapsed, the raters were told to switch to the third

subject. This process was repeated three times. The videotape was then advanced until the same subjects entered the second reference area. This procedure continued until each subject had been observed for three fifteen-second intervals within each of the three reference areas.

Two persons were employed as data coders. They were positioned at a comfortable viewing distance from the video monitor and were separated by a four-foot-high divider to prevent comparisons of ratings or distractions brought about by each other's movements. Raters were instructed to count relevant behavioral incidents for each subject during each fifteen-second interval. These scores were recorded on a prepared rating sheet.

DEPENDENT MEASURES AND ANALYSES

The experimental questionnaire incorporated a series of seven-point bipolar scales. The main dependent measures concerned the degree to which subjects felt crowded or uncrowded and relaxed or tense, while waiting in line. An additional set of items pertained to subjects' perception of the DMV waiting area in terms of its temperature, stuffiness, noisiness, and size. These scales were analyzed in terms of a least-squares analysis of variance (ANOVA) incorporating the factors of room partitioning and sex of subject. Within-cell correlations among the questionnaire items, and between the subjective-report and behavioral data, also were examined.

As an index of behavioral tension—the frequency of self-manipulations exhibited by each subject over three observation intervals—was computed from the videotape data. The self-manipulation measure was chosen as an index of tension in view of its extensive usage in previous research on self-disclosure and nonverbal communication (Altman and Taylor, 1973). Self-manipulation was defined as the touching of some part of the body or an article worn on the body (e.g., glasses) with one's hand. Cigarette smoking was not included in this category to minimize smoker/nonsmoker differences in self-manipulation

scores. The self-manipulation index was analyzed in terms of a repeated-measures, least-squares ANOVA incorporating the factors of partitioning, sex of subject, and time.

CONTROL MEASURES

A set of covariates was utilized in the statistical analyses as a means of controlling for the effects of individual differences on participants' subjective and behavioral responses. Among these were items pertaining to subjects' perception of crowding and noise at home, their friendliness toward roommates or family members, and the number of persons with whom they share a bedroom. The rationale for using these items as covariates was that subjects' sensitivity to crowding at the DMV might be related to their perception of density-related problems at home.

Additional steps were taken to control nonexperimental sources of variation both within and between treatment groups. As indicated earlier, all sessions were matched according to the day of the week and time of day at which they were run. In regard to temperature control, air circulation normally occurring within the office was permitted through the entrance and exit of the waiting area, as well as over the tops of partitions. Recorded temperatures remained relatively constant during each session and varied only by one to two degrees across all three trials. Finally, the number of people occupying the waiting area was recorded at various times during each session to provide an index of room density. Mean occupancy levels did not vary significantly between treatment conditions. The average number of subjects waiting in line during each session was between thirteen and fourteen persons.

RESULTS

The use of ANOVA procedures in analyzing the experimental data was based on a number of assumptions. First, it was assumed that assignment of subjects to each treatment group

would occur randomly in the sense that a wide range of individual attributes would be equally likely to appear within each experimental group. This assumption seemed justified in view of the cross-section of local residents serviced at the DMV on most days of the year (with the exception of religious holidays, weekends, and so forth). It was further assumed that the responses of subjects in the sample were normally distributed and that the variances on each dependent measure were approximately equivalent between groups. These assumptions were supported through graphic inspection of the raw data and a comparison of group variances on each item.

An additional and critical assumption was that the responses of individuals within each treatment group were statistically independent. This assumption seemed reasonable in view of the minimal amount of interaction which occurred among subjects while waiting in line, but was threatened by the confounding of each treatment level with the unique circumstances surrounding a single experimental session.

As a partial assessment of the independence assumption, each treatment group was divided into two subgroups comprised of those individuals who arrived at the DMV during the early portion of the session, and those who participated during the later portion. It was assumed that this procedure would yield two groups of subjects who had waited in line at different times during the same session and had thereby been exposed to different people, noise levels, and other surrounding circumstances (e.g., the demeanor of agency personnel and the level of food deprivation as a function of DMV entry time). Thus, if subjects' data were correlated with those of others near them, statistical comparisons between the early and late subgroups should reveal significant differences on some or all dependent measures.

A two-factor, least-squares ANOVA (partitioning × entry time) was computed on the data, indicating an absence of both entry-time main effects and a partitioning × entry time interaction effect. These results provided some support for the assumption that subjects' scores within each treatment condition were statistically independent.

ANALYSES OF SUBJECTIVE DATA

All questionnaire data were analyzed in terms of a two-way, least-squares ANOVA (partitioning × sex). Analyses of covariance revealed no noticeable shifts in the data and did not significantly improve prediction. Therefore, all analyses reported below are without covariates.

The prediction that maximal room-partitioning would reduce the perception of crowding was not supported by the data. The ordering of treatment means for this variable is opposite to the predicted pattern, with the highest level of reported crowding being evidenced in the partitions condition, and the lowest level appearing in the control group (see Table 1). The differences between these means, however, were not statistically significant.

Analyses further revealed that subjects in the partitions condition felt significantly more tense while waiting in line than those in the control and ropes conditions ($F = 3.87$, $df = 2/78$, $p < .05$). This pattern of means is similar to the ordering observed on the crowding variable (see Table 1).

Also, it was observed that subjects in the ropes condition perceived the waiting area to be significantly warmer than those in the control and partitions conditions ($F = 3.25$, $df = 2/78$, $p < .05$). Additional analyses of questionnaire data revealed no other significant differences attributable to either the partitioning or sex factor.

TABLE 1
Means Pertaining to Perceived Crowding, Tension, and Room Temperature*

	Control	Ropes	Partitions
uncrowded-crowded	4.68	4.76	5.44
relaxed-tense	3.56	3.56	5.12
cold-hot	4.44	5.36	4.44

*Larger means indicate higher ratings on the underlined attribute. All means are collapsed over sex.

ANALYSES OF BEHAVIORAL DATA

An assessment of interobserver reliability was obtained by comparing the observers' ratings of self-manipulation on 10% of the subjects within each treatment group. The index of reliability was simply the percentage of agreement among the two observers. The within-group reliability coefficients were .78 (control), .92 (ropes), and 1.0 (partitions)—yielding an overall reliability coefficient of .90.

The self-manipulation index was analyzed in terms of a three-way, least-squares ANOVA model (partitioning × sex × time). Tests for both linear and quadratic trends were performed. Results revealed significant main effects for partitioning and sex (see Table 2), such that subjects in the partitions condition exhibited the highest level of self-manipulation while those in the control group manifested the least ($F = 4.14$, $df = 2/56$, $p < .05$), and males displayed more self-manipulation than females ($F = 13.44$, $df = 3/54$, $p < .05$), indicating that the decrease in self-manipulation over time was most pronounced among female subjects in the partitioning group (see Figure 2).

CORRELATIONAL ANALYSES

Pearson correlation coefficients were computed on the subjective and behavioral data. Among the questionnaire items, perceived crowding at the DMV was significantly correlated with feelings of tension while waiting in line ($r = .51$, $df = 62$, $p < .001$) and ratings of the waiting room as hot ($r = .53$, $df = 62$, $p < .001$), stuffy ($r = .55$, $df = 62$, $p < .001$), noisy ($r = .52$, $df = 62$, $p < .001$), and small ($r = .45$, $df = 62$, $p < .001$). The correlation between perceived crowding and self-manipulation, however, was not significant.

DISCUSSION

The results of the present study regarding the negligible impact of partitioning on perceived crowding fail to replicate

TABLE 2
Means for Self-Manipulation Index*

	Control		Ropes		Partitions	
	Females	Males	Females	Males	Females	Males
Time 1	.07	.66	.36	.88	1.07	.56
Time 2	.13	.45	.13	.23	.06	.45
Time 3	.00	.17	.25	.20	.00	.10

*Larger means indicate levels of self-manipulation.

the findings obtained in earlier laboratory experiments. Subjects in the maximally partitioned area felt no less crowded than those in the nonpartitioned room. And, as indicated above, the actual ordering of crowding means was opposite to the predicted pattern, although mean differences were not statistically significant.

There are several possible explanations for the absence of partitioning effects on perceived crowding, all of which point toward important areas for future research. First, it is conceivable that architectural variations in a particular setting simply exert minimal influence on occupants' perception of crowding (assuming that density is held constant). This interpretation of the results implies that the relationship between partitioning and reduced crowding, observed in earlier research employing Desor's (1972) scale-modeling technique, may be an artifact of laboratory conditions and role-playing procedures, and may not generalize to the actual responses of people in at least certain types of naturalistic settings. The adequacy of this line of reasoning can be determined only through more extensive replicative research conducted in field-experimental settings.

An alternative explanation of the present results is that the incorporation of partitions in a particular setting does indeed

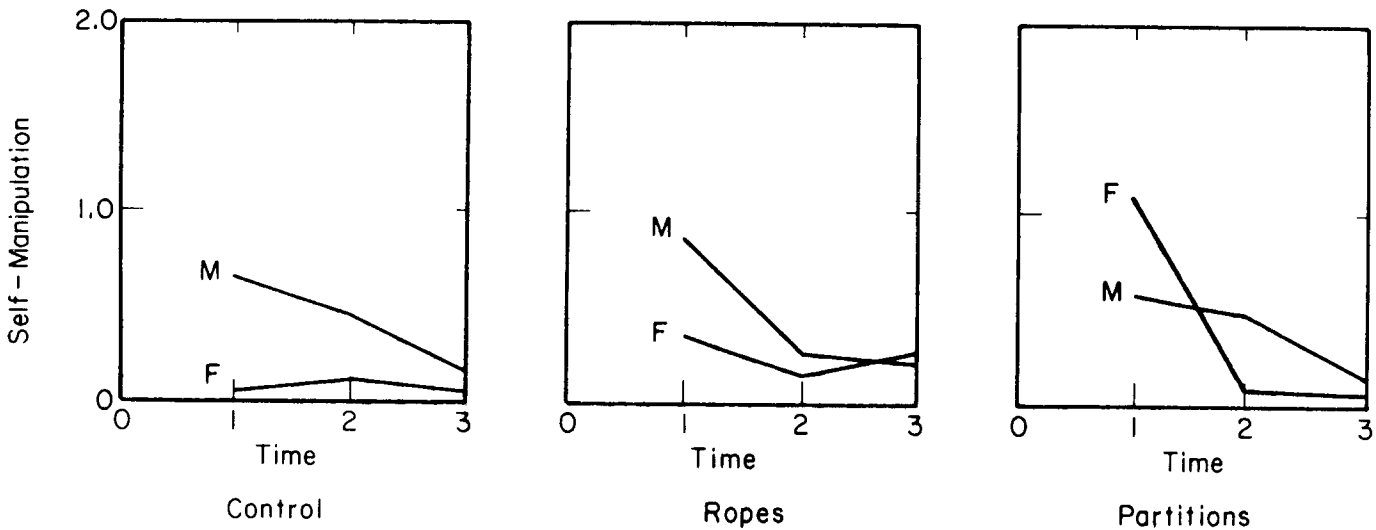

Figure 2: Mean levels of self-manipulation during each observation interval.

affect people's perception of crowding in the area, but that the exact nature of the relationship between design features and emotional reactions depends upon a host of situational circumstances. The psychological impact of partitions, for example, may be mediated largely by the individual's sense of personal control over the environment. In settings where one has the option of arranging furniture to suit his or her needs (as in dormitory study areas), the provision of movable partitions may serve to reduce crowding by providing shielding from excessive stimulation, facilitating personal-space maintenance, and enhancing cognitive organization of the environment. But in certain public settings (such as agency offices of the DMV) where the occupant's perception of control over the environment is minimal, the installation of partitions may promote negative rather than positive emotional reactions. Thus, to the degree that partitions in the present study were interpreted as "herding" devices, employed by agency personnel as an impersonal means of exerting control over people waiting for service, they may have done more to evoke frustration and resentment than to reduce crowding stress.

In conjunction with the variable of perceived environmental control, two other situational factors may account for the unexpectedly elevated levels of reported crowding, tension, and self-manipulation under conditions of maximal partitioning. The physical arrangement of partitions, instead of reducing social stimulation, may have heightened it by forcing subjects to conform to a queuing pattern in which they were always adjacent to a line of others moving in a direction opposite to their own. Such an arrangement, by increasing opportunities for eye contact with several strangers, may have raised stimulation levels rather than lowered them.

Moreover, the inclusion of four large wooden partitions in a relatively small waiting area may have led to a sense of clutter and behavioral restriction, rather than one of order and free movement. It had been expected that the potentially beneficial effects of partitions would be most pronounced in relation to solid wooden partitions as compared with ropes and standards,

since the latter devices, while facilitating the establishment of interpersonal boundaries, would block less stimulation than solid partitions. These predicted effects, however, may have been offset by the clutter and restriction of movement imposed by bulky room dividers.

The findings pertaining to self-manipulation provide additional clues regarding the absence of significant treatment effects on subjects' perception of crowding at the DMV. It is plausible that subjects in the maximal-partitioning condition initially felt more crowded than those in the ropes and control conditions (as suggested by the data and interpretations discussed above), but that over time they were able to resolve their feelings of crowding through nonverbal strategies of adaptation. The possibility that self-manipulation served as a stress-reducing mechanism for subjects waiting in line is suggested both by the significantly decreasing pattern of self-manipulation levels observed in the present study as well as by the parallel results obtained in a recent experiment conducted by Sundstrom (1974), in which subjects' reports of crowding and levels of object manipulation decreased together over time in a high-density situation. These results emphasize that future research on crowding must attend more closely to processes of behavioral and perceptual adaptation under conditions of high density, and the situational circumstances which either enhance or impair these processes.

The finding that females exhibited most self-manipulation upon entering the maximally partitioned area may be explainable in terms of the "cluttering" hypothesis mentioned earlier. This explanation involves the assumptions that solid partitions led to the perception of clutter and reduced freedom of movement; sex-differences in environmental perception are related in part to male-female differences in physical size; and that body size is positively correlated with the perception of control over the environment. Given these assumptions, it then seems plausible that women felt particularly uncomfortable upon entering a maze of large partitions, but that initial feelings of discomfort became readily manageable in view of the

short-term and nonthreatening nature of the situation. This speculation, of course, is especially tentative in view of the many assumptions it involves.

The observed treatment effect on reported tension, indicating that subjects in the maximally partitioned area felt most tense while waiting in line whereas those in the nonpartitioned area reported the least amount of tension, provides further evidence that partitioning in the present study exerted a negative impact on subjects.

Moreover, the correlations between reported crowding and tension, as well as between crowding and negative ratings of the physical environment, support the conceptualization of crowding as a stressful experiential state. Although self-reports of crowding and tension were significantly correlated, these measures were not correlated with observed levels of self-manipulation. This apparently contradictory finding may be attributable to the different times at which subjective and behavioral assessments were gathered. Whereas self-manipulation scores were recorded at different points in the experimental session, questionnaire measures of crowding and tension were obtained only upon the departure of each person from the waiting area. Thus, while group levels of self-manipulation fluctuated widely within each group, post-measures of crowding and tension may have been consistently lower as a result of subjects' adaptation to stress while waiting in line.

The results of this study indicate that architectural factors do exert significant effects on the responses of setting occupants, but that adequate prediction and control of such effects in a design context will depend upon more extensive research directed at certain critical issues. First, the generalizability of laboratory findings to naturalistic settings must be assessed more thoroughly in the context of field-experimental situations. As a step in that direction, a replication of the present study is planned in which data will be gathered both from occupants of a DMV office and from role-playing subjects who will perform the Desor (1972) procedure using a scale-model replica of the actual office. This approach, while holding certain variables

constant (such as the functional properties of the setting and the particular arrangement of its furniture), should provide a useful comparison between the behavior of people in naturalistic environments and the responses of role-playing subjects in experimental settings.

Second, it will be important to move toward a more thorough delineation of crowding experiences in regard to the situational parameters of their intensity, persistence, and likelihood of occurrence. Stokols (1974) has proposed a typology of crowding experiences based upon the distinctions between personal versus neutral thwartings and primary versus secondary environments. One of the basic assumptions underlying the framework is that crowding, or the need for more space, may be associated with a wide range of actual or anticipated thwartings, ranging from rather impersonal and inconsequential annoyances (e.g., feeling cramped on a busy city sidewalk) to situations which pose a direct threat to one's emotional security or physical safety (as where one must share a dormitory suite with roommates that he/she does not like). When proximity with others is associated with the former (neutral) variety of thwartings, crowding experiences will tend to be transitory and easily resolved through either behavioral or cognitive and perceptual adaptations. But in the context of the latter (personal) thwartings, feelings of crowding will be relatively prolonged and irresolvable.

The typology distinguishes between primary and secondary environments in terms of the amount of time occupants spend in the setting, the degree to which they relate to others on an anonymous or personal basis, and the psychological importance of the activities they perform in the setting. Furthermore, it is assumed that the probability of personal thwartings resulting from interpersonal proximity will be higher in primary settings (e.g., homes, offices, classrooms) than in secondary ones (e.g., commercial, transportation, and recreation environments), for it is in the former that relations with others are least transitory and most personal. Thus, in primary environments, crowding experiences should be relatively more intense than those that occur in secondary settings.

In relation to the results of the present study, the proposed typology suggests that subjects' feelings of crowding at the DMV were rather mild, in view of the secondary nature of the setting (though for agency personnel, the DMV would represent a primary setting). Due to the anonymous and transitory quality of the experimental situation, those subjects who felt crowded upon entering the DMV would have been able to adapt quite easily to the discomforts and annoyances of the situation. Such ready adaptation to crowding may be considerably more difficult for people in primary settings where high density is prolonged, particularly if close contact with others is associated with social conflict. Under these circumstances, behavioral withdrawal from the situation may provide the only viable strategy of reducing perceived crowding.

Overall, the findings of this study suggest that in order to predict where architectural interventions will be most effective in reducing the perception of crowding, it will be necessary to learn more about the psychological implications of high density (or interpersonal proximity) within different types of settings. Moreover, the results underline the importance of developing extensive programs of naturalistic and longitudinal research as a basis for examining the intensity and persistence of crowding experiences in relation to a diversity of situational factors.

NOTE

1. Individuals arriving at the DMV office for driver's licensing tests were directed to a different area of the building and did not participate as subjects in the present study.

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