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AVERSIVE ENVIRONMENTS: EFFECTS OF NOISE AND DENSITY ON PHYSICAL AGGRESSION AND TASK PERFORMANCE.

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AVERSIVE ENVIRONMENTS: EFFECTS OF NOISE AND DENSITY ON PHYSICAL AGGRESSION AND TASK PERFORMANCE

By

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B.A. King's College, 1973
M.A. University of Windsor, 1975

A Dissertation
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To Terri

ABSTRACT

The present study was concerned with how density and noise, both alone and in conjunction with one another, affect physical aggression and task performance. Research on noise has indicated that high levels of noise increase aggression only in previously angered subjects. Although the findings concerning the effects of density are more equivocal, there is some empirical evidence to suggest that aversive noise negatively affects ongoing task performance.

Research on density has often failed to corroborate the common assumption that high density has negative effects on interpersonal behavior. Freedman (1975) proposed a density-intensity model to explain density effects. According to Freedman, high density per se has neither good effects nor bad effects; rather, it serves to intensify the individual's typical reactions to the situation. Thus, it would be expected that high density would increase aggression only in individuals predisposed to being aggressive (i.e., angered individuals). There is also some evidence to indicate that exposure to high density hinders task performance.

Based upon the above findings, it was hypothesized that high density or high noise alone would increase aggression only in previously angered subjects, while the combination of the two stressors would yield more aggression than when only one stressor is present. Furthermore, it was expected that high density and high noise would both hinder task performance, with the greatest decrement occurring when these two stressors were combined.

Ninety-six female undergraduates participated in groups of four. The study involved a 2 X 2 X 2 design, with manipulations of density (low versus high), noise (low versus high), and anger (anger versus nonanger). Upon arrival at the experiment, subjects were asked to get to know one other subject by exchanging written descriptions of their own personalities. Anger was manipulated by varying the feedback (either positive or negative) that was ostensibly returned by the other person. Subjects then were required to work on a 30-minute card sequencing and addition task; during this time the density and noise level of the room in which they worked were varied. Following the task performance phase of the experiment, subjects were given an opportunity to aggress by the administration of electric shock against the person who previously had evaluated them.

In general, the results were nonsupportive of the hypotheses concerning the effects of density and noise on aggression. As expected, the effect of anger was significant, with angered subjects being more aggressive than nonangered subjects. However, the hypothesized density X anger interaction was not obtained, thereby failing to lend support to the density-intensity model. Nonetheless, there was a highly significant main effect of density, with subjects exposed to high levels of density being more aggressive than their low density counterparts. The hypothesized noise X anger interaction was also not obtained. Finally, there were no significant additive effects of density and noise, subjects exposed to high density-high noise were no more aggressive than subjects exposed to high density alone.

There were no significant main effects of either density or noise on any of several measures of task performance. Furthermore, the effects

of density and noise were nonadditive; subjects exposed to high density-high noise performed as well as subjects in the other conditions.

The incongruence between the obtained and hypothesized results were discussed in terms of procedural differences between the present study and those of previous researchers. For example, one critical difference may be that the present study involved subjects who had to move about during exposure to the environmental conditions, whereas previous investigators have typically employed seated subjects.

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CHAPTER I

INTRODUCTION

Until recently, very little attention had been directed by psychologists toward the possible effects of the environment on human behavior. However, during the last half decade, there has been a proliferation of studies relating various environmental stimuli to human functioning. Typically, the researchers have concentrated on how environmental "stressors" affect human behavior, focusing on the deleterious consequences of exposure to such stimuli. For example, the relationship between noise and task performance (Glass & Singer, 1972), noise and aggression (Donnerstein & Wilson, 1976), noise and altruism (Matthews & Canon, 1975), temperature and aggression (Baron & Bell, 1975), crowding and task performance (Sherrod, 1974), and crowding and aggression (Freedman, 1975) have all been investigated. The present study is concerned with the effects of noise and crowding on human aggressive behavior and task performance. Although each of these variables has been investigated separately, it appears that no researchers to date have attempted to explore the possible joint effects of the two stressors. The combined effects of noise and crowding are deemed to be an important issue because these two variables often occur together in the modern urban environment. Indeed, as Heimstra and McFarling (1974) note, "In laboratory research as well as in many field studies, researchers try to eliminate or control variables other than the independent variable that might affect the subjects. Although such efforts are a necessary experimental procedure, they remove the studies even further from the

real world, in which numerous variables interact and affect the organism" (p. 163).

Before introducing the rationale for this study, the relevant empirical literature concerning noise and crowding will be presented. Because the research on these two variables employs somewhat different methodologies, each will be presented separately.

Noise

The most extensive investigation of the effects of noise on human behavior was conducted by Glass and Singer (1972). Their research indicates that noise is not a univariate concept, but rather that the consequences of exposure to noise are dependent upon the types of noise employed (e.g., high vs. low intensity, controllable vs. uncontrollable, and predictable vs. unpredictable). Glass and Singer focused primarily on the relationships between noise and both ongoing and subsequent task performance. One of the interesting findings to emerge from their research was that there were few, if any, deleterious effects of exposure to noise on ongoing task performance. However, Glass and Singer did find significant decrements in subsequent task performance and frustration tolerance, especially if the noise was presented in an unpredictable, uncontrollable manner. Thus, their research seems to indicate that the most potent consequences of noise are on behavioral measures taken immediately after the termination of the noise.

Although their studies dealt primarily with non-interpersonal behavior (i.e., task performance), Glass and Singer (1972) suggest that "uncontrollable and unpredictable noise should affect aggressiveness, exploitative behavior, liking for others, and general irritability in

interpersonal relations" (p. 159). In an attempt to extend Glass and Singer's research to the realm of interpersonal behavior, Donnerstein and Wilson (1976) investigated the effects of noise on ongoing and subsequent aggressive behavior. In their first experiment, male subjects were either angered or treated in a neutral manner by a male confederate. Subjects were then given an opportunity to aggress against the confederate by the administration of electric shock while being subjected to either high-intensity (95 dB) or low-intensity (52 dB) unpredictable-uncontrollable noise. The results of this study revealed that whereas noise had no effect on the aggressiveness of nonangered subjects, angered subjects were differentially affected by the noise manipulation, with angered subjects exposed to high levels of noise being more aggressive than angered subjects exposed to low-intensity noise. As might be expected, angered subjects displayed an overall higher level of aggression than nonangered subjects, regardless of the noise condition.

A second study by Donnerstein and Wilson (1976) employed a similar procedure to that described above. However, in this experiment the measure of aggression was taken after exposure to the noise manipulation. Donnerstein and Wilson found no effect of the noise manipulation on the posttest aggressive behavior of nonangered subjects; however, angered subjects were significantly more aggressive in the high noise condition compared with their counterparts in the low noise condition. Taken together, Donnerstein and Wilson's research indicates that high intensity noise facilitates aggression, but only in previously angered subjects. Comparable results have been obtained by both Konecni

(1975b) and Geen and O'Neill (1969).

The findings of Donnerstein and Wilson are consistent with a vast amount of aggression research which indicates that angered subjects who are exposed to arousing stimuli make heightened aggressive responses (e.g., Zillman, Katcher, & Milavsky, 1972; Donnerstein, Donnerstein, & Evans, 1975). These findings have been explained in terms of a cognitive-labeling interpretation of aggressive behavior. According to this interpretation, increased arousal such as that produced by noise facilitates aggression only if the individual interprets the arousal as anger. That is, only individuals given a reason to label their feelings as anger (e.g., angered subjects) should be negatively affected by the environmentally induced arousal. This cognitive-labeling approach is subscribed to by several leading researchers in the field of aggression (e.g., Berkowitz, 1969; Bandura, 1973) and is consistent with the Schacter-Singer two-factor theory of emotion (Schacter & Singer, 1962). If the person has no justification for labeling his internal state as anger, aversive environmental stimulation, including noise, will not facilitate aggression.

A final study by Duncan (1978) also bears on the issue of noise and aggression. Four experimental groups all received bursts of 90 dB white noise, with the predictability and controllability of the noise being the independent variables. A control group received no noise stimulation. Ongoing task performance was found to be hindered by exposure to the aversive noise. After being subjected to the noise, subjects were either frustrated or not frustrated by their co-actors. On a measure of aggressiveness, frustrated subjects

were found to be more aggressive than non-frustrated individuals. However, of greater interest was the noise by frustration interaction, with frustrated individuals exposed to uncontrollable-unpredictable noise displaying the greatest amount of aggression.

Taken together, the studies on the behavioral effects of intense noise seem to reveal a rather consistent pattern of results-- aversive noise stimulation facilitates aggression but only in subjects whose negative affect has been aroused. Although the results are somewhat more equivocal, aversive noise also seems to negatively affect task performance, especially on measures taken after exposure to the noise. We now turn our attention to the consequences of crowding on human behavior.

Density

Compared with research on noise, there has been more attention directed towards the effects of crowding. However, the research on crowding is much more problematic and open to more interpretations than the research on noise. Perhaps the greatest single problem is conceptual in nature and centers on exactly what is meant by crowding. Investigators often use the terms crowding and density interchangeably, defining them in terms of the amount of available space per person. However, it has been argued that there is a crucial difference between crowding and density. Stokols (1972) proposes that density refers to a strictly physical phenomenon and is measured by the number of people per unit of space. Crowding, on the other hand, is a psychological concept and is primarily subjective in nature. That is, it is the individual's perception of the situation that determines whether or

not the experiences the subjective feeling of being crowded. According to Stokols, high density is a necessary but not a sufficient condition for the feeling of being crowded. Similar distinctions have been proposed by others (Altman, 1975; Esser, 1973; Desor, 1972). For example, Altman (1975) defines crowding as a state which exists for the individual when the achieved privacy (the amount of social contact actually obtained) is less than the desired privacy (a subjective statement of an ideal level of interaction with others). Thus, two individuals exposed to identical conditions of density may react quite differently to the situation depending upon their respective levels of desired privacy.

Furthermore, density itself is not a unitary concept but may have multiple meanings. Loo (1974) proposes that we distinguish between social and spatial density. Density can be manipulated in two ways: One can vary social density (add more members to an environment while holding the amount of space constant), or one can vary spatial density (hold the number of people constant while changing the size of the environment). Loo suggests that these different ways of manipulating density may produce somewhat different perceptions of the situation, a prediction substantiated by the findings of Baum and Koman (1976).

Experimental research on density had its origins in studies on subhuman species. Perhaps the most famous research was conducted by Calhoun (1962). In his experiment, rats which lived in a high density situation eventually developed various pathologies. In particular, those animals living in the most densely populated section - what Calhoun called a "behavioral sink" - showed the greatest amount of

social pathology and physiological malfunctioning. Further evidence of the deleterious effects of excess population on animals has been obtained by Christian, Flyger, and Davis (1960). They observed that unchecked population growths of deer eventually produced a mass die-off which they attributed to metabolic overactivity resulting from the stresses of overpopulation. Numerous other studies have demonstrated a relationship between high density in animals and social and/or physical pathology; however, the above studies should suffice as a backdrop for research on overpopulation in humans. Although interesting in their own right, caution should, of course, be exercised in attempting to generalize the results of animal experiments to human populations.

The earliest work on density in humans was done by sociologists who tried to find a link between overpopulation and various forms of social pathology. Many early studies indicated a high correlation between population concentration and adult crime (Schmid, 1969), juvenile delinquency (Schmitt, 1957), mental illness (Faris & Dunham, 1965), and suicide (Sainsbury, 1956). Taken together, this research indicated a strong relationship between high density and human pathology. However, as Altman (1975) points out, the investigations were open to numerous criticisms, perhaps the most potent of which is the relatively undifferentiated way in which density was measured. For example, density was often defined as the number of people per acre, while ignoring relevant variables such as the number of people per dwelling unit. Additionally, no effort was made to control for other pertinent factors, such as income and health facilities. Later investigators tried to correct some of these problems. Galle, Gove, and McPherson

(1972) looked at various definitions of density, such as the number of persons per room in a dwelling unit and the number of housing units per apartment complex, while statistically controlling for such potentially confounding factors as ethnic background and socio-economic status. Galle et al. found the highest significant positive correlations between the number of people per room and a variety of indicators of social pathology including mortality rate and juvenile delinquency. Other studies employing different populations, such as university dormitory students (Zuckerman, Schmidt, & Yosha, 1977; Barron, Mandel, Adams, & Griffen, 1976) and confined prisoners (Paulus, Cox, McCain, & Chandler, 1975), also have found negative behavior (e.g., lack of helpfulness and aggressiveness) and affective states to be related to high social density living conditions. However, not all researchers have obtained comparable results. Freedman, Heshka, and Levy (1975) found only nonsignificant correlations between density and various pathologies in New York City residents. Taken together, most studies have indicated a moderately positive correlation between high density and pathology in the "real world."

Turning our attention to laboratory research, several researchers have attempted to relate density to task performance. In one study, Freedman, Klevensky, and Ehrlich (1971) manipulated both social and spatial density. Groups of 5 or 9 subjects worked on an assortment of tasks in either a large, medium, or small room. In spite of a large number of performance measures, none was significantly affected by the density manipulation. A second experiment by the same authors, using the same manipulations but fewer dependent measures, yielded

similar nonsignificant results.. However, more recent research by Paulus, Annis, Seta, Schkade, and Matthews (1976) indicated a significant effect of both group size and room size on task performance. Paulus et al. attribute Freedman's lack of significant findings to the specific tasks employed by him which may have been insensitive to stress. Finally, field research conducted in a supermarket by Langer and Saegert (1977) revealed an inverse relationship between task performance (finding items on a shopping list) and spatial density.

The studies cited above involved task performance measures which were taken while the subjects were experiencing the high density conditions. However, Sherrod (1974) hypothesized that there may be posttest decrements in task performance after exposure to crowded conditions in a manner analagous to Glass and Singer's (1972) findings on noise. Sherrod used both concurrent and posttest measures of task performance. Whereas there was no effect of density on concurrent task performance, subjects exposed to high density conditions displayed lower posttest frustration tolerance (as measured by persistence on insoluble problems).

One final study of the relationship between density and task performance is worthy of note. Heller, Groff, and Solomon (1977) manipulated both density and level of physical interaction. Physical interaction was varied by having subjects work on problems while either seated or while moving about the room. Heller et al. failed to find a main effect of density; however, there was a significant interaction between density and physical interaction, with subjects

exposed to the high density, high physical interaction condition performing poorest on the dependent measures. The authors argue that the mere presence of other people in confined quarters is not necessarily deleterious to effective functioning. It is only when such high levels of density can interfere with ongoing interactions that task performance is negatively affected. Similarly, McClelland (1975) found perceptions of crowding to be influenced by both density and interaction level. The findings of Heller et al. and McClelland may account for why certain researchers failed to find effects of density on task performance (e.g., Freedman et al., 1971; Sherrod, 1974) as these latter researchers employed only seated (low physical interaction) conditions.

Some writers have argued that crowding is primarily a social phenomenon; hence, the greatest effect of high density should be on social behavior rather than on task performance. One study which tested this proposition was conducted by Griffitt and Veitch (1971). They manipulated social density by having subjects interact in either large or small groups in the same sized room. The temperature (cool or hot) was also varied. The researchers found that self-reports of affective experiences were generally more negative in the high than low density condition. Subjects also were asked to rate a hypothetical stranger portrayed as attitudinally similar or dissimilar to themselves. Here, too, density had an effect, with subjects in the high density condition rating the stranger less attractive than did subjects exposed to low density. Density also interacted with temperature, with responses being the most negative in subjects exposed to high

density-high temperature conditions. As expected, attitudinally similar strangers were rated as more attractive than attitudinally dissimilar others.

Not all researchers have found such strong negative reactions high density. For example, Freedman, Levy, Buchanan, and Price (1972) had four-person homogenous sex groups interact in either a large or a small room. The subject's level of aggression (as measured by cooperative vs. competitive choices in a modified Prisoner's Dilemma game) was the primary dependent variable. No overall density effect was obtained; however, there was a significant density by sex interaction. Males were more competitive in the high density condition, whereas females were more cooperative in the high density condition. A second experiment by Freedman et al. (1972) measured the severity of mock jury sentences as influenced by density and sex of subject. The results of this study paralleled those reported above, with females giving the least punitive sentences in the high density situation and males giving the most punitive sentences when exposed to the same conditions. Stokols, Rall, Pinner, and Schopler (1973) also found that males in crowded environments felt more competitive and aggressive towards one another, with somewhat opposite results for crowded females. This pattern of sex differences has likewise been obtained by Ross, Layton, Erickson, and Schopler (1973), with males reacting more negatively and females more positively to high density conditions.

In an attempt to explain the differential effects of density on males and females, Freedman (1975) proposed the density-intensity

theory. According to Freedman, crowding per se "has neither good effects nor bad effects on people but rather serves to intensify the individual's typical reactions to the situation" (pp. 89-90). In other words, if an individual typically finds a situation to be pleasant, high density should intensify that feeling, resulting in a more positive state than that which would exist under low density conditions. Similarly, high density may intensify negative reactions, with situations ordinarily evoking negative responses becoming even more unpleasant. For example, high density at a cocktail party should serve to intensify the positive reactions to that situation, whereas high density in a dentist's waiting room should serve to make that experience even more unpleasant. This intensification effect is in part due to the crowding making the others present a more important social stimulus. In short, "crowding intensifies the normal reaction - making a bad experience worse and a good experience better" (p. 93).

As a post hoc explanation of the density by sex interaction found by Freedman et al. (1972), Freedman (1975) speculates that the interactive effects may be due to the differing reactions males and females typically have to the experimental situation. Specifically, Freedman feels that men entering a room of other men may feel somewhat threatened and view the others as rivals with whom they must compete. Females, on the other hand, may not have such a negative reaction to a room full of females; in fact, they may regard the experience as somewhat pleasant. This explanation can account for the generally more negative reactions of males to high density situations and the generally more positive

reactions of females to the same conditions of density.

In order to assess the viability of his theory, Freedman conducted a series of experiments. In one study, Freedman (1975) had subjects give speeches to their co-actors in either large or small rooms. The manipulation of the subject's dominant response was accomplished by having half of the subjects expect to receive only positive feedback from their co-actors and the other half only negative comments. As predicted, there was a significant density by evaluation interaction. Subjects receiving positive evaluations reacted more favorably to the high density condition than to the low density situation, with the opposite pattern of results occurring for the subjects receiving negative evaluations. As this study employed only female and mixed-sex groups, a second experiment was conducted using male volunteers. In this study, the positive or negative orientations towards the situation were manipulated by having the subjects work on problems that either could or could not be solved. In other words, some groups experienced "success" while other groups experienced "failure." Results consistent with the density-intensity theory were obtained.

A third study conducted by Freedman (1975) focused on an interesting aspect of his theory. As in his first experiment, subjects gave speeches in either large or small rooms and received either positive or negative feedback. However, half of the subjects received these comments from their co-actors in the room while the remainder received these comments from observers in another room. Recall that according to the theory, crowding serves as an intensifier by making the other people present a more important stimulus, thereby intensifying

the individual's reaction to them. As such, only people present in the room should produce this facilitative effect. External factors, such as people in the next room, should not intensify dominant responses. The results supported this prediction. As before, small rooms intensified the dominant response, but only when the comments originated from others in the room; evaluations from the observers in the adjacent room produced no intensification of the dominant response. Freedman interprets this result as indicating that the intensification effect is limited to the group itself.

A simple conclusion regarding the consequences of high density is hard to draw. However, it does seem that high density produces certain decrements, especially on posttest measures of task performance. Likewise, density may have an effect on various interpersonal behaviors, but only under certain conditions. Interestingly, although several studies purported to deal with density and aggression, none employed the most established means of measuring aggression: the number of shocks administered to another person on a Buss (1961) aggression machine. Typically these studies employed either paper and pencil measures of aggression or measures best described as reflecting cooperation vs. competition rather than aggression.

Summary and Statement of Hypotheses

Although the findings on noise and density are somewhat mixed, there is reasonable evidence to conclude that these two environmental stimuli are related to human behavior and functioning. The purpose of the present study was to explore how these two variables alone and in conjunction with one another influence both task performance

and aggressive responses.

The basic design of the experiment involved placing four persons in a room where they worked on a given task. Prior to entering the room, each subject was either angered or not angered by one of her co-actors. Once in the experimental room, two additional variables were manipulated: subjects were exposed to either high or low intensity noise and to either high or low (spatial) density. Following this phase of the experiment, subjects were given an opportunity to aggress against the person who had previously evaluated them. Thus, the experiment consists of a 2^3 (affect X noise X density) factorial design.

Previous research has indicated that high intensity noise facilitates the expression of aggression only in angered subjects (Donnerstein & Wilson, 1976; Konecni, 1975a). These findings can be interpreted in terms of a cognitive-labeling explanation of aggression, which states that an arousing stimulus will facilitate aggression only if the individual is able to label his internal feelings as anger. This increased arousal facilitates aggression in angered subjects by triggering their dominant response which in this case would be aggression. Thus, in the present study, it was expected that noise would facilitate aggression only in previously angered subjects. Additionally, the aggression literature cited above indicates that the affect manipulation would produce differential initial levels of aggression, with the angered subjects exhibiting more aggression than nonangered subjects. Based upon the above reasoning, the following two hypotheses were proposed:

Hypothesis 1. Angered subjects will display more aggression than nonangered subjects.

Hypothesis 2. High intensity noise will increase aggression only in previously angered subjects; nonangered subjects will be unaffected by the noise.

Although the findings on density are somewhat more mixed than those on noise, some predictions are nonetheless possible. In particular, Freedman's (1975) density-intensity theory is relevant to the present issue. According to this theory, high density should intensify the individual's normal reaction to the situation. In terms of the present study, previously angered subjects exposed to high density conditions should become even more aggressive while nonangered subjects should be unaffected by this manipulation. Interestingly, the predictions based upon this aspect of Freedman's theory are consistent with those that may be derived from the cognitive-labeling model. Both would predict that environmental stimuli may increase the likelihood of the expression of a person's dominant response; thus both noise and density would increase aggression only in previously angered subjects. Although these explanations were forwarded to account for different phenomena, they have in common the assumption that a person's labeling of his feelings is a crucial determinant of how aversive stimuli will affect his behavior. The following hypothesis was proposed:

Hypothesis 3. High density will increase aggression only in previously angered subjects; nonangered subjects will be unaffected by the density.

The prediction regarding the joint effects of noise and density is more problematic than predictions related to the operation of the variables working alone. Based mainly on intuition, it might be expected that the combination of density and noise would increase the level of aggression of previously angered subjects above those levels produced by either variable presented alone. This speculation follows from the reasoning that if both density and noise alone can facilitate aggression, then perhaps their effects are additive. Such a finding would be similar to the additive effects of density and heat obtained by Griffitt and Veitch (1971) on measures of attraction. Likewise, if neither noise nor density affects aggression in nonangered subjects, then the combination of the two would not be expected to affect levels of aggression.

Hypothesis 4. The highest level of aggression will be manifested by angered subjects exposed to both high noise and high density combined; nonangered subjects will be unaffected by the combination of noise and density.

A graph displaying the predicted results of the above four hypotheses can be found in Figure 1.

Although the above hypotheses are based upon the relevant noise and density literature, a line of research by Baron and Bell (1975; 1976; Bell & Baron, 1976) may be applicable to the present study. In a series of experiments, Baron and Bell have investigated the relationship between heat and physical aggression. These researchers obtained an interesting interaction involving temperature and anger, with high ambient temperatures facilitating aggression in nonangry subjects but

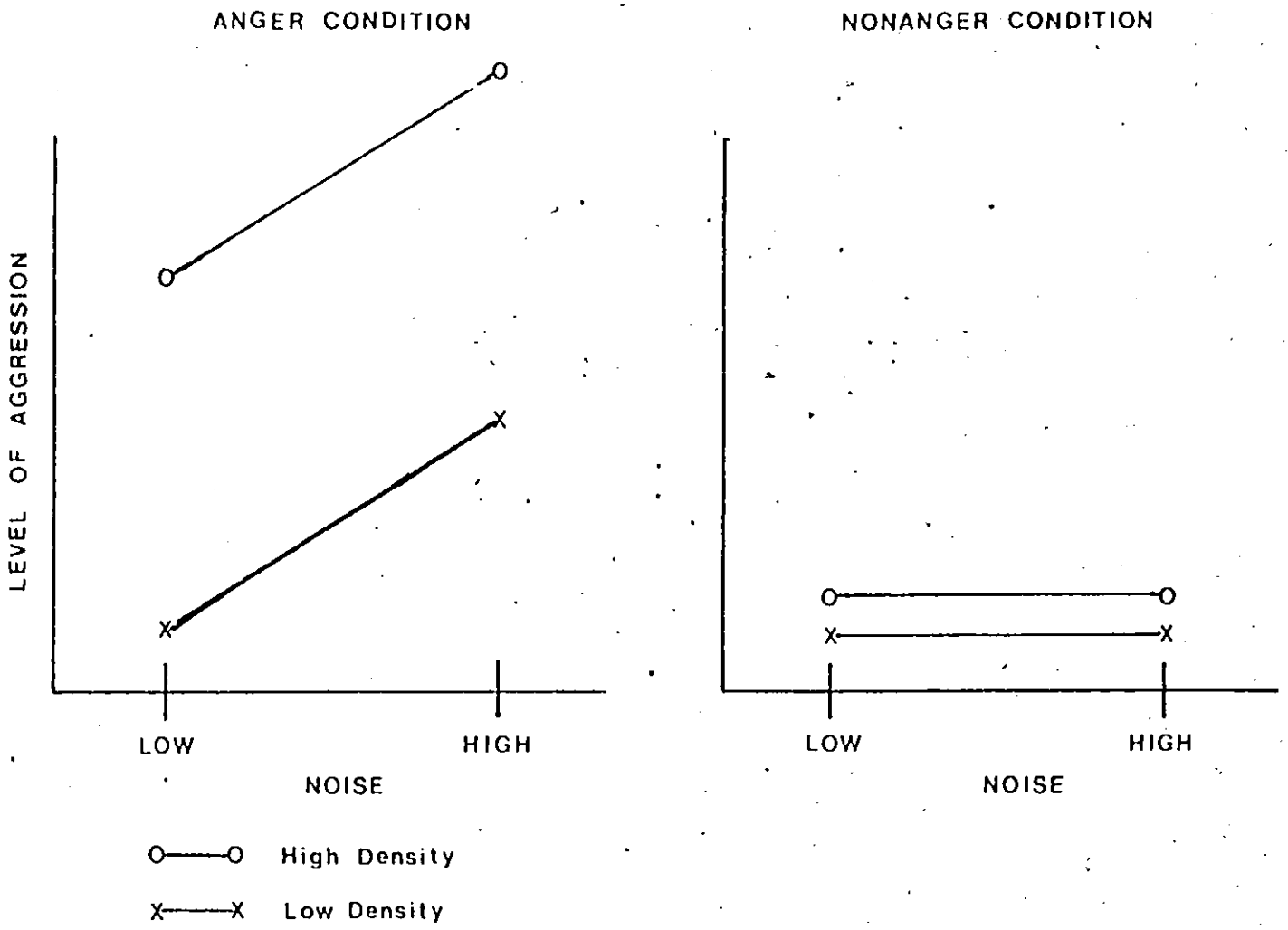

Figure 1. Hypothesized levels of aggression resulting from exposure to the experimental conditions.

inhibiting the aggression of angry subjects. In attempting to explain these results, Baron and Bell (1975; 1976) propose a model suggesting a curvilinear relationship between negative affect and aggression.

> According to this hypothesis, under moderate levels of negative affect such as those which would be produced independently by strong anger arousal or high ambient temperatures alone, aggressive responses are dominant in subjects' behavior hierarchies and overt attacks against others are facilitated. On the other hand, under more extreme levels of negative affect such as those which would be produced by strong anger arousal and high ambient temperatures together, other responses incompatible with overt assaults (e.g., flight from the oppressive situation, attempts to minimize discomfort) become dominant instead, and aggression is therefore reduced (Bell & Baron, 1976, p. 19).

Although the above relationship was based upon temperature and aggression, it is tempting to generalize their hypothesis to the present study. According to their approach, any stimulus capable of evoking negative affect should facilitate aggression up to a certain point; beyond that point, excessively high levels of negative affect should inhibit aggression. If it is assumed that both noise and density can elicit negative affect, then Baron and Bell's approach might yield predictions opposite to those proposed for the present study. Perhaps of greatest interest is the prediction regarding the combination of noise and density. If both noise and density can elicit negative affect independently, then their combination should yield greater negative affect than either presented alone. As such, angered subjects exposed to high density and loud noise should be less aggressive than angered subjects exposed to either stimuli alone. Of course, the above prediction based upon their model assumes that noise and density are capable of evoking negative affect. The present study will be able

to determine how generalizable Baron and Bell's model is to independent variables other than temperature.

This experiment also investigated the effects of density and noise on concurrent task performance. Although the data are somewhat equivocal, there is some evidence to suggest that exposure to high noise has deleterious consequences on task performance (e.g., Duncan, 1977). The research on density also indicates that high density negatively affects task performance (e.g., Heller et al., 1977). If both of these stimuli alone can adversely affect task performance, it may be argued that the two stimuli presented in conjunction with one another will produce greater decrements in performance than would occur for either stimuli presented separately. Thus, the following hypotheses are proposed.

Hypothesis 5. Subjects exposed to high noise will perform more poorly than subjects exposed to low noise.

Hypothesis 6. Subjects exposed to high density will perform more poorly than subjects exposed to low density.

Hypothesis 7. Subjects exposed to high noise and high density combined will perform more poorly than subjects in any other condition.

CHAPTER II

METHOD

Overview

The overall design of the study was a 2 X 2 X 2 factorial with manipulation of anger (anger or nonanger), noise (low or high intensity), and density (low or high). Subjects participated in the experiment in groups of four. Upon arrival at the experiment, subjects were asked to get to know one another by writing a personality sketch. Anger was manipulated by varying the feedback that the subjects received from a partner, with half the subjects receiving favorable comments and evaluations of their personality and the other half negative comments and evaluations. Following this, subjects worked on a thirty-minute task with levels of noise and density being varied. After completion of the task performance phase of the experiment, subjects were given an opportunity to administer electric shock to the person who previously had evaluated them. The last part of the experiment involved the completion of a post-experimental questionnaire.

Subjects

Ninety-six female undergraduates from introductory psychology classes at the University of Windsor were recruited as subjects. They participated in the experiment in groups of four with twelve subjects being assigned to each condition. Only previously unacquainted subjects were used

Setting and Apparatus

The task-performance part of the experiment was conducted in a room with a floor area of 81 square feet (7.53 square meters). The

room contained a moveable partition which extended to within 4 inches (10.2 centimeters) of the ceiling and four narrow rectangular tables placed along the wall upon which the task materials were placed. Density was varied by the positioning of the partition. The room also contained a speaker, through which prerecorded random sequences of white noise were introduced, and a small one-way mirror which was used for the observation of the subjects.

Two additional rooms, approximately equal in size and appearance to each other, were used. Each room contained two desks each with high partitions on three sides. These desks were arranged so that a subject sitting in one could not observe a subject sitting in the other. Each desk contained a modified "aggression machine" (Buss, 1961), consisting of 10 switches labeled from 1 to 10. The aggression machine also contained a light and four jacks. The light was used to indicate the beginning of a trial. One of the jacks was for administering a sample shock. A set of electrodes, when inserted into this jack, was capable of delivering shock when button 4 was depressed. The shock was produced by a centrally located Model 935A Harvard (shock) Apparatus. The other jacks, along with appropriate labels, were provided to help give the impression that the aggression machine could be used to either administer shock or to record the physiological reactions of the person receiving the shock. Each aggression machine was connected to an Esterline-Angus pen recorder, which provided a continuous recording of the intensity and duration of shocks delivered by a subject. Each room also contained a microphone so that the experimenter could monitor whether or not the subjects

were speaking during the experiment.

A fourth room contained the equipment that was employed by the experimenter, including the pen recorders, tape recorders, and shock generator. A fifth room, which adjoined all of the above rooms, was used for meeting and debriefing the subjects.

Procedure

The subjects were informed at the time of their solicitation that the experiment dealt with the effects of sound stimuli on behavioral and physiological responding. Subjects were run in groups of four; the subjects in each group were recruited from different classes to insure that they were unacquainted with each other. Upon arriving at the meeting room, a subject was asked if she had a hearing problem. Had she answered affirmatively, she would not have been allowed to participate in the study. However, no subject indicated having such a problem. Then the subject was instructed to take a seat and to refrain from talking to any of the other participants. Once all four subjects had arrived, the experimenter, using a procedure and material adopted from Baron and Bell (1976; Baron, 1978),[1] informed them of the study as follows:

> Hello. My name is Wayne Lesko. In this study we are interested in observing the effects of noise in confined quarters on various physiological and behavioral measures.[2]

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[1]The methodology employed was as identical as possible to that used by Baron and Bell. Whatever minor changes made were necessitated by the fact that the present study involved the simultaneous participation of four subjects, whereas Baron and Bell worked with a single subject and confederate. Nonetheless, it appears that the essence of Baron and Bell's procedure has remained intact.

[2]Because of the obvious presence of the noise, especially in the high noise condition, no attempt was made to conceal this variable from the subjects. A plausible explanation for the lack of space in the high density condition was provided by saying we were studying the effects of noise in "confined quarters."

However, before beginning the study, we would first like you to get to know some of your fellow participants. To begin with, I would like you to put on these letter designations which will be used throughout the study.[3] Because we want to hold as constant as possible exactly what is being exchanged, we will ask you not to talk to one another but rather to limit your information exchange to a personality description. We would like you to first write a brief description or sketch of your personality. This information will then be exchanged with one other person. You will be asked to rate your partner on a series of traits. In normal interactions, you get feedback from the other person which helps you tell how she is reacting to you. For that reason, the ratings that you give to the other person will in turn be exchanged in order that you may see what kind of an impression you have made on her. Do you have any questions?

Could A and B please go into this room and C and D into the other room? You will find the personality sketch forms on the desks. You have about five minutes to complete them. Please do not talk to one another during this part of the experiment.

After five minutes had elapsed, the experimenter collected the personality sketches. On his way from one room to the other, he was able to unobtrusively substitute standardized personality sketches (see Appendix A) that were returned to the subjects along with a blank rating form (see Appendix B). Subjects were aware of whom they were evaluating by the letter designation at the top of the sheet, with A being paired with C and B being paired with D. Once this was accomplished, they were informed:

We would now like you to rate your partner's personality on a series of traits. As you can see, each trait is numbered from one to seven, with each end denoting opposite extremes of a continuum. After reading through the description, indicate on this sheet how much of each trait you believe your partner possesses. Once this is done, your ratings will be returned to your partner so that she can see what kind of an impression she has made

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[3]Letters were printed on a name tag which a subject pinned to her chest. The letter tags were shuffled and randomly assigned to the subjects.

on you. Do you have any questions?

Once these ratings were completed, the experimenter collected them and unobtrusively substituted standardized ratings (see Appendix C) which were then given to the subjects. The anger manipulation was achieved by means of these standardized ratings. Subjects in the anger condition were given ratings that were very negative and quite derogatory. On the other hand, subjects in the nonanger condition received ratings that were very favorable and flattering.

A group of subjects was randomly assigned to one of the eight experimental conditions. That is, all subjects in a given group were in the same condition. Thus, all four subjects in a given group received the same personality sketches - either positive ones or negative ones - as well as being exposed to the same levels of noise and density.

Once the subjects read over the evaluations that their partners had made of them, the experimenter escorted them to the task performance room where he explained the next part of the study.

Recall that the task performance room had narrow tables placed along the walls. On the tables were placed eight stacks of computer cards in boxes. The cards in a given stack had the same one-digit number between 1 and 8, inclusive, printed on the upper left side. Also, printed on the right hand side of each card was a two-digit number. The number was between 11 and 99 but did not end in a zero. An example of the task materials may be found in Appendix D. A distinctive symbol (e.g., #, /, $) was printed on a card which was taped to the wall above each stack of cards. Each stack of cards had its own symbol. The room also contained a stack of control cards

which the subjects used to sequence the other cards in the room. Each control card contained a random sequence of the symbols that were taped to the wall. The symbols used as the means for sequencing the cards were not placed on the computer cards themselves so as to prevent a subject from simply picking up a group of computer cards and sequencing them in her hand. This procedure forced the subjects to walk about picking up only one card at a time. Additionally, the room contained envelopes in which completed card sets were placed, and a separate box for each of the subjects where they deposited their completed materials. The instructions and procedures were adopted from the methodology of Heller, Grof, and Solomon (1977):

> As I mentioned earlier, part of this study involves the effects of noise in confined quarters on task performance. You will notice stacks of computer cards arranged on tables around the room. Above each pile you will find the symbol of the card. Your task is to arrange these cards according to the sequence indicated on the control cards. (The experimenter pointed to the box which held the control cards.) You are to take a control card and assemble the other cards according to the sequence indicated on it. Additionally, you will notice that each card has a two-digit number on it. After properly sequencing the cards, add up these numbers and write their sum on the control card. Once that is completed, place the set in an envelope, keeping the card sequence correct with the control card on top. Then, place the envelope in the box with your letter on it, pick up a new control card, and start over. Let me demonstrate. (The experimenter demonstrated the proper procedure for the subjects.) The object of this task is to complete as many card sets as possible while both correctly ordering them and properly adding up the numbers. Be sure not to bend the cards as they will be computer corrected and any mutilated cards will be counted as errors. The four people in this experiment who complete this task best will receive a bonus of $15 in addition to their experimental credit points.[4] Do you have any questions?

---

[4] A bonus was included to insure that the subjects were motivated to perform the task properly.

This part of the experiment will last approximately one-half hour. You are to work on your task individually; that is, do not help others but work on your own task. It is also very important not to talk to one another while working on your respective tasks.

Bursts of noise will be played in the room while you are working in order to determine how they affect your performance. I will be observing your behavior from the next room via this window. You can begin once you hear the first burst of noise after I leave; I'll return when the time is up. Do you have any questions?

The above task corresponded to what Heller et al. (1977) labeled a high interaction condition. The situation is such that subjects are forced to move about the room in random patterns in order to complete the task. In the present experiment, these procedures had the advantage of yielding data on the effects of noise and density on two types of task performance: number of card sets properly sequenced and number of card sets correctly added. Whereas the performance on card sequencing is primarily a motor task and can be easily interfered with by the presence of others, the addition task is more cognitive in nature and performance on it is influenced by factors other than physical blocking of the response by the presence of others (Heller et al., 1977).

The density manipulation was achieved by varying the useable floor space in the experimental room by use of partitions. Useable floor space was defined as the amount of floor space actually available to the participants, i.e., the total floor space minus the space occupied by the tables. The high density condition afforded the subjects 4.5 square feet (0.42 square meters) per person, while the low density condition allowed 16.1 square feet (1.50 square meters) per person.

For the noise manipulation, pre-recorded white noise was introduced into the room by means of a speaker. The noise was both unpredictable and uncontrollable, the conditions which have been found to produce the most potent effects of noise on behavior (Glass & Singer, 1972). The bursts of noise were 1-second in duration and occurred at random intervals on the average of one burst every five seconds. The noise was at 95 dB in the high noise condition and 50 dB in the low noise condition; these are levels comparable to those employed by previous investigators (e.g., Donnerstein & Wilson, 1976; Duncan, 1978).

Once the experimenter had delivered the instructions to the subjects, he left the experimental room and turned on the tape recorder. The experimenter observed the subjects through the one-way mirror. Exactly 30 minutes later, the experimenter turned off the recorder, entered the experimental room, and instructed the subjects as follows:

> That is the end of this part of the experiment. The next part of the study deals with the effects of noise on physiological responses. For this next part, I would like you to return to the seats you occupied earlier.

Because the subjects were in two separate rooms, the instructions were presented individually to each group. Subjects awaiting instructions were asked not to speak to each other. The instructions and methodology employed are based upon research by Baron and Bell (1975; 1976).

> This part of the study concerns the effects of noise upon physiological reactions to electric shock. In order to investigate this topic, half of you will serve as responders and receive a series of electric shocks of varying intensity administered by the other two subjects who will act as stimulators. I will be in another room continuously monitoring the responders' physiological reactions to the shocks she will receive. In a moment, I will randomly determine which room will contain the responders and which room the stimulators? Do you have any questions?

The experimenter then delivered the same instructions to the other set of subjects. After this, the experimenter returned to the first room and stated:

> According to my chart, the other room will contain the responders and this room the stimulators. That is, the other two people will receive the shocks, and the two of you will administer the shocks. Now, the shocks that will be employed are harmless; in a moment I will give you an idea of their magnitude. I have already asked the other two if they would be willing to receive the shocks and they have agreed to it. Are you willing to act as stimulators?
>
> I am now going to connect the others to the physiological equipment. I will return in a few minutes to give you detailed instructions about your task. Please do not talk to one another while I am gone.

The experimenter then proceeded to the second room and delivered the same set of instructions. Returning to the first room, the experimenter described the subjects' task.

> As I mentioned, we are interested in studying the individual's physiological reaction to electric shock. Additionally, we are interested in how shock and noise may interact with one another to affect physiological responding. As a result, the subjects receiving the shock will be exposed to noise at the same time they are receiving shocks.
>
> Your task is to administer shocks to the other person each time the light on the box in front of you is illuminated. As you will notice, this box contains 10 buttons labeled from 1 to 10. The light will be illuminated according to a predetermined random schedule specifically designed to prevent the responder from "getting ready" for each shock and thus influencing her physiological reactions to them. Each time the light goes on, you are to select and depress one of the switches on your panel.
>
> Because we are interested in a wide assortment of shock intensities and because a large number of subjects will eventually participate in this study, you should feel free to choose any shock button you wish, and depress it as long as is desired each time the light is illuminated. Remember, you may change the intensity

> and duration of the shock as you wish each time the light is illuminated. The numbers below the buttons indicate their intensity, with higher numbers associated with stronger shocks. In order to give you an idea of the magnitude of the shocks, I would like to give each of you a sample shock.

The experimenter then proceeded to give each subject a sample shock from button 4. The intensity of the shock (65 volts) was selected by pretesting so as to be moderately noxious and unpleasant. After the sample shocks had been administered, the experimenter continued:

> Each of you will be administering shocks to the person whom you earlier evaluated. Remember, you are to select a button and depress it each time the light is illuminated. Be sure to push the button down all the way in order to insure that it makes contact. Do you have any questions? The light will go on in a few minutes.

The experimenter then delivered the same set of instructions to the second pair of subjects. Once that was completed, the experimenter proceeded to illuminate the shock signal 20 times, thus providing the subjects with 20 opportunities to aggress against the other person.

Baron and Bell (1976), who developed this procedure, suggest that it is better than the usual "teacher-learner" paradigm because it provides "a measure of aggression somewhat less contaminated by various altruistic motives (e.g., a desire to help the "learner" master the experimental materials) than the more commonly used techniques" (p. 248). The method employed allows for the simultaneous measurement of the aggression of all four subjects. Recall that each subject believes that she is shocking the person who previously evaluated her. In reality, no shocks were actually delivered.

After the twentieth shock trial, the experimenter entered the first room and explained:

> That is the end of this part of the experiment. While I disconnect the apparatus from the responders, I would like you to complete this questionnaire. I will be back in a few minutes.

The questionnaire consisted of three parts (see Appendix E). The first part was designed to assess the individual's perceptions of her experiences in the task performance room. It consisted of a seven-point scale of bipolar adjectives derived from those employed by Griffitt and Veitch (1971) and Paulus et al. (1976). The second part of the questionnaire was intended primarily as a check on the affect manipulations. Subjects were asked to indicate how much they liked the other person, how angry they were, and so on. The third part concerned subjects' suspicions regarding the nature of the experiment.

Once all the subjects had completed the questionnaire, the experimenter took each one aside individually to query them further about the experiment. This was done in private so that one subject's comments would not influence those of the other people. This interview was open-ended, and was directed primarily by the subject's responses on the questionnaire. Once all four subjects had been individually interviewed, the experimenter brought them together and gave them a thorough debriefing (see Appendix F).

The experimenter then thanked the subjects individually and gave them their experimental credit cards.

CHAPTER III

RESULTS

Preliminary Analyses

In order to insure that subjects were unacquainted with one another prior to the experiment, all subjects were asked to indicate on a post-experimental questionnaire (Appendix E-3) whether they knew any of their co-actors. None of the subjects indicated previous acquaintance with any of her fellow participants. Additionally, subjects indicated that they had not heard anything about the experiment prior to participating in it.

The post-experimental questionnaire also contained items asking the subjects whether they spoke to anyone during the course of the experiment and what they thought was the purpose of the study. Subjects indicated that they did not speak during the experiment except to utter brief apologies when they accidentally bumped into someone in the task performance room. Also, the vast majority of subjects accepted the cover story at face value, i.e., they believed the study dealt with the effects of noise in confined quarters on task performance and physiological responding. Several of the subjects saw the connection between the noise manipulation and the administration of shock in that they believed the experiment was concerned with how that environmental factor was related to the shocks they gave to their partners. However, these subjects still believed that they were actually administering shock to the other person. Interestingly, not one subject suspected that the personality description and feedback they received in the beginning

of the study did not originate from her partner.

Before proceeding with the analyses, the potential problems of interdependency of results should be discussed. In the present study, four people participated together in a given trial. For that reason, it may be argued that the results of a given trial are nonindependent insofar as the behavior of one subject may have influenced another's responses. In such cases, it has sometimes been suggested that a group score rather than an individual subject score be regarded as the appropriate unit of analysis. Agreement on this issue is far from unanimous; researchers seem to be equally divided between those who use individual subject data (e.g., Griffitt & Veitch, 1971) and those who employ group data (e.g., Freedman et al., 1972). Thus, it was decided to test whether the subject's responses were related. Separate intraclass correlations (see Snedecor, 1967) were calculated for each of the eight experimental conditions on each of the following dependent measures: intensity of shock; duration of shock; intensity X duration of shock (see next section); number of card sets completed; number of card set sequencing errors; and number of card set addition errors. Within any given condition, the scores of the subjects who were paired with one another were used in calculating the correlations because the responses of these two subjects theoretically should be more interdependent than those of any other combination of subjects. None of the 48 correlations that were calculated approached significance. Because of this apparent lack of interdependency between subject scores, the data from the individual subjects were used as the units of analyses. Nonetheless, analyses were also performed on the group data. The results obtained by

these analyses are comparable to those obtained for the individual subject data. Summary tables for the analyses of variance on the group data may be found in Appendix G.

Aggression Measures

Two measures of aggression were directly available from the subjects' responses: intensity of shock (the shock level selected) and duration of shock (the length of time the shock switch was depressed). From these two measures, a third measure, intensity X duration of shock, was calculated. This latter measure is obtained by multiplying the intensity of shock selected by the length of time the switch was depressed. Such an index of aggression has been used by previous researchers as a means of obtaining a composite index of severity of shock (e.g., Baron & Bell, 1976; 1977). Tests of homogeneity of variance then were performed on the above three measures. Nonhomogeneity of variance was indicated for only the intensity X duration measure. In order to reduce heterogeneity of variance, a simple square root transformation was performed: $Y = \sqrt{X} + \sqrt{X + 1}$, where X = intensity X duration (Baron, 1978). The resulting measure was called transformed intensity X duration of shock.

In order to test the hypotheses related to aggression (Hypotheses 1, 2, 3, and 4) a 2 X 2 X 2 (density X noise X anger) analysis of variance was conducted on each of the three dependent measures: intensity of shock, duration of shock, and transformed intensity X duration of shock. The mean scores for each dependent variable are presented in Table 1, and the summaries of the analyses of variance are presented in Table 2. Figure 2 contains a graphic representation of the results of the analyses for the intensity of shock, and Figures 3 and 4 depict the

results of the duration and intensity X duration analyses, respectively. The reader is referred back to Figure 1 to compare how these figures correspond to the hypothesized relationships.

Hypothesis 1 stated that angered subjects would display more aggression than nonangered subjects. As Table 2 indicates, the effect of anger was significant for the duration of shock and the transformed intensity X duration of shock; anger did not significantly affect the intensity of shock. Inspection of the means in Table 1 and Figures 3 and 4 reveals that subjects in the anger condition delivered more shock than their nonangered counterparts. The trend of the results for the intensity of shock is in the same direction (see Figure 2). Thus, subjects who were previously angered were indeed more aggressive than nonangered subjects, findings which lend support to the first hypothesis.

Hypothesis 2 stated that high noise would facilitate aggression in previously angered subjects, whereas nonangered subjects would be unaffected by the noise manipulation. As Table 2 reveals, there was no significant interaction between noise and anger on any of the dependent measures. Moreover, the main effect of noise was not significant. Thus, Hypothesis 2 was not supported, with noise apparently having no effect, either by itself or in conjunction with anger, on the subjects' subsequent aggressive behavior.

The third hypothesis dealt with the effects of density, and stated that high density would increase aggression in previously angered subjects but not in nonangered subjects. As Table 2 indicates, the hypothesized density by anger interaction did not materialize. However, there was a highly significant main effect of density on all three

TABLE 1

Mean Measures of Amount of Shock

			Intensity	Duration[a]	Transformed Intensity X Duration
Low Density	Low Noise	Nonanger	2.43	0.36	1.48
		Anger	1.95	0.42	1.49
	High Noise	Nonanger	2.00	0.39	1.49
		Anger	3.17	0.49	1.67
High Density	Low Noise	Nonanger	4.24	0.84	1.94
		Anger	4.58	0.96	2.08
	High Noise	Nonanger	4.04	0.64	1.86
		Anger	4.01	0.97	2.09

[a]Figures designate duration in seconds.

TABLE 2

Analyses of Variance of Measures of Amount of Shock

Source	df	Intensity MS	Intensity F	Duration MS	Duration F	Transformed Intensity X Duration MS	Transformed Intensity X Duration F
Density (A)	1	80.373	36.198***	4.511	59.137***	5.130	61.434***
Noise (B)	1	0.000	0.000	0.012	0.162	0.017	0.198
Anger (C)	1	1.515	0.682	0.554	7.257**	0.474	5.676*
A X B	1	3.658	1.648	0.133	1.740	0.095	1.140
A X C	1	0.220	0.099	0.124	1.626	0.056	0.676
B X C	1	2.458	1.107	0.086	1.125	0.112	1.345
A X B X C	1	6.050	2.725	0.050	0.654	0.009	0.103
Residual	88	2.220		0.076		0.084	

*$p < .05$
**$p < .01$
***$p < .001$

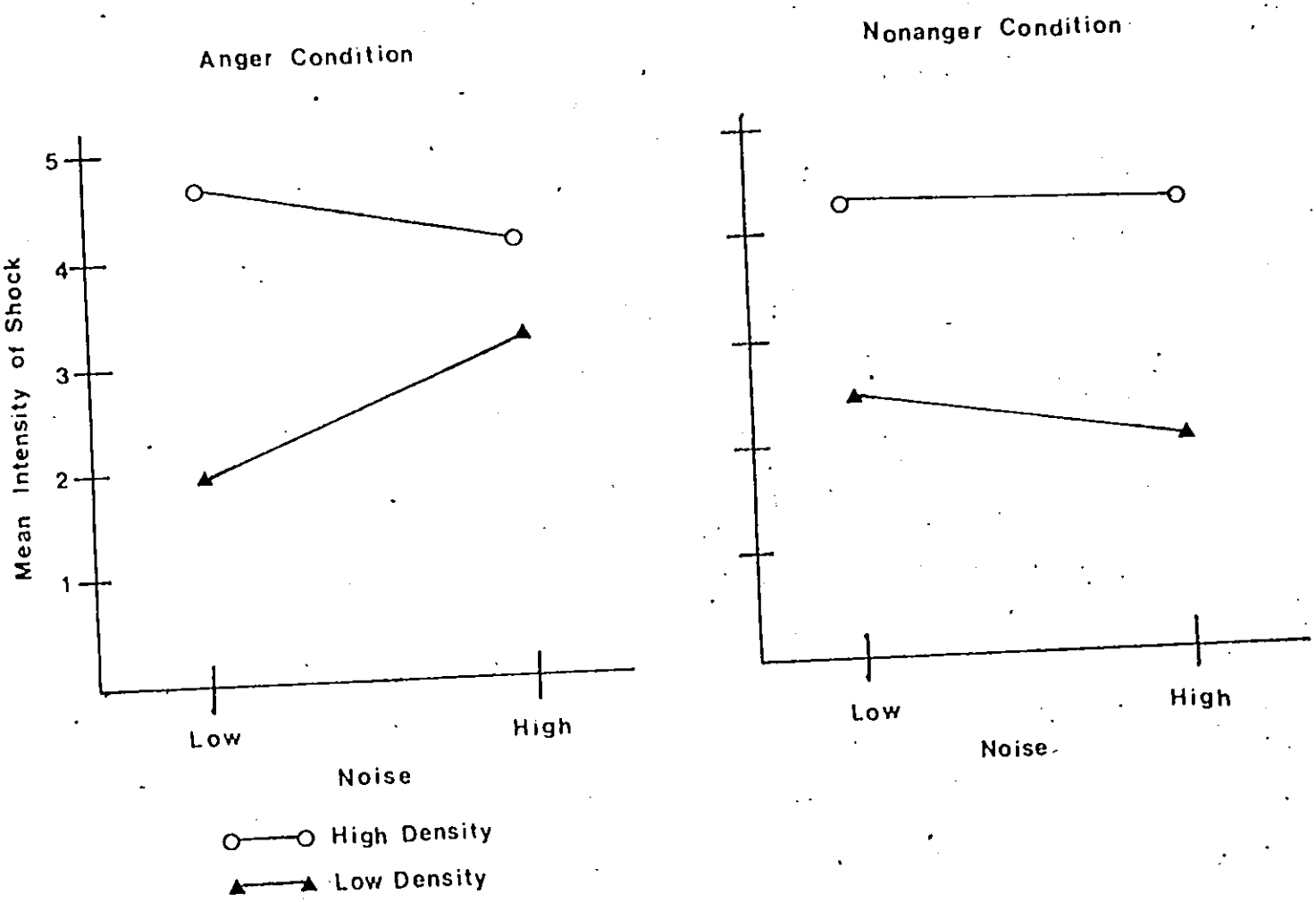

Figure 2. Mean intensity of shocks.

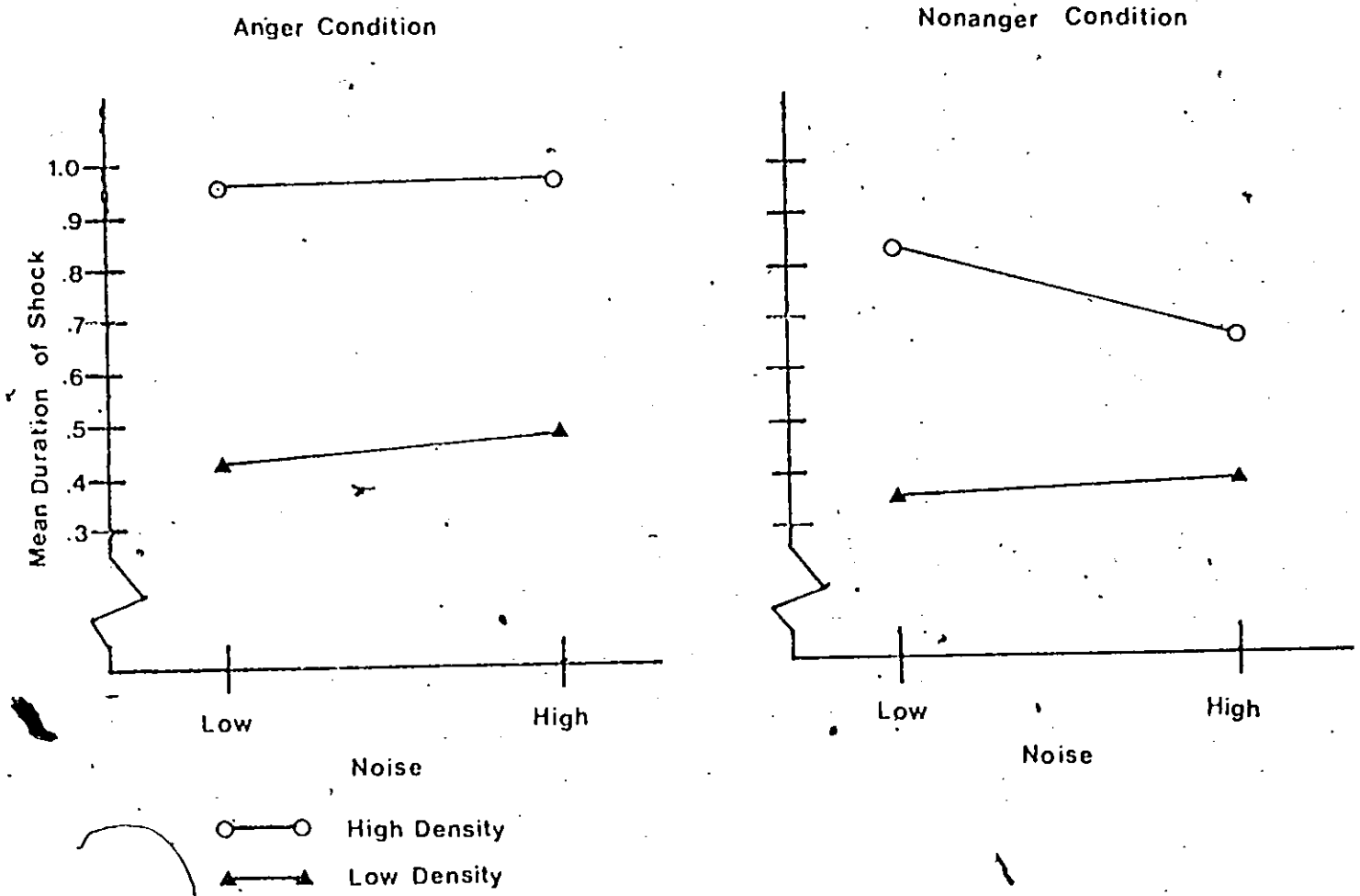

Figure 3. Mean duration of shocks.

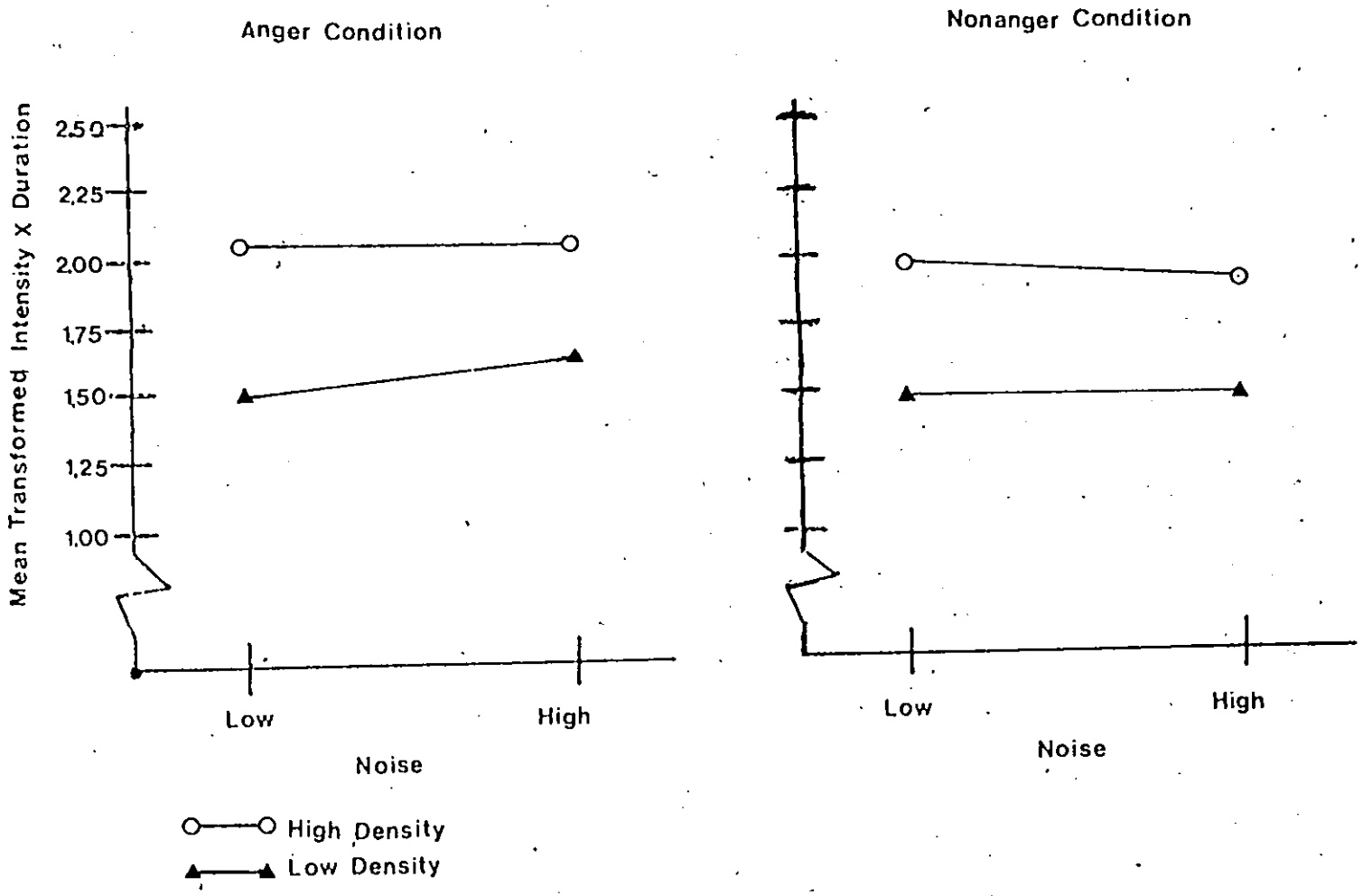

Figure 4. Mean transformed intensity X duration of shocks.

dependent measures. Inspection of the means in Table 1 and Figures 2, 3, and 4 reveals that more shock was administered in the high density condition than in the low density condition. Thus, high density seems to have made subjects more aggressive regardless of their level of anger arousal.

Hypothesis 4 concerned the additive effects of noise and density. It stated that the highest level of aggression would be manifested by angered subjects who were exposed to a combination of high noise and high density. The failure to support this hypothesis is apparent from the lack of a significant noise X anger and density X anger interaction (see Table 2). Moreover, as Table 1 reveals, high noise and high density combined did not yield more aggression than in any other condition, regardless of the subject's anger level.

Except for the confirmation of the hypothesized differential levels of aggression of angered and nonangered subjects (Hypothesis 1), the results of the analyses of the aggression data did not lend support to the experimental hypotheses. Although density itself facilitated the expression of aggression, there apparently was no interaction between density and anger (Hypothesis 3) or between noise and anger (Hypothesis 2). Furthermore, contrary to Hypothesis 4, the combination of the two stressors failed to increase aggression beyond that expressed by subjects who were exposed to high density.

Task Performance

A second set of hypotheses concerned the effects of noise and density upon task performance. The analyses consisted of separate

2 X 2 X 2 (density X noise X anger) analyses of variance on each of the following dependent measures: total number of sets completed, number of sets incorrectly sequenced, number of sets incorrectly added, percentage of sets incorrectly sequenced, and percentage of sets incorrectly added. The means may be found in Table 3, and the results of the analyses of variance are presented in Table 4.

Hypotheses 5 and 6 stated that subjects exposed to high noise and high density, respectively, would perform poorer than subjects exposed to lower levels of noise and density. Hypothesis 7 predicted that subjects exposed to high noise and high density combined would perform poorer than subjects in any other condition. As Table 4 indicates, there were no significant main effects for either noise or density on the various task performance measures. There was, however, a significant density X noise X anger interaction on the measure of total number of card sets completed. Although tests of simple effects failed to detect any significant differences, the pattern of means reveals that this interaction occurred for noise and anger only under the high density condition. Specifically, angered subjects exposed to high noise completed more card sets than angered subjects exposed to low noise ($\bar{X}$'s = 19.70 and 17.87, respectively), whereas nonangered subjects performed in an opposite manner, with these subjects completing fewer card sets when working under high noise than under low noise conditions ($\bar{X}$'s = 18.45 and 19.70, respectively). Table 4 also reveals that the combination of high levels of density and noise failed to produce poorer task performance than that obtained in any other condition. Thus, none of the task performance hypotheses was supported.

TABLE 3

Mean Measures of Task Performance

			Number Sets Completed	Number Sequenced Wrong	Percent Sequenced Wrong	Number Added Wrong	Percent Added Wrong
Low Density	Low Noise	Nonanger	18.17	4.08	22	6.42	37
		Anger	18.17	2.83	13	5.50	31
	High Noise	Nonanger	20.08	3.75	20	7.17	37
		Anger	19.50	2.25	12	5.50	29
High Density	Low Noise	Nonanger	21.25	2.08	10	6.33	32
		Anger	17.58	2.25	14	5.08	30
	High Noise	Nonanger	16.83	3.17	22	3.83	23
		Anger	20.00	3.08	18	4.92	27

TABLE 4

Analyses of Variance of Measures of Task Performance

	df	Number Sets Completed MS	F	Number Sequenced Wrong MS	F	Percent Sequenced Wrong MS	F	Number Added Wrong MS	F	Percent Added Wrong MS	F
Density (A)	1	0.094	0.007	5.042	0.446	0.001	0.030	29.260	2.335	0.078	1.881
Noise (B)	1	2.344	0.164	3.375	0.298	0.022	0.507	5.510	0.440	0.028	0.674
Anger (C)	1	1.760	0.124	15.042	1.329	0.042	0.975	11.344	0:905	0.018	0.437
A X B	1	41.344	2.901*	8.167	0.722	0.052	1.200	17.510	1.397	0.015	0.349
A X C	1	0.010	0.001	16.667	1.473	0.044	1.014	8.760	0.699	0.039	0.943
B X C	1	58.594	4.112**	0.000	0.000	0.005	0.122	3.760	0.300	0.002	0.040
A X B X C	1	82.510	5.790**	0.375	0.033	0.011	0.266	14.260	1.138	0.006	0.152
Residual	80	14.251		11.316		0.043		12.531		0.042	

*$p < .10$
**$p < .05$

Questionnaire

The postexperimental questionnaire consisted of several parts. The first part (Appendix E-1) concerned the subjects' perceptions of their experience in the room where they worked during the task performance phase of the experiment. The questionnaire consisted of 14 pairs of bipolar adjectives, each with a seven-point scale. A principal components factor analysis was performed on subject responses to the items. The final varimax rotated factor matrix is presented in Table 5. Four factors were identified from the analysis. Factor I, labeled as Frustration Factor, had the frustrated-not frustrated and difficult-easy items load highly on it. The hot-cold, warm-cool, and noisy-not noisy items had high loadings on Factor II; hence, it was labeled an Environmental Factor. Factor III was labeled an Activity Factor; the passive-active, crowded-not crowded, and energetic-tired items had high loadings on it. Items with high loadings on Factor IV (an Affect Factor) were comfortable-uncomfortable, happy-sad, good-bad, interesting-uninteresting, pleasant-unpleasant, and angry-not angry.

The resultant subject factor scores from the factor analysis for each of the four factors were then subjected to a 2 X 2 X 2 (density X noise X anger) analysis of variance. The cell means and results of the analyses of variance are provided in Tables 6 and 7, respectively.[5] As Table 7 reveals, noise had a significant main effect on Factor II.

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[5]Univariate analyses of individual items of subject reactions to the task performance situation may be found in Appendix H.

TABLE 5

Final Varimax Rotated Factor Matrix of Measures of Reactions to the Task Performance Situations

Variable	Factor I Frustration	II Temperature	III Crowding	IV Affect
Hot-cold	- .04	.87	.17	.07
Comfortable-uncomfortable	.09	- .16	- .30	.73
Passive-active	.05	- .04	- .76	- .19
Happy-sad	- .32	.17	.17	.65
Noisy-quiet	.47	.44	- .02	.00
Good-bad	.41	.08	.09	.67
Warm-cool	- .06	.86	.13	- .04
Angry-not angry	.52	- .08	.12	- .49
Difficult-easy	.81	.03	- .11	.02
Interesting-uninteresting	.02	- .21	.38	.69
Energetic-tired	- .04	.13	.48	.38
Crowded-not crowded	.10	.24	.72	- .26
Frustrated-not frustrated	.71	- .08	.21	- .34
Pleasant-unpleasant	- .50	.13	.19	.56
Eigenvalue	3.81	2.28	1.40	1.14
Proportion of variance accounted for by factor	27.2	16.3	10.0	8.1

TABLE 6

Mean Factor Scores of Measures of Reactions to the Task Performance Situations

			Factor			
			I	II	III	IV
			Frustration	Temperature	Crowding	Affect
Low Density	Low Noise	Nonanger	.04	- .07	.44	- .56
		Anger	.13	.44	.29	.13
	High Noise	Nonanger	.09	.24	.01	- .12
		Anger	- .07	- .12	.19	.53
High Density	Low Noise	Nonanger	.17	.03	- .34	- .57
		Anger	- .24	.38	- .13	.15
	High Noise	Nonanger	- .02	- .57	- .23	.09
		Anger	- .10	- .33	- .23	.35

TABLE 7

Analyses of Variance of Factor Scores for Measures of Reactions to the Task Performance Situations

		Factor I: Frustration		Factor II: Temperature		Factor III: Crowding		Factor IV: Affect	
Source	df	MS	F	MS	F	MS	F	MS	F
Density (A)	1	0.21	0.20	1.45	1.51	5.21	5.21*	0.00	0.00
Noise (B)	1	0.06	0.05	3.63	3.76*	0.40	0.40	4.31	4.64*
Anger (C)	1	0.45	0.42	0.82	0.85	0.08	0.08	7.95	8.55**
A X B	1	0.02	0.01	1.67	1.74	0.44	0.44	0.00	0.00
A X C	1	0.28	0.26	0.32	0.33	0.05	0.05	0.19	0.20
B X C	1	0.01	0.01	1.42	1.48	0.02	0.02	0.37	0.40
A X B X C	1	0.48	0.46	0.86	0.89	0.44	0.44	0.28	0.30
Residual	88	1.06		0.96		1.00		0.93	

*$p < .05$
**$p < .01$

Subjects in the high noise condition rated the situation as being a less pleasant environment than did their low noise counterparts. Noise also had a significant main effect on Factor IV. Subjects exposed to high noise indicated experiencing more negative affect than subjects exposed to low noise levels.

Analyses of variance of the factor scores also revealed that density had a significant effect on the Activity Factor, with high density subjects feeling more active than their low density counterparts. Finally, the anger manipulation was significant with regard to Factor IV (Affect), with angered subjects expressing more negative affect than nonangered subjects.

The second part of the postexperimental questionnaire (Appendix E-2) primarily served as a check on the anger manipulation and on the subjects' reactions to the other participants. A separate 2 X 2 X 2 (density X noise X anger) analysis of variance was conducted on the responses to each of the eight questions. The means are presented in Table 8, and the summaries of the analyses of variance may be found in Table 9.

Density had a significant main effect only on Question 1. Subjects in the high density condition rated themselves as being in a poorer mood prior to the experiment than did subjects exposed to the low density manipulation. Noise did not have any significant main effects.

The check on the anger manipulation was accomplished by analysis of the effects of the anger factor. As Table 9 reveals, anger had a highly significant main effect on Questions 3, 5, and 7. Compared to nonangered subjects, subjects in the anger condition rated the bogus evaluation they received more negatively, disliked their partners more,

TABLE 8

Mean Responses to Questionnaire Items

			Question 1[a]	Question 2[b]	Question 3[c]	Question 4[d]
Low Density	Low Noise	Nonanger	1.67	4.33	1.42	3.00
		Anger	2.00	4.17	6.75	2.50
	High Noise	Nonanger	2.00	4.64	2.33	3.83
		Anger	1.83	4.00	6.08	3.18
High Density	Low Noise	Nonanger	2.42	4.33	1.42	2.50
		Anger	2.58	3.42	6.67	3.08
	High Noise	Nonanger	2.83	3.67	1.83	3.33
		Anger	2.25	4.08	6.33	2.25

[a] Prior to participating in the experiment, I would rate my mood as generally (pleasant...unpleasant).
[b] How much did the presence of others interfere with your task performance? (very much interfered...did not interfere at all).
[c] How favorable was the evaluation you received from the other person? (very favorable...very unfavorable).
[d] How favorable was the evaluation you gave to the other person? (very favorable...very unfavorable).

TABLE 8 Continued

			Question 5[e]	Question 6[f]	Question 7[g]	Question 8[h]
Low Density	Low Noise	Nonanger	2.50	2.58	6.83	6.67
		Anger	2.92	3.17	5.00	6.75
	High Noise	Nonanger	2.42	2.42	7.00	6.58
		Anger	4.25	3.17	2.83	6.67
High Density	Low Noise	Nonanger	2.33	2.33	6.67	6.92
		Anger	3.08	2.58	4.50	6.00
	High Noise	Nonanger	2.92	3.00	6.83	6.67
		Anger	2.83	2.75	5.08	6.33

[e]How much did you like the person whom you evaluated earlier? (liked her very much...disliked her very much).
[f]How much did you like the other people in the room? (liked them very much...disliked them very much).
[g]How angry were you with the person whom you earlier evaluated? (very angry...not at all angry).
[h]How angry were you with the other people in the room? (very angry...not at all angry).

TABLE 9

Analyses of Variance of Responses to Questionnaire Items

Source	df	Question 1[a] MS	F	Question 2[b] MS	F	Question 3[c] MS	F	Question 4[d] MS	F
Density (A)	1	9.920	5.783**	3.915	1.265	0.305	0.223	2.831	1.734
Noise (B)	1	0.080	0.047	0.026	0.008	0.305	0.223	3.551	2.175
Anger (C)	1	0.266	0.155	2.394	0.774	529.032	388.005****	4.255	2.607
A X B	1	0.007	0.004	0.027	0.009	0.128	0.094	3.712	2.274
A X C	1	0.218	0.127	0.101	0.033	0.497	0.364	0.846	0.518
B X C	1	3.077	1.794	1.198	0.387	7.416	5.439**	5.443	3.334*
A X B X C	1	0.004	0.002	4.768	1.541	0.859	0.630	3.039	1.862
Residual	88	1.715		3.094		1.363		1.632	

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

[a]Prior to participating in the experiment, I would rate my mood as generally (pleasant...unpleasant).
[b]How much did the presence of others interfere with your task performance? (very much interefered...did not interfere at all).
[c]How favorable was the evaluation you received from the other person? (very favorable...very unfavorable).
[d]How favorable was the evaluation you gave to the other person? (very favorable...very unfavorable).

TABLE 9 Continued

Source		Question 5[e]		Question 6[f]		Question 7[g]		Question 8[h]	
		MS	F	MS	F	MS	F	MS	F
Density (A)	1	1.102	0.811	0.667	0.581	3.010	1.544	0.844	1.021
Noise (B)	1	3.450	2.540	0.667	0.581	2.344	1.202	0.010	0.013
Anger (C)	1	12.298	9.054***	2.667	2.323	147.510	75.656****	1.760	2.129
A X B	1	1.152	0.848	1.500	1.307	11.344	5.818**	0.094	0.113
A X C	1	3.791	2.791*	2.667	2.323	6.510	3.339*	3.010	3.642*
B X C	1	0.541	0.399	0.167	0.145	5.510	2.826*	0.510	0.617
A X B X C	1	7.933	5.841**	0.667	0.581	11.344	5.818**	0.510	0.617
Residual	88	1.358		1.148		1.950		0.827	

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

[e] How much did you like the person whom you evaluated earlier? (liked her very much...disliked her very much).
[f] How much did you like the other people in the room? (liked them very much...disliked them very much).
[g] How angry were you with the person whom you earlier evaluated? (very angry...not at all angry).
[h] How angry were you with the other people in the room? (very angry...not at all angry).

and were more angry with their partners.

Anger was also involved in an interaction on each of these questions. Anger interacted with noise on Question 3. Simple effects analyses failed to detect any significant effects of noise. However, inspection of the means suggests that the interaction is the result of nonangered subjects perceiving the evaluation they received as less favorable under high than under low noise conditions ($\bar{X}$'s = 2.08 and 1.42, respectively), whereas angered subjects perceived the evaluation as slightly more favorable when exposed to high rather than low noise ($\bar{X}$'s = 6.21 and 6.71, respectively). Moreoever, there was a significant effect of anger at both noise intensities.

Anger was also involved in a significant three-way interaction with density and noise for Question 5. Simple effects analyses revealed statistically significant differences in the high noise but not in the low noise condition. Angered subjects who were exposed to high noise disliked their partner more in the low density situation than in the high density situation ($F(1,88) = 4.20$; $p < .05$; $\bar{X}$'s = 4.25 and 2.83, respectively), whereas nonangered subjects in the high noise condition disliked their partner more in the high density condition than in the low density situation ($F(1,88) = 3.79$; $p < .05$; $\bar{X}$'s = 2.92 and 2.42, respectively). Additionally, there was a significant effect of anger at both noise and density conditions.

Anger was involved in a density X noise X anger interaction for Question 7. Simple effects analyses of the interaction revealed that anger was significant over all conditions. Additionally, there were significant differences in the anger but not in the nonanger condition.

Angered subjects exposed to high noise and low density were more angry than angered subjects exposed to low noise-low density (F (1,88) = 4.02; $p < .05$; $\bar{X}$'s = 2.83 and 5.00, respectively). Furthermore, angered subjects exposed to high noise were more angry under low density than under high density conditions (F (1,88) = 4.51; $p < .05$; $\bar{X}$'s = 2.83 and 5.08, respectively).

The simple effects analyses of the interactions confirms the fact that the anger manipulations did indeed have a differential impact on the subjects' feelings in the anger-nonanger conditions.

CHAPTER IV

DISCUSSION

Generally, the results of the present experiment are nonsupportive of the hypotheses. Nonetheless, the attainment of significant results, especially with regard to the density manipulation, may shed some light on the relationship between this environmental stressor and aggression.

The significant effect of anger upon subsequent aggressive behavior, as well as responses to various questionnaire items, confirms the effectiveness of the anger manipulation that was employed. As hypothesized, angered subjects were more aggressive than their non-angered counterparts. However, this effect was limited to the duration and transformed intensity X duration measures of shock; anger had a nonsignificant effect on the intensity of shocks. This pattern of results accords with other research employing a similar aggression paradigm. For example, Baron (1978), employing the same anger arousal procedures and aggression measures, found transformed intensity X duration and duration of shock, but not intensity of shock, to be differentially affected by the anger manipulation. Moreover, the checks on the anger manipulation corroborated its effectiveness. The responses of the subjects to the postexperimental questionnaire items revealed that angered subjects expressed more negative affect toward their partners than did subjects who were not angered.

While working on the task performance part of the experiment, subjects were exposed to various combinations of high and low density and high and low noise after which the measurement of aggression was

taken. The hypothesis regarding density stated that high density would facilitate the expression of aggression only in previously angered subjects and that nonangered subjects would be unaffected by the density manipulation. This hypothesis was based upon Freedman's (1975) density-intensity theory and cognitive-labeling theory. Cognitive-labeling theory maintains that density induced arousal will increase aggression only in individuals who can label the arousal as anger (i.e., angered subjects). Freedman's theory posits that high density per se has neither good effects nor bad effects. Rather, density serves to intensify the individual's dominant response to the particular situation. Thus, only subjects who have been previously angered should have been adversely affected by the high density condition. The analyses of the aggression data failed to detect the hypothesized interaction between density and anger. Unexpectedly, however, there was a significant main effect of density. Subjects who were exposed to high density, regardless of their level of anger arousal, were much more aggressive than subjects exposed to low density on all dependent measures. Thus, the results of the present study do not lend support to Freedman's density-intensity theory nor to cognitive-labeling theory.

One possible explanation for the effect of density may lie in the specific way in which density was manipulated. Without exception, previous researchers have manipulated density under conditions that may be labeled low-interaction situations. For example, Freedman's (1975) research always involved subjects who were seated in the various density conditions. However, in the present study, subjects were required to move about the room during exposure to the environmental

conditions. Perhaps this high level of physical interaction made the high density condition much more salient than would be the case had the subjects been seated. Responses to the questionnaire items revealed that subjects did indeed perceive the high density situation to be more crowded and involve more activity than the low density condition. The density main effect may in part be attributed to the greater impact of density on people when they are forced to move about rather than remain seated. In short, the present means of varying density may have constituted a stronger manipulation of density than those employed by previous researchers. Freedman et al. (1972) speculate "that the effects of density (may) occur largely when physical activity is required" and that the results of experiments involving seated subjects "may not generalize to situations in which a high degree of physical activity is required" (p. 543).

The strong impact of the density manipulation may also explain the failure to obtain the hypothesized density X anger interaction concerning the aggressive behavior of the subjects. Specifically, high density may have produced such high arousal that even subjects who were not angered were affected by the manipulation. According to Geen (1976), any physical stimulus capable of producing arousal should energize aggression in the presence of suitable cues. The aggression machine may have constituted such an aggression-eliciting cue. The hypothesized interaction very well may have been obtained had a weaker density manipulation (i.e., seated subjects) been employed. Thus, the present study may indicate that both the density-intensity and cognitive-labeling theories are limited to moderate stressors. Very intense stimuli, in

and of themselves, may facilitate the expression of aggression even in subjects who are not predisposed to being aggressive (i.e., angered subjects).

The other environmental stressor, noise, also generally failed to produce results in accord with experimental hypotheses. Although the failure to obtain a significant noise main effect coincides with the results of previous studies, the lack of a noise by anger interaction was unexpected. Numerous studies have documented the finding that noise facilitates aggression in previously angered subjects (e.g., Donnerstein & Wilson, 1976). Why this effect did not occur is not exactly clear. The possibility that the noise level (95 dB) was not high enough to facilitate aggression is unlikely because that noise level corresponds with those employed in other studies which have obtained a significant noise by anger interaction (e.g., Donnerstein & Wilson, 1976). Furthermore, responses to the postexperimental questionnaire indicated that the noise manipulations did produce a differential impact on the subjects' reactions to the two conditions, with subjects expressing more negative affect and perceiving the situation as more noisy in the high noise as compared to the low noise condition.

Perhaps an explanation for the lack of significance resides in the specific procedure that was employed. In noise-aggression studies, subjects typically are seated while working. The high interaction conditions present for both high and low density may have produced a distraction for the subjects insofar as the subjects were continually required to attend to the presence of others. Research by Worchel

and Teddlie (1976) indicates that the addition of pictures on the wall of a crowded room reduces the effects of density. In the present study, the constant movement necessary to perform the task may have required the subjects to essentially "tune out" the noise thereby enabling them to adapt to that aspect of the situation. Indeed, Glass and Singer (1972) have documented numerous conditions that facilitate adaptation to aversive noise, one of which is providing subjects with a difficult, distracting task to perform. If the need to attend to other people in the environment produces a high level of sensory stimulation, then people may adapt to the situation by allotting less attention to some of the competing stimuli (Milgram, 1970).

One final aggression-related result of the experiment that doesn't accord with predictions is the lack of an increase in aggression when high levels of the environmental stressors are combined. In light of the nonsignificance of the noise factor, it is hardly surprising that high noise combined with high density would fail to yield more aggression than that produced by high density alone.

One may recall that a different set of predictions could be derived from Baron and Bell's (1976; 1977) research on temperature and aggression. Specifically, Baron and Bell predict a curvilinear relationship between negative affect and aggression, and thus would expect that there would be less aggression when the two stressors were combined than with either of the stressors presented alone. As indicated previously, this prediction was not confirmed; subjects exposed to high density-high noise were not more aggressive than subjects exposed to either stressor alone. Furthermore, when the subjects' aggression scores were plotted against

their self-reported anger, there was no evidence of the curvilinear relationship which Baron and Bell predicted. In fact, there was a trend for subjects in the anger condition reporting the lowest anger to be the most aggressive. While the above findings do not support Baron and Bell, there is some cause to question whether the present study is an adequate test of their model. They would predict that the greatest amount of negative affect should occur in the high density-high noise-anger condition. Inspection of the means in Table 8 reveals that this was not the case; hence, the applicability of the present data to Baron and Bell's theory is debatable.

The second focus of the study was on the effects of noise and density on task performance. Neither factor, either alone or in conjunction with the other, had a significant effect upon task performance. This failure to reject the null hypothesis, especially with regard to the density factor, is an enigma. The procedures employed were based directly upon the methodology of Heller et al. (1977) with only a few minor modifications. Although the materials consisted of computer cards rather than sheets of paper and contained 2-digit numbers rather than 1-digit numbers, neither of these modifications seems likely to have changed the essence of the procedure. There was, however, one difference which may be the critical factor. Heller et al. used groups of eight subjects while the present study employed four-person groups. Thus, although spatial density was identical in both experiments, social density differed. Attending to others in an eight-person group could conceivably place greater demands on a subject than when a group is half that size. In other words, perhaps reductions in spatial density interfere with task performance only when some minimum number of people are present. It would be interesting to use the Heller et al. paradigm

varying not only spatial density but also social density.

But what of the lack of a significant effect of noise on task performance? Although the results do not support the experimental hypothesis, they are in accord with the majority of research that fails to find noise effects on concurrent measures of task performance (e.g., Glass & Singer, 1972). A different pattern of results could easily have emerged had posttest measures of task performance been employed.

The results of the present study underscore the importance of investigating the specific conditions under which varous environmental stressors may or may not have an effect upon human behavior. Whether or not variables such as noise and density affect behavior may depend not only upon manipulations used to achieve these states but also upon the specific dependent measures that are employed. For example, one potentially fruitful direction for future density research may be the investigation of the effects of various levels of physical interaction on different measures of behavior. In line with this is the need to more fully explore the similarities and differences produced by variations in spatial and social density. Density may indeed not turn out to be a univariate concept but rather one dependent upon the specific circumstances surrounding its manipulation and the means by which its effects are measured. Similarly, it would be fruitful to more fully explore the conditions under which noise may or may not produce effects on various behavioral measures. Such a detailed exploration of the paramaters of density, noise, and other environmental stressors is necessary if we are to gain an understanding of the complexities of the multivariate "real world."

APPENDIX A .

PERSONALITY SKETCH

APPENDIX A

Standardized Personality Sketch Form[1]

Your letter A

PERSONALITY SKETCH FORM

I guess I'm just an average sort of girl. Not real different from most other people. I think you could describe me as being pretty friendly but I don't overdo it. My family is kind of typical so there is nothing unusual about my background. I generally like the same things that other people do, like sports, going out having a good time, stuff like that. I'm hoping to get a good job after I graduate, something I like that also pays pretty well.

[1]The content of this sketch was presented to the subjects in handwritten form.

APPENDIX B

PERSONALITY EVALUATION FORM

APPENDIX B

Personality Evaluation Form

Your letter_____

IMPRESSION FORM

On the basis of the personality sketch provided by the other subject, please rate this person on the following dimensions.

1. Intelligence (circle one)

   very low 1 2 3 4 5 6 7 very high

2. Maturity (circle one)

   very low 1 2 3 4 5 6 7 very high

3. Likeableness (Circle one)

   very low 1 2 3 4 5 6 7 very high

4. Sincerity (circle one)

   very low 1 2 3 4 5 6 7 very high

5. Femininity (circle one)

   very low 1 2 3 4 5 6 7 very high

6. Openmindedness (circle one)

   very low 1 2 3 4 5 6 7 very high

7. Emotional stability (circle one)

   very low 1 2 3 4 5 6 7 very high

Please indicate your overall impression of the other subject.

APPENDIX C

SUBJECT FEEDBACK

APPENDIX C-1

Subject Feedback: Nonanger Condition[1]

Your letter A

IMPRESSION FORM

On the basis of the personality sketch provided by the other subject, please rate this person on the following dimensions.

1. Intelligence (circle one)
   very low 1 2 3 4 5 6 (7) very high
   very
2. Maturity (circle one)
   very low 1 2 3 4 5 (6) 7 very high
3. Likeableness (circle one)
   very low 1 2 3 4 5 (6) 7 very high
4. Sincerity (circle one)
   very low 1 2 3 4 5 6 (7) very high
5. Femininity (circle one)
   very low 1 2 3 4 5 (6) 7 very high
6. Openmindedness (circle one)
   very low 1 2 3 4 5 (6) 7 very high
7. Emotional stability (circle one)
   very low 1 2 3 4 5 6 (7) very high

Please indicate your overall impression of the other subject.

She seems like a pretty nice girl. I get the impression she's kind of friendly and probably easy to get along with.

[1]The standardized feedback on this sheet was presented to the subjects in handwritten form.

APPENDIX C-2

Subject Feedback: Anger Condition[1]

Your letter A

IMPRESSION FORM

On the basis of the personality sketch provided by the other subject, please rate this person on the following dimensions.

1. Intelligence (circle one)
   very low 1 2 (3) 4 5 6 7 very high

2. Maturity (circle one)
   very low 1 (2) 3 4 5 6 7 very high

3. Likeableness (circle one)
   very low 1 (2) 3 4 5 6 7 very high

4. Sincerity (circle one)
   very low 1 2 (3) 4 5 6 7 very high

5. Femininity (circle one)
   very low 1 (2) 3 4 5 6 7 very high

6. Openmindedness (circle one)
   very low 1 (2) 3 4 5 6 7 very high

7. Emotional stability (circle one)
   very low 1 2 (3) 4 5 6 7 very high

Please indicate your overall impression of the other subject.

She doesn't seem too nice to me. I get the impression she's kind of a pain and hard to get along with.

---

[1]The standardized feedback on this sheet was presented to the subjects in handwritten form.

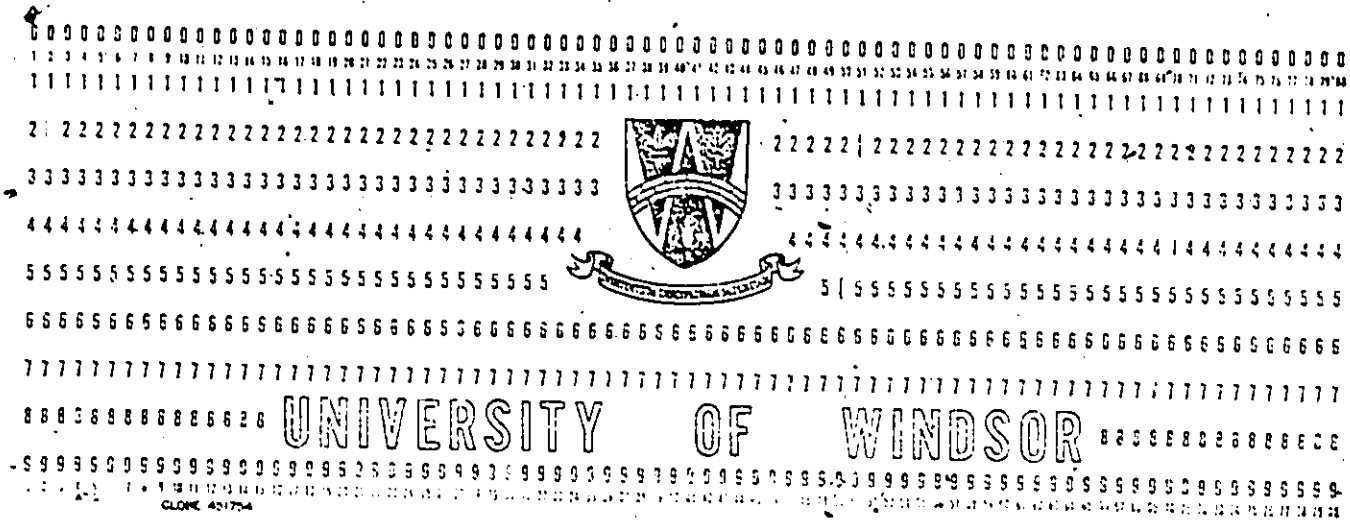
APPENDIX D

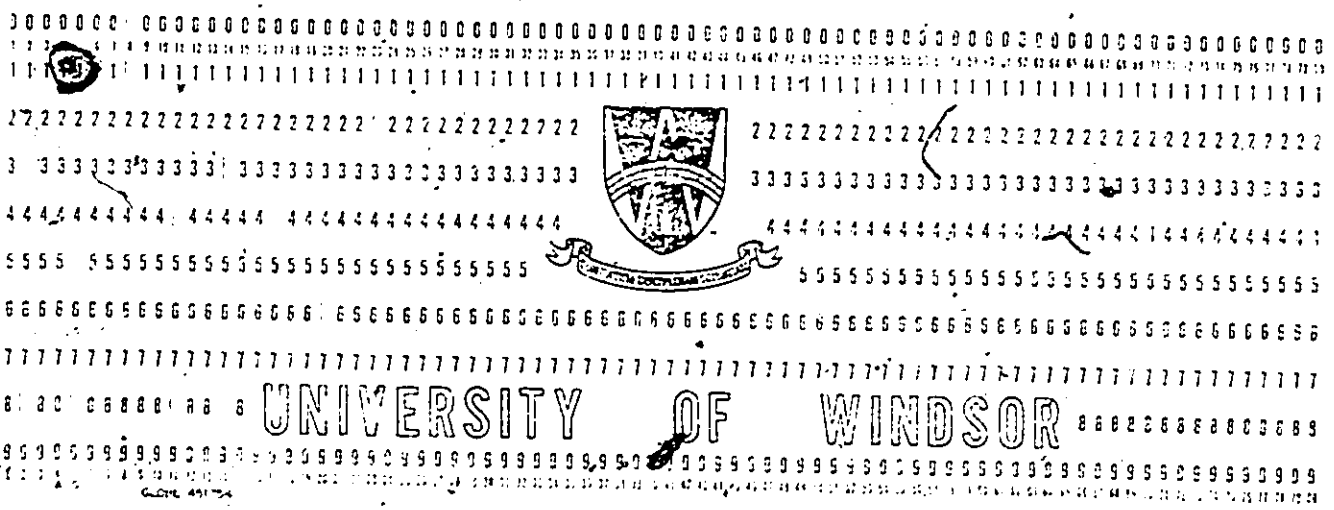
TASK MATERIALS

APPENDIX D

Example of Task Materials[1]

Task card and control card, respectively.





[1] The symbols printed on the control card correspond to those that were taped to the wall above the appropriate stack of cards.

APPENDIX E

POST-EXPERIMENTAL QUESTIONNAIRE

APPENDIX E-1

Rating Form for Reactions to Task Performance Room

Your letter_____

Please use the following adjective pairs to rate your reactions to the room where you worked on the card task. Circle only one number for each pair of adjectives. Be sure to respond to each pair.

hot	1	2	3	4	5	6	7	cold
comfortable	1	2	3	4	5	6	7	uncomfortable
passive	1	2	3	4	5	6	7	active
happy	1	2	3	4	5	6	7	sad
noisy	1	2	3	4	5	6	7	quiet
good	1	2	3	4	5	6	7	bad
warm	1	2	3	4	5	6	7	cool
angry	1	2	3	4	5	6	7	not angry
difficult	1	2	3	4	5	6	7	easy
interesting	1	2	3	4	5	6	7	uninteresting
energetic	1	2	3	4	5	6	7	tired
crowded	1	2	3	4	5	6	7	uncrowded
frustrated	1	2	3	4	5	6	7	not frustrated
pleasant	1	2	3	4	5	6	7	unpleasant

APPENDIX E-2

Anger Manipulation Check

Your letter_____

Please answer the following questions.

1. Prior to participating in the experiment, I would rate my mood as generally

   pleasant 1 2 3 4 5 6 7 unpleasant

2. How much did the presence of others interfere with your task performance?

   very much interfered 1 2 3 4 5 6 7 did not interfere at all

3. How favorable was the evaluation you received from the other person?

   very favorable 1 2 3 4 5 6 7 very unfavorable

4. How favorable was the evaluation you gave to the other person?

   very favorable 1 2 3 4 5 6 7 very unfavorable

5. How much did you like the person whom you evaluated earlier?

   liked her very much 1 2 3 4 5 6 7 disliked her very much

6. How much did you like the other people in the room?

   liked them very much 1 2 3 4 5 6 7 disliked them very much

7. How angry were you with the person whom you earlier evaluated?

   very angry 1 2 3 4 5 6 7 not at all angry

8. How angry were you with the other people in the room?

   very angry 1 2 3 4 5 6 7 not at all angry

APPENDIX E-3

Suspicions about Experiment Questionnaire

Your letter_____

Did you know any of the other participants prior to participating in the study? If yes, who do you know and how well.

Did you hear anything about this experiment from anyone prior to your participation in it? If yes, what have you heard?

Did you talk to anyone during the course of the experiment?

What do you think we were measuring in this experiment? (Use other side if necessary.)

Who is your Psych. 115 T.A.?

APPENDIX F

SUBJECT DEBRIEFING

APPENDIX F

Subject Debriefing

First of all, I would like to tell you that no shocks were actually administered by you to anyone else. All of you were led to believe that you were the stimulators and your partners the responders. I sincerely apologize for this deception; however, as you will shortly see, it was necessary for the purpose of the present study.

Recently people have become increasingly concerned with the effects of the environment on humans. In particular, there is the common belief that various factors associated with city life, such as crowding and noise, adversely affect human behavior. This study was designed to assess how these two factors, crowding and noise, affect both task performance and aggression.

Previous research has indicated that environmental stressors, such as heat, only have a negative effect on people predisposed to being angry. For that reason, it was necessary to put some of you in a good mood and others in a bad mood. This was accomplished by the personality descriptions and evaluations you received in the beginning of the experiment. These materials did not originate from your partner, but were standardized by me so that half of you would receive a positive personality evaluation and the other half a negative personality evaluation; all of you received the same personality description.

Following this, you were placed in the experimental room. Some groups experienced high noise, others low noise. Additionally, crowding was also varied, with some groups being more crowded than others. At this time, your task performance was measured by the number of card sets successfully completed. Your aggressiveness, as measured by the shock apparatus, was then measured in the last part of the experiment. As you can hopefully see, the only way that we could have conducted this study was if you were not aware of all of the details prior to participating in it. Do you have any questions?

It will take approximately a month to score all of the task performance cards. As soon as that is done, I will notify the winner by sending a letter to her via her Psych. 115 T.A. Additionally, a list of the winners will be posted on the door of this room.

I cannot overemphasize the importance of not telling other people about the experiment. If a person were to know something of the experiment prior to participating in it, her data would be useless. For that reason, I ask you not to discuss any part

of this experiment with anyone for at least the next three weeks. If someone knew about the experiment when they arrived, I would not be able to use them, which would be a waste not only of their time, but also the time of the other three people in the group. I hope that you can understand my concern in this matter. Do you have any questions?

APPENDIX G

ANALYSES OF GROUP DATA

APPENDIX G-1

Analyses of Variance of Measures of Amount of Shock: Group Data

Source	df	Intensity MS	Intensity F	Duration MS	Duration F	Transformed Intensity X Duration MS	Transformed Intensity X Duration F
Density (A)	1	20.130	20.437**	1.131	70.467**	1.396	50.714**
Noise (B)	1	0.000	0.000	0.004	0.218	0.004	0.151
Anger (C)	1	0.385	0.392	0.137	8.505*	0.051	1.846
A X B	1	0.905	0.921	0.035	2.150	0.030	1.086
A X C	1	0.054	0.055	0.032	1.965	0.000	0.018
B X C	1	0.614	0.625	0.020	1.236	0.005	0.187
A X B X C	1	1.510	1.537	0.013	0.785	0.040	1.456
Residual	88	0.983		0.016		0.028	

*$p \leq .01$
**$p \leq .001$

APPENDIX G-2

Analyses of Variance of Measures of Task Performance: Group Data

		Number Sets Completed		Number Sequenced Wrong		Percent Sequenced Wrong		Number Added Wrong		Percent Added Wrong	
Source	df	MS	F	MS	F	MS	F	MS	F	MS	F
Density (A)	1	5.607	0.543	2.600	0.218	0.000	0.009	10.011	3.202	0.028	2.633
Noise (B)	1	2.802	0.271	13.360	1.119	0.006	0.453	2.734	0.874	0.012	1.166
Anger (C)	1	2.407	0.233	21.851	1.831	0.001	0.042	1.450	0.464	0.002	0.159
A X B	1	0.482	0.047	17.511	1.468	0.014	1.073	6.510	2.082	0.008	0.729
A X C	1	6.407	0.621	0.510	0.043	0.033	2.436	3.604	1.153	0.016	1.494
B X C	1	8.402	0.814	7.594	0.636	0.002	0.137	2.100	0.672	0.002	0.209
A X B X C	1	4.002	0.388	9.754	0.818	0.001	0.039	5.510	1.763	0.004	0.415
Residual	88	10.323		11.931		0.013		3.126		0.011	

APPENDIX G-3

Analyses of Variance of Responses to Questionnaire Items: Group Data

		Question 1[a]		Question 2[b]		Question 3[c]		Question 4[d]	
Source	df	MS	F	MS	F	MS	F	MS	F
Density (A)	1	2.802	4.966*	0.770	1.089	0.082	0.182	0.602	1.423
Noise (B)	1	0.042	0.074	0.084	0.048	0.007	0.015	0.960	2.270
Anger (C)	1	0.060	0.106	0.770	1.089	134.427	299.557***	1.127	2.664
A X B	1	0.007	0.012	0.034	0.048	0.002	0.004	0.960	2.270
A X C	1	0.082	0.145	0.150	0.213	0.082	0.182	0.167	0.394
B X C	1	0.482	0.854	0.400	0.566	2.160	4.813*	1.042	2.463
A X B X C	1	0.060	0.106	1.000	1.414	0.375	0.836	1.042	2.463
Residual	88	0.564		0.707		0.449		0.423	

*$p < .05$
**$p < .01$
***$p < .001$

[a] Prior to participating in the experiment, I would rate my mood as generally (pleasant...unpleasant).
[b] How much did the presence of others interfere with your task performance? (very much interfered...did not interfere at all).
[c] How favorable was the evaluation you received from the other person? (very favorable...very unfavorable).
[d] How favorable was the evaluation you gave to the other person? (very favorable...very unfavorable).

Source	df	Question 5[e] MS	F	Question 6[f] MS	F	Question 7[g] MS	F	Question 8[h] MS	F
Density (A)	1	0.327	0.900	0.260	0.515	0.020	0.031	0.167	0.538
Noise (B)	1	0.807	2.223	0.150	0.297	0.220	0.335	0.000	0.000
Anger (C)	1	3.375	9.299**	0.700	1.385	40.301	61.296***	0.540	1.742
A X B	1	0.282	0.776	0.304	0.601	5.900	8.974**	0.027	0.086
A X C	1	0.960	2.645	0.634	1.253	0.304	0.462	0.667	2.150
B X C	1	0.107	0.294	0.094	0.185	0.770	1.172	0.167	0.538
A X B X C	1	1.815	5.001**	0.094	0.185	5.900	8.974**	0.107	0.344
Residual	88	0.363		0.506		0.657		0.310	

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

[e]How much did you like the person whom you evaluated earlier? (liked her very much...disliked her very much).
[f]How much did you like the other people in the room? (liked them very much...disliked them very much).
[g]How angry were you with the person whom you earlier evaluated? (very angry...not at all angry).
[h]How angry were you with the other people in the room? (very angry...not at all angry).

APPENDIX F

UNIVARIATE ANALYSES ON INDIVIDUAL ITEMS OF SUBJECT REACTIONS TO THE TASK PERFORMANCE SITUATION

APPENDIX H-1

Mean Reactions to the Task Performance Situation

			Item Description[a]			
			Hot-Cold	Comfortable-Uncomfortable	Passive-Active	Happy-Sad
Low Density	Low Noise	Nonanger	3.00	4.42	4.17	4.17
		Anger	3.83	4.18	5.08	4.33
	High Noise	Nonanger	3.50	4.42	5.08	3.75
		Anger	2.83	5.42	4.17	4.67
High Density	Low Noise	Nonanger	3.00	4.17	5.58	3.58
		Anger	3.58	5.25	4.75	4.17
	High Noise	Nonanger	2.58	5.25	5.83	3.92
		Anger	2.75	5.42	5.42	4.25

			Item Description[a]			
			Noisy-Quiet	Good-Bad	Warm-Cool	Angry-Not Angry
Low Density	Low Noise	Nonanger	4.75	3.33	3.00	6.08
		Anger	4.83	3.92	3.75	5.25
	High Noise	Nonanger	5.33	4.00	3.00	5.17
		Anger	4.33	4.75	3.17	4.33
High Density	Low Noise	Nonanger	6.00	3.50	2.50	5.75
		Anger	5.17	4.09	3.25	4.67
	High Noise	Nonanger	4.00	4.00	1.92	5.50
		Anger	4.75	4.42	2.33	4.75

			Item Description[a]			
			Difficult-Easy	Interesting-Uninteresting	Energetic-Tired	Crowded-Not Crowded
Low Density	Low Noise	Nonanger	4.83	3.33	4.25	3.33
		Anger	5.25	5.17	4.42	3.33
	High Noise	Nonanger	5.25	4.17	4.00	2.83
		Anger	5.08	4.83	4.00	2.58
High Density	Low Noise	Nonanger	4.75	3.42	3.33	2.25
		Anger	4.58	3.67	4.08	2.58
	High Noise	Nonanger	5.25	4.50	4.08	2.42
		Anger	4.58	4.92	3.75	2.17

			Item Description[a]	
			Frustrated-Not Frustrated	Pleasant-Unpleasant
Low Density	Low Noise	Nonanger	4.50	3.42
		Anger	4.25	4.25
	High Noise	Nonanger	4.33	4.33
		Anger	4.42	4.42
High Density	Low Noise	Nonanger	4.75	3.50
		Anger	4.00	4.58
	High Noise	Nonanger	3.75	4.25
		Anger	3.73	4.33

[a]Low scores indicate a response toward the first adjective of the pair and high scores toward the second adjective.

APPENDIX H-2

Analyses of Variance of Measures of Reactions to Task Performance Situations

Source	df	Hot-Cold MS	Hot-Cold F	Comfortable-Uncomfortable MS	Comfortable-Uncomfortable F	Passive-Active MS	Passive-Active F	Happy-Sad MS	Happy-Sad F
Density (A)	1	2.199	1.123	3.892	1.952	15.447	5.209**	1.342	1.038
Noise (B)	1	4.377	2.235	8.928	4.478**	1.667	0.562	0.217	0.168
Anger (C)	1	1.160	0.592	6.218	3.119*	2.880	0.971	5.649	4.368**
A X B	1	0.896	0.457	0.002	0.001	0.971	0.327	0.302	0.234
A X C	1	0.553	0.282	0.315	0.158	1.936	0.653	0.021	0.016
B X C	1	5.296	2.704	0.128	0.064	2.542	0.857	0.447	0.345
A X B X C	1	1.692	0.864	6.866	3.443*	6.963	2.348	1.668	1.290
Residual	88	1.958		1.994		2.965		1.293	

*p < .10
**p < .05

	df	Noisy-Quiet MS	Noisy-Quiet F	Good-Bad MS	Good-Bad F	Warm-Cool MS	Warm-Cool F	Angry-Not Angry MS	Angry-Not Angry F
Density (A)	1	0.363	0.122	0.000	0.000	13.371	5.432**	0.048	0.022
Noise (B)	1	9.315	3.123*	8.079	6.025**	5.925	2.407	8.167	3.720*
Anger (C)	1	1.017	0.341	8.079	6.025**	5.925	2.407	14.761	6.724**
A X B	1	8.298	2.782*	0.667	0.497	1.077	0.438	2.637	1.201
A X C	1	0.724	0.243	0.161	0.120	0.051	0.021	0.041	0.019
B X C	1	0.198	0.066	0.000	0.000	1.077	0.438	0.000	0.000
A X B X C	1	11.906	3.992**	0.129	0.129	0.150	0.061	0.000	0.000
Residual	88	2.983		1.341		2.461		2.195	

*p < .10
**p < .05

Source	df	Difficult-Easy		Interesting-Uninteresting		Energetic-Tired		Crowded-Uncrowded	
		MS	F	MS	F	MS	F	MS	F
Density (A)	1	2.783	1.056	2.305	0.768	2.674	0.941	12.608	3.461*
Noise (B)	1	1.122	0.426	14.074	4.691**	0.046	0.016	4.535	1.245
Anger (C)	1	0.733	0.278	12.655	4.217**	0.642	0.226	0.255	0.070
A X B	1	0.210	0.080	6.654	2.218	2.000	0.703	0.832	0.228
A X C	1	2.171	0.824	6.654	2.218	0.159	0.056	0.010	0.003
B X C	1	1.358	0.516	0.759	0.253	2.038	0.717	1.744	0.479
A X B X C	1	0.067	0.025	3.971	1.324	1.068	0.376	0.518	0.142
Residual	88	2.635		3.001		2.843		3.643	

*p < .10
**p < .05

Source	df	Frustrated-Not Frustrated MS	F	Pleasant-Unpleasant MS	F
Density (A)	1	2.386	0.703	0.137	0.071
Noise (B)	1	2.386	0.703	3.980	2.043
Anger (C)	1	1.207	0.382	6.781	3.481*
A X B	1	2.420	0.712	0.450	0.231
A X C	1	0.553	0.163	0.119	0.061
B X C	1	1.655	0.487	4.374	2.246
A X B X C	1	0.230	0.068	0.072	0.037
Residual	88	3.397		1.948	

*$p < .10$
**$p < .05$

APPENDIX I

RAW DATA

APPENDIX I-1

RAW DATA OF MEASURES OF AGGRESSION AND TASK PERFORMANCE

HIGH DENSITY, HIGH NOISE, ANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
1	1	4.90	1.70	08.1	23	7	2
	2	4.20	0.79	02.4	19	5	4
	3	4.50	0.93	34.6	27	2	3
	4	4.75	0.73	02.8	17	13	0
2	5	3.95	0.66	02.3	19	5	1
	6	2.90	1.13	03.3	21	7	2
	7	1.55	1.13	01.8	21	2	0
	8	6.90	1.68	11.8	21	2	1
3	9	5.00	0.75	03.5	19	2	3
	10	4.70	0.65	03.0	20	1	3
	11	2.30	0.74	01.7	13	9	13
	12	2.50	0.63	01.6	20	4	5

HIGH DENSITY, HIGH NOISE, NONANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
4	13	5.50	1.60	08.7	18	0	0
	14	4.20	0.59	02.7	12	4	2
	15	4.30	0.41	01.6	16	0	1
	16	4.50	0.51	02.1	15	2	0
5	17	3.26	0.55	02.2	11	2	11
	18	3.26	0.55	02.2	19	3	2
	19	3.60	0.71	02.5	21	4	2
	20	1.00	0.46	01.1	20	6	4
6	21	4.75	0.63	02.6	22	12	9
	22	2.80	0.29	00.9	16	1	0
	23	5.30	0.70	03.0	20	5	1
	24	6.00	0.63	03.9	12	7	6

HIGH DENSITY, LOW NOISE, ANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
7	25	5.47	1.12	06.0	16	13	5
	26	5.90	1.18	07.0	18	6	4
	27	3.15	0.60	01.9	14	5	0
	28	3.00	0.88	02.8	17	6	0
8	29	2.75	1.33	03.6	19	2	1
	30	1.95	0.71	01.3	25	11	8
	31	6.25	0.58	06.5	11	5	8
	32	5.20	1.80	08.1	15	2	0
9	33	5.20	0.70	03.6	15	5	0
	34	5.85	1.29	07.9	16	2	0
	35	6.30	0.79	05.7	20	4	1
	36	3.95	0.50	01.7	25	0	0

HIGH DENSITY, LOW NOISE, NONANGER

Group	Subject	SHOCK			TASK PERFORMANCE		
		Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
10	37	3.25	0.69	02.1	26	6	0
	38	5.50	1.19	06.7	19	5	0
	39	6.50	0.94	05.8	24	10	9
	40	4.80	1.18	05.4	13	9	3
11	41	1.22	0.92	01.1	17	7	2
	42	4.70	1.25	06.1	21	6	3
	43	2.00	0.43	00.8	23	7	1
	44	1.70	0.38	01.0	20	11	1
12	45	5.25	0.98	04.3	19	1	3
	46	5.35	1.31	06.1	27	5	2
	47	3.45	0.41	01.3	20	4	0
	48	7.20	0.38	02.6	26	5	1

LOW DENSITY, HIGH NOISE, ANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
13	49	3.26	0.43	01.4	26	9	3
	50	1.00	0.33	00.3	17	5	0
	51	4.70	0.56	02.4	23	2	3
	52	1.20	0.29	00.3	25	4	1
14	53	1.20	0.29	00.3	22	4	1
	54	1.30	0.53	00.7	20	7	1
	55	5.20	0.61	03.1	14	8	0
	56	4.95	0.58	02.6	18	8	3
15	57	2.26	0.53	01.2	18	6	2
	58	4.44	0.63	03.4	17	4	4
	59	4.44	0.63	03.4	17	6	8
	60	4.10	0.45	01.8	17	3	1

LOW DENSITY, HIGH NOISE, NONANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
16	61	1.00	0.45	00.5	27	2	2
	62	2.47	0.42	01.0	22	18	3
	63	2.10	0.39	00.9	21	10	1
	64	2.95	04.4	01.3	29	4	1
17	65	1.00	0.25	00.3	17	4	1
	66	1.00	0.43	00.4	16	12	4
	67	1.25	0.41	00.5	17	2	8
	68	1.00	0.36	00.4	20	8	1
18	69	4.15	0.29	01.3	17	9	4
	70	3.60	0.60	02.4	19	4	4
	71	1.00	0.25	00.3	16	2	0
	72	2.50	0.44	01.1	20	11	16

LOW DENSITY, LOW NOISE, ANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
19	73	2.65	0.53	01.4	17	3	0
	74	1.00	0.28	00.3	21	1	1
	75	1.00	0.30	00.3	19	4	5
	76	1.30	0.25	00.3	19	3	1
20	77	2.70	0.58	01.6	16	4	1
	78	2.70	0.58	01.6	23	13	4
	79	2.45	0.43	01.0	18	5	1
	80	4.85	0.35	01.7	18	9	4
21	81	1.20	0.44	00.6	17	4	4
	82	1.00	0.28	00.3	14	6	3
	83	1.00	0.34	00.4	16	13	2
	84	1.60	0.71	01.1	20	1	2

LOW DENSITY, LOW NOISE, NONANGER

		SHOCK			TASK PERFORMANCE		
Group	Subject	Intensity	Duration	Intensity X Duration	Number Sets Completed	Number Sequenced Wrong	Number Added Wrong
22	85	0.60	0.15	00.2	15	10	1
	86	1.30	0.28	00.4	13	8	1
	87	2.60	0.81	02.0	22	9	18
	88	1.35	0.28	00.4	24	3	1
23	89	4.55	0.39	01.7	22	5	3
	90	2.10	0.29	00.6	22	9	4
	91	1.00	0.28	00.3	20	3	3
	92	1.50	0.38	00.5	14	5	1
24	93	5.10	0.41	01.7	20	10	4
	94	1.50	0.38	00.5	19	6	3
	95	3.90	0.30	01.1	13	3	4
	96	3.65	0.33	01.1	14	6	6

APPENDIX I-2

RAW DATA OF REACTIONS TO TASK PERFORMANCE SITUATION AND QUESTIONNAIRE RESPONSES

HIGH DENSITY, HIGH NOISE, ANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
1	1	3	7	7	4	7	4	1	4	7	7	7	1	4	4	2	4	7	1	1	2	7	7
	2	1	6	7	5	6	5	6	3	4	5	4	1	3	5	3	2	6	3	4	4	3	3
	3	4	5	7	4	3	4	4	4	4	3	1	3	6	4	1	6	4	3	4	4	4	4
	4	4	6	6	4	6	5	1	5	1	3	6	1	1	5	3	1	7	1	2	6	5	7
2	5	3	4	6	4	4	4	2	6	5	5	5	1	2	4	2	5	6	2	2	2	6	7
	6	4	5	4	5	4	4	4	4	4	3	4	4	3	4	2	7	6	3	3	3	7	7
	7	3	5	4	5	4	4	1	5	7	7	1	1	7	1	1	3	7	1	2	2	7	6
	8	2	6	7	5	5	5	3	2	3	6	2	1	1	7	1	6	7	1	2	1	6	7
3	9	2	5	6	4	4	5	1	4	6	4	4	3	4	5	4	3	7	2	4	2	3	7
	10	3	4	3	3	6	4	3	7	6	6	1	5	7	4	4	5	7	2	2	2	7	7
	11	3	6	4	4	4	5	1	6	3	7	7	1	4	6	2	4	7	4	4	1	4	7
	12	1	6	4	4	4	4	1	7	5	3	3	5		4	2	3	5	4	4	4	2	7

HIGH DENSITY, HIGH NOISE, NONANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
4	13	4	4	7	6	6	5	3	7	7	7	6	7	3	6	7	6	6	5	5	5	5	5
	14	1	7	6	4	1	4	1	4	3	6	6	7	2	4	2	3	1	3	4	4	7	6
	15	3	4	6	4	3	1	3	7	5	4	4	1	4	3	2	1	1	2	1	3	7	7
	16	2	6	6	4	7	4	2	4	4	5	5	2	4	4	2	4	2	3	4	4	7	7
5	17	1	7	7	3	7	1	1	7	7	1	3	1	7	3	3	6	1	3	3	3	7	7
	18	3	1	6	5	2	6	3	3	2	2	3	1	2	6	2	2	2	3	4	4	7	7
	19	4	4	6	4	1	4	4	7	7	4	1	1	4	5	1	4	2	3	2	2	7	7
	20	3	6	6	4	6	5	1	5	4	4	3	3	3	4	2	2	1	2	1	1	7	7
6	21	3	6	4	4	1	5	2	4	4	2	3	1	4	5	6	5	2	2	2	2	7	7
	22	2	6	7	2	6	4	1	7	6	5	4	2	7	3	2	6	1	6	4	3	7	7
	23	2	7	6	4	4	5	1	4	7	7	6	1	2	4	1	1	1	4	1	3	7	6
	24	3	5	3	3	4	4	1	7	7	7	5	2	3	4	4	4	2	4	4	2	7	7

HIGH DENSITY, LO.. :OISE, ANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
7	25	4	2	3	3	7	4	3	6	5	2	4	7	6	2	4	2	6	2	3	2	7	7
	26	3	5	3	4	6	3	5	4	6	4	5	3	4	4	4	5	7	7	4	2	4	7
	27	4	5	3	4	6	4	4	4	4	3	3	5	5	5	2	2	6	4	2	2	6	6
	28	1	4	3	4	6	4	1	4	4	3	4	2	3	4	4	6	7	4	4	3	3	4
8	29	3	7	7	3	4	4	1	3	6	1	1	1	1	5	2	4	7	3	4	3	6	5
	30	3	5	6	4	2	5	3	6	3	6	6	1	3	4	3	2	7	2	3	4	3	6
	31	7	7	4	7	4	9	4	1	6	7	7	1	1	7	1	1	7	1	3	2	2	2
	32	4	5	4	4	4	4	4	3	3	2	3	2	3	5	3	2	7	4	5	4	7	7
9	33	3	4	5	2	4	2	2	7	7	1	5	1	7	4	2	4	7	4	3	4	7	7
	34	3	5	6	5	5	5	4	4	3	6	5	2	3	4	3	4	5	3	2	2	1	7
	35	7	7	1	6	7	7	7	7	1	5	5	5	5	7	2	3	7	2	2	2	6	7
	36	1	7	7	4	7	3	1	7	7	4	1	1	7	4	1	6	7	1	2	1	2	7

HIGH DENSITY, LOW NOISE, NONANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
10	37	2	4	7	3	5	3	3	6	5	3	3	2	6	3	2	3	2	3	3	3	7	7
	38	4	3	6	3	6	3	3	6	5	3	2	2	6	3	1	6	2	1	1	1	7	7
	39	4	4	4	4	7	4	4	4	4	6	5	6	4	4	4	2	2	5	3	2	3	7
	40	6	5	5	6	7	5	6	4	6	3	3	2	5	6	2	7	1	4	2	2	7	7
11	41	3	4	6	2	6	2	3	7	7	3	4	1	7	6	1	6	1	4	2	2	7	7
	42	2	3	5	5	7	5	1	6	5	3	3	1	2	2	1	4	1	2	3	3	7	7
	43	2	5	4	2	4	3	2	7	6	3	5	3	7	4	5	7	1	2	2	2	7	7
	44	2	5	6	5	6	3	1	4	3	3	2	2	3	2	1	3	2	2	4	4	7	7
12	45	4	4	6	4	5	3	3	7	3	4	4	3	4	4	1	3	1	3	2	2	7	7
	46	4	2	5	2	6	2	2	7	6	2	3	3	7	2	2	6	1	1	2	2	7	7
	47	2	6	6	4	6	5	1	4	3	3	4	1	2	4	3	2	2	2	2	3	7	6
	48	1	5	7	3	7	4	1	7	4	5	2	1	4	2	6	3	1	1	2	2	7	7

LOW DENSITY, HIGH NOISE, ANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
13	49	4	6	1	6	7	4	2	6	7	6	7	7	6	5	1	3	6	3	5	3	5	7
	50	1	7	7	5	7	5	1	7	4	4	5	1	5	3	1	2	6	3	3	3	3	7
	51	4	6	6	4	2	4	4	3	7	3	1	1	3	4	1	4	7	3	6	2	3	7
	52	1	6	7	5	2	4	3	3	6	4	2	k	6	4	1	5	7	3	2	3	3	7
14	53	3	5	6	4	3	5	3	6	7	7	3	1	4	4	1	4	7	3	7	3	1	7
	54	6	5	7	4	7	4	5	3	4	2	3	3	2	4	2	4	7	2	4	4	1	6
	55	4	4	2	5	5	4	4	4	4	4	4	3	3	4	3	4	5		4	3	4	6
	56	5	6	2	7	5	7	6	4	4	6	7	4	4	7	2	6	2	6	6	1	2	7
15	57	1	5	2	4	3	5	1	3	4	7	4	2	6	5	2	3	7	3	3	4	3	7
	58	1	5	3	4	3	5	2	4	5	6	4	3	5	5	2	4	7	3	3	4	3	6
	59	2	5	3	4	4	5	3	4	4	5	4	2	5	4	3	4	6	3	4	4	3	7
	60	2	5	4	4	4	5	4	5	5	4	4	3	4	4	3	5	6	3	4	4	3	6

LOW DENSITY, HIGH NOISE, NONANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
16	61	1	6	7	5	5	2	1	6	6	2	1	1	4	4	1	4	6	5	1	1	7	7
	62	2	5	3	4	5	4	2	4	4	5	5	2	3	5	2	3	2	4	3	2	7	5
	63	4	5	4	5	6	5	4	4	6	5	5	2	6	5	4	4	2	5	2	3	7	7
	64	3	5	5	4	6	4	3	4	5	5	3	4	3	5	5	4	6	4	1	1	7	6
17	65	5	5	6	1	7	6	3	7	7	1	3	2	7	1	1	5	1	3	1	2	7	7
	66	5	5	3	4	4	4	3	6	4	6	6	4	2	7	1	6	1	2	1	2	7	7
	67	3	6	1	6	4	6	2	1	3	7	6	2	2	7	2	5	1	5	4	3	7	7
	68	3	4	5	4	4	4	3	6	6	4	4	4	4	4	2	6	1	4	4	2	7	7
18	69	4	3	6	4	7	4	3	6	5	4	4	3	4	4	3	6	4	4	3	3	7	6
	70	4	3	7	3	3	4	4	7	5	5	3	2	6	4	1		2	3	3	4	7	6
	71	4	1	7	1	7	1	7	7	5	1	2	7	7	1	1	7	1	2	2	2	7	7
	72	4	5	7	4	6	4	1	4	7	5	6	1	4	5	1	1	1	5	4	4	7	7

LOW DENSITY, LOW NOISE, ANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
19	73	4	3	4	4	7	2	5	7	7	5	4	7	7	3	1	7	7	1	3	2	4	7
	74	4	5	1	4	7	4	3	4	7	6	4	6	6	4	2	6	7	2	2	2	1	7
	75	4	3	5	4	3	3	2	6	6	4	6	6	4	5	4	2	7	2	4	4	4	7
	76	2	6	5	4	4	5	2	4	4	7	6	1	3	6	1	4	7	2	3	4	7	7
20	77	4	7	6	7	5	4	4	4	7	7	2	1	2	5	1	2	7	2	2	4	6	7
	78	4		6	5	3	5	4	4	4	6	4	3	6	5	4	3	6	3	3	3	6	6
	79	4	3	7	4	6	3	4	7	4	4	6	1	1	4	3	3	7	3	3	3	7	6
	80	6	2	7	3	6	4	6	6	6	2	5	2	3	4	2	5	5	4	2	2	2	7
21	81	4	5	3	4	3	5	4	6	4	7	5	1	4	5	2	5	7	2	4	4	6	7
	82	4	5	5	6	4	5	5	4	3	5	5	3	3	4	1	4	7	2	2	4	4	7
	83	3	3	6	4	3	4	3	4	4	6	4	6	5	4	1	3	7	4	4	3	7	7
	84	3	4	6	3	7	3	3	7	7	3	2	3	7	2	2	6	7	3	3	3	6	6

LOW DENSITY, LOW NOISE, NONANGER

Group	Subject	Reactions to Task Situation[a]														Questionnaire Responses[a]							
		Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
22	85	3	3	4	4	3	4	3	4	4	3	4	3	4	3	2	7	1	1	1	1	7	7
	86	5	4	5	4	7	4	6	5	7	4	4	7	7	4	1	4	3	3	4	4	7	7
	87	2	3	3	4	6	2	2	6	4	2	5	4	5	2	2	2	1	5	4	2	5	6
	88	1	6	7	4	2	4	1	7	3	3	1	1	3	4	2	1	1	2	2	2	7	7
23	89	1	4	4	6	7	4	2	6	7	6	4	4	7	1	1	5	1	1	2	2	7	7
	90	2	1	2	3	3	2	1	7	6	4	2	3	6	4	1	6	1	3	3	4	7	7
	91	4	3	2	6	7	4	4	5	1	5	5	6	1	7	1	6	1	4	3	3	7	7
	92	6	7	5	3	7	1	7	7	7	2	7	1	5	2	1	2	4	6	3	5	7	7
24	93	4	6	1	4	7	4	3	7	5	1	4	1	3	3	1	6	1	4	1	2	7	7
	94	2	7	5	4	2	5	1	5	3	2	4	3	3	5	4	2	1	3	4	3	7	4
	95	4	4	4	4	2	2	3	7	6	1	7	6	6	2	1	7	1	1	1	1	7	7
	96	2	5	4	4	4	4	3	7	5	7	4	1	4	4	3	4	1	3	2	2	7	7

[a]A blank space indicates missing data.

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