EXTRAVERSION AND PREFERRED LEVEL OF SENSORY STIMULATION

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ABSTRACT

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By

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One hundred and twenty male undergraduate subjects were measured for extraversion using the Eysenck Personality Inventory, the Contact Personality Factor, and the Sensation Seeking Scale to test the hypothesis that extraversion and preferred level of sensory stimulation are correlated. Each subject then underwent laboratory testing in which preferred and unpleasant levels of auditory and visual stimulation were determined by the subject under task and relaxed conditions.

The results revealed that there was a significant positive correlation between extraversion and amount of auditory and visual stimulation necessary to produce slightly unpleasant hedonic tone in a relaxed situation. A secondary finding was that degree of internal arousal was positively correlated with amount of sensory stimulation preferred.

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Elek John Ludvigh III

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To Bill Kell and Dozier Thornton,

whose consistent respect and caring are,

more than anything else,

responsible for enabling me to grow sufficiently

to successfully complete my graduate program.

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My total graduate school experience has been a complex and multifaceted one which, although often stressful and occasionally distressing, has resulted in my becoming not only a better educated person, but a more alive and complete person. To those who have contributed to my knowledge I am grateful. To those who have contributed not only as teachers, but who have had a significant and positive personal impact on me, I am deeply grateful.

As an entering graduate student I was very unsure of myself and my goals. Norman Abeles did much at this time both to help assure me of my potential competence and to clarify and define my goals. At a slightly later developmental stage, in a time of considerable personal stress, Jo Burrow and Bill Kell enabled me to continue when I had seriously considered modifying or giving up my plans. At this same time I was also growing as a result of having met Jeanne Gullahorn, whose zest for life in general and enthusiasm for teaching in particular have had a great influence on me. As a clinical neophyte I came under the influence of Jane Church and John Mullen. Each, in a unique way, did much to give me the courage necessary to pursue

clinical work at an even deeper and more involved level. Later Bill Mueller's interest in me in conjunction with his great knowledge of human dynamics enabled me to begin to approach maturity in my interactions with my clients. At this stage of my life I was also fortunate in knowing Elaine Donnelson, whose rigorous approach to personality theory together with her warmth and humor did much to rekindle my excitement in the more academic aspects of psychology. Also at approximately the same time I was doubly fortunate in that I met Cecil Williams. The fact that he regarded me as a colleague in spite of my obvious lack of experience did much to enable me to grow to be more worthy of this respect.

Finally, to Andy Barclay I owe a special debt of gratitude. He, like Cecil Williams, was able to grant me colleague status, while at the same time tirelessly helping me with my work on the dissertation. His ability to be available and helpful while simultaneously allowing me to investigate what I felt was of importance and relevance has been of immeasurable value in helping me to complete the dissertation.

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INTRODUCTION

All of us as human beings have, at a number of times, felt overwhelmed by sensory stimulation and have felt a need to get away from it all, to a haven of quiet isolation. Those of us who are involved in clinical and counseling work will probably have noted that our clients frequently express a need to get "far from the madding crowd." This need to reduce stimulation--to escape from the bombardment of the senses to a calm and quiet environment--can be thought of as a neurotic need to escape. On the other hand, it may be at least partially a manifestation of an attempt to maintain what has been called "sensoristasis" (Schultz, 1965), a homeostatic balance with respect to sensory stimulation.

We may also have worked with as clients or been acquainted with people who not only feel a need to get away from it all occasionally, but who appear to have a more or less chronic need to avoid contact with others and the bustling world in general. Some clinical workers classify such types as "schizoid personalities." In turn, people with this type of personality frequently think there is something wrong with them because they do not enjoy the exciting, arousing aspects of life as much as those around them do. While some such people probably are disturbed, it is possible that some "withdrawn" behavior is, to an extent, due to a lower level of stimulation necessary to maintain sensoristasis.

The problem to which this study addresses itself centers around the above issue of sensoristasis, or homeostatic balance of stimulation. It seeks to investigate the following issues:

1. Is there a correlation between certain personality types and need for, or avoidance of, sensory stimulation?
2. How do ongoing emotional processes affect the need for or avoidance of sensory stimulation?
3. How is need for avoidance of sensory stimulation affected by conditions where work must be done as opposed to situations where one is simply attempting to relax and be comfortable?

Hopefully, any light shed on these issues will have implications for both management of one's daily life and one's clinical practice.

REVIEW OF
RELEVANT BACKGROUND LITERATURE

Any study which addresses itself to the issue of the need of human beings for sensory stimulation must consider the effects of sensory restriction or sensory deprivation. Since the pioneering study on sensory deprivation by Bexton (1953), a tremendous amount of research has been carried out on the effects of reduced sensory input on human physiological, cognitive, perceptual and affective functioning. Since the literature is so voluminous, no attempt will be made to review it in its entirety. However, a number of studies in the area of sensory deprivation have relevance for the present study and will be discussed briefly in order to provide background information.

The most striking finding of the sensory deprivation research is that most people find sensory deprivation aversive. This finding by Bexton (1953) has been replicated by a vast number of subsequent workers. In fact, so universal has been the finding that sensory deprivation is aversive that sensory deprivation experimenters routinely expect a subject attrition rate of at least 20% in even short term sensory deprivation studies. Just a few of the studies which have reported subject distress in response to sensory deprivation are those of: Azima & Cramer, 1956; Brownfield, 1966; Cohen, Silverman & Shamovian, 1962; Francis, 1964, 1966, 1966a; Gibby, Adams & Carrera, 1960; Hull & Zubeck, 1962; Jackson & Pollard, 1966; Leon & Frank, 1966; Petrie, Collins & Solomon, 1960; Rossi & Solomon, 1964, 1964a, 1964b, 1964c, 1954, 1966; Tranel, 1962; Vernon & McGill, 1960; Zubeck, 1963, 1964, 1964a, 1964b; Zuckerman, 1964; Zuckerman & Haber, 1965; and Zuckerman, Persky, Hopkins, Murtaugh, Basu & Schilling, 1966.

Because of the overwhelming number of studies showing that sensory deprivation is aversive to many experimental subjects, there is a tendency to assume that sensory deprivation is aversive to all types of subjects. This does not appear to be the case, however. Azima and Cramer (1956) used a mental hospital population and found that most patients stayed in sensory deprivation of their own free will for 4-6 days and also observed that 100% of the depressives who underwent sensory deprivation were judged markedly improved after the sensory deprivation period. Brownfield (1966), in a study using both normal and emotionally disturbed individuals, found that a small but significant proportion of both normal and disturbed subjects reported feelings of well-being associated with sensory deprivation.

Further, like Azima & Cramer (1956), Brownfield noted that depressives reported reduced anxiety after sensory deprivation. Gibby, Adams & Carrera (1960) found that sensory deprivation of six hours duration led to overall reduction of anxiety and depression of the group of Veterans Administration mental patients used as subjects, but noted that while most improved, some worsened as a result of sensory deprivation.

Ludvigh (1970) observed that approximately one-third of the subjects in a short term sensory deprivation experiment did not stimulate themselves with light and sound even when such stimuli were readily available to them. In a similar study, Rossi & Solomon (1964a) found that approximately one-third of the subjects who believed they could shorten a sensory deprivation experience by button pressing did not attempt to reduce the period of sensory deprivation. Finally, Zubeck (1964) reported that one subject who had participated in an experiment in which he experienced sensory deprivation continuously for 14 days requested permission to return to the sensory deprivation situation several days after the experiment was over.

It thus appears that the issue of the aversive nature of sensory deprivation is not completely settled. In a later section of this paper, personality and physiological factors which may be related to the aversiveness or nonaversiveness of sensory deprivation will be considered. In order to lay the groundwork for that discussion, however, it is necessary to consider some of the physiological effects of sensory deprivation.

Research on the physiological effects of sensory deprivation has focused primarily on galvanic skin response (G. S. R.) and electroencephalogram (E. E. G.) records. Studies related to the E. E. G. have consistently found significantly reduced occipital lobe frequency under conditions of sensory deprivation and have found that the reduction of frequency becomes greater with passage of time in sensory deprivation (Zubeck, 1963, 1963a, 1964). It has also been found that there are considerable individual differences in the effects of sensory deprivation on the E. E. G. (Zubeck, 1964).

Contrasting with E. E. G. evidence suggesting decreased arousal due to sensory deprivation are the studies on G. S. R. These studies uniformly find that while G. S. R. drops for the first hour or two, it then rises gradually and continuously until the end of the session, even in quite long sessions (Hanna, Burns & Tiller, 1963; Zuckerman, Levine & Biase, 1964; and Vernon, McGill, Gulick & Candland, 1961). These findings suggest that autonomic arousal is increasing as cortical arousal is decreasing in subjects undergoing sensory deprivation.

Having examined some of the research related to the affective and physiological effects of sensory deprivation, it is now appropriate to review research which has investigated the relationship between various personality characteristics and subject reactions to sensory deprivation. Myers (1969), in an extensive and detailed review of literature relating personality characteristics to tolerance of sensory deprivation, states that

> . . . the literature on personality factors associated with deprivation tolerance is diverse, and outcomes on the whole, are disappointingly inconsistent. This is not altogether surprising in view of the wide procedural variations, probably multiplicity of relevant predictors, diversity of criteria employed and the interactions of these considerations. (Myers, 1969, p. 328)

Because, however, of the logical appeal of the idea that introverts, who appear to desire less sensory stimulation than extraverts or ambiverts (normals), should be better sensory deprivation tolerators than extraverts, a careful review of this segment of the sensory deprivation-personality trait area was conducted.

In an early study concerned with introversion and sensory deprivation tolerance, Petrie, Collins & Solomon (1960) found that subjects who tolerated sensory deprivation well were significantly more introverted than subjects who tolerated sensory deprivation poorly. Contradicting the findings of Petrie et al. (1960) was a study by Tranel (1962), who found the subjects classified as introverts by the Myers-Briggs Type Indicator tolerated sensory deprivation significantly less well than extraverts. Tranel however noted that these contradictory results could be due to the fact that introverts followed instructions which were aimed at maximizing the effects of sensory deprivation, while extraverts disobeyed the instructions and tended to engage in unauthorized self-stimulation activities. Another study suggesting that introverts tolerate sensory deprivation less well than extraverts was conducted by Reed and Kenna (1964), who found that introverts as classified by the Maudsley Personality Inventory perceived a given period of sensory deprivation as being longer than extraverts.

Two studies of sensory deprivation tolerance and the extraversion-introversion dimension have been conducted by Rossi and Solomon. The first (1965) found that introverts as classified by the Myers-Briggs Type Indicator tolerated sensory deprivation slightly, but not significantly less well than extraverts, while in the second (1966) there was no difference in toleration between the groups. In a subsequent study, Reed and Solomon (1964) found that all subjects reporting depersonalization during a brief sensory deprivation period were significantly lower on Maudsley Personality Inventory extraversion scores than those who did not experience depersonalization, again suggesting that introverts find sensory deprivation more aversive than extraverts. Ludvigh (1970) found that there was no significant difference between introverts and extraverts as measured by the Eysenck Personality Inventory in manifest need for sensory stimulation while in a sensory deprivation situation. However, the lack of significant findings could have been due to the short length of the sensory deprivation period.

The experimental findings cited thus far suggest that, contrary to what one would logically expect, introverts tolerate sensory deprivation less well than extraverts. A possible explanation for these findings has been suggested, however, by Zuckerman, Persky, Link and Basu (1968). They hypothesize that

> while understimulation and overstimulation appear to be on the same continuum, this is not really the case. In an S. D. or even in a social isolation situation some sensation seekers find new and interesting sensations which make these situations quite tolerable. (p. 192)

Because the results of studies relating extraversion-introversion to sensory deprivation tolerance are open to doubt due to the exciting aspects of sensory deprivation which may appeal to the impulsive, thrill-seeking extravert, an attempt has been made to construct a questionnaire which is more directly related to sensation seeking than the Myers-Briggs Type Indicator, Maudsley Personality Inventory, Minnesota Multiphasic Personality Inventory, or Eysenck Personality Inventory. This scale, called the Sensation Seeking Scale, was developed by Zuckerman, Kolin, Price and Zoob (1964) and appears to be a potentially better predictor of reaction to sensory deprivation than is extraversion-introversion score.

Using the Sensation Seeking Scale, Zuckerman (1968) found a positive correlation between Sensation Seeking Scale scores and the adverse affects of social isolation. In addition it was found that Sensation Seeking Scale scores were negatively correlated with the aversive affects of sensory deprivation. These results were in concurrence with other users of the Sensation Seeking Scale (Zuckerman, Schultz, & Hopkins, 1967), who observed that volunteers for sensory deprivation experiments had significantly higher Sensation Seeking Scale scores than nonvolunteers. These findings suggest that sensory deprivation is a "new kick" for people with high scores on the Sensation Seeking Scale.

Of perhaps even greater interest is the finding of Brownfield (1966) that people low on the Sensation Seeking Scale reported feelings of well-being associated with a 10 hour sensory restriction period in which subjects were isolated in a dark, quiet room. Thus, while the use of the Sensation Seeking Scale has been quite limited, it does appear to be of potential use as a paper and pencil measure of human sensation seeking behavior.

Sensory deprivation phenomena clearly do have implications for man in his more natural environment and, in fact, can highlight psychological factors which would ordinarily not be at all observable. For the purposes of the present study, however, it must be remembered that true sensory deprivation with its large reduction of sensory input bears little resemblance to a natural environment and so must serve, at best, as being suggestive of factors which are important in a more natural setting. Implications which are relevant to the normal environment in which we live and work are found in the research on human stimulus seeking. It is to this area of research that we will now turn our attention.

Stimulus Seeking Research

While it has been suggested that the stressful effects of sensory deprivation may be due to such factors as confinement (Zuckerman et al., 1968) or social isolation (Walters and Parke, 1964), it appears more probable that the stressful effects are due to the main effect of sensory deprivation--reduction of sensory input. In an unusually well designed and carefully controlled experiment, Smith and Myers (1966) found that subjects in a dark, quiet sensory deprivation situation sought significantly more stock market reports than control subjects who were similarly confined and isolated, but who had many types of sensory stimulation available to them. Similarly, Zuckerman and Habor (1965) found that subjects who were most stressed by sensory deprivation conditions were most eager to engage in self-stimulation activities using light and sound while in sensory deprivation.

Human beings, then, apparently need sensory stimulation and will work for it when deprived of it. A relevant issue at this juncture is the problem of the function sensory stimulation serves. One position is that sensory stimulation satisfies some sort of information drive. Jones (1969, p. 180) in an extensive review of human stimulus seeking behavior states that the studies reviewed ". . . support clearly the view that sensory deprivation motivates stimulus seeking responses where stimuli are of a meaningful verbal sort."

Two experiments testing the hypothesis that the meaningfulness, or information value, of sensory stimulation has much to do with its ability to satisfy subjects in a sensory deprivation situation have been conducted by Jones and his colleagues. In the first (Jones, Wilkenson and Braden, 1961), it was found that subjects deprived of visual information for various periods of time had a response rate for visual information which was an increasing monotonic function of hours of visual deprivation. While this study showed that the need for sensory stimulation increases as a function of hours of deprivation, its assumption that the information value of the stimuli was what was reinforcing the deprived subjects received no direct support. However, in a later study, Jones and McGill (1967) found that operant response rates in a visual restriction situation were an increasing linear function of the information value of the stimuli available. This study clearly does support the hypothesis that the reinforcement value of stimuli with high information value tends to be higher than the reinforcement value of stimuli with low information value. It does not, however, establish the existence of the information drive postulated by Jones and, as will be seen, there are alternative explanations.

Before proceeding on to the alternative explanation of sensation seeking behavior, two additional studies related to the information drive hypothesis which are relevant to the present research bear mention. In the first, Thornton (1966) found that information in one sensory modality could satisfy the drive for information in another modality. That is, prior visual information satiation reduced subsequent responding for auditory information. In the second Jones (1961) found that irrelevant drives such as hunger and shock increased the rate of self-stimulation for information deprived subjects. These studies suggest that need for sensory input at any given time can be affected by both prior stimulus satiation and ongoing internal arousal state of the subject.

Brain Arousal Research

An alternative to the information drive explanation of human stimulus seeking behavior is derived from research in neurophysiology.

Moruzzi and Magoun (1949) made an important discovery while conducting a study on direct electrical stimulation of the brain. They observed that electrical stimulation of the ascending reticular formation caused the E. E. G. wave which is characteristic of sleep to be eliminated, if present, and be replaced by one of cortical activation or arousal. It was also found that a sensory stimulus of any kind produced similar E. E. G. effects. Subsequent research by Weinberger and Lindsley (1964) has shown that stimulus offset can also produce the same E. E. G. effects as stimulus onset. Thus it appeared that cortical arousal and concomitant alert, awake behavior patterns could be produced in an organism by sensory stimulation, the offset of sensory stimulation, or direct stimulation of the ascending reticular formation or ascending reticular activation system, as it has come to be known since the work of Moruzzi and Magoun (1949).

Considerable theorizing has been based on the above work, and the outcome of all such theorizing has been rather similar. In short, Schlosberg (1954), Malmo (1958), Lindsley (1951), and Hebb (1955) all suggested either directly or indirectly that an adequate degree of cortical arousal leads to adaptive behavior and pleasant emotional tone, while inadequate or excessive cortical arousal leads to disorganized behavior and unpleasant emotional tone.

Sensory deprivation studies have demonstrated that decreased E. E. G. activity is generally associated with poor task performance and unpleasant emotional tone. It is therefore possible that cortical arousal underlies human stimulus-seeking behavior.

A simplified and condensed view of the standpoint of the above activation theorists who think that the cortical arousal value of stimuli is the source of human stimulus-seeking behavior is as follows: Sensory stimulation creates an aroused E. E. G. pattern via the ascending reticular activation system. Therefore, stimulus-seeking behavior is an attempt to obtain the cortical arousal that will increase task performance and hedonic tone.

One of the obvious problems with the above formulation is that cortical arousal is mediated largely by the reticular formation, but cortical impluses can activate the reticular formation which in turn activates the cortex (Schultz, 1965; Cofer and Appley, 1965). Furthermore, while sensory stimulation <u>tends</u> to activate the cortex, it is neither necessary nor sufficient for some degree of cortical arousal.

A second major problem with the position of the activation theorists is that cortical arousal has not been shown to be <u>necessarily</u> correlated with adequate task performance (Vernon and Hoffman, 1956) or pleasant emotional tone (Zubeck, 1964). The rationale behind this assumption is that task performance, hedonic tone, and

E. E. G. activity all appear generally reduced by sensory deprivation. While it is reasonable to assume that the reduced cortical activation produced the reduction in task performance and hedonic tone usually associated with sensory deprivation, this assumption cannot be considered fully established at the present moment.

The final problem with the cortical arousal theory of stimulus seeking behavior is similar to the preceding one. That is, while excessive stimulation is associated with reduced task performance, reduced hedonic tone, and an abnormally high level of cortical arousal (Lindsley, 1961), it has not been demonstrated that the "excessive" level of arousal of the cortex causes the other effects.

In spite of the weaknesses of the cortical activation explanation of sensory stimulation seeking behavior, it appears to be a springboard to the best explanation currently available for such activity. This explanation, like those cited above, is an activation theory. Its difference lies in the fact that it is more flexible and comprehensive. Additionally it has greater heuristic value in that it can be used to explain a wider range of behaviors than can simple activation theory.

Optimum Arousal Theory and Research

Fiske and Maddi (1961) have integrated the experimental data related to the activation hypotheses and have developed eight propositions which form a conceptual framework explaining the functions of varied experience. A discussion of the research supporting their eight points takes Fiske and Maddi (1961) over thirty pages of text. It is therefore impractical to attempt to summarize here the support they cite. However, because of the importance and relevance of these propositions for the present study, and because at least a portion of the research supporting them has been cited and briefly discussed by the present author for the purposes of the study at hand, it is appropriate to at least list their propositions:

I. The impact of a stimulus is its momentary contribution to the activation level of an organism.
II. An organism's level of activation varies directly over time with the total impact of current stimulation.
III. The impact of a stimulus is derived not only from the intensity and meaningfulness of the stimulus but also from the extent to which it provides variation from prior stimulation.
IV. For any task there is a level of activation which is necessary for maximally effective performance.
V. The behavior of an organism tends to modify its activation level toward the optimal zone for the task at hand.
VI. For each stage in an organism's sleep-wakefulness cycle, there is a characteristic or normal level of activation.
VII. In the absence of specific tasks, the behavior of an organism is directed towards the maintenance of activation at the characteristic or normal level.
VIII. Negative affect is normally experienced when activation level differs markedly from normal level; positive affect is associated with shifts of activation toward normal level.

(Fiske & Maddi, 1961, pp. 17-46)

The above propositions have implications for much of the research on sensory deprivation tolerance and stimulus seeking behavior since they suggest that subject reactions in various experimental conditions are not a simple function of such factors as information deprivation or need for cortical arousal, but rather are due to a complex dynamic interaction of a multiplicity of subject and situational variables. It is suggested here, based on the work of Fiske and Maddi (1961), that overly simplistic approaches have led to many of the conflicting results in the sensory deprivation and stimulus seeking research. With this idea in mind let us now redirect our attention to the issue of personality and stimulus seeking behavior which was touched on earlier. By avoiding oversimplification it is hoped that an apparently fruitful avenue of research which has seem to be a dead end may be reopened.

Stimulus Seeking Behavior and Extraversion Revisited

In an earlier section of the present study, the general lack of significant findings in research attempting to correlate sensation seeking scores and extraversion scores with various behavioral indices was reviewed. While it is possible to unearth methodological flaws which might be responsible for the lack of results, such *post hoc* hypothesizing is not appropriate for this work. The approach that will be followed is to first present the hypothesized relationship in its most comprehensive form and then to consider research which has a bearing on the hypothesized relationship proper and any study which seeks to investigate the possible relationship.

H. J. Eysenck, perhaps one of the most significant proponents of the biological foundations of human personality, has based a considerable portion of his theoretical framework on the research of the brain activation theorists. Based upon the work on cortical arousal and inhibition, Eysenck states two postulates explaining the general relationship he feels exists between personality and cortical inhibition-excitation phenomena.

First:

> Human beings differ with respect to the speed with which excitation and inhibition are produced and the speed with which inhibition is dissipated. These differences are properties of the physical structures involved in making stimulus response connections.

Second:

> Individuals in whom excitatory potential is generated slowly and in whom excitatory potentials so generated are relatively weak are thereby predisposed to develop extraverted patterns of behavior. . . . Individuals in whom excitatory potentials so generated are strong are thereby predisposed to develop introverted patterns of behavior. . . . Similarly individuals in whom reactive inhibition is developed quickly, in whom strong reactive inhibitions are generated, and in whom reactive inhibition is dissipated slowly are thereby predisposed to develop extraverted patterns of behavior; . . . conversely, individuals in whom reactive inhibition is developed slowly, in whom weak reactive inhibitions are generated, and in whom reactive inhibition is dissipated quickly are thereby predisposed to develop introverted patterns of behavior (Eysenck, 1967, p. 77).

Based on the foregoing, Eysenck hypothesizes that the sensory thresholds of introverts are lower than those of extraverts ". . . because of the higher efficiency of performance associated with cortical excitation" (Eysenck, 1967, p. 100). Extrapolating from this hypothesis, "the theory linking introversion with low sensory thresholds (and small j.n.d.s.) has been extended by Eysenck to pain tolerance and sensory deprivation tolerance in the following manner" (Eysenck, 1967, p. 100).

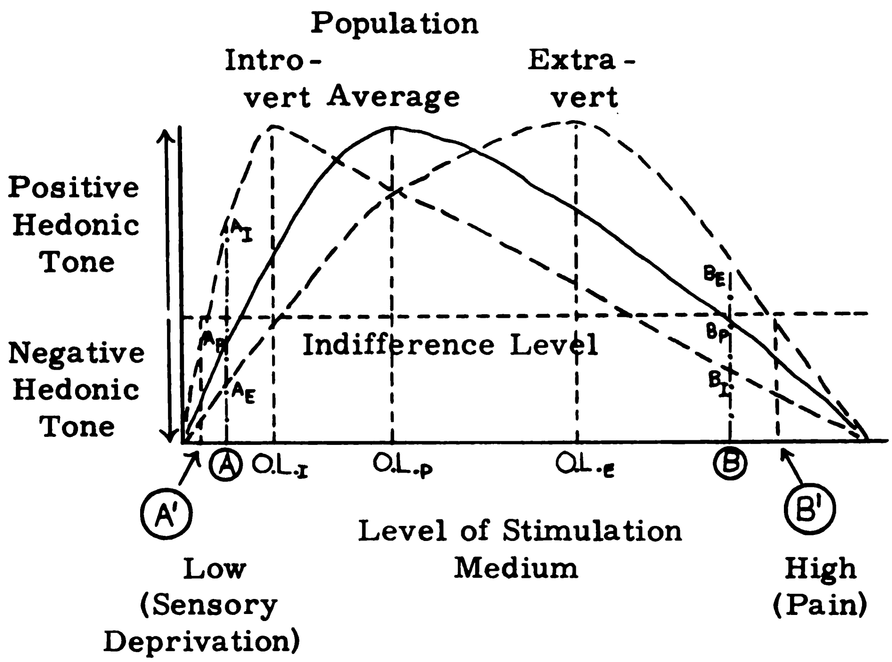

Figure 1. --Relation between level of sensory input and hedonic tone as a function of personality. (Eysenck, 1967, p. 109)

The hypothesized relationship graphed above is explained by Eysenck as follows:

> . . . along the abscissa we have plotted degrees of sensory stimulation, from extremely low at the left to extremely high on the right. Along the ordinate we have plotted the hedonic tone associated with these different levels of stimulation, ranging

from strongly negative (feelings of displeasure or even pain; desire to escape, to end the stimulation; abience) to strongly positive (feelings of intense pleasure; desire to prolong the stimulation, or even to increase it; adience). Between the positive and negative hedonic tones there is an indifference level, indicating that stimulation is neither sought nor avoided but is quite neutral to the subject. The strongly drawn curvilinear line in the centre of the diagram indicates the relationship between hedonic tone and strength of sensory stimulation, as derived from random samples of the population. We find that extremely high levels of stimulation produce pain and discomfort and have consequently a high negative hedonic tone (Beecher, 1959). Extremely low levels of stimulation (sensory deprivation) have also been found to be productive of high negative hedonic tone and to be bearable only for relatively short periods (Solomon et al., 1967; Zubeck, 1964). It is only at intermediate levels of sensory stimulation that positive hedonic tone develops, and this finding is not perhaps entirely out of line with common experience and expectation. In any case, there is ample experimental evidence in the literature for the general correctness of the picture presented in Figure 37 (Berlyne, 1960).

We must now turn to individual differences in excitation and inhibition. Introverts have lower thresholds, and show less adaptation/inhibition to continued stimulation; extraverts have higher thresholds, and show more adaptation/inhibition to continued stimulation. It would seem to follow that any given degree of stimulation would be experienced as effectively higher by introverts than by extraverts. Objectively equal amounts of stimulation, therefore, would not be experienced as equal by extraverts, ambiverts, and introverts; they would appear displaced to the left of the abscissa of Figure 37 for the introvert, and to the right by the extravert. Similarly, if O. L. represents the optimum (or preferred) level of stimulation of a given person, then $O.L._I$ would lie to the left of $O.L._P$, and this in turn to the left of $O.L._E$, where I and E refer to introvert and extravert, respectively, and P to the population average.

Again, consider two points, A and B, on the abscissa, referring to low and high stimulation, respectively. If straight lines are drawn through these points, parallel to the ordinate, they will cross the general curve relating level of stimulation to hedonic tone roughly at the indifference level; in other words, for the average person these two stimuli are equally indifferent.

> For the typical extravert and introvert, however, as already explained, the general curve is not representative and has to be displaced to the left for the introvert and to the right for the extravert. As shown in the diagram, it follows that stimulus A will be positively hedonic for the introvert (A_I) and negatively hedonic for the extravert (A_E), while B will be negatively hedonic for the introvert (B_I) and positively hedonic for the extravert (B_E). In other words, we postulate a certain degree of stimulus hunger (sensation seeking, arousal seeking) in the extravert, and a certain degree of stimulus aversion in the introvert. Conversely, it would seem to follow that extraverts should be more tolerant of pain, introverts of sensory deprivation (Eysenck, 1967, p. 109).

Eysenck's hypothesis is an appealing and quite logical one, but in spite of the research he cites, it has not received much experimental support. It is suggested here, however, that the hypothesized relationship is essentially accurate and that with a few modifications will be supported by adequately designed research.

The keynote of the present study is that Eysenck's formulation, while basically correct, must first be slightly modified and then tested under certain specific conditions before the hypothesized relationship can be observed. In a subsequent section, research will be mentioned which has a bearing on the methodology of any study attempting to investigate Eysenck's hypothesis. At this point, however, it is appropriate to see what modifications of Eysenck's hypothesis are suggested by research which has already been done.

While Eysenck's explanation of Figure 1 is an elaborate and detailed one, its basic assumptions can be paraphrased quite simply as follows:

1. Very low and very high levels of stimulation produce negative hedonic tone.
2. Positive hedonic tone develops only at intermediate levels of sensory stimulation.
3. Any amount of stimulation is experienced as effectively higher by introverts than by extraverts.
4. The optimum level of stimulation for introverts is lower than that for ambiverts which is also lower than that for extraverts.

The real problem with these propositions is the lack of such modifying statements as "in general," "usually," and "other things being equal." For example, regarding proposition 1, research has been discussed here which suggests that very low levels of stimulation do not always produce negative hedonic tone (pages 3-4). Regarding proposition 2, research has been cited showing that positive hedonic tone can develop at very low levels of stimulation (pages 4-5).

Propositions 3 and 4, while perhaps generally true, could fail to receive experimental support on any given occasion if the eight propositions (all of which are supported by research) suggested by Fiske and Maddi (pages 16-17) are not taken into account or controlled for.

Even if Eysenck's basic assumptions are largely correct, there has been no research supporting the accuracy of his graphic representation. He assumes that hedonic tone is related in a curvilinear fashion to level of stimulation. Research by Beebe Center (1932) suggests that the optimum level of stimulation is largely a function of adaptation level and is not a highly specific location on a curve as Eysenck suggests. Additionally, research has been cited indicating that people who are low on the Sensation Seeking Scale, as well as some introverts, find mild sensory deprivation situations pleasant (pages 4-5).

These research findings, in conjunction with the concept of neural step-functions suggested by Ashby (1960), can lead to a modification of Eysenck's graph as follows:

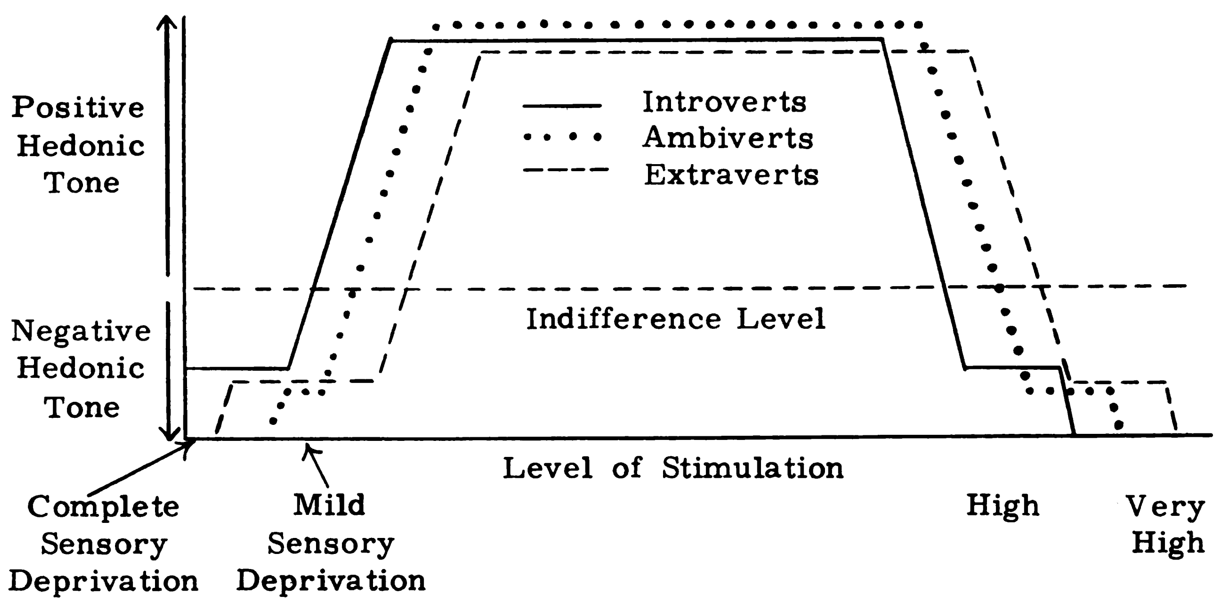

Figure 2. --Hedonic tone and level of sensory input as a function of personality, given other factors held constant.

This representation agrees with the notion that personality is related to a need for sensory input, but suggests that there is a fairly broad optimum level for each personality type. Also, by not clustering introverts and extraverts in the extreme negative hedonic tone area at the sensory deprivation end of the sensory stimulation continuum, the formulation takes into account the research suggesting that almost one-third of the subjects find sensory deprivation neutral or only mildly aversive (pages 4-5).

As a result of these modifications, Figure 2 predicts wider introvert-extravert differences in stimulation necessary to cause slightly negative hedonic tone than would be expected based on Figure 1. Also, unlike Figure 1, Figure 2 predicts optimum level differences between extraverts and introverts to be of the same magnitude between groups as slightly unpleasant level differences.

It should be noted that this graph was presented not as a representation of reality, but simply to show that even if Eysenck's basic assumptions about personality and need for stimulation were true, the data do not yet exist to support the type of graphic representation he presents in Figure 1.

An examination of the research and theory which has been cited relevant to Eysenck's hypothesis suggests a number of points which could be incorporated into his basic theory presented on pages 19-20 above. First, studies by Lindsley (1961) and Cofer and Appley (1965) suggest that cortical arousal can be created by cortical impulses to the reticular activating system as well as by activation of the reticular activating system by external stimulation. This suggests that internal arousal processes can substitute for external stimulation.

Second, the same research suggests that even if internal arousal processes do not entirely substitute for external stimulation, they may still modify need for external stimulation

Third, proposition IV of Fiske and Maddi (1961), the theoretical stand of Hebb (1955), and the work of Courts (1939) and Stauffacher (1937) all suggest that optimum level of arousal is at least partially a function of the task to be performed.

Fourth, proposition VI of Fiske and Maddi (1961) suggests that the stage of the organism's sleep-wakefulness cycle must be considered when studying the effect of stimulation on the organism's affective state.

Fifth, proposition III of Fiske and Maddi (1961) and the work of Jones and his associates (Jones *et al.*, 1961; Jones and McGill, 1967) suggest that the *nature* of the sensory stimulation is as important in determining its arousal value as its objective stimulus strength.

Sixth, the work of Zuckerman et al. (1968), Zuckerman et al. (1967), and Schubert (1964) points up the possibility that true sensory deprivation situations may have high arousal value and thus should be at the high rather than at the low end of the sensory stimulation continuum.

Seventh, the work of Fiske and Maddi (1961) suggests that need for stimulation at any given time is determined by an interplay of a number of factors, rather than being determined simply by the extraversion-introversion dimension.

Eighth, the analysis of an alternative graphical representation of the basic assumptions of the theory suggest that such a representation is not appropriate until more data are in.

Thus it is clear that while Eysenck's hypothesis may be basically correct, it is both loosely formulated and probably not sufficient to explain sensory seeking behavior in general. The present author does believe, like Eysenck, that the extraversion-introversion dimension may in fact have a pervasive effect on what constitutes sensoristasis for any given person. Even if this is so, however, this effect is one which apparently can be masked by a number of other factors at any given time. Hence, research which hopes to uncover the relevance of this factor should be carefully designed to take into account not only the variables already mentioned but variables related to the methodology of the investigation itself.

Findings Related to the Design of the Present Research

Leuba has published two articles which are of relevance to the experimental methodology of the present study. The first (Leuba, 1955) was a theoretical paper which in some ways was the precursor of proposition II of Fiske and Maddi (1961). This article suggested that the arousal level of a subject at any given time is determined by the total of all sensory input. In a subsequent paper based partly on empirical research, Leuba (1962) broadened his earlier position. He suggested that the arousal level of a subject is a function of all sensory input including degree of internal stimulation and kinesthetic feedback. In addition he pointed out the obvious but previously neglected fact that sensitivity of the sense organs could also influence the impact of stimuli on subject arousal.

Two studies on the role of movement on the effects of sensory deprivation have been conducted which suggest that Leuba's implication that arousal is influenced by kinesthetic feedback is correct. In the first, Courtney and Solomon (1961) found that large arm and leg movements at frequent intervals slightly reduced visual distortions following a sensory deprivation experience as contrasted with small finger movements. The second study by Zubeck (1963) used even greater bodily activity in a sensory deprivation situation. In this study subjects were allowed free motion throughout the sensory deprivation experience. In addition there were five minute periods of forced vigorous exercise every two hours. Results showed much less E. E. G. slowing and much better performance on intellectual and perceptual motor tasks for exercised subjects than for controls in "normal" sensory deprivation.

Based on the foregoing, it is clear that any study which is attempting to minotor the stimulus seeking behavior of subjects should control for subject movement. Especially important, because of its apparently larger effect on arousal, is a control for gross body movement.

An interesting and suggestive study related to internal arousal was conducted by Rossi, Furhman and Solomon (1967). Their major finding was that subjects can be accurate in judging their own internal arousal states during sensory deprivation. Subjects rated their internal arousal and these ratings were correlated with E. E. G. records. The average correlation for the 10 subjects was .36 ($P < .05$), with all but one of the correlations being positive. This study suggests that a good control for internal arousal states is the subject's rating of his own internal arousal after the experiment is concluded.

Further work relevant to subjects' internal arousal states is cited by Eysenck (1963). In a volume on how drugs affect various perceptual and motor functions, Eysenck concludes ". . . that depressant drugs have an extraverting effect, while stimulant drugs have an introverting effect" (Eysenck, 1963, p. x). It thus appears that another important variable to be controlled for in stimulus seeking research is the ingestion of substances which might affect the internal arousal states of excitation inhibition processes of experimental subjects.

Still another area of research related to the design of the present study involves the psychology of psychological experiments. Orne (1962), in a detailed discussion of the demand characteristics of psychological experiments, presents evidence that subjects, in general, do what they think the experimenter wants them to do, regardless of the actual experimental instructions. He further suggests that the best way to determine what the demand characteristics of the experiment are is to ask the subjects open-ended questions regarding the purposes of the experiment.

A related, but more specific study investigating extraneous variables affecting the results of sensory deprivation experiments was conducted by Jackson and Pollard (1966). This study found that subjects' responses to sensory deprivation are largely a function of their expectations. Because sensory deprivation effects have been widely publicized, this phenomenon may be limited to sensory deprivation experiments. However, since sensory seeking research, of necessity, involves some degree of sensory restriction, it appears advisable to attempt to insure that subject expectations about what they may experience in a sensory restriction situation do not unduly influence their response to the experiment itself.

PROBLEM AND HYPOTHESES

In the introduction to the present study it was stated that the broad issue to be investigated here is related to sensoristasis, or homeostatic balance of stimulation. It was further stated that within this broad area there were two specific sub-areas which were to be addressed. These sub-areas were listed as:

1. Personality traits and need for or avoidance of sensory stimulation.
2. Ongoing internal arousal processes and need for or avoidance of sensory stimulation.

Because of interdependence of these factors, specific hypotheses related to each of the areas will, of necessity, mention factors related to the other area. While this is perhaps a bit confusing, it does appear necessary in light of the overall view that simplistic approaches tend to mask existing differences. The problem, then, is to investigate each of the areas of interest in such a way as to reveal existing relationships while simultaneously controlling for confounding variables which could mask such relationships. The majority of the discussion to this point has been related to the first area, that is the area of personality and sensoristatic behavior. More specifically, it has been primarily related to the hypothesis of Eysenck that the extraversion-introversion dimension is related to need for or avoidance of sensory stimulation.

Several modifications of Eysenck's basic formulation have been suggested, but it is still the general issue of need for sensory stimulation which is the main area of interest in the present study. While the other area to be investigated is worthy of study in itself, it is being considered primarily because failure to do so could mask existing differences in the extraversion-introversion sensoristasis area.

There are two basic assumptions underlying the extraversion-introversion sensoristasis hypotheses. They are:

1. Other things being equal, Eysenck's hypotheses that extraversion is positively correlated with stimulus hunger is correct.
2. Stimulus hunger can manifest itself in a desire for higher level of stimulation and/or more frequent periods of stimulation.

The hypotheses derived from these assumptions are as follows:

H_1 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and the amount of ambient illumination and sound which is necessary to provide optimum hedonic tone.

H_2 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and the amount of ambient illumination and sound which is necessary to create a slightly unpleasant level of hedonic tone.

H_3 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and amount of sensory stimulation necessary to maintain sufficient arousal to perform adequately an intrinsically non-stimulating task. That is, because any task requires some degree of arousal (Fiske and Maddi's proposition IV), and because extraverts presumably are less aroused by sensory stimulation than introverts, they will require relatively more stimulation to achieve sufficient arousal to perform the task.

While it is of secondary interest to the author in the present study, the issue of internal arousal level and sensoristasis is worthy of investigation for two reasons. The first is that failure to control for abnormal internal arousal might mask an existing correlation between the extraversion-introversion and Sensation Seeking Scale scores and sensoristasis. The second reason is that, while there have been several theoretical discussions (pages 28-30) about the effect of abnormal internal arousal on stimulus seeking behavior, there have been only two studies conducted investigating the relationship. The first by Jones (1961) found that heightened but irrelevant drive increased stimulus sekking behavior. The second by Ludvigh (1970) found that abnormally internally aroused subjects did not as a group differ from normally aroused subjects in amount of self-stimulation desired in a mild sensory deprivation situation. Thus actual studies of this relationship are rare, and any light cast on this area is of use to stimulus seeking research in general.

Four additional assumptions related to the arousal hypotheses are as follows:

1. Propositions IV, V, VI, and VIII of Fiske and Maddi (1961) cited on page 17 of the present study are correct. Without restating these propositions, they suggest respectively that amount of stimulation sought for the purpose of activation or arousal is a function of (a) the nature of the task, (b) the absence of any task, (c) the current sleep-wakefulness stage of the organism, and (d) the tendency of organisms to adjust

stimulation level toward the optimal zone of the task-nontask situation.

2. The arguments presented by Leuba (1962) cited on page 28 of the present study are correct. The position of this writer is that internal arousal caused the same type of activation of the organism as external stimulation.

3. The work of Jones (1961) (which contradicts propositions V and VII of Fiske and Maddi), showing that high irrelevant drive increases stimulus seeking behavior in a nontask oriented situation is either incorrect or does not describe a general phenomenon.

4. The work of Rossi et al. (1967), showing that subjects can judge their own internal arousal states with fair accuracy, is essentially correct.

Based on the above working assumptions, the following "internal arousal hypotheses" were made.

H_4 Subjects under relaxed conditions reporting abnormally high internal arousal will desire less sensory stimulation than normally aroused subjects.

This hypothesis was logically derived from the assumptions on page 35 by deducing that when high arousal is serving no adaptive function, the subject will attempt to reduce it to a more normal level by reducing the arousal-producing sensory input.

H_5 Subjects with a task orientation reporting abnormally high internal arousal will desire less sensory stimulation than normally aroused subjects.

Derivation of this hypothesis is based on the following reasoning: There is a relatively fixed, moderately high overall arousal level which is necessary to perform a vigilance task effectively. This overall arousal level is determined by summing internal arousal and arousal produced by external sensory stimulation. Clearly, given a vigilance task, subjects with high internal arousal will need relatively lower amounts of arousal-producing stimulation than normally internally aroused subjects to reach the moderately high overall level of arousal required by the task.

H_6 Subjects reporting abnormally low internal arousal will desire less sensory stimulation than normally aroused subjects when in a relaxed situation.

The key assumption relevant to H_6 is that low arousal is due primarily to the stage of the subject's sleep-wakefulness cycle he is in. That is, if arousal is low, it is probably due to factors such as fatigue or drowsiness. Since there is no adaptive value in increasing arousal through increasing sensory input when in a relaxed situation, and since the sleep-wakefulness cycle changes relatively slowly, it seemed logical to hypothesize that low internal arousal subjects would attempt to maintain low arousal by subjecting themselves to less sensory stimulation than normally aroused subjects.

H_7 Task-oriented subjects reporting abnormally low internal arousal states will desire more stimulation than normally aroused subjects when in a task-oriented situation.

The reasoning behind H_7 is analogous to that for H_5 except that the internal arousal level is reversed. In short, because subjects with low internal arousal have "farther to go" than normally aroused subjects in order to reach the level of overall arousal necessary to complete the task, they will need more external stimulation to produce an adequate arousal level.

Similarly to the internal arousal area, the issue of sensoristasis and task or nontask orientation was investigated primarily because it was felt that ignoring it might lead to false rejection of the hypothesis that extraversion-introversion and Sensation Seeking Scale tendencies are related to need for sensory stimulation. Unlike the internal arousal area, however, data were sought on this issue to help highlight differences rather than to prevent the masking of differences. That is, it was felt that by observing subjects under two different sets of conditions, the chances of being able to observe the differences hypothesized would be increased.

METHOD

Subjects

One hundred and twenty male undergraduate students drawn from an introductory psychology class at Michigan State University served as subjects for the experiment. Subjects were predominantly freshmen and sophomores and for the most part could be considered psychologically unsophisticated.

Experimental Room

The experimental room was an 8' by 10' windowless, well-insulated room equipped with a 6" by 25" one-way mirror installed in the door to enable the experimenter to unobtrusively observe subject activity. The room temperature was controlled at 72° Fahrenheit and had "normal" flourescent lighting of 300 watts when lighting was not being controlled by the subject.

The furnishings consisted of a comfortable overstuffed arm-chair and a 2' by 18" table placed beside the right arm of the chair. A small bookcase with some miscellaneous equipment was located behind the chair, out of the subject's view. Aside from these furnishings and the apparatus to be described in the following section, the room was devoid of furnishings and objects that could be of any interest to the subject.

Apparatus

Apparatus consisted of a 600-watt incandescent light source equipped with a 10-step, calibrated, continuously variable dimmer, placed on a 2" by 4" box on the table beside the subject's armchair. A remote control switch in series with the dimmer enabled the experimenter to turn the subject-controlled light source on and off at will from outside the experimental room.

Also on the table was a tape recorded with a 10-step, calibrated volume knob. The recorder could be started by the subject by pushing a button on one end of a $\frac{3}{4}$" by 5" plastic cylinder, into the other end of which ran a flexible electrical cord. The cylinder was draped by its cord over the right arm of the chair so that it was maximally accessible to the subject's grasp. Wired in series with the tape-recorder button-press circuit was a remote-control switch, a Hunter timer, and a 3-digit counter. The Hunter timer could be set to provide tape recorder "on" periods of from one second to 10 minutes for each button press. It should be noted, however, that button presses are not stored by the timer. If the interval were set at one minute, the subject would have to press the button once each minute in order to maintain continuous stimulation. The timer turned the recorder on when the button was pressed and turned it off at the end of a predetermined interval, no matter how many times the button was pressed in the intervening period. The counter simply recorded the number of times the recorder was turned on.

An intercom placed on the bookshelf behind the subject enabled the experimenter to monitor any subject verbalizations. A 7.5-watt red light bulb was hung from a single wire such that it was located at eye level, six feet from a seated subject. Directly adjacent to the red light bulb was a 4" by 4" white X on the wall.

Materials

Paper-and-pencil tests used were the Eysenck Personality Inventory, Sensation Seeking Scale (Appendix A), and the Contact Personality Factor. The Eysenck Personality Inventory and Contact Personality Factor test extraversion-introversion, while the Sensation Seeking Scale is a measure of a person's desire to experience sensory excitement of various types.

Neither the Contact Personality Factor nor Eysenck Personality Inventory has been critically reviewed, although Burros (1965) reviewed the construction methods used in the Eysenck Personality Inventory. Because of the lack of outside criteria, information on the reliability, validity and personality traits measured by both the Eysenck Personality Inventory and Contact Personality Factor must be drawn from the publisher's manuals.

The Eysenck Personality Inventory was constructed using factor analytic techniques. It measures both neuroticism (which does not concern us here) and the extraversion-introversion dimension. Extraversion and introversion are personality traits described as follows by the Eysenck Personality Inventory manual (Eysenck, 1968):

> The typical extravert is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change. He is carefree, easygoing, optimistic, and likes to "laugh and be merry." He prefers to keep moving and doing things, tends to be aggressive and to lose his temper quickly. His feelings are not kept under tight control, and he is not always a reliable person.
>
> The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, "looks before he leaps," and distrusts the impulse of the moment. He does not like excitement, takes matters of every-day life with proper seriousness, and likes a well-ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards.

Test-retest reliabilities of the Eysenck Personality Inventory extraversion scale on two groups totaling 119 subjects was .88. The split-half reliability of the extraversion scale on a group of 1,655 normal subjects was .86 (Eysenck and Eysenck, 1968, pp. 14-15). Concurrent validity is claimed for the Eysench Personality Inventory extraversion scale in that it correlates highly with other measures purporting to measure extraversion. Construct validity and factorial validity are also claimed for the Eysenck Personality Inventory (Eysenck and Eysenck, 1968, pp. 16-17).

The Contact Personality Factor, like the Eysenck Personality Inventory, was developed using factor analytic techniques. It is derived from the well-known 16-personality factor test of Cattell, and "measures exactly what is measured by the second-order extraversion factor derivable from the 16-personality factor scores (I. P. A. T., 1954, p. 1)." Reliability of the Contact Personality Factor based on alternate forms testing (N = 125) is claimed to be .96 (I. P. A. T., 1954a, p. 3). Validity is claimed for the Contact Personality Factor on the basis of its factorial construction, and sample norms are available for it (I. P. A. T., 1954c).

An examination of the actual Eysenck Personality Inventory and Contact Personality Factor forms suggests that the Eysenck Personality Inventory measures sociability, impulsivity and thrill-seeking, while the Contact Personality Factor measures factors primarily related to sociability.

The Sensation Seeking Scale, as has been mentioned earlier, is a measure of sensation-seeking and is presumably less related to sociability and impulsivity than are the tests of extraversion. The authors of the Sensation Seeking Scale have designated which items are related to actual sensory sensation-seeking and it is thus possible to get both an overall score from the Sensation Seeking Scale and a subscore which may be indicative of a need for sensory input. Unfortunately, while the test-retest reliability of the Sensation Seeking Scale has been determined by its authors to be .68 (Zuckerman et al., 1964), no validity or normative data of any kind is available for it. The decision to use it was made because it was the only instrument of its kind available.

An additional measure was the Abnormal Arousal Questionnaire (Appendix B), constructed by the present author. Its purpose was to check for possible abnormal arousal states and to serve as a control for possible perceptual handicaps of subjects. It also contained a question designed to reveal any unusual demand characteristics of the experiment.

The purpose of each of the items on the Abnormal Arousal Questionnaire was as follows: Questions 1-6 attempted to determine deviations from the subject's normal internal arousal during the self-stimulation period. Questions 7-12 attempted to determine deviations from the subject's normal internal arousal during the optimal level of stimulation period (which includes the slightly unpleasant level period). Questions 13-16 attempted to determine whether ingestion of any substances which would alter the subject's normal arousal level affected subject performance during the experiment as a whole. Questions 18-19 serve as a control for subject perceptual handicaps which might reduce his sensitivity to the experimental stimuli. Question 17 served to control for unusual experimental demand characteristics or unusual subject set. Question 20 attempted to assess possible secondary reward characteristics of the sound stimulation used in the experiment.

PROCEDURE

Testing

Each subject was given both the paper-and-pencil tests and the lab measures individually during a one hour long testing session. On reporting to the experiment the subject was successively given the Eysenck Personality Inventory, Sensation Seeking Scale, and Contact Personality Factor. When these tests were completed, the optimum level of stimulation period of lab testing was begun.

Optimum Level Portion

During the optimum level portion of the experiment, the subject adjusted levels of light and sound to both optimum and uncomfortable levels. The experimenter controlled the on-set, off-set, and adaptation periods from outside the room, entering only at the end of each period to record settings of light and sound levels by the subject. An overview of the optimum level and unpleasant level of stimulation portion of the procedure is as follows:

The subject was seated alone in the dark, sound insulated experimental room for an adaptation period of one minute. At the end of the one minute period the experimenter outside turned on the variable light source in the experimental room for thirty seconds. During this period the subject adjusted the light to the level most comfortable for him. At the end of the thirty second "light on" period, the experimenter simultaneously turned out the lights and turned on the sound (background music) for thirty seconds. As with the light, the subject adjusted the sound to his most comfortable, or optimum level.

At the end of the thirty second "sound on" period, the experimenter turned on the lights in the experimental room, entered, and recorded the settings made by the subject. The experimenter then left the room and the entire procedure described above (including the one minute adaptation period) was repeated.

Following recording the second set of preferred light and sound levels, the same basic procedure was repeated except that instead of the subject setting the light and sound to optimum levels individually, they were adjusted together to an optimum overall level.

Subsequent to recording the subject's optimum level of light and sound in conjunction, each of the above three trials were repeated with the modification that instead of setting the stimuli to optimally comfortable levels, the subject adjusted them to a level slightly too high for comfort.

Actual instructions to the subject for this portion of the experiment were as follows:

> During the next part of the experiment I want you to help me find out what for you is the most comfortable level of light and sound stimulation. The first step in the procedure is to have you sit in the chair in this room in the dark for one minute so that you won't be too much influenced by the lighting and sound conditions you are under now. Just sit in the chair and relax for the minute. When the minute is up, the light will come on automatically. This is your signal to begin the first optimal level trial.
>
> The procedure you are to follow is this: When the lights come on, adjust them up or down by turning the knob on the box on the table by your right hand. Adjust the lights until they are at the level of brightness where you are most comfortable. From the time they are turned on until they go off, feel free to adjust the lights as much as you want. Just try to be sure you are as comfortable as possible. While you are adjusting the lights please keep your eyes approximately at the level of the large white X on the wall. You don't need to stare at the X, just try to keep your eyes at approximately its general level. Thirty seconds after the lights come on, they will go off. Please do not touch the adjusting knob after this point. When the lights go out, the tape recorder beside your right hand will go on automatically, playing background music. Your job with the tape recorder is the same as it was with the lights. Reach out and adjust the volume knob up or down to the level where you are most comfortable. Please note the position of the tape recorder volume control knob now since you will be reaching for it in the dark. The tape recorder, like the lights, will go off after thirty seconds.
>
> When the recorder goes off, the lights will come back on and I will come into the room and record the level of light and sound that you set. Before I leave I will reset the light and sound control knobs to the levels at which they were set when they first came on. After I leave, the light will go out for one minute before coming on again. When it comes on, repeat the procedure you used the first time, adjusting the light and the sound to the level where you are most comfortable. When I come back into the room to record the levels you have set as most comfortable for the light and sound, I'll explain the next steps in this part of the experiment.

E entered the room when the trial was completed, recorded the levels set for the second trial and reset light dimmer and tape recorder volume knobs to the control position. E then said:

> When I leave the room, the lights will go out as before. One minute after they go out, they will come on again, but this time background music will come on at the same time. Your job is just like before, except this time you are to adjust both the lights and sound together. Again, adjust them so that you are as comfortable as possible. Remember, you should try to adjust your overall level of stimulation so that you are as comfortable as possible. You had thirty seconds for light adjustment and thirty seconds for sound adjustment before; this time you will have one one-minute period in which to adjust the light and the sound together. At the end of the minute the music will go off and I will come into the room and record the levels you set as being most comfortable. At that time, I will tell you what we will be doing next.

E entered the room when the trial was completed, recorded the levels set for the trial and reset light dimmer and tape recorder volume knobs to the control position. E then said:

> In this trial, we are going to go back to the same procedure we used on the first and second trials, except that instead of adjusting the light and sound to optimally comfortable levels, I want you to adjust each in turn to a level you feel is slightly unpleasant. Let me emphasize that I don't want you to see how much you can take or anything such as that--you are just to adjust the light and sound to levels that are a little too high for comfort--a little annoying. Again, there will be a minute of darkness and quiet after I leave; and, as before, you will have thirty seconds to adjust the light and thirty seconds to adjust the sound. When I come in to record the levels you have set, I will tell you what we are going to do next.

After recording the slighly unpleasant levels set by the subject, the experimenter gave the following instructions:

In this step we are going to combine what you did in the last step with what you did in the step before that. After I leave the room, the lights will go out for one minute. When they come on, the music will come on also, as in the trial before last. What I want you to do this time is to adjust the lights and sound together as you did before--but this time, adjust them so that the combined effect is slightly unpleasant. When I come back into the room to record the levels you have set, I will tell you what we are going to do next.

Self-Stimulation Portion

After entering the room and recording the levels of light and sound judged unpleasant in combination by the subject, the experimenter gave the following instructions:

We are now starting a whole new section of the experiment. This part of the experiment will be conducted with the normal fluorescent lighting of the room on. What I want you to do in this section, which is called the "self-stimulation period," is to keep track of the number of times that the red light bulb you see in front of you lights up. This section lasts one-half hour, and the bulb may light up zero to ten times in that period. There is no regularity to when it lights up, but it will stay lit fairly brightly for one-tenth of a second. This is a very short flash but if you are alert you should be able to spot it each time it comes on. Your job is simply to keep track in your head of the total number of flashes in the one-half hour period.

As a possible aid to you in this somewhat boring task, you can provide yourself with some sound stimulation. The stimulation consists of background music like that used in the portion of the experiment you just completed. I will set the level of the recorder just one step higher than the average of your first two trials from the optimum level part of the experiment. Thus the sound should be a comfortable level but a bit louder than what you find ideally comfortable in a relaxed situation.

If you push the button on the end of the cylinder you see here, it will provide you with one minute of the background music. At the end of a minute the sound will go off and you will have to push again in order to make it start again. Please push the button only when there is no music actually coming out of the recorder. You cannot get ten minutes of continuous music by pushing the button ten times in quick succession; this would only give you one minute of sound and would also interfere with my recording of how much sound you wanted during this part of the experiment.

Please do feel free to push the button any time the sound is not on and you would like some sound to help keep your attention from wandering from your task of keeping track of the number of flashes of the red light bulb. Remember to press for sound only if you want it; your main and most important task is to keep track of the number of flashes of the red bulb. If the sound helps you keep from getting bored or keeps your attention from wandering too much from the task, feel free to use it. If it distracts you from the task or reduces your concentration on the task, do not use it. You should use the sound stimulation to the extent that it helps you to successfully complete the task. Please do not smoke or get out of the chair until I come back into the room at the end of one-half hour. Are there any questions?

After answering any questions the subject had, the experimenter left the room and monitored subject activity and verbalization via the one-way mirror and intercom. Any subject manifesting large and frequent body movements or frequent verbalization had an "H" for "hyperactive" placed in the lower right-hand corner of his Abnormal Arousal Questionnaire.

One minute, three minutes, and fourteen minutes after the experimenter left the room, the red bulb was turned on for one-tenth of a second. The subject's score when asked how many times the red bulb had flashed was recorded in the lower right-hand corner of his Abnormal Arousal Questionnaire.

Abnormal Arousal Questionnaire and De-Briefing Period

After completing the self-stimulation period the subject was escorted from the experimental room and asked to fill out the Abnormal Arousal Questionnaire. On completing the Abnormal Arousal Questionnaire, he was given a de-briefing sheet (Appendix F) and was informed that he had completed the experiment.

Tabulation of the Data

The Eysenck Personality Inventory, Contact Personality Factor, and Sensation Seeking Scale were scored by hand using appropriate keys. These three tests provided each subject with five separate scores, since both the Contact Personality Factor and Eysenck Personality Inventory have lie scores which are scored separately from the extraversion scales.

Lab Measure Data

In order to provide uniformly comparable data for each subject on all lab measures, the data from the Optimum Period and Slightly Unpleasant Period portions of the lab measures period were transformed as follows. Scores for light $level_1$ and light $level_2$ from the Optimum Period portion of the lab measures section were summed to provide a single Optimum Period Light Level score for each subject.

Scores for sound $level_1$ and sound $level_2$ from the Optimum Period portion of the lab measures were combined similarly to those for light level to provide a single Optimum Period Sound Level score for each subject. Scores for the preferred level of light and sound in conjunction from the Optimum Period portion of the lab measures were summed and then multiplied by two to provide a single Optimum Period Level of conjoint Light and Sound score for each subject.

Scores for the Slightly Unpleasant Period portion of the lab measures were transformed to provide comparability with the above scores. Thus, Slightly Unpleasant Period light $level_1$ and sound $level_1$ scores were simply multiplied by a factor of two, and the Slightly Unpleasant Period Light Level plus Sound Level scores were summed and multiplied by a factor of two

Using the above transformations, each subject was thus given a single score for each of the following lab measures: Optimum Period Light Level, Optimum Period Sound Level, Optimum Period Light Level plus Sound Level, Slightly Unpleasant Period Light Level, Slightly Unpleasant Period Light Level, Slightly Unpleasant Period Sound Level, Slightly Unpleasant Period Light Level plus Sound Level. In addition to the above, each subject was given a Minutes of Music score which was simply the total number of minutes of music with which he provided himself during the self-stimulation portion of the lab measures section.

Abnormal Arousal Questionnaire Data

The main function of the Abnormal Arousal Questionnaire was to ascertain the existence of abnormalities of subject arousal. As was described on page 45, items 1-12 were designed to assess the subject's internal arousal during the lab measures period. When these items were initially constructed, it was assumed that they would be equally weighed with questions 1-6 determining subject arousal during the Self-Stimulation Period and questions 7-12 assessing subject arousal during the Optimum Level Period.

A pre-analysis examination of questions 1-12 suggested, however, that there was considerable overlap between some items, and that some items might not be as clearly related to internal arousal as was originally thought. Specifically, it appeared that the groups of items 1-4 and 7-10 were each quite homogeneous and that items 5 and 11 were of dubious value in measuring subject arousal. This re-evaluation of the Abnormal Arousal Questionnaire data suggested that items 5 and 11 should be considered separately from the arousal items and that a single score should be given each subject for questions 1-4 and 7-10.

Questions 6 and 12 directly determined each subject's deviation from his normal arousal state while in the lab session.

Because this deviation from the norm was of direct relevance to the testing of hypotheses 4 and 5, the scores on these items were considered separately and were ultimately weighed in such a fashion as to give them importance equal to that of items 1-4 and 7-10. As part of the re-evaluation of the Abnormal Arousal Questionnaire, items 13-16 were reviewed. Re-examination suggested that abnormal arousal states implied by positive responses to items 13-16 would be reflected quantitatively by responses to items 1-12. Because of this, it was decided to disregard these items in the tabulation.

Item 20 served as a control question for possible secondary reinforcement characteristics of the sound stimulation available in the Self-Stimulation Period. Scores on this item, like those on items 1-12, ranged from 1-7. On this item, low scores indicated a dislike for the music and high scores enjoyment of it.

Summary of Transformed Raw Data

The tabulated Abnormal Arousal Questionnaire data discussed above, with the transformed data from the laboratory measures and scores on the three personality tests, resulted in a total of 19 scores for each of the 120 subjects. To provide an overview of the outcome of the data tabulation, the variables for which scores were determined for each subject are listed in Appendix C with the items and transformations which were involved in determining each.

RESULTS

Before the actual analysis of results was begun, information provided by items 17, 18, and 19 was examined to determine if certain subjects should be eliminated from the sample. Criteria for elimination were reported presence of vision or hearing abnormalities and/or the clear presence of unusual demand characteristics of the experiment. For example, subjects who reported being hard of hearing or who reported believing the lab measures portion of the experiment was ". . . a test of masculinity to see how much stimulation I can take" were eliminated. This elimination process reduced the number of subjects from 120 to 114.

Basic summary statistics were computed for all subjects on each of the 19 variables evaluated to enable an overview of the data.

Inspection of Table 1 reveals two main results. The first is that the experimental sample conforms quite closely to published normative scores for both the Eysenck Personality Inventory ($\mu = 13.1$, $\sigma = 4.1$) and its lie scale ($\mu = 3.8$, $\sigma = 1.7$) and the Contact Personality Factor ($\mu = 32$, $\sigma = 6.6$) and its distortion score ($\mu = 6$,

Table 1

Summary Data for All Subjects
(N = 114)

Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Self-Stimulation Period Absolute Arousal	4.00	23.00	10.16	3.70
Self-Stimulation Period Day Dreaming	1.00	7.00	3.07	1.54
Self-Stimulation Period Deviation from Normal Arousal	1.00	5.00	2.81	1.11
Optimum Period Absolute Arousal	5.00	23.00	12.31	3.76
Optimum Period Day Dreaming	1.00	7.00	5.23	1.63
Optimum Period Deviation from Normal Arousal	1.00	6.00	3.15	1.22
Degree of Liking of Music	1.00	7.00	3.92	1.57
Optimum Period Level of Light	2.00	18.00	7.54	4.02
Optimum Period Level of Sound	2.00	13.00	6.94	1.80
Optimum Period Level of Light and Sound in Conjunction	4.00	26.00	13.12	4.55

Table 1--Continued

Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Slightly Unpleasant Period Level of Light	4.00	18.00	12.25	3.93
Slightly Unpleasant Period Level of Sound	4.00	18.00	10.26	2.60
Slightly Unpleasant Period Level of Light and Sound in Conjunction	12.00	36.00	23.49	5.72
Minutes of Music	0.00	30.00	12.40	10.42
Contact Personality Factor Score	19.00	46.00	33.22	5.64
Contact Personality Factor Lie Score	1.00	12.00	5.89	2.26
Sensation Seeking Scale Score	4.00	24.00	16.07	4.34
Eysenck Personality Inventory Score	1.00	20.00	12.44	3.72
Eysenck Personality Inventory Lie Scale Score	0.00	7.00	2.42	1.65

$\sigma = 2$). The second is that virtually all of the variables are normally distributed.

Table 2

Correlations between Extraversion Scores and Laboratory Measures of Preferred and Slightly Unpleasant Levels of Sensory Stimulation for All Subjects
(N = 114)

Variable	Contact Personality Factor	Eysenck Personality Inventory	Sensation Seeking Scale
Optimum Period Level of Light	.008	-.009	-.124
Optimum Period Level of Sound	.167	-.021	-.056
Optimum Period Level of Light and Sound in Conjunction	.127	-.045	-.174*
Slightly Unpleasant Period Level of Light	.124	.105	-.161*
Slightly Unpleasant Period Level of Sound	.234***	.163*	.012
Slightly Unpleasant Period Level of Light and Sound in Conjunction	.229***	.154*	-.166*
Minutes of Music	.043	.112	-.029

*P $\leq$ .10
**P $\leq$ .05
***P $\leq$ .01

Based on these observations regarding the distributions of the variables, a correlational analysis is appropriate to investigate the interrelationships relevant to testing H_1, H_2, and H_3. Correlations which have direct bearing on these hypotheses are presented above in Table 2.[1]

H_1, which postulated a positive correlation between extraversion and amount of sensory stimulation preferred to produce optimum hedonic tone, did not receive statistical support.

H_2 postulated a positive correlation between extraversion and amount of stimulation necessary to produce slight discomfort. Of the nine applicable correlations, six are in the predicted direction, two are significant at the .10 level, and two are significant at the .01 level. Additionally it should be noted that all correlations not supporting H_2 were contributed by the Sensation Seeking Scale, a test of more questionable validity than the Eysenck Personality Inventory or Contact Personality Factor. It thus appears that while the correlations are not of high magnitude, there is significant statistical support for this hypothesis.

H_3, which proposed a positive correlation between extraversion and amount of sensory stimulation preferred when in a task situation, also failed to receive support. In fact, of the twelve correlations applicable to these hypotheses, only two reached even the .10 level of significance.

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[1]Appendix D presents the full 19 × 19 intercorrelation matrix from which Table 2 was extracted.

Earlier, the view was presented that if subjects with abnormal internal arousal states were included in the sample, they might mask an existing correlation between extraversion-introversion and/or Sensation Seeking Scale scores and sensoristatic variables. Based on this belief, another correlational analysis was conducted after eliminating all subjects whose deviation from the norm on any one of the four variables related to arousal (Self-Stimulation Period Abnormal Arousal, Self-Stimulation Period Deviation from Normal Arousal, Optimum Period Abnormal Arousal, Optimum Period Deviation from Normal Arousal) was greater than $1\frac{1}{2}\sigma$. To further assure a subsample with a minimum of confounding variation, all subjects with scores of $1\frac{1}{2}\sigma$ above the mean on either the Contact Personality Factor or Eysenck Personality Inventory lie scales were also eliminated. Elimination of both these groups provided a group of 62 subjects who were defined as "normal." As in the previous analysis on all subjects, basic summary statistics were calculated before the correlational analysis was carried out.

Table 3 reveals that a number of the distributions of scores on the 19 variables measured depart appreciably from normality. It should be noted however that the departures are not extreme and that this subsample, like the larger sample from which it was drawn, does conform closely to published norms for both the Eysenck

Table 3

Summary Data for "Normal" Subjects
(N = 62)

Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Self-Stimulation Period Absolute Arousal	5.00	14.00	9.10	2.55
Self-Stimulation Period Day Dreaming	1.00	7.00	3.08	1.60
Self-Stimulation Period Deviation from Normal Arousal	2.00	4.00	2.68	0.76
Optimum Period Absolute Arousal	6.00	18.00	11.82	3.35
Optimum Period Day Dreaming	1.00	7.00	5.05	1.74
Optimum Period Deviation from Normal Arousal	2.00	4.00	3.00	0.83
Degree of Liking of Music	1.00	7.00	3.98	1.61
Optimum Period Level of Light	2.00	17.00	7.40	3.92
Optimum Period Level of Sound	2.00	13.00	6.81	1.77
Optimum Period Level of Light and Sound in Conjunction	4.00	24.00	12.84	4.43

Table 3--Continued

Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Slightly Unpleasant Period Level of Light	4.00	18.00	12.52	3.67
Slightly Unpleasant Period Level of Sound	4.00	18.00	9.74	2.36
Slightly Unpleasant Period Level of Light and Sound in Conjunction	12.00	36.00	23.58	5.78
Minutes of Music	0.00	30.00	10.79	10.06
Contact Personality Factor Score	19.00	46.00	32.68	5.60
Contact Personality Factor Lie Score	1.00	9.00	5.24	1.81
Sensation Seeking Scale Score	4.00	24.00	15.40	4.53
Eysenck Personality Inventory Score	3.00	19.00	12.56	3.92
Eysenck Personality Inventory Lie Scale Score	0.00	4.00	1.87	1.25

Personality Inventory and Contact Personality Factor. Having adequately met the necessary statistical assumptions for this smaller sample, a 19 $\times$ 19 correlation matrix similar to the matrix for the total sample described above was computed for the normally aroused subjects only (Appendix E). Correlations from this matrix which had implications for the testing of H_1, H_2, and H_3 were extracted from the larger matrix and are presented on page 66.

Inspection of Table 4 reveals findings quite similar to those for the entire sample. Again H_2 is supported while H_1 and H_3 fail to receive statistically significant support. Worthy of note, however, is the fact that while H_1 is not clearly supported by data from this "normal" sample, it comes much closer to receiving support than it did for the sample as a whole. Specifically, for the six relevant correlations based on Eysenck Personality Inventory and Contact Personality Factor scores, five are in the predicted direction, one is significant at the .05 level and one barely fails to reach the .10 significance level.

In this analysis, as in the previous one, H_3 fails to receive even tentative support. None of the correlations between any of the personality tests and the minutes of music score approach even the .10 level of significance. As an aside, it is interesting to note that the minutes of music score was not significantly correlated with any of the 18 other variables on which these subjects were measured!

Table 4

Correlations between Extraversion Scores and Laboratory Measures of Preferred and Slightly Unpleasant Levels of Sensory Stimulation for Subjects with Normal Internal Arousal States
(N = 62)

Variable	Contact Personality Factor	Eysenck Personality Inventory	Sensation Seeking Scale
Optimum Period Level of Light	.008	.052	-.256**
Optimum Period Level of Sound	.210	-.078	-.202
Optimum Period Level of Light and Sound in Conjunction	.241**	.068	-.257***
Slightly Unpleasant Period Level of Light	.101	.191	-.231
Slightly Unpleasant Period Level of Sound	.254**	.200	-.058
Slightly Unpleasant Period Level of Light and Sound in Conjunction	.241**	.233*	-.167
Minutes of Music	.082	.092	.003

*$P < .10$
**$P \leq .05$
***$P \leq .01$

Having examined the data with respect to the extraversion-sensoristasis hypotheses, it is now appropriate to examine the data relevant to the internal arousal-sensoristasis hypotheses, H_4-H_7.

Since H_4-H_7 are all related to differences in stimulus seeking behavior as a function of low, normal, or high internal arousal, all subjects were classified by degree of arousal. Splitting into three classes was achieved by classifying all subjects who scored greater than or equal to 1σ from the mean on any of the four internal arousal variables as high and low arousal subjects respectively. Since it was possible for a subject to score $+1\sigma$ on one of the four arousal variables and -1σ on another, some subjects were initially classified as having both high and low internal arousal. Because data for these subjects was of questionable validity and because dual classification of single subjects created severe statistical problems, these anomolous subjects were eliminated from the analysis related to arousal, resulting in a subject number of 111.

The overall correlational analysis for all subjects (Appendix D) strongly suggested that all four internal arousal variables were significantly correlated. Nevertheless, because the two Deviation from Normal Arousal variables were based on only one questionnaire item, it was felt that it would be advisable to check to assure that the method of classification described above had resulted in three groups which could be accurately described as having high, medium, and low <u>overall</u> levels of internal arousal. To test the effectiveness of the grouping, means for each group were determined and Fisher-Student t values for significance of differences between means for the high, medium, and low arousal groups on each of the arousal variables were computed.

Table 5

Mean Scores of Low, Normal, and High Arousal Groups on Individual Arousal Variables

Variable	Low Arousal (N = 26)	Normal Arousal (N = 47)	High Arousal (N = 38)
Self-Stimulation Period Absolute Arousal	6.89	9.87	12.66
Self-Stimulation Period Deviation from Normal Arousal	2.11	2.79	3.34
Optimum Period Absolute Arousal	8.73	11.45	15.79
Optimum Period Deviation from Normal Arousal	2.53	2.85	3.94

Tables 5 and 6 show that the trichotomization was clearly effective in separating subjects on overall arousal, since all differences are in the predicted direction and all but one highly significant for each of the four arousal variables. To enable direct testing of H_4-H_7, a univariate analysis of variance was computed on each of the seven sensory seeking lab measure variables for low, medium, and high arousal subjects.

Table 6

t Values for Difference between Means of Low, Normal, and High Arousal Groups on Individual Arousal Variables

Variable	Low Arousal vs Normal Arousal	Low Arousal vs High Arousal	Normal Arousal vs High Arousal
Self-Stimulation Period Absolute Arousal	5.81***	7.07***	4.10***
Self-Stimulation Period Deviation from Normal Arousal	3.24***	4.37***	2.52**
Optimum Period Absolute Arousal	5.42***	9.42***	7.88***
Optimum Period Deviation from Normal Arousal	1.39	4.64***	5.02***

*$P \leq .05$
**$P \leq .01$
***$P \leq .001$

As seen in Table 7, the existence of significant main effects for arousal on all of the Optimum Period and Slightly Unpleasant Period lab measures was established. At this point the single effects of the analysis of variance relevant to testing H_4-H_7 were examined.

Table 7

F Ratios and Significance Levels of Main Effects for Arousal in Univariate Analysis of Variance on Sensory Seeking Variables

Variable	F Ratio	Significance Level
Optimum Period Level of Light	3.18	.05
Optimum Period Level of Sound	3.87	.02
Optimum Period Level of Light and Sound in Conjunction	3.28	.04
Slightly Unpleasant Period Level of Light	3.00	.05
Slightly Unpleasant Period Level of Sound	3.18	.05
Slightly Unpleasant Period Level of Light and Sound in Conjunction	2.75	.06
Minutes of Music	.52	.59

Tables 8 and 9 show that H_4 is not supported. Interestingly, however, there is very strong support for the converse of H_4. That is, contrary to H_4, subjects with abnormally high internal arousal states score significantly higher on five of the six sensory seeking variables than normally aroused subjects.

Table 8

Mean Scores and Standard Deviation of Low, Normal, and High Arousal Groups on Sensory Seeking Variables

Variable	Low Arousal (N = 26)		Normal Arousal (N = 47)		High Arousal (N = 38)	
	$\overline{X}$	σ	$\overline{X}$	σ	$\overline{X}$	σ
Optimum Period Level of Light	7.11	4.10	6.64	3.30	9.03	4.45
Optimum Period Level of Sound	6.35	1.62	6.83	1.54	7.52	2.10
Optimum Period Level of Light and Sound in Conjunction	12.23	3.78	12.51	4.20	14.74	5.04
Slightly Unpleasant Period Level of Light	11.15	4.58	12.04	3.48	13.42	3.70
Slightly Unpleasant Period Level of Sound	9.54	2.56	10.00	2.67	11.01	2.32
Slightly Unpleasant Period Level of Light and Sound in Conjunction	21.84	5.92	23.19	5.90	25.00	4.83
Minutes of Music	11.54	9.49	13.79	10.47	11.57	10.84

Table 9

t Values and Significance Levels for Simple Effects of Mean Differences on Low, Medium, and High Arousal Groups (Sensory Seeking Variables)

Variable	$\overline{X}$ Low - $\overline{X}$ Medium	$\overline{X}$ Medium - $\overline{X}$ High	$\overline{X}$ Low - $\overline{X}$ High
Optimum Period Level of Light	.54	-2.84***	-1.72***
Optimum Period Level of Sound	-1.24	-1.75*	-2.41***
Optimum Period Level of Light and Sound in Conjunction	-.27	-2.19**	-2.12**
Slightly Unpleasant Period Level of Light	-.92	-1.74*	-2.15**
Slightly Unpleasant Period Level of Sound	-.71	-1.89*	-2.41***
Slightly Unpleasant Period Level of Light and Sound in Conjunction	-.97	-1.50	-2.30**
Minutes of Music	.89	.94	.01

*$P < .10$
**$P \leq .05$
***$P \leq .01$

H_5, which postulated that highly aroused subjects would desire less sensory stimulation than normally aroused subjects when in a task situation failed to receive any statistical support whatsoever.

H_6 postulated that in a relaxed situation, subjects with low arousal would desire less sensory stimulation than normally aroused subjects. This hypothesis failed to receive statistically significant support. Worthy of note, however, is that differences on five of the six sensory seeking variables are in the predicted direction and that two of these five just fail to reach the .10 significance level.

H_7, which postulated that low arousal subjects would use more stimulation than normal arousal subjects when in a task situation, also failed to receive significant statistical support.

In sum, the results related to the internal arousal-sensoristasis hypotheses in a nontask situation reveal that there is a significant overall relationship between these variables and that the subjects with abnormally high arousal internal state account for most of the variance. Additionally, the results suggest that sensory seeking behavior is an increasing monotonic function of internal arousal when in a nontask situation. Results related to internal arousal-sensoristasis in a task situation were inconclusive.

DISCUSSION

Ludvigh (1970) in an earlier study investigating extraversion-introversion and sensoristasis suggested that if there was a relationship between the variables, it was rather weak. The present study supports the existence of the positive correlation between extraversion and sensory seeking behavior hypothesized by Eysenck but points up the fact that even under the best of conditions such a relationship can account for only a small fraction of sensory seeking behavior.

Of some interest is the finding that the hypothesized relationship between the extraversion-introversion dimension, level of sensory stimulation and hedonic tone holds up considerably better for negative levels of hedonic tone than for optimum levels.

The data from the present study suggest that while extraverts and introverts may not be significantly different in preferred level of stimulation, they do differ on what constitutes an uncomfortably high level of stimulation. Since the even highest absolute levels of stimulation used in the present study did not exceed those encountered in daily life, the implications of the present study's findings are similar to that of Eysenck's original hypothesis. Thus differences which Eysenck explains in terms of optimum levels of stimulation (page 20) can be explained equally well in terms of unpleasant levels of sensory input.

Also interesting is confirmation (at least for the sample used in the present study) of Eysenck's assumption (Figure 1, page 20) that optimum and unpleasant levels of stimulation are approximately normally distributed. This finding, in conjunction with the greater extravert-introvert differences in the area of negative hedonic tone, suggests modification of the relationship depicted by Eysenck in Figure 1, page 20.

While the general shape of the curves observed in the present study was similar to those proposed by Eysenck, differences on level of sensory input between extraverts and introverts would be greater in the negative hedonic tone area than at optimal levels. Thus the present study suggests that the relationship can best be graphed as shown on the following page.

Implications of Figure 3 are somewhat limited because of the small magnitude of the differences involved. It does, however, seem justifiable to say that level hedonic tone is approximately normally distributed over amount of sensory input. Additionally it appears that there is a significant positive correlation between extraversion and amount of sensory stimulation necessary to produce feelings of slight discomfort.

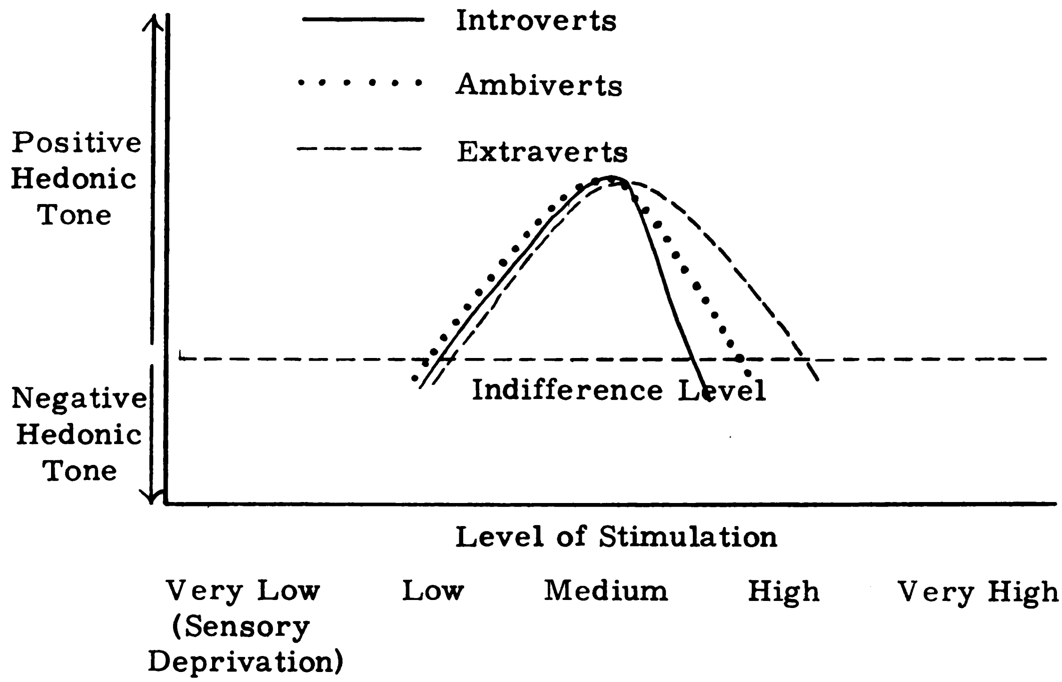

Figure 3. --Relation between level of sensory input, hedonic tone, and the extraversion-introversion dimension based on obtained data.

A final note on Figure 3 is that where there is no applicable data, no assumptions as to the nature of the relationship are made. The graph is thus incomplete and must remain so until carefully controlled studies are conducted investigating extraversion-introversion sensoristasis differences at both extreme ends of the sensory stimulation continuum.

An interesting secondary implication of the present study is related to the logical and appealing propositions IV, V, VI, and VIII of Fiske and Maddi. Contrary to expectations, H_4-H_7, which were based on these propositions, were not supported. Receiving considerable support, however, was the work of Jones (1961), based on the Hull-Spence drive generalization model, which showed that irrelevant drive increased stimulus seeking behavior regardless of the adaptiveness of such arousal.

Discussion of the relative merits of the highly elaborate Hull-Spence learning theory model and the model proposed by Fiske and Maddi is beyond the scope of the present study. Worthy of note, however, is the fact that the Hull-Spence model used by Jones (1961) accurately predicted the behavior of subjects with high arousal, while the Fiske and Maddi model correctly predicted the direction of the behavior of subjects with low arousal (although the results failed to reach statistical significance). While the exact theoretical meaning of this finding is unclear, it is apparent that arousal phenomena are not as clean and easy to describe as the presentation of Fiske and Maddi makes it appear.

A unique contribution of the present study to the sensori-stasis area should be noted. This finding is that ongoing internal arousal states are strongly correlated with sensory seeking behavior. In the particular sample dealt with in the present study, there was a highly significant positive correlation between heightened internal arousal and sensory seeking behavior. In fact, the proportion of the variance of sensory seeking behavior accounted for by the author's measure of internal arousal prepared for the present study was considerably greater than was accounted for by the more sophisticated Eysenck Personality Inventory.

While the finding that there is a statistically significant relationship between extraversion and stimulus seeking behavior is of theoretical importance, the relationship observed is disappointingly weak. Of less theoretical importance but much more exciting is the observation that internal arousal, a variable considered in the present study mainly to prevent confounding of more important extraversion-introversion variables, may well be of real importance in human sensory seeking behavior. Future research would do well to investigate this area carefully, as it may be of much greater importance than the extraversion-introversion dimension which was the primary focus of the present study.

Summary

The present study investigated the relationship between extraversion-introversion and preferred levels of stimulation. A review of the literature related to the extraversion-introversion dimension and sensory seeking behavior suggested the following hypotheses.

H_1 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and the amount of ambient illumination and sound which is necessary to provide optimum hedonic tone.

H_2 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and the amount of ambient illumination and sound which is necessary to create a slightly unpleasant level of hedonic tone.

H_3 There is a positive correlation between extraversion scores, Sensation Seeking Scale scores, and amount of sensory stimulation necessary to maintain sufficient arousal to perform adequately an intrinsically nonstimulating task.

Because of the belief that failure to control for abnormal internal arousal states could mask the extraversion-introversion sensoristasis differences of interest, information was gathered on such states. Based on research suggesting that internal arousal sums with arousal produced by external stimulation, the following hypotheses were proposed.

H_4 Subjects under relaxed conditions reporting abnormally high internal arousal will desire less sensory stimulation than normally aroused subjects.

H_5 Subjects with a task orientation reporting abnormally high internal arousal will desire less sensory stimulation than normally aroused subjects.

H_6 Subjects reporting abnormally low internal arousal will desire less sensory stimulation than normally aroused subjects when in a relaxed situation.

H_7 Task oriented subjects reporting abnormally low internal arousal states will desire more stimulation than normally aroused subjects when in a task oriented situation.

To enable testing of the above hypotheses, 120 male undergraduates were measured for extraversion and sensation seeking tendencies using the Eysenck Personality Inventory, the Contact Personality Factor, and the Sensation Seeking Scale. Subjects then individually underwent a laboratory measures session to determine the amount of sensory stimulation they preferred and the amount of stimulation required to produce feelings of mild discomfort. The stimuli used were white light and background music. Subjects simply adjusted these stimuli to pleasant and slightly unpleasant levels using continuously variable control knobs.

To investigate the extraversion-introversion-sensoristasis relationship under slightly different conditions, a measure of preferred amount of stimulation while in a task situation was obtained for each subject. This index was determined by having each subject perform a vigilance task and allowing him to stimulate himself with music at will throughout the task. The amount of music used ty the subject was recorded and was transformed into a sensory seeking score.

After the lab measures portion of the experiment, subjects were given a questionnaire to ascertain their level of internal arousal during the experiment.

Analysis of the data related to the extraversion-introversion sensoristasis hypotheses (H_1-H_3) revealed the following:

There was tentative support for H_1 in that while the observed correlations for subjects as a whole were not statistically significant for the "normally aroused" subject subgroup, 5 out of 6 were in the predicted direction and 2 did approach significance.

There was considerable support for H_2 since the 6 relevant correlations between Eysenck Personality Inventory and Contact Personality Factor scores and lab measures of slightly unpleasant levels of stimulation were all in the predicted direction and 4 were significant at the .10 level or higher. H_3 failed to receive support.

Analysis of the data related to the internal arousal sensoristasis hypotheses (H_4-H_7) failed to reveal support for any of these hypotheses. It should be noted, however, that while the specific hypotheses made were not supported, the overall effect of internal arousal on sensory seeking behavior was clearly established. Briefly what was discovered was that while hypotheses generated by the homeostatic conceptualization of sensory seeking behavior are not supported, there is strong support for a drive model such as that proposed by Hull.

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APPENDICES

APPENDIX A

SENSATION SEEKING SCALE

SSS

1. A. I would like a job which would require a lot of traveling.
   B. I would prefer a job in one location.

2. A. I am invigorated by a brisk, cold day.
   B. I can't wait to get into the indoors on a cold day.

3. A. I find a certain pleasure in routine kinds of work.
   B. Although it is sometimes necessary I usually dislike routine kinds of work.

4. A. I often wish I could be a mountain climber.
   B. I can't understand people who risk their necks climbing mountains.

5. A. I dislike all body odors.
   B. I like some of the earthy body smells.

6. A. I get bored seeing the same old faces.
   B. I like the comfortable familiarity of everyday friends.

7. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don't know well.

8. A. I would not like to try any drug which might produce strange and dangerous effects on me.
   B. I would like to try some of the new drugs that produce hallucinations.

9. A. I would prefer living in an ideal society where everyone is safe, secure, and happy.
   B. I would have preferred living in the unsettled days of our history.

10. A. I sometimes like to do things that are a little frightening.
    B. A sensible person avoids activities that are dangerous.

11. A. If I were a salesman I would prefer a straight salary, rather than the risk of making little or nothing on a commission basis.
    B. If I were a salesman I would prefer working on a commission if I had a chance to make more money than I could on a salary.

12. A. I would like to take up the sport of water skiing.
    B. I would not like to take up water skiing.

13. A. I don't like to argue with people whose beliefs are sharply divergent from mine, since such arguments are never resolved.
    B. I find people that disagree with my beliefs more stimulating than people who agree with me.

14. A. When I go on a trip I like to plan my route and timetable fairly carefully.
    B. I would like to take off on a trip with no preplanned or definite routes, or timetables.

15. A. I would like to learn to fly an airplane.
    B. I would not like to learn to fly an airplane.

16. A. I would not like to be hypnotized.
    B. I would like to have the experience of being hypnotized.

17. A. The most important goal of life is to live it to the fullest and experience as much of it as you can.
    B. The most important goal of life is to find peace and happiness.

18. A. I would like to try parachute jumping.
    B. I would never want to try jumping out of a plane, with or without a parachute.

19. A. I enter cold water gradually giving myself time to get used to it.
    B. I like to dive or jump right into the ocean or a cold pool.

20. A. I prefer friends who are excitingly unpredictable.
    B. I prefer friends who are reliable and predictable.

21. A. When I go on a vacation I prefer the comfort of a good room and bed.
    B. When I go on a vacation I would prefer the change of camping out.

22. A. The essence of good art is in its clarity, symmetry of form, and harmony of colors.
    B. I often find beauty in the "clashing" colors and irregular forms of modern paintings.

23. A. I prefer people who are emotionally expressive even if they are a bit unstable.
    B. I prefer people who are calm and even tempered.

24. A. A good painting should shock or jolt the senses.
    B. A good painting should give one a feeling of peace and security.

25. A. When I feel discouraged I recover by relaxing and having some soothing diversion.
    B. When I feel discouraged I recover by going out and doing something new and exciting.

26. A. People who ride motorcycles must have some kind of an unconscious need to hurt themselves.
    B. I would like to drive or ride on a motorcycle.

APPENDIX B

ABNORMAL AROUSAL QUESTIONNAIRE

AA Questionnaire

1. Were you sleepy or drowsy during the self-stimulation period, or were you wide awake and alert?

Very wide awake and alert ___ ___ ___ ___ ___ ___ ___ Very sleepy or drowsy

2. Were you nervous or calm during the self-stimulation period?

Very calm ___ ___ ___ ___ ___ ___ ___ Very nervous

3. Did you feel relaxed or tense during the self-stimulation period?

Very tense ___ ___ ___ ___ ___ ___ ___ Very relaxed

4. Were you excited or calm during the self-stimulation period?

Very calm ___ ___ ___ ___ ___ ___ ___ Very excited

5. Did you find yourself daydreaming during the self-stimulation period?

Not at all ___ ___ ___ ___ ___ ___ ___ Daydreamed considerably

6. How closely would you say your overall level of excitement or calmness during the self-stimulation period corresponded to your average level of excitement or calmness during an average day?

I was much calmer and more relaxed during the self-stimulation period than I usually am on an average day. ___ ___ ___ ___ ___ ___ ___ I was much more excited, nervous and aroused during the self-stimulation period than I usually am on an average day.

7. Were you sleepy or drowsy during the optimal level of stimulation period, or were you wide awake and alert?

Very wide awake and alert ___ ___ ___ ___ ___ ___ ___ Very sleepy or drowsy

8. Were you nervous or calm during the optimal level of stimulation period?

Very calm ___ ___ ___ ___ ___ ___ ___ Very nervous

9. Did you feel relaxed or tense during the optimal level of stimulation period?

Very tense ___ ___ ___ ___ ___ ___ ___ Very relaxed

10. Were you excited or calm during the optimal level of stimulation period?

Very calm ___ ___ ___ ___ ___ ___ ___ Very excited

11. Did you find yourself daydreaming during the optimal level of stimulation period?

Not at all ___ ___ ___ ___ ___ ___ ___ Daydreamed considerably

12. How closely would you say your overall level of excitement or calmness during the optimal level of stimulation period corresponded to your average level of excitement or calmness during an average day?

I was much calmer and more relaxed during the optimal level of stimulation period than I usually am on an average day. ___ ___ ___ ___ ___ ___ ___ I was much more excited, nervous and aroused during the optimal level of stimulation period than I usually am on an average day.

13. If you are taking medication of any kind, please specify all medication.

14. Are you currently taking tranquilizers of any kind? yes no

15. Are you currently taking stimulants of any kind? yes no

16. Did you have two or more cups of coffee or two or more bottles of "coke" or "Tab" within two hours of reporting to the experiment? yes no

17. What do you think the purpose of the experiment was?

    a. As represented by experimenter

    b. Other; please explain briefly.

18. Are you hard of hearing? yes no

19. Do you have any visual handicaps other than needing to wear corrective glasses? yes no

20. I liked the music used in the experiment very much. ___ ___ ___ ___ ___ ___ ___ I disliked the music used in the experiment very much.

Optimum Period						Slightly Unpleasant Period			
LL_1	SL_1	LL_2	SL_2	LL + SL		LL_1	SL_1	LL + SL	
___	___	___	___	___	___	___	___	___	___

Flashes Observed ______ # Minutes Music ______ H. _____

APPENDIX C

SUMMARY AND DERIVATION OF

LABORATORY AND QUESTIONNAIRE VARIABLES

APPENDIX C

SUMMARY AND DERIVATION OF

LABORATORY AND QUESTIONNAIRE VARIABLES

Variable	Determinants	Transformations Used in Computing Scores
1. Self-Stimulation Period Absolute Arousal	Items 1 - 4 on Abnormal Arousal Questionnaire	Item scores were summed.
2. Self-Stimulation Period Day Dreaming	Item 5 on Abnormal Arousal Questionnaire	None.
3. Self-Stimulation Period Deviation from Normal Arousal	Item 6 on Abnormal Arousal Questionnaire	None.
4. Optimum Period Absolute Arousal	Items 7 - 10 on Abnormal Arousal Questionnaire	All item scores were summed.
5. Optimum Period Day Dreaming	Item 11 on Abnormal Arousal Questionnaire	None.
6. Optimum Period Deviation from Normal Arousal	Item 12 on Abnormal Arousal Questionnaire	None.

Variable	Determinants	Transformations Used in Computing Scores
7. Degree of Liking of Music	Item 20 on Abnormal Arousal Questionnaire	None.
8. Optimum Period Level of Light	Optimum Period Light $Level_1$ and Optimum Period Light $Level_2$ from lab measures portion	Scores were summed.
9. Optimum Period Level of Sound	Optimum Period Sound $Level_1$ and Optimum Period Sound $Level_2$ from lab measures portion	Scores were summed.
10. Optimum Period Level of Light and Sound in Conjunction	Optimum Period Light Level + Optimum Period Sound Level from lab measures portion	Scores were summed then multiplied by 2.
11. Slightly Unpleasant Period Level of Light	Slightly Unpleasant Period Light Level from lab measures portion	Score was multiplied by 2.
12. Slightly Unpleasant Period Level of Sound	Slightly Unpleasant Period Sound Level from lab measures portion	Score was multiplied by 2.
13. Slightly Unpleasant Period Level of Light and Sound in Conjunction	Slightly Unpleasant Period Light Level + Slightly Unpleasant Period Sound Level from lab measures portion	Scores were summed then multiplied by 2.

Variable	Determinants	Transformations Used in Computing Scores
14. Minutes of Music	Minutes of Music score from lab measures portion	None.
15. Contact Personality Factor Score	Score on Contact Personality Factor items	None.
16. Contact Personality Factor Lie Score	Score on Contact Personality Factor lie items	None.
17. Sensation Seeking Scale Score	Score on Sensation Seeking Score items	None.
18. Eysenck Personality Inventory Score	Score on Eysenck Personality Inventory items	None.
19. Eysenck Personality Inventory Lie Scale Score	Score on Eysenck Personality Inventory lie items	None.

APPENDIX D

CORRELATION MATRIX I--ALL SUBJECTS

APPENDIX F

CORRELATION MATRIX I--ALL SUBJECTS
(N = 114)

Variable[a]	1	2	3	4	5	6	7	8	9
1	1.00								
2	0.00	1.00							
3	0.40***	-0.06	1.00						
4	0.33***	-0.02	0.06	1.00					
5	0.14	0.28***	0.07	0.37***	1.00				
6	0.06	-0.20**	0.19**	0.52***	0.21**	1.00			
7	-0.02	0.02	-0.12	-0.20**	-0.05	-0.16*	1.00		
8	0.17*	0.02	0.06	0.18**	-0.02	0.19**	-0.08	1.00	
9	0.20**	0.03	0.18	0.15	0.10	0.09	-0.25***	0.33***	1.00
10	0.26***	-0.04	0.11	0.18**	-0.01	0.17*	-0.13	0.69***	0.52***
11	0.11	-0.01	0.02	0.23***	0.10	0.09	-0.12	0.71***	0.19**
12	0.21**	0.02	0.11	0.18**	0.10	0.22***	-0.23***	0.28***	0.63***
13	0.16	-0.04	-0.00	0.25***	0.11	0.00	-0.06	0.50***	0.33***
14	0.13	0.05	0.19**	-0.09	0.05	-0.01	0.15	-0.08	0.11
15	-0.01	-0.00	-0.05	0.00	-0.04	0.05	0.03	0.08	0.17
16	0.06	0.05	0.03	0.01	0.07	0.10	0 05	0.01	-0.07
17	-0.11	-0.09	0.06	-0.07	0.13	-0.05	-0.16*	-0.12	-0.06
18	-0.26***	-0.01	-0.13	-0.05	0.09	-0.01	-0.05	-0.01	-0.02
19	0.07	0.19**	0.01	0.15	0.17*	-0.01	-0.15	-0.11	0.11

[a]Key for Variables:

1--Self-stimulation period Absolute arousal
2--Self-stimulation period Day dreaming
3--Self-stimulation period Deviation from normal arousal
4--Optimum period Absolute arousal
5--Optimum period Day dreaming
6--Optimum period Deviation from normal arousal
7--Degree of liking of music
8--Optimum period Level of light
9--Optimum period Level of sound
10--Optimum period Level of light and sound in conjunction
11--Slightly unpleasant period Level of light
12--Slightly unpleasant period Level of sound
13--Slightly unpleasant period Level of light and sound in conjunction
14--Minutes of music
15--Contact Personality Factor score
16--Contact Personality Factor lie score
17--Sensation Seeking Scale score
18--Eysenck Personality Inventory score
19--Eysenck Personality Inventory lie scale score

10	11	12	13	14	15	16	17	18	19
1.00									
0.53***	1.00								
0.42***	0.43***	1.00							
0.51***	0.80***	0.66***	1.00						
0.04	-0.13	0.12	-0.09	1.00					
0.13	0.12	0.23***	0.23***	0.04	1.00				
-0.07	-0.04	0.06	-0.00	0.12	0.02	1.00			
-0.17*	-0.16	0.01	-0.17*	-0.03	0.12	-0.07	1.00		
-0.05	0.11	0.16*	0.15*	0.11	0.48***	-0.00	0.28***	1.00	
-0.09	-0.15	0.10	-0.10	0.00	-0.10	0.34	0.02	-0.15	1.00

*$P < .10$
**$P \leq .05$
***$P \leq .01$

APPENDIX E

CORRELATION MATRIX II--"NORMAL" SUBJECTS

APPENDIX G

CORRELATION MATRIX II--"NORMAL" SUBJECTS
(N = 62)

Variable[a]	1	2	3	4	5	6	7	8	9
1	1.00								
2	-0.03	1.00							
3	0.04	-0.07	1.00						
4	0.27**	0.03	-0.08	1.00					
5	0.19	0.39***	0.07	0.42***	1.00				
6	-0.31***	-0.12	0.23*	0.34***	0.14	1.00			
7	0.17	0.13	-0.07	-0.11	0.04	-0.12	1.00		
8	-0.09	0.02	-0.16	0.15	0.04	0.22*	-0.03	1.00	
9	0.11	-0.13	0.10	0.10	0.15	-0.06	-0.19	0.25	1.00
10	0.11	-0.08	-0.05	0.12	-0.03	0.07	-0.01	0.64***	0.53***
11	-0.08	-0.02	-0.08	0.26**	0.11	0.14	-0.08	0.64***	0.17
12	0.10	-0.17	0.23*	0.08	0.08	-0.02	-0.10	0.13	0.61***
13	0.04	-0.11	0.15	0.12	0.08	0.09	-0.00	0.40***	0.30***
14	0.08	0.06	0.32***	-0.15	-0.04	0.09	0.19	-0.04	0.08
15	-0.01	0.01	-0.12	-0.14	-0.10	-0.21*	0.09	0.00	0.21
16	0.23*	-0.01	0.07	0.16	0.08	0.05	0.04	0.15	0.08
17	-0.18	-0.12	0.12	-0.11	0.10	0.25**	-0.25**	-0.26**	-0.20
18	-0.15	0.00	-0.09	0.02	0.16	0.22*	-0.02	0.05	-0.08
19	0.18	0.10	0.01	0.33***	0.25***	-0.08	-0.19	-0.04	0.37***

[a]Key for Variables:
1--Self-stimulation period Absolute arousal
2--Self-stimulation period Day dreaming
3--Self-stimulation period Deviation from normal arousal
4--Optimum period Absolute arousal
5--Optimum period Day dreaming
6--Optimum period Deviation from normal arousal
7--Degree of liking of music
8--Optimum period Level of light
9--Optimum period Level of sound
10--Optimum period Level of light and sound in conjunction
11--Slightly unpleasant period Level of light
12--Slightly unpleasant period Level of sound
13--Slightly unpleasant period Level of light and sound in conjunction
14--Minutes of music
15--Contact Personality Factor score
16--Contact Personality Factor lie score
17--Sensation Seeking Scale score
18--Eysenck Personality Inventory score
19--Eysenck Personality Inventory lie scale score

10	11	12	13	14	15	16	17	18	19
1.00									
0.53***	1.00								
0.40***	0.36***	1.00							
0.54***	0.78***	0.66***	1.00						
-0.09	-0.19	0.07	-0.13	1.00					
0.24	0.10	0.25**	0.24**	0.08	1.00				
0.04	0.03	0.19	0.16	0.08	0.09	1.00			
-0.26**	-0.23*	-0.06	-0.17	0.00	0.02	-0.23*	1.00		
0.07	0.19	0.20	0.23*	0.09	0.43	-0.03	0.40***	1.00	
-0.05	-0.04	0.21	-0.05	-0.05	-0.19	0.06	-0.11	-0.34***	1.00

*$P < .10$
**$P \leq .05$
***$P \leq .01$

APPENDIX F

SUBJECT DE-BRIEFING SHEET

What the Experiment Was About

The experiment in which you just participated was designed to test the hypothesis that there is a positive correlation between extraversion and preferred amount of sensory stimulation. The Eysenck Personality Inventory and CPF tests you took at the beginning of the experiment measure extraversion, that is, how outgoing and sociable you are. The SSS measures your sensation seeking tenden-cies--how much physical and sensory stimulation you prefer.

The lab measures portion of the experiment was designed to objectively determine how much sensory stimulation you prefer under both relaxed and task conditions. Your scores on the three paper-and-pendil tests will be correlated with your lab measures, and this data will enable evaluation of the hypothesized relationship.

Thank you for participating in the experiment!

Please destroy this sheet when you are done with it.