THE CHANGE SEEKER INDEX AND RESPONSE TO MONOTONY: A REPLICATION

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CHAPTER I

INTRODUCTION

Organisms of varying degrees of complexity often respond to their environments in ways that cause the sensory input to their central nervous systems to vary. For example, the simple, unicellular paramecium may alternate right turns with left turns when it approaches a T choice point in a maze (Lepley & Rice, 1952); mice have been shown to learn a lever pressing response which resulted solely in a brief illumination of their experimental compartment (Kish, 1955); and, while humans placed under conditions of sensory restriction have experienced bizarre perceptual, emotional, and cognitive disturbances (Heron, 1957), less restricted humans perform such diverse behaviors as reading thrilling stories, building model airplanes, racing cars, and conducting scientific investigations. Although the explanations proposed for these highly diverse phenomena are many and range from the relatively automatic process of reactive inhibition (Lepley & Rice, 1952) to the highly complex, less easily defined "need to know" (Maslow, 1963), many of them have focused upon the variation in sensory input produced by exploratory-like behaviors. An explanation of the latter type is that organisms possess an optimal or characteristic level of stimulus input which they will attempt to maintain (see, for example, Berlyne, 1963; Fiske & Maddi, 1961; Leuba, 1955). Optimal-level-of-stimulation theory allows for the often observed fact that people frequently seek more stimulation

rather than less and recognizes that increases in arousal can be reinforcing as well as decreases (Hill, 1973).

Interest in examining individual differences in optimal levels of stimulation in humans has led to the development of several paper-and-pencil scales, with notable examples including the Change Seeker Index (Garlington & Shimota, 1964) and the Sensation-Seeking Scale (Zuckerman, Kolin, Price, & Zoob, 1964; Zuckerman, Note 1).

The Change Seeker Index (CSI) was constructed on the contention that "humans require some stimulus variability," and that "the optimum amount of stimulus variation necessary for effective functioning differs from one person to another" (Garlington & Shimota, 1964, p. 919). It was believed that change seeking was a measurable aspect of behavior, and while Fiske and Maddi had devised a technique whereby need for variation could be assessed by using a special scoring procedure on TAT stories (Maddi, Charlens, Maddi, & Smith, 1962), Garlington and Shimota felt the system too tedius to administer and score on a large scale and attempted to devise a structured questionnaire to measure one's need for change or stimulus variation. The present 95-item questionnaire remains from an original preliminary pool of 211 items, some of which were selected from a number of existing personality tests, and others which were written specifically for the questionnaire. Items were included with the intention of tapping both internal (ideational, cognitive) and external sources of stimulus input with special emphasis being placed upon change in stimuli, making the questionnaire an over-all, global measure of need for stimulation. The CSI has shown strong positive correlations with several other scales purporting to measure traits similar to stimulus seeking, for example, the change scale of the Personality

Research Form (r = .45), the Obscure Figures Test (r = .26), the originality-divergent thinking scale of the Omnibus Personality Inventory (r = .59; Acker & McReynolds, 1967); Graves Art Judgment Test (r = .30), the Welsh Revised Art Test (r = .30; Garlington & Shimota, 1964); two random shapes measures of visual complexity (r = .48, .39; Looft & Baranowski, 1971); the Similes Preference Inventory (r = .44), and the Change in Word Completion Task (r = .55; Farley, 1971).

A scale published the same year as the CSI, the Sensation Seeking Scale (SSS), was also developed to assess individual differences in optimal level of stimulation or arousal. However, the SSS is typically viewed as a measure of sensation seeking from external sources (Pearson, 1970; Zuckerman, Note 2), and while the SSS and CSI obviously have much in common, showing correlations ranging from .50 to .67, Zuckerman himself has pointed out that "in no case are these correlations high enough, even allowing for unreliability, to consider the scales as alternate measurements of the same thing" (Zuckerman, Note 1, p. 10). A study by Farley in 1967 suggested that the SSS might include more than one simple factor, prompting Zuckerman and his associates to write new items in an attempt to define the dimensions of sensation seeking. Factor analysis resulted in four interpretable factors, tentatively labelled Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility (Zuckerman, 1971). The Boredom Susceptibility subscale will be described in greater detail elsewhere in this report.

While the general notion of an optimal level of stimulation implies that a shift in the level of stimulus input in either direction, above or below, the characteristic level should bring about an attempt

to correct the situation, most of the research in the area has placed emphasis on that half of the theory dealing with situations which provide stimulus input levels below the optimum for the individual. For example, several attempts have been made to relate need for stimulation to response to sensory deprivation, testing the general notion that persons needing little stimulus variation would better tolerate the restricted conditions than would persons with higher stimulus needs. The results from such studies have been inconclusive. While some investigators have demonstrated some relationship between need for stimulation, as measured by the SSS, and responses such as cognitive and perceptual disorganization, discomfort, quitting behavior, and restless body movement (Brownfield, 1966; Zuckerman, Persky, Hopkins, Murtaugh, Basu, & Schilling, 1966); other studies have failed to produce the predicted relationships. For example, Zuckerman, Persky, Link, and Basu (1968) found that while the SSS was predictive of several stress responses to social confinement, it was not predictive of responses to social isolation or sensory restriction conditions. Zuckerman (Note 1) reports personal communication from T. I. Myers and J. B. Zubek that no relationship between the SSS and long term endurance of sensory deprivation conditions could be found. Likewise, Hocking and Robertson (1969) reported an unclear relationship between scores on the SSS and type of stimulation requested during a sensory restriction experiment, with the high scorers requesting less visual stimulation than the low scorers, but more auditory and kinesthetic stimulation, and while the latter difference was in the expected direction, it failed to reach statistical significance.

Several explanations have been proposed for the failures of the Sensation-Seeking Scale to predict various responses associated with conditions of sensory restriction. Lambert and Levy (1972) have suggested simply that need for stimulation and discomfort in isolation are unrelated phenomena. Other proposed explanations focus either on the very general, undifferentiated nature of the scale itself (see, for example, Zuckerman & Link, 1968) or on the global, "life-style" areas of personality being examined (see, for example, Ruder & Brown, Note 3), suggesting that the scale's failure to predict responses in a highly specific, carefully controlled laboratory experiment is hardly surprising. A different sort of explanation makes use of the findings that high sensation seekers tend to be field independent (Zuckerman, Kolin, Price, & Zoob, 1964; Zuckerman & Link, 1968). Since sensory deprivation is a situation in which some subjects are threatened by the absence of cognitive structuring, measures of anxiety and neuroticism are often more predictive of stress in short term sensory deprivation conditions than measures of sensation seeking (see, for example, Zuckerman, 1968). Further, since high sensation-seekers tend to be field independent, they would be less dependent upon their immediate surroundings to supply them with desired cognitive structure and, therefore, may be less stressed by a strange environment and less likely to seek stimulation simply to avoid the unfamiliar experimental situation than might lower scoring subjects (Zuckerman, Note 1). In any event, the sensory deprivation experiment represents only one type of situation in which stimulus variation is restricted.

Another condition which provides little stimulus variation while presenting the subject with a much more naturalistic surrounding is one

involving a monotonous, repetitive task. In marked contrast to the multitude of studies dealing with sensory deprivation, however, very little experimental data has been gathered to relate need for stimulation to persistence at, or tolerance for, a repetitive cognitive task. A study somewhat related to this question (Maddi, Charlens, Maddi, & Smith, 1962) examined the effects of stimulus novelty (listening to a novel recording) and stimulus monotony (listening to a monotonous recording) on imaginative productions scored on two response variables: (a) desire for novelty, and (b) novelty of productions. The results indicated that the monotony group scored higher in desire for novelty but lower in novelty of productions than any of the other groups examined. The latter results were tentatively explained by suggesting that, with the onset of the monotonous stimulation, the individual's activation level dropped below normal. Under more ordinary circumstances, the individual would have been expected to initiate some behavior aimed at raising activation to its characteristic level. But if, as was the case in the Maddi et al. study, such stimulation-increasing actions were prevented from occurring by instructional constraints imposed upon the subject, the level of activation would have continued to drop until it reached a level low enough to result in a temporary decrease in the individual's ability to behave and think in an active, productive manner.

A possible alternative explanation of the Maddi et al. (1962) results, i.e., that desire for novelty was negatively correlated with novelty of productions because the latter reflects a "nonmotivational" propensity for creative functioning, which is diminished by any strong motive, was effectively eliminated by a later study by Maddi and Berne

(1964). Group administered Thematic Apperception Test protocols were scored for novelty of production and desire for novelty as in the 1962 study and were also scored for n achievement, n affiliation, and n power. The only significant negative correlation obtained was that between desire for novelty and novelty of productions.

While a series of later reports by these investigators further expand and clarify the nature of the need for variety as exhibited in novelty of productions, curiosity, and desire for novelty (Maddi, Propst, & Feldinger, 1965; Maddi & Andrews, 1966), no further work relating these measures to repetitive or monotonous stimulation appears to have been attempted.

To the best of the author's knowledge, the only study specifically relating stimulus-need to performance on a repetitive cognitive task was performed in 1974 by V. G. Ruder (Note 4) in which need for stimulation as measured by the Change Seeker Index (CSI) was found to be a possible significant factor affecting persistence at a monotonous task. Persons with a "medium" need for stimulation were found to work on a monotonous experimental task for longer periods of time before taking a break than were either high- or low-scoring subjects, resulting in an inverted U-shaped function. Although a difference had been predicted between the performances of the high scorers and the low scorers, i.e., that low scoring subjects would work longer than high scoring subjects before taking a break, their performances appeared remarkably similar. Both groups, in other words, spent relatively short periods of time working on the experimental task. The post hoc explanation for these results was, very briefly, as follows: The high scorers found the task

particularly aversive because of its excessive repetition; hence, they resorted to frequent breaks. For a person needing a great deal of stimulus variation, however, the relief from the monotony of a repetitive task afforded by taking a break in a sterile, small experimental cubicle would probably be meager at best. Some amount of stimulation may have been achieved, therefore, by shifting from one activity to the other. The low scorers, on the other hand, may have been driven to frequent breaks because they were "overstimulated" by the experimental task; since they presumably needed lower levels of stimulation, the lesser stimulation associated with taking breaks would have been welcomed. Thus, while doing so for entirely different reasons, the low and high scoring groups performed similarly; the design of the study provided no means of differentiating the performance of understimulated high scoring subjects from that of overstimulated low scoring subjects.

Further, interpretation of the Ruder (Note 4) study is made more difficult due to a possible dependency between two of the dependent measures, mean length of work periods and proportion of time spent in breaks. From the complementary nature of the main finding, i.e., that medium CSI scorers worked longer at a time on the task than did either high or low scorers and, in turn, spent proportionately less time in breaks than did the other two groups, it cannot be determined which of two possible interpretations is more appropriate: Medium scorers may have found the experimental task more tolerable and/or the passive breaks more aversive than the high scoring subjects. Similarly, the high scorers may have found the monotony of the problems more aversive than the medium scorers and/or they in fact may have welcomed the internal stimulation (daydreaming, etc.) made possible by taking breaks.

If, however, the breaks were primarily responsible for the effect, breaks being more aversive and/or rewarding for one group than for another, this should have been reflected in yet another dependent measure, mean length of time spent in such breaks. No differences in break lengths were found, however, suggesting that groups differed in their reactions to the work and not to factors associated with breaks.

Statement of the Problem

The present study was designed to (a) attempt to replicate the relationship found in the 1974 study between need for stimulation and tolerance for and persistence at a monotonous task, and (b) clarify the nature of the relationship. Replication of the inverted-U finding should be particularly intriguing in view of the large number of similarly shaped functions relating many performance measures to arousal (Berlyne, 1967). Further, as previously discussed, the earlier study failed to provide the means whereby the performance of high CSI scorers could be differentiated from that of low CSI scorers. To facilitate such a discrimination a second task, one providing a relatively high level of stimulation, appeared useful. Faced with the monotony of the first task, and requiring higher levels of stimulation, the high scorers were expected to shift to the second task. The low scorers, on the other hand, were expected to shift from the first task to rest breaks rather than to the second task--having satisfied their need for stimulation on the first task, they would welcome a period of "doing nothing" and show little inclination to expose themselves to the added stimulation of the second activity.

In addition, since the earlier work appeared to indicate that the subjects' reactions to work rather than to the breaks formed the basis for the main finding, the present study emphasized length of work periods rather than proportion of time spent in rest breaks.

Secondary purposes of the present study were to correlate scores on the CSI with scores on the Boredom Susceptibility (BS) subscale of the Sensation-Seeking Scale (Zuckerman, Note 1), a subscale described as incorporating need for change and variety more than any of the other factors of the SSS (Zuckerman, 1971); and to explore the relationships that may exist between Boredom Susceptibility and the dependent measures in the present study. Zuckerman and his co-workers have indicated a need for more work "to elucidate the usefulness of the...BS subscale" and have suggested that the subscale might be tested "in experiments involving monotonous tasks" (Zuckerman, Neary, Manglesdorff, & Brustman, 1972, p. 320).

CHAPTER II

REVIEW OF THE LITERATURE

Optimal level of stimulation theory has been advanced as an alternative to drive reduction theories which hold that all primary motivation is directed at reducing internal and external stimulation to a minimum. Berlyne (1963), for example, in discussing collative motivation (motivation dependent on properties of stimuli such as novelty, surprisingness, change, ambiguity, and incongruity) suggests that an organism which has some choice with respect to the environment it enters will prefer an environment with "just the right collative properties" (p. 320) and leave one which is either too dull or too exciting. Fiske and Maddi (1961) speak of an organism's need to maintain a normal, or characteristic, level of activation, and they suggest that this motive is nonspecific in the sense that any of a wide variety of behaviors can be utilized to provide the appropriate stimulation. Although they feel that the characteristic level of activation may vary somewhat within an individual throughout the waking hours, this variation is regarded as systematic. Leuba (1955), while addressing himself to the "unsatisfactory state" of theories of learning, also supports the concept of "optimal stimulation." Briefly, Leuba suggests that

> . . . the organism tends to acquire those reactions which, when over-all stimulation is low, are accompanied by increasing stimulation; and when over-all stimulation is high, those which are accompanied by decreasing stimulation (p. 29).

Similar concepts have been put forth by Dember and Earl (1957), Hebb and Thompson (1964), Schultz (1965), and White (1959).

In the earlier report (V. G. Ruder, Note 4) the results from a number of correlational studies relating need for stimulation to numerous dispositional variables, occupational interests, aptitudes, and demographic variables were summarized in tabular form. While the table presented a reasonably comprehensive review of the literature from 1964 through 1973 and is reproduced in its entirety in the present report (see Table 1), some comment on the content of the table should be made. First, only studies using the Change Seeker Index (CSI), the Sensation Seeking Scale (SSS), or the Stimulus-Variation Seeking Scale (SVSS; Penney & Reinehr, 1966) were included in the review. It now appears that inclusion of the SVSS as an important measure of sensation seeking, on an equal plane with the CSI and particularly the SSS, may have been inappropriate since little research use has apparently been made of the scale since its introduction. Further, while other noteworthy scales purporting to measure traits similar to sensation seeking are included in the table, they are mentioned only with respect to their correlations to either the CSI, SSS, or SVSS, with the result that many studies making use of the Obscure Figures Test (OFT; Acker & McReynolds, 1965), the Novelty Experiencing Scale (NES; Pearson, 1970), or the Similes Preference Inventory (SPI; Pearson & Maddi, 1966), for example, were not included in the review.

To correct some of the deficiencies in Table 1 and to bring the review of the literature up to date, Table 2 presents a summary of research not reviewed previously.

TABLE 1

SUMMARY OF VARIABLES RELATING TO STIMULUS-SEEKING

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Abasement	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Abasement	Edward's Personal Preference Schedule	M	SSS	n.s	Zuckerman & Link, 1968
Achievement	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Achievement	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968
Affiliation	Ajective Check List	M	SSS	-.35*	Zuckerman & Link, 1968
Affiliation	Edward's Personal Preference Schedule	M	SSS	-.38*	Zuckerman & Link, 1968
Authoritarianism--Dogmatism	California F Scale	F	SVSS	n.s.	Penney & Reinehr, 1966
Authoritarianism--Dogmatism	California F Scale	M	SVSS	n.s.	Penney & Reinehr, 1966
Authoritarianism--Dogmatism	California F Scale	F	SSS	n.s.	Kish & Donnenwerth, 1972
Authoritarianism--Dogmatism	Rokeach D Scale	F	SSS	n.s.	Kish & Donnenwerth, 1972
Authoritarianism--Dogmatism	California F Scale	M	SSS	-.81**	Kish & Donnenwerth, 1972
Authoritarianism--Dogmatism	Rokeach D Scale	M	SSS	-.38*	Kish & Donnenwerth, 1972
Autonomy	Adjective Check List	M	SSS	.53**	Zuckerman & Link, 1968
Autonomy	Edward's Personal Preference Schedule	M	SSS	.64**	Zuckerman & Link, 1968
Defensiveness	MMPI	M[a]	SSS	-.238*	Blackburn, 1969
Deference	Adjective Check List	M	SSS	-.58**	Zuckerman & Link, 1968
Deference	Edward's Personal Preference Schedule	M	SSS	-.48**	Zuckerman & Link, 1968
Depression	Multiple Affect Adjective Check List	M & F	SSS	n.s.	Zuckerman, Kolin, Price & Zoob, 1964
Depression	Multiple Affect Adjective Check List	M & F	SSS	n.s.	Zuckerman & Link, 1968
Depression	Multiple Affect Adjective Check List[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link & Basu, 1968

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables (Continued)			
Depression	Multiple Affect Adjective Check List[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Depression	Multiple Affect Adjective Check List[d]	M & F	SSS	-.46**	Zuckerman, Persky, Link, & Basu, 1968
Depression	MMPI	M	SSS	n.s.	Blackburn, 1969
Depression	MMPI	M[e]	SSS	-.31**	Kish & Busse, 1969
Dominance	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Dominance	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968
Ego Strength	MMPI	M	SSS	.32**	Kish & Busse, 1969
Endurance	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Endurance	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968
Exhibitionism	Adjective Check List	M	SSS	.46**	Zuckerman & Link, 1968
Exhibitionism	Edward's Personal Preference Schedule	M	SSS	.37**	Zuckerman & Link, 1968
Extraversion	Eysenck Personality Inventory	M	SSS	.47**	Farley & Farley, 1967
Extraversion	Edward's Personality Inventory	M	SSS	n.s.	Zuckerman & Link, 1968
Extraversion	MMPI	M	SSS	n.s.	Blackburn, 1969
Extraversion	Eysenck Personality Inventory	M & F	SSS	.29*-.58**	Farley & Farley, 1970
Extraversion	Eysenck Personality Inventory	M & F	CSI	.46*-.49***	Farley & Farley, 1970
Heterosexuality	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Heterosexuality	Edward's Personal Preference Schedule	M	SSS	-.32*	Zuckerman & Link, 1968
Hypochondriasis	MMPI	M	SSS	n.s.	Blackburn, 1969
Hypochondriasis	Multiple Affect Adjective Check List	M[f]	SSS	-.30**	Thorne, 1971
Hypomania	MMPI	M & F	SSS	.21*	Zuckerman, Schultz & Hopkins, 1967
Hypomania	MMPI	M	SSS	.35*	Zuckerman & Link, 1968
Hypomania	MMPI	M	SSS	.467***	Blackburn, 1969
Hypomania	MMPI	M[f]	SSS	.47**	Thorne, 1971
Hypomania	MMPI	F[g]	SSS	.40**	Thorne, 1971
Hysteria	MMPI	M	SSS	n.s.	Blackburn, 1969

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables (Continued)			
Impulsivity	Eysenck Personality Inventory	M & F	SSS	.27*-.60**	Farley & Farley, 1967
Impulsivity	Eysenck Personality Inventory	M & F	CSI	.46***-.69**	Farley & Farley, 1967
Impulsivity	MMPI	M	SSS	.393***	Blackburn, 1969
Intraception	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Intraception	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968
Lability	Adjective Check List	M	SSS	.51**	Zuckerman & Link, 1968
Lie	Edward's Personality Inventory	M	SSS	n.s.[h]	Zuckerman & Link, 1968
Lie	MMPI	M[a]	SSS	-.26*	Blackburn, 1969
Masculinity-Feminity	MMPI	M	SSS	n.s.	Blackburn, 1969
Neuroticism	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968
Nurturance	Adjective Check List	M	SSS	-.50**	Zuckerman & Link, 1968
Nurturance	Edward's Personal Preference Schedule	M	SSS	-.50**	Zuckerman & Link, 1968
Orderliness	Adjective Check List	M	SSS	-.33*	Zuckerman & Link, 1968
Orderliness	Edward's Personal Preference Schedule	M	SSS	-.41**	Zuckerman & Link, 1968
Paranoia	MMPI	M	SSS	.265*	Blackburn, 1969
Personal Adjustment	Adjective Check List	M	SSS	-.54**	Zuckerman & Link, 1968
Positive Contemplation	Myers Post-Isolation Questionnaire[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Positive Contemplation	Myers Post-Isolation Questionnaire[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Positive Contemplation	Myers Post-Isolation Questionnaire[d]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Psychasthenia	MMPI	M	SSS	n.s.	Blackburn, 1969
Psychopathic Deviate	MMPI	M	SSS	n.s.	Zuckerman & Link, 1968
Psychopathic Deviate	MMPI	M	SSS	.249*	Blackburn, 1969
Repression	MMPI	M[a]	SSS	-.359***	Blackburn, 1969
Repression	MMPI	M[e]	SSS	-.26**	Kish & Busse, 1969

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
Dispositional Variables (Continued)					
Schizophrenia	MMPI	M	SSS	.222*	Blackburn, 1969
Self-Control	Adjective Check List	M	SSS	-.48**	Zuckerman & Link, 1968
Sociability	Eysenck Personality Inventory	M & F	SSS	.20-.51*	Farley & Farley, 1970
Sociability	Eysenck Personality Inventory	M & F	CSI	.35-.40***	Farley & Farley, 1970
Social Introversion	MMPI	M	SSS	n.s.	Blackburn, 1969
Social Introversion	MMPI	M[e]	SSS	-.17*	Kish & Busse, 1969
Social Participation	MMPI	M	SSS	n.s.	Blackburn, 1969
Succorance	Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Succorance	Edward's Personal Preference Schedule	M	SSS	-.46**	Zuckerman & Link, 1968
Tedium Stress	Myers Post-Isolation Questionnaire[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Tedium Stress	Myers Post-Isolation Questionnaire[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Tedium Stress	Myers Post-Isolation Questionnaire[d]	M & F	SSS	-.49***	Zuckerman, Persky, Link, & Basu, 1968
Unfavorable Self-Concept	Adjective Check List	M	SSS	.36*	Zuckerman & Link, 1968
Unreality Stress	Myers Post-Isolation Questionnaire[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Unreality Stress	Myers Post-Isolation Questionnaire[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Unreality Stress	Myers Post-Isolation Questionnaire[d]	M & F	SSS	-.43**	Zuckerman, Persky, Link, & Basu, 1968
Validity	MMPI (F Scale)	M	SSS	.30**	Blackburn, 1969
Stimulus-Seeking					
Change-Seeking	Personality Research Form	M & F	CSI	.45**	Acker & McReynolds, 1967
Change-Seeking	Personality Research Form	M & F	SSS	.45**	Acker & McReynolds, 1967

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Stimulus-Seeking (Continued)			
Change-Seeking	Adjective Check List	M	SSS	.43**	Zuckerman & Link, 1968
Change-Seeking	Edward's Personal Preference Schedule	M	SSS	.46**	Zuckerman & Link, 1968
Change-Seeking	Obscure Figures Test	M[e]	SSS	sig.[i]	Kish & Busse, 1969
Change-Seeking	Activities Index	M	SSS	.48**	Pearson, 1970
Change-Seeking	Edward's Personality Inventory	M	SSS	.49**	Pearson, 1970
Change-Seeking	Personality Research Form	M	SSS	.57**	Pearson, 1970
External Cognition	Novelty Experiencing Scale	M	SSS	n.s.	Pearson, 1970
External Sensation	Novelty Experiencing Scale	M	SSS	.68**	Pearson, 1970
General Novelty Seeking	Novelty Experiencing Scale	M	SSS	.38**	Pearson, 1970
Internal Cognition	Novelty Experiencing Scale	M	SSS	n.s.	Pearson, 1970
Internal Sensation	Novelty Experiencing Scale	M	SSS	.20*	Pearson, 1970
Novelty	Maze Test A and B	M & F	SSS	n.s.	Zuckerman, Kolin, Price, & Zoob, 1964
Novelty	Maze Test A	M & F	CSI	n.s.	Acker & McReynolds, 1967
Novelty	Maze Test A	M & F	SSS	n.s.	Acker & McReynolds, 1967
Novelty	Obscure Figures Test	M & F	CSI	.26**	Acker & McReynolds, 1967
Novelty	Obscure Figures Test	M & F	SSS	.25*	Acker & McReynolds, 1967
Novelty	Obscure Figures Test	M[j]	SSS	.43**	Kish, 1970a
Novelty	Desire for Novelty Scale	M	SSS	n.s.	Pearson, 1970
Originality-Divergent Thinking	Unusual Uses Test	M & F	SVSS[k]	.45**	Penney & Reinehr, 1966
Originality-Divergent Thinking	Unusual Uses Test	M & F	SVSS[m]	.27**	Penney & Reinehr, 1966
Originality-Divergent Thinking	Omnibus Personality Inventory	M & F	CSI	.59**	Acker & McReynolds, 1967
Originality-Divergent Thinking	Omnibus Personality Inventory	M & F	SSS	.65**	Acker & McReynolds, 1967
Parent's SSS Scores	"Take home" SSS	M[n] & F[n]	SSS	n.s.	Kish & Donnenwerth, 1972

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Stimulus-Seeking (Continued)			
Parent's SSS Scores	"Take home" SSS	M^p& F^p	SSS^q	.39**	Kish & Donnenwerth, 1972
Parent's SSS Scores	"Take home" SSS	M^p& F^p	SSS^r	.34*	Kish & Donnenwerth, 1972
Parent's SSS Scores	"Take home" SSS	M^p& F^p	SSS^s	.28**	Kish & Donnenwerth, 1972
Parent's SSS Scores	"Take home" SSS	M^p& F^p	SSS^t	.27**	Kish & Donnenwerth, 1972
Preference for Visual Complexity	Graves Art Judgment Test	M & F	CSI	.30*	Garlington & Shimota, 1964
Preference for Visual Complexity	Welsh Revised Art Test	M & F	CSI	.30*	Garlington & Shimota, 1964
Preference for Visual Complexity	Random Shapes: Set One	M & F	CSI	$.48^h$	Looft & Baranowski, 1971
Preference for Visual Complexity	Random Shapes: Set Two	M & F	CSI	$.39^h$	Looft & Baranowski, 1971
Preference for Visual Complexity	Random Shapes: Set One	M & F	SSS	$.36^h$	Looft & Baranowski, 1971
Preference for Visual Complexity	Random Shapes: Set Two	M & F	SSS	$.33^h$	Looft & Baranowski, 1971
Preference for Visual Complexity	Random Shapes: Set One	M & F	SVSS	$.36^h$	Looft & Baranowski, 1971
Preference for Visual Complexity	Random Shapes: Set Two	M & F	SVSS	$.29^h$	Looft & Baranowski, 1971
Variety	Similes Preference Inventory	M & F	CSI	.44**	Farley, 1971
Variety	Change in Word Completion Task	M & F	CSI	.55**	Farley, 1971
Variety	Similes Preference Inventory	M & F	SSS	.36**	Farley, 1971
Variety	Change in Word Completion Task	M & F	SSS	.34*	Farley, 1971
Variety	Obscure Figures Test	M^e	SSS	.43**	Kish, 1970b
Variety	Obscure Figures Test	M	SSS	$.35^u$	Kish, 1970b
		Aggression--Hostility Measures			
Aggression	Adjective Check List	M	SSS	.55**	Zuckerman & Link, 1968
Aggression	Edward's Personal Preference Schedule	M	SSS	n.s.	Zuckerman & Link, 1968

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Aggression--Hostility Measures (Continued)			
Covert Hostility	MMPI	M	SSS	.251*	Blackburn, 1969
Direction of Hostility	MMPI	M[a]	SSS	-.389***	Blackburn, 1969
General Hostility	MMPI	M	SSS	.258*	Blackburn, 1969
Hostility	Multiple Affect Adjective Check List	M & F	SSS	n.s.	Zuckerman, Kolin, Price, & Zoob, 1964
Hostility	Multiple Affect Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Hostility	Multiple Affect Adjective Check List[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Hostility	Multiple Affect Adjective Check List[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Hostility	Multiple Affect Adjective Check List[d]	M & F	SSS	-.35*	Zuckerman, Persky, Link, & Basu, 1968
Overt Hostility	MMPI	M	SSS	.283**	Blackburn, 1969
		Anxiety Measures			
Anxiety	Multiple Affect Adjective Check List	M & F	SSS	-.32*	Zuckerman, Kolin, Price, & Zoob, 1964
Anxiety	Taylor Manifest Anxiety Scale	M	SVSS	n.s.	Penney & Reinehr, 1966
Anxiety	Taylor Manifest Anxiety Scale	F	SVSS	n.s.	Penney & Reinehr, 1966
Anxiety	Taylor Manifest Anxiety Scale	M	SSS	n.s.	Zuckerman, Schultz, & Hopkins, 1967
Anxiety	Multiple Affect Adjective Check List	M	SSS	n.s.	Zuckerman & Link, 1968
Anxiety	Taylor Manifest Anxiety Scale	M	SSS	n.s.	Zuckerman & Link, 1968
Anxiety	Multiple Affect Adjective Check List[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Anxiety	Multiple Affect Adjective Check List[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Anxiety	Multiple Affect Adjective Check List[d]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Anxiety Measures (Continued)			
Anxiety	MMPI	M	SSS	n.s.	Blackburn, 1969
Characteristic Anxiety Level	Taylor Manifest Anxiety Scale	M & F	CSI	n.s.	McReynolds, 1971
Characteristic Anxiety Level	Taylor Manifest Anxiety Scale	M & F	SSS	n.s.	McReynolds, 1971
Current Anxiety Level	Anxiety Self-Rating Scale	M & F	CSI	-.14*	McReynolds, 1971
Current Anxiety Level	Anxiety Self-Rating Scale	M & F	SSS	n.s.	McReynolds, 1971
		Intelligence--Aptitude			
Clerical Perception	General Aptitude Test Battery	M^e& F^e	SSS	n.s.	Kish & Busse, 1968
Composite Aptitude	American College Testing Program	M	SSS	.43**	Kish & Donnenwerth, 1972
Composite Aptitude	American College Testing Program	F	SSS	n.s.	Kish & Donnenwerth, 1972
English Aptitude	American College Testing Program	M	SSS	.27*	Kish & Donnenwerth, 1972
English Aptitude	American College Testing Program	F	SSS	n.s.	Kish & Donnenwerth, 1972
Finger Dexterity	General Aptitude Test Battery	M^e& F^e	SSS	n.s.	Kish & Busse, 1968
Form Perception	General Aptitude Test Battery	M^e& F^e	SSS^w	.28*	Kish & Busse, 1968
General Learning Ability	General Aptitude Test Battery	M^e& F^e	SSS^w	.34**	Kish & Busse, 1968
Intelligence	Shipley-Hartford Institute of Living	M^v& F^v	CSI	n.s.	Garlington & Shimota, 1964
Manual Dexterity	General Aptitude Test Battery	M^e& F^e	SSS	n.s.	Kish & Busse, 1968
Mathematics Aptitude	American College Testing Program	M	SSS	.39**	Kish & Donnenwerth, 1972
Mathematics Aptitude	American College Testing Program	F	SSS	n.s.	Kish & Donnenwerth, 1972
Motor Coordination	General Aptitude Test Battery	M^e& F^e	SSS	n.s.	Kish & Busse, 1968
Natural Science Aptitude	American College Testing Program	M	SSS	.37**	Kish & Donnenwerth, 1972
Natural Science Aptitude	American College Testing Program	F	SSS	n.s.	Kish & Donnenwerth, 1972
Numerical Aptitude	General Aptitude Test Battery	M^e& F^e	SSS^w	.27*	Kish & Busse, 1968

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Intelligence--Aptitude (Continued)			
Quantitative Aptitude	College Entrance Examination Board Scholastic Aptitude Test	M	SVSS	.25*	Penney & Reinehr, 1966
Quantitative Aptitude	College Entrance Examination Board Scholastic Aptitude Test	F	SVSS	n.s.	Penney & Reinehr, 1966
Social Science Aptitude	American College Testing Program	M	SSS	.38**	Kish & Donnenwerth, 1972
Social Science Aptitude	American College Testing Program	F	SSS	n.s.	Kish & Donnenwerth, 1972
Spatial Ability	General Aptitude Test Battery	M^e & F^e	SSS^w	.29*	Kish & Busse, 1968
Verbal Ability	General Aptitude Test Battery	M & F	SSS	n.s.	Kish & Busse, 1968
Verbal Aptitude	College Entrance Examination Board Scholastic Aptitude Test	M	SVSS	.36*	Penney & Reinehr, 1966
Verbal Aptitude	College Entrance Examination Board Scholastic Aptitude Test	F	SVSS	n.s.	Penney & Reinehr, 1966
		Interest--Value			
Accountant	Strong Vocational Interest Blank-Men	M	SSS	-.38**	Kish & Donnenwerth, 1969
Aesthetic	Study of Values	M & F	SSS	.31*	Farley & Dionne, 1972
Banker	Strong Vocational Interest Blank-Men	M	SSS	-.46**	Kish & Donnenwerth, 1969
Clerical Interest	Kuder Preference Board	M^e & F^e	SSS	.36*	Kish & Donnenwerth, 1969
Dietitian	Strong Vocational Interest Blank-Women	F	SSS	-.34*	Kish & Donnenwerth, 1969
Economic	Study of Values	M & F	SSS	-.40*	Farley & Dionne, 1972
Elementary Teacher	Strong Vocational Interest Blank-Women	F	SSS	-.36*	Kish & Donnenwerth, 1969
Home Economics Teacher	Strong Vocational Interest Blank-Women	F	SSS	-.41**	Kish & Donnenwerth, 1969
Housewife	Strong Vocational Interest Blank-Women	F	SSS	-.47**	Kish & Donnenwerth, 1969
Lawyer	Strong Vocational Interest Blank-Women	F	SSS	.38**	Kish & Donnenwerth, 1969

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Interest--Value (Continued)			
Minister	Strong Vocational Interest Blank-Men	M	SSS	.40*	Kish & Donnenwerth, 1969
Mortician	Strong Vocational Interest Blank-Men	M	SSS	-.41*	Kish & Donnenwerth, 1969
Musician	Strong Vocational Interest Blank-Men	M	SSS	.37*	Kish & Donnenwerth, 1969
Pharmacist	Strong Vocational Interest Blank-Men	M	SSS	-.41*	Kish & Donnenwerth, 1969
Physician	Strong Vocational Interest Blank-Men	M	SSS	.43*	Kish & Donnenwerth, 1969
Political	Study of Values	M & F	SSS	n.s.	Farley & Dionne, 1972
Psychiatrist	Strong Vocational Interest Blank-Men	M	SSS	.53**	Kish & Donnenwerth, 1969
Psychologist	Strong Vocational Interest Blank-Men	M	SSS	.54**	Kish & Donnenwerth, 1969
Psychologist	Strong Vocational Interest Blank-Women	F	SSS	.28*	Kish & Donnenwerth, 1969
Purchasing Agent	Strong Vocational Interest Blank-Men	M	SSS	-.48**	Kish & Donnenwerth, 1969
Religious	Study of Values	M & F	SSS	n.s.	Farley & Dionne, 1972
Scientific Interest	Kuder Preference Board	M[e] & F[e]	SSS	.36*	Kish & Donnenwerth, 1969
Social	Study of Values	M & F	SSS	n.s.	Farley & Dionne, 1972
Social Worker	Strong Vocational Interest Blank-Men	M	SSS	.38*	Kish & Donnenwerth, 1969
Theoretical	Study of Values	M & F	SSS	n.s.	Farley & Dionne, 1972
		Perception			
Autokinetic Perception	Stationary Light	M & F	SVSS	sig.[x]	Penney & Reinehr, 1966
Field Independence	Embedded Figures Test	M & F	SSS[y]	.54**	Zuckerman, Kolin, Price & Zoob, 1964
Field Independence	Embedded Figures Test	M	SSS[z]	-.33*	Zuckerman & Link, 1968
Field Independence	Rod and Frame Test	M	SSS[z]	-.42**	Zuckerman & Link, 1968
Field Independence	Rod and Frame Test	M	SSS[aa]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	F	SSS[aa]	n.s.	Bone & Choban, 1972

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Perception (Continued)			
Field Independence	Rod and Frame Test	M	SSS[bb]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	F	SSS[bb]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	M	SSS[cc]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	F	SSS[cc]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	M	SSS[dd]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	F	SSS[dd]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	M	SSS[ee]	n.s.	Bone & Choban, 1972
Field Independence	Rod and Frame Test	F	SSS[ee]	n.s.	Bone & Choban, 1972
Visual Acuity	Orthorator Equivalent to Standard Snellen Test	M	SSS	.23*-.44**	Palmer, 1970
		Political and Sexual Attitudes			
Perceived Political Ideology	Information Questionnaire	M & F	CSI	.35**	Stock & Looft, 1969
Political Liberalism	Five-Point Political Continuum	M & F	CSI	.41[h]	Looft, 1971
Political Liberalism	Five-Point Political Continuum	M & F	SSS	.38[h]	Looft, 1971
Political Liberalism	Multiple Choice Questionnaire	M & F	CSI	.35***	Brown, Ruder, Ruder, & Young, in press
Political Party Preference	Information Questionnaire	M & F	CSI	.13*	Stock & Looft, 1969
Sexual Permissiveness	Intimacy Permissiveness Scale	M[e]	SSS	.49**	Kish & Donnenwerth, 1972
Sexual Permissiveness	Intimacy Permissiveness Scale	F[e]	SSS	.55**	Kish & Donnenwerth, 1972
Sexual Permissiveness	Multiple Choice Questionnaire	M & F	CSI	.43***	Brown, Ruder, Ruder, & Young, in press
		Demographic Variables			
Age	Chronological Age	M[v] & F[v]	CSI	-.21**	Garlington & Shimota, 1964

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Demographic Variables (Continued)			
Age	Chronological Age	F[ff]	CSI	n.s.	Garlington & Shimota, 1964
Age	Chronological Age	M[v] & F[v]	SSS	-.33[h]	Brownfield, 1966
Age	Chronological Age	M[gg] & F[gg]	SSS	-.25[h]	Brownfield, 1966
Age	Chronological Age	M[hh]	SSS	-.27**	Kish & Busse, 1968
Age	Chronological Age	M[ii]	SSS	-.36***	Thorne, 1971
Age	Chronological Age	M[jj]	SSS	n.s.	Thorne, 1971
Age	Chronological Age	M[kk]	SSS	n.s.	Thorne, 1971
Age	Chronological Age	M[mm]	SSS	-.43***	Thorne, 1971
Age	Chronological Age	M[nn]	SSS	-.30***	Thorne, 1971
Age	Chronological Age	F[f]	SSS	n.s.	Thorne, 1971
Age	Chronological Age	F[kk]	SSS	n.s.	Thorne, 1971
Age	Chronological Age	F[mm]	SSS	-.39***	Thorne, 1971
Age	Chronological Age	F[nn]	SSS	-.22**	Thorne, 1971
Birth Order	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Culture	Rural and Urban Samples	M & F	SSS	n.s.[pp]	Kish & Busse, 1968
Curriculum	Information Questionnaire	M & F	CSI	n.s.[qq]	Stock & Looft, 1969
Education	Highest Educational Level Attained	M	SSS	n.s.[u]	Kish & Busse, 1968
Father's Occupation	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Grade Point Average	Multiple Choice Questionnaire	M & F	CSI	-.28***	Brown, Ruder, Ruder, & Young, in press
Marital Status	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Mother's Occupation	Information Questionnaire	M & F	CSI	n.s.[qq]	Stock & Looft, 1969
Religion	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Residence[uu]	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Town Size	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969
Work-Not Work	Information Questionnaire	M & F	CSI	n.s.	Stock & Looft, 1969

TABLE 1 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Other			
Food Preference	Food Preference Inventory[rr]	M[e]	SSS	-.26*	Kish & Donnenwerth, 1972
Food Preference	Food Preference Inventory[rr]	F[e]	SSS	-.45**	Kish & Donnenwerth, 1972
Personal Space	Pedersen Personal Space Measure[ss]	M & F	SSS[dd]	n.s.	Pedersen, 1973
Personal Space	Pedersen Personal Space Measure[tt]	M & F	SSS[dd]	.50*	Pedersen, 1973
Personal Space	Pedersen Personal Space Measure[ss]	M & F	SSS[cc]	.43*	Pedersen, 1973
Personal Space	Pedersen Personal Space Measure[tt]	M & F	SSS[cc]	n.s.	Pedersen, 1973
Personal Space	Pedersen Behavioral Personal Space Measure[ss]	M & F	SSS[dd]	n.s.	Pedersen, 1973
Personal Space	Pedersen Behavioral Personal Space Measure[tt]	M & F	SSS[dd]	n.s.	Pedersen, 1973
Personal Space	Pedersen Behavioral Personal Space Measure[ss]	M & F	SSS[cc]	n.s.	Pedersen, 1973
Personal Space	Pedersen Behavioral Personal Space Measure[tt]	M & F	SSS[cc]	n.s.	Pedersen, 1973
Physiology	17-Ketogenic Steroids[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Physiology	17-Ketogenic Steroids[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Physiology	17-Ketogenic Steroids[d]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Physiology	17-Ketosteroids[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Physiology	17-Ketosteroids[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Physiology	17-Ketosteroids[d]	M & F	SSS	-.51***	Zuckerman, Persky, Link, & Basu, 1968
Somatic Symptoms	Somatic Check List[b]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Somatic Symptoms	Somatic Check List[c]	M & F	SSS	n.s.	Zuckerman, Persky, Link, & Basu, 1968
Somatic Symptoms	Somatic Check List[d]	M & F	SSS	-.41**	Zuckerman, Persky, Link, & Basu, 1968

TABLE 1 (Continued)

*$p < .05$

**$p < .01$

***$p < .001$

[a]psychiatric offenders

[b]Ss tested under conditions of sensory deprivation

[c]Ss tested under conditions of social isolation

[d]Ss tested under conditions of social confinement

[e]alcoholic patients

[f]felons

[g]delinquents

[h]probability levels not reported

[i]difference between alcoholics and normals significant at $p < .05$ (t test)

[j]chronic schizophrenics

[k]correlation between SVSS and total relevant uses score

[m]correlation between SVSS and total originality score

[n]high school students

[p]college students

[q]father's score correlated with daughter's score

[r]mother's and father's combined scores correlated with daughter's score

[s]father's score correlated with son's or daughter's score

[t]mother's and father's combined scores correlated with son's or daughter's score

[u]General Learning Ability partialled out

[v]psychiatric patients

[w]rank difference correlation coefficients (rho)

[x]High SSS Scorers perceived significantly more movement, $p < .025$ (F test)

[y]correlation for females alone positive but n.s.

[z]High scores indicated field dependence; therefore, negative correlations signify a positive relationship between sensation-seeking and field independence.

TABLE 1 (Continued)

[aa]Form IV; General Sensation Seeking

[bb]Form IV; Thrill and Adventure Seeking Subscale

[cc]Form IV; Bordeom Susceptibility Subscale

[dd]Form IV; Disinhibition Subscale

[ee]Form IV; Experience Seeking Subscale

[ff]school teachers

[gg]control group (hospital staff, students, faculty)

[hh]alcoholics pooled with hospital controls

[ii]felons (major)

[jj]felons (minor)

[kk]delinquents

[mm]mentally ill

[nn]felons, delinquents, mentally ill combined

[pp]t test

[qq]$p < .10$

[rr]FPI is scored in the passive direction; therefore, negative correlations indicate positive relationships between "oral activity" and sensation-seeking.

[ss]male approaching

[tt]female approaching

[uu]dormitory, off-campus, fraternity-sorority, or home

TABLE 2

SUMMARY OF VARIABLES RELATING TO STIMULUS-SEEKING: A SUPPLEMENT

Variable	Measure	Sex of Ss	Scale	r	Reference
	Dispositional Variables				
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Adventurousness	Cattell's Sixteen Personality Factor Test	F	SSS	.54**	Gorman, 1970
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS[a]	.48**	Zuckerman, Bone, Neary, Manglesdorff & Brustman, 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.37**	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS[b]	.43**	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS[c]	.34**	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	F	SSS[c]	.36**	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS[d]	.25*	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	M	SSS[e]	.40**	Zuckerman et al., 1972
Adventurousness	Cattell's Sixteen Personality Factor Test	M	TAT[f-h]	n.s.	Maddi & Andrews, 1966
Bohemianism	Cattell's Sixteen Personality Factor Test	M	SSS	.57**	Gorman, 1970
Bohemianism	Cattell's Sixteen Personality Factor Test	F	SSS	.35*	Gorman, 1970
Bohemianism	Cattell's Sixteen Personality Factor Test	M	SSS[a]	.29*	Zuckerman et al., 1972
Bohemianism	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.41**	Zuckerman et al., 1972
Bohemianism	Cattell's Sixteen Personality Factor Test	M	SSS[c]	.31**	Zuckerman et al., 1972
Bohemianism	Cattell's Sixteen Personality Factor Test	F	SSS[c]	.29*	Zuckerman et al., 1972
Bohemianism	Cattell's Sixteen Personality Factor Test	M	SSS[e]	.34**	Zuckerman et al., 1972
Bohemianism	Cattell's Sixteen Personality Factor Test	F	SSS[e]	.43**	Zuckerman et al., 1972
Cyclothymia	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Cyclothymia	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Defensiveness	MMPI (K Scale)	M[i]	OFT	.22*	Kish, 1970b
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Dominance	Cattell's Sixteen Personality Factor Test	F	SSS	.64**	Gorman, 1970

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS[a]	.52**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.44**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS[b]	.38**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS[c]	.44**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	F	SSS[c]	.43**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS[d]	.39**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	F	SSS[d]	.37**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	M	SSS[e]	.50**	Zuckerman et al., 1972
Dominance	Cattell's Sixteen Personality Factor Test	F	SSS[e]	.48**	Zuckerman et al., 1972
Ego Strength	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Ego Strength	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Ego Strength	MMPI	M[i]	OFT	.25*	Kish, 1970b
Ego Strength	Cattell's Sixteen Personality Factor Test	F	SSS[d]	-.35**	Zuckerman et al., 1972
Exteroception	Questionnaire	M	TAT[f]	-.37**	Maddi & Andrews, 1966
Exteroception	Questionnaire	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Exteroception	Questionnaire	M	TAT[h]	n.s.	Maddi & Andrews, 1966
Exteroception	Questionnaire	M & F	SPI	-.47**	Pearson & Maddi, 1966
Exteroception	Questionnaire	M & F	TAT[f]	-.48**	Pearson & Maddi, 1966
Exteroception	Questionnaire	M	SPI	n.s.	Pearson & Maddi, 1966
Exteroception	Questionnaire	M	TAT[f]	-.37**	Pearson & Maddi, 1966
Extraversion	Maudsley Personality Inventory	M	SSS	.24**	Bone & Montgomery, 1970
Extraversion	Maudsley Personality Inventory	F	SSS	.23*	Bone & Montgomery, 1970
Extraversion	Cattell's Sixteen Personality Factor Test	M	TAT[f-h]	n.s.	Maddi & Andrews, 1966
Extraversion	Maudsley Personality Inventory	M	TAT[f-h]	n.s.	Maddi & Andrews, 1966
Extraversion	Eysenck E Scale	M	SSS[a]	.25*	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	F	SSS[a]	.29**	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	M	SSS[b]	.35**	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	F	SSS[b]	.28**	Zuckerman et al., 1972

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Extraversion	Eysenck E Scale	M	SSS[c]	n.s.	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	F	SSS[c]	.32**	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	M	SSS[d]	n.s.	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	F	SSS[d]	.32**	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	M	SSS[e]	n.s.	Zuckerman et al., 1972
Extraversion	Eysenck E Scale	F	SSS[e]	n.s.	Zuckerman et al., 1972
Guilt Proneness	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Guilt Proneness	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Guilt Proneness	Cattell's Sixteen Personality Factor Test	M[j]	Maze[k]	-.65**	Howard & Diesenhaus, 1965
Guilt Proneness	Cattell's Sixteen Personality Factor Test	F	SSS[d]	.30*	Zuckerman et al., 1972
Hypnotizability	Harvard Group Scale of Hypnotic Susceptibility	M & F	SSS[a-e]	n.s.	Zuckerman et al., 1972
Hypochondriasis	MMPI	M	SSS[c]	.29*	Zuckerman et al., 1972
Hypochondriasis	MMPI	F	SSS[c]	.23*	Zuckerman et al., 1972
Hypomania	MMPI	M[i]	OFT	.26*	Kish, 1970b
Hypomania	MMPI	M	SSS[a]	.18-.30*	Zuckerman et al., 1972
Hypomania	MMPI	F	SSS[a]	.41**-.42**	Zuckerman et al., 1972
Hypomania	MMPI	F	SSS[b]	.29**-.35**	Zuckerman et al., 1972
Hypomania	MMPI	M	SSS[c]	.26*-.54**	Zuckerman et al., 1972
Hypomania	MMPI	F	SSS[c]	.37**-.39**	Zuckerman et al., 1972
Hypomania	MMPI	M	SSS[d]	.43**-.50**	Zuckerman et al., 1972
Hypomania	MMPI	F	SSS[d]	.30**-.34**	Zuckerman et al., 1972
Hypomania	MMPI	F	SSS[e]	.30**-.32**	Zuckerman et al., 1972
Impulsivity	Activities Index	M	TAT[f]	.27*	Maddi & Andrews, 1966
Impulsivity	Activities Index	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Impulsivity	Activities Index	M	TAT[h]	n.s.	Maddi & Andrews, 1966

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Lie	MMPI	F	SSS[d]	-.30**	Zuckerman et al., 1972
Locus of Control	Rotter's I-E Scale	M & F	SSS[a-e]	n.s.	Zuckerman et al., 1972
Masculinity-Femininity	MMPI	M	SSS[b]	-.28*	Zuckerman et al., 1972
n order	Activities Index	M & F	SPI	-.26*	Pearson & Maddi, 1966
n order	Activities Index	M & F	TAT[f]	-.27*	Pearson & Maddi, 1966
n order	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
n order	Activities Index	M	TAT[f]	n.s.	Pearson & Maddi, 1966
n understanding	Activities Index	M	TAT[f]	n.s.	Maddi & Andrews, 1966
n understanding	Activities Index	M	TAT[g]	n.s.	Maddi & Andrews, 1966
n understanding	Activities Index	M	TAT[h]	-.29*	Maddi & Andrews, 1966
Neuroticism	Maudsley Personality Inventory	M	SSS	n.s.	Bone & Montgomery, 1970
Neuroticism	Maudsley Personality Inventory	F	SSS	n.s.	Bone & Montgomery, 1970
Openness to Experience	Experience Inventory	M	SSS[a]	.29**	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	F	SSS[a]	.44**	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	M	SSS[b]	.27**	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	F	SSS[b]	.37*	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	M	SSS[c]	.40*	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	F	SSS[c]	.51*	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	M	SSS[d]	.28*	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	F	SSS[d]	.35*	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	M	SSS[e]	n.s.	Zuckerman et al., 1972
Openness to Experience	Experience Inventory	F	SSS[e]	n.s.	Zuckerman et al., 1972
Paranoia	MMPI	F	SSS[c]	.22*	Zuckerman et al., 1972
Psychasthenia	MMPI	M	SSS[c]	.27*	Zuckerman et al., 1972

TABLE 2 (Continued)

Variables	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Psychopathic Deviate	MMPI	F	SSS[a]	.14-.32**	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	F	SSS[b]	.06-.32**	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	M	SSS[c]	.39**-.57**	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	F	SSS[c]	.31**-.32**	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	M	SSS[d]	.21-.40**	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	F	SSS[d]	.23*-.26*	Zuckerman et al., 1972
Psychopathic Deviate	MMPI	F	SSS[e]	.09-.26*	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Radicalism	Cattell's Sixteen Personality Factor Test	F	SSS	.46**	Gorman, 1970
Radicalism	Cattell's Sixteen Personality Factor Test	M[j]	Maze[l]	.44*	Howard & Diesenhaus, 1965
Radicalism	Cattell's Sixteen Personality Factor Test	M	TAT[f]	.28**	Maddi & Andrews, 1966
Radicalism	Cattell's Sixteen Personality Factor Test	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Radicalism	Cattell's Sixteen Personality Factor Test	M	TAT[h]	.26**	Maddi & Andrews, 1966
Radicalism	Cattell's Sixteen Personality Factor Test	M	SSS[a]	.39**	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.39**	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	M	SSS[b]	.31**	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	M	SSSc	.44**	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	M	SSS[d]	.39**	Zuckerman et al., 1972
Radicalism	Cattell's Sixteen Personality Factor Test	F	SSS[d]	.34**	Zuckerman et al., 1972
Rigidity	Activities Index	M & F	SPI	-.45**	Pearson & Maddi, 1966
Rigidity	Activities Index	M & F	TAT[f]	-.38**	Pearson & Maddi, 1966
Rigidity	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
Rigidity	Activities Index	M	TAT[f]	n.s.	Pearson & Maddi, 1966
Schizophrenia	MMPI	F	SSS[a]	.24*	Zuckerman et al., 1972
Schizophrenia	MMPI	M	SSS[c]	.34**	Zuckerman et al., 1972
Schizophrenia	MMPI	F	SSS[c]	.28*	Zuckerman et al., 1972
Schizophrenia	MMPI	M	SSS[d]	.27*	Zuckerman et al., 1972

TABLE 2 (Continued)

Variables	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	F	SSS	-.50**	Gorman, 1970
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	M[j]	Maze[k]	.48*	Howard & Diesenhaus, 1965
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	F	SSS[a]	-.29*	Zuckerman et al., 1972
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	M	SSS[c]	-.34**	Zuckerman et al., 1972
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	M	SSS[d]	-.36**	Zuckerman et al., 1972
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	F	SSS[d]	-.34*	Zuckerman et al., 1972
Self-sentiment Control	Cattell's Sixteen Personality Factor Test	M	SSS[e]	-.25*	Zuckerman et al., 1972
Self-sufficiency	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Self-sufficiency	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Self-sufficiency	Cattell's Sixteen Personality Factor Test	M	SSS[b]	-.26*	Zuckerman et al., 1972
Self-sufficiency	Cattell's Sixteen Personality Factor Test	F	SSS[b]	-.33*	Zuckerman et al., 1972
Sensitivity	Cattell's Sixteen Personality Factor Test	M	TAT[f]	.33**	Maddi & Andrews, 1966
Sensitivity	Cattell's Sixteen Personality Factor Test	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Sensitivity	Cattell's Sixteen Personality Factor Test	M	TAT[h]	.35**	Maddi & Andrews, 1966
Sentience	Activities Index	M	TAT[f]	.30*	Maddi & Andrews, 1966
Sentience	Activities Index	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Sentience	Activities Index	M	TAT[h]	n.s.	Maddi & Andrews, 1966
Sentience	Activities Index	M & F	SPI	n.s.	Pearson & Maddi, 1966
Sentience	Activities Index	M & F	TAT[f]	n.s.	Pearson & Maddi, 1966
Sentience	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
Sentience	Activities Index	M	TAT[f]	.30*	Pearson & Maddi, 1966
Shrewdness	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Shrewdness	Cattell's Sixteen Personality Factor Test	F	SSS	-.33*	Gorman, 1970
Shrewdness	Cattell's Sixteen Personality Factor Test	M	SSS[c]	-.30**	Zuckerman et al., 1972
Social Introversion	MMPI	M[i]	OFT	-.33**	Kish, 1970b
Social Introversion	MMPI	M	SSS[d]	-.27*	Zuckerman et al., 1972

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Social Introversion	MMPI	F	SSS[d]	-.28**	Zuckerman et al., 1972
Social Introversion	MMPI	M	SSS[e]	-.33**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Superego Strength	Cattell's Sixteen Personality Factor Test	F	SSS	-.45**	Gorman, 1970
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS[a]	-.38**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	F	SSS[a]	-.39**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS[b]	-.23*	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS[c]	-.55**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	F	SSS[c]	-.49**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS[d]	-.41**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	F	SSS[d]	-.50**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	M	SSS[e]	-.32**	Zuckerman et al., 1972
Superego Strength	Cattell's Sixteen Personality Factor Test	F	SSS[e]	-.35**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Surgency	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS[a]	.42**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.32*	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS[b]	.42**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS[c]	.42**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	F	SSS[c]	.36**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS[d]	.60**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	F	SSS[d]	.36**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	M	SSS[e]	.34**	Zuckerman et al., 1972
Surgency	Cattell's Sixteen Personality Factor Test	F	SSS[e]	.40**	Zuckerman et al., 1972
Suspicion	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Suspicion	Cattell's Sixteen Personality Factor Test	F	SSS	.39*	Gorman, 1970
Suspicion	Cattell's Sixteen Personality Factor Test	F	SSS[a]	.29*	Zuckerman et al., 1972
Suspicion	Cattell's Sixteen Personality Factor Test	M	SSS[c]	.25*	Zuckerman et al., 1972
Suspicion	Cattell's Sixteen Personality Factor Test	F	SSS[c]	.38**	Zuckerman et al., 1972

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Dispositional Variables			
Suspicion	Cattell's Sixteen Personality Factor Test	M	SSS[d]	.31**	Zuckerman et al., 1972
Suspicion	Cattell's Sixteen Personality Factor Test	F	SSS[d]	.35**	Zuckerman et al., 1972
Tendermindedness	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Tendermindedness	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Tension	Cattell's Sixteen Personality Factor Test	M	SSS	n.s.	Gorman, 1970
Tension	Cattell's Sixteen Personality Factor Test	F	SSS	n.s.	Gorman, 1970
Validity	MMPI	M	SSS[a]	.05-.35**	Zuckerman et al., 1972
Validity	MMPI	F	SSS[a]	.26*-.29**	Zuckerman et al., 1972
Validity	MMPI	M	SSS[b]	n.s.	Zuckerman et al., 1972
Validity	MMPI	F	SSS[b]	.23*-.25*	Zuckerman et al., 1972
Validity	MMPI	M	SSS[c]	.38**-.39**	Zuckerman et al., 1972
Validity	MMPI	F	SSS[c]	.23*-.37**	Zuckerman et al., 1972
Validity	MMPI	M	SSS[d]	.12-.33*	Zuckerman et al., 1972
Validity	MMPI	F	SSS[d]	.02-.25*	Zuckerman et al., 1972
Validity	MMPI	M	SSS[e]	n.s.	Zuckerman et al., 1972
Validity	MMPI	F	SSS[e]	.21*-.23*	Zuckerman et al., 1972
		Stimulus-Seeking			
Complexity of Productions	Geometric Figure Completion Task	M	TAT[f]	.39**	Maddi, Propst & Feldinger, 1965
Complexity of Productions	Geometric Figure Completion Task	M	TAT[g]	n.s.	Maddi, Propst & Feldinger, 1965
Complexity of Productions	Geometric Figure Completion Task	M	TAT[h]	n.s.	Maddi, Propst & Feldinger, 1965

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Stimulus-Seeking			
Conjunctivity-Disjunctivity	Activities Index	M & F	SPI	-.40*	Pearson & Maddi, 1966
Conjunctivity-Disjunctivity	Activities Index	M & F	TAT[f]	-.28*	Pearson & Maddi, 1966
Conjunctivity-Disjunctivity	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
Conjunctivity-Disjunctivity	Activities Index	M	TAT[f]	n.s.	Pearson & Maddi, 1966
Interoceptive Variety Seeking	Similes Preference Test	M & F	OFT	.52	Uribe & McReynolds, 1967
n change	Activities Index	M	TAT[f]	.25*	Maddi & Andrews, 1966
n change	Activities Index	M	TAT[g]	n.s.	Maddi & Andrews, 1966
n change	Activities Index	M	TAT[h]	.27**	Maddi & Andrews, 1966
n change	Activities Index	M & F	SPI	.47**	Pearson & Maddi, 1966
n change	Activities Index	M & F	TAT[f]	.29*	Pearson & Maddi, 1966
n change	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
n change	Activities Index	M	TAT[f]	.25**	Pearson & Maddi, 1966
n play	Activities Index	M	TAT[f-h]	n.s.	Maddi & Andrews, 1966
n play	Activities Index	M & F	SPI	n.s.	Pearson & Maddi, 1966
n play	Activities Index	M & F	TAT[f]	n.s.	Pearson & Maddi, 1966
n play	Activities Index	M	SPI	n.s.	Pearson & Maddi, 1966
n play	Activities Index	M	TAT[f]	n.s.	Pearson & Maddi, 1966
Nonverbal Productivity	Stick-Figures Task	M	TAT[f]	n.s.	Maddi, Propst & Feldinger, 1965
Nonverbal Productivity	Stick-Figures Task	M	TAT[g]	n.s.	Maddi, Propst & Feldinger, 1965
Nonverbal Productivity	Stick-Figures Task	M	TAT[h]	-.27*	Maddi, Propst & Feldinger, 1965

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Stimulus-Seeking			
Originality	Plot Titles Test	M	OFT	.38**	Acker & McReynolds, 1965
Originality	Omnibus Personality Inventory	M	OFT	n.s.	Acker & McReynolds, 1965
Originality	Omnibus Personality Inventory	F	OFT	.32*	Acker & McReynolds, 1965
Originality	Uses Test	M	TAT[f]	.62**	Maddi & Andrews, 1966
Originality	Uses Test	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Originality	Uses Test	M	TAT[h]	n.s.	Maddi & Andrews, 1966
Originality	Anagrams Task	M	TAT[f-h]	n.s.	Maddi, Propst & Feldinger, 1965
Originality	Uses Test	M & F	SPI	.34*	Pearson & Maddi, 1966
Originality	Uses Test	M & F	TAT[f]	.42**	Pearson & Maddi, 1966
Originality	Uses Test	M	SPI	.37**	Pearson & Maddi, 1966
Originality	Uses Test	M	TAT[f]	.62**	Pearson & Maddi, 1966
Spontaneous Flexibility	Bricks Uses Test	M	TAT[f-h]	n.s.	Maddi, Propst & Feldinger, 1965
Spontaneous Flexibility	Stick-Figures Task	M	TAT[f-h]	n.s.	Maddi, Propst & Feldinger, 1965
Variety	Similes Preference Inventory	M & F	TAT[f]	.45**-.47**	Pearson & Maddi, 1966
Variety	Similes Preference Inventory	M & F	TAT[g]	n.s.	Pearson & Maddi, 1966
Variety	Similes Preference Inventory	M & F	TAT[h]	n.s.	Pearson & Maddi, 1966
Verbal Productivity	Anagrams Task	M	TAT[f-h]	n.s.	Maddi, Propst & Feldinger, 1965
Verbal Productivity	Bricks Uses Test	M	TAT[f-h]	n.s.	Maddi, Propst & Feldinger, 1965
Visual Complexity	Figure Preference Test	M	SSS[a]	.26*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	F	SSS[a]	.32*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	M	SSS[b]	.22*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	F	SSS[b]	.22*	Zuckerman et al., 1972

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Stimulus-Seeking			
Visual Complexity	Figure Preference Test	M	SSS[c]	.31*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	F	SSS[c]	.41*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	M	SSS[d]	n.s.	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	F	SSS[d]	.29*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	M	SSS[e]	.32*	Zuckerman et al., 1972
Visual Complexity	Figure Preference Test	F	SSS[e]	.34*	Zuckerman et al., 1972
		Anxiety			
Anxiety	Taylor Manifest Anxiety Scale	M	TAT[f]	.25*	Maddi & Andrews, 1966
Anxiety	Taylor Manifest Anxiety Scale	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Anxiety	Taylor Manifest Anxiety Scale	M	TAT[h]	.25*	Maddi & Andrews, 1966
Anxiety	Cattell's Sixteen Personality Factor Test	M	TAT[f]	n.s.	Maddi & Andrews, 1966
Anxiety	Cattell's Sixteen Personality Factor Test	M	TAT[g]	n.s.	Maddi & Andrews, 1966
Anxiety	Cattell's Sixteen Personality Factor Test	M	TAT[h]	.26*	Maddi & Andrews, 1966
Anxiety	S-R Inventory of Anxiousness	M	SSS[a]	-.35*--.06	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	F	SSS[a]	-.50**--.02	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	M	SSS[b]	-.53**--.02	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	F	SSS[b]	-.63**--.01	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	M	SSS[c]	-.31**--.05	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	F	SSS[c]	-.51**--.02	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	M	SSS[d]	-.23*-+.07	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	F	SSS[d]	-.37**-+.08	Segal, 1973
Anxiety	S-R Inventory of Anxiousness	M	SSS[e]	-.35**-+.07	Segal, 1973
		Intelligence-Aptitude			
Abstract Aptitude	Shipley-Hartford Scale	M	OFT	n.s.	Acker & McReynolds, 1965

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Intelligence-Aptitude			
Arithmetic Concepts	Iowa Test of Basic Skills	M^m & F^m	SSS	n.s.	Kish and Leahy, 1970
Arithmetic Problem-Solving	Iowa Test of Basic Skills	M^m & F^m	SSS	.20*	Kish and Leahy, 1970
Finger Dexterity	General Aptitude Test Battery	M^i	OFT	.28*	Kish, 1970b
General Learning Ability	General Aptitude Test Battery	M^i	OFT	.36**	Kish, 1970b
General Learning Ability[n]	General Aptitude Test Battery	M^i	OFT	.33[o]	Kish, 1970b
Intelligence	Cattell's Sixteen Personality Factor Test	M	TAT^f	.25*	Maddi & Andrews, 1966
Intelligence	Cattell's Sixteen Personality Factor Test	M	TAT^g	n.s.	Maddi & Andrews, 1966
Intelligence	Cattell's Sixteen Personality Factor Test	M	TAT^h	n.s.	Maddi & Andrews, 1966
Intelligence	General Classification Test	M	TAT^f	n.s.	Maddi & Andrews, 1966
Intelligence	General Classification Test	M	TAT^g	n.s.	Maddi & Andrews, 1966
Intelligence	General Classification Test	M	TAT^h	.27*	Maddi & Andrews, 1966
Intelligence	WAIS Vocabulary	M	TAT^{f-h}	n.s.	Maddi, Propst & Feldinger, 1965
Intelligence	General Classification Test	M	SPI	n.s.	Pearson & Maddi, 1966
Intelligence	General Classification Test	M	TAT^f	n.s.	Pearson & Maddi, 1966
Manual Dexterity	General Aptitude Test Battery	M^i	OFT	.28*	Kish, 1970b
Math Aptitude	Iowa Test of Basic Skills	M^m & F^m	SSS	sig.[p]	Kish & Leahy, 1970
Numerical Ability	General Aptitude Test Battery	M^i	OFT	.31*	Kish, 1970b
Total Aptitude	Shipley-Hartford Scale	M	OFT	n.s.	Acker & McReynolds, 1965

TABLE 2 (Continued)

Variable	Measure	Sex of Ss	Scale	r	Reference
		Intelligence-Aptitude			
Verbal Aptitude	Shipley-Hartford Scale	M	OFT	.38*	Acker & McReynolds, 1965
Verbal Intelligence	GT Vocabulary Test[q]	M & F	SPI	n.s.	Pearson & Maddi, 1966
Verbal Intelligence	GT Vocabulary Test[q]	M & F	TAT[f]	n.s.	Pearson & Maddi, 1966
		Interest			
Clerical	Kuder Preference Record	M[m] & F[m]	SSS	-.43**	Kish & Leahy, 1970
Computational	Kuder Preference Record	M[i]	OFT	.32*	Kish, 1970b
Persuasive	Kuder Preference Record	M[i]	OFT	.27*	Kish, 1970b
Scientific	Kuder Preference Record	M[i]	OFT	.30*	Kish, 1970b
Scientific	Kuder Preference Record	M[m] & F[m]	SSS	.36**	Kish & Leahy, 1970
		Demographic Variables			
Age	Chronological Age	M[r]	OFT	-.15*	Kish, 1970b
Education	Highest Educational Level Attained	M[r]	OFT	sig.[s]	Kish, 1970b
Education[t]	Highest Educational Level Attained	M[i]	OFT	-.04[o]	Kish, 1970b
Social Class	Autobiographical Questionnaire	M	TAT[f-h]	n.s.	Maddi & Andrews, 1966

*$p < .05$

**$p < .01$

TABLE 2 (Continued)

[a]Form IV; General Sensation Seeking

[b]Form IV; Thrill and Adventure Seeking Subscale

[c]Form IV; Experience Seeking Subscale

[d]Form IV; Disinhibition Subscale

[e]Form IV; Boredom Susceptibility Subscale

[f]scored for Novelty of Productions

[g]scored for Desire for Novelty

[h]scored for Curiosity

[i]alcoholics

[j]psychiatric patients

[k]Maze Test, Form A

[l]Maze Test, Form B

[m]high school freshman students

[n]education held constant

[o]partial correlation coefficient

[p]t test between High and Low aptitude groups; $p < .05$, one-tailed

[q]Thorndike (1926)

[r]alcoholics and chronic schizophrenics

[s]F test, $p < .01$

[t]general learning ability held constant

An examination of Table 2 reveals that among the dispositional variables hypomania again exhibits consistent positive correlations with stimulus seeking, as does extraversion. Fairly strong positive relationships may also be found between stimulus seeking and adventurousness, bohemianism, dominance, psychopathic deviation, radicalism, and surgency. Negatively correlated with sensation seeking are traits such as self-sentiment control, social introversion, and superego strength.

The portion of Table 2 labelled "Stimulus-Seeking" shows the relationships between scales specifically designed to measure individual differences in need for stimulus variation and various other tests tapping preferences and performances thought to be associated with stimulus seeking. The strongest positive relationships are found between need for stimulation and visual complexity and originality.

Anxiety measures such as the Taylor Manifest Anxiety Scale and the anxiety scale from Cattell's Sixteen Personality Factor Test have consistently resulted in nonsignificant relationships with stimulus seeking (Table 1 and Table 2). Segal (1973), however, using the S-R Inventory of Anxiousness, a scale designed to assess how a person responds to various types of specific situations, found a large number of statistically significant negative correlations with sensation seeking.

The majority of the intelligence and aptitude variables examined show little or no relationship with stimulus seeking. However, interest in computational, persuasive, or scientific occupations appears to be positively correlated with need for change while clerical interests appear to be negatively related to such needs.

An extremely useful compilation of research results relating specifically to the SSS may be found in Zuckerman's (Note 1) Manual and Research Report for the Sensation Seeking Scale. No attempt was made to include that large volume of data in Table 2.

CHAPTER III

METHOD

Subjects

The original pool of subjects consisted of 97 undergraduate psychology students at Oklahoma State University. On the basis of their scores on the Change Seeker Index, 30 subjects were selected for participation in the study and placed into one of three experimental groups, each consisting of five men and five women. Since it was desirable that the means for males and females within each CSI group be as similar as possible, five female subjects were excluded from the original subject pool, one because of her extremely low score (CSI = 25) and four for high scores (CSI scores ranging from 79 to 86) for which no comparably scoring males could be obtained. With these exceptions, the first experimental group was made up of subjects scoring highest on the CSI (High CSI Scorers), the second was composed of subjects clustering more closely about the overall group mean (Medium CSI Scorers), and the third consisted of subjects scoring lowest on the CSI (Low CSI Scorers). Table 3 shows the means and standard deviations for each of the CSI groups.

The subjects were not aware of the basis for their selection but were debriefed at the close of the experimental session. As in the earlier study, the subject selection procedure accomplished two main

TABLE 3

MEANS AND STANDARD DEVIATIONS OF HIGH, MEDIUM, AND LOW CSI GROUPS

CSI Group	M	SD
High	66.30	1.95
Males	65.20	1.48
Females	67.40	1.82
Medium	52.50	2.76
Males	53.40	2.07
Females	51.60	3.29
Low	37.60	4.09
Males	38.40	4.98
Females	36.80	3.35

purposes: it maximized the differences in mean CSI scores among the three experimental groups and avoided possible problems associated with volunteer bias (Zuckerman, Schultz, & Hopkins, 1967).

Participation in the study was not compulsory; however, a small credit toward their final course grade was sufficient incentive to gain the initial cooperation of all subjects.

Three subjects failed to complete the entire experimental session. Two of these (a High CSI female and a Low CSI male) left early in the session and were replaced by similarly scoring individuals from the original subject pool. The third, a High CSI male, remained in the experimental cubicle long enough (over two hours of the three-hour session) to warrant including his data in the analysis.

The Change Seeker Index and Boredom Susceptibility Subscale

The Change Seeker Index consists of 95 true-false items, keyed in the direction of "high change seeking," and is based upon a wide variety of personal preferences and self-perceptions (see Appendix A). A detailed description of the scale and its reliability and validity may be found elsewhere (Garlington & Shimota, 1964; V. G. Ruder, Note 4).

The Boredom Susceptibility (BS) subscale of the Sensation Seeking Scale was derived from one of the four factors resulting from a factor analysis of the experimental Form III of the SSS (Zuckerman, 1971). Boredom Susceptibility was not as clearly defined in its structure as the other subscales, having a factor reliability across sexes of only .37 as compared with reliabilities of .95 for the General subscale, .75 for Thrill and Adventure Seeking, .83 for Experience Seeking, and .81

for Disinhibition. Split-half reliabilities were computed on the original sample and on a replication sample. In the replication sample the reliability of the male BS scale dropped from .75 to .56, and the female BS subscale fell from .58 to .36, requiring that the female BS scale be dropped. The male scale, however, has been used for females in some later studies, and the practice was followed in the present experiment. Satisfactory retest reliabilities have been obtained on the BS subscale in two subsequent studies, resulting in r's of .87 and .82 (Zuckerman, Note 1).

The BS subscale is made up of 18 forced-choice items selected from the larger 72-item Sensation Seeking Scale, a scale purporting to measure one's need for stimulation from primarily external sources. Eighteen additional "filler" items from the General Sensation-Seeking subscale were added to the BS subscale, bringing the scale used in the present study to a total of 36 items (see Appendix B).

The CSI and BS were administered concurrently, the two scales being described simply as "interest tests" which were being administered as part of a "long term research project."

Apparatus and Experimental Task

The basic apparatus was housed in a small cabinet, 51 cm. long, 48 cm. wide, and 76 cm. high containing a Kodak Carousel Projector, a speaker connected with a white noise generator, a "Magic Window" (see below), and, in a separate unit, the circuitry involved in signalling the subject's affect rating (see below). In the top of the cabinet was a small 10 cm. by 10 cm. screen on which a simple addition problem was

backprojected. To the right of the screen were two push buttons, one labelled "true" and the other "false" (see Figure 1).

Each problem required the addition of three four-digit numbers. A sum was provided for each problem, but it always differed from the correct sum by one to five digits. A red number, either "1," "2," "3," "4," or "5," appeared in an adjacent box and the subject's task was to determine whether or not the number in the box correctly or incorrectly specified the number of "wrong" digits in the presented sum. For example, in the following problem two digits in the presented sum differ from the corresponding digits (underlined) in the correct sum (correct sum = 1<u>4</u>8<u>8</u>7). Since the number in the box is other than "2," however,

$$\begin{array}{r} 1347 \\ 9814 \\ 3726 \\ \hline 15897 \end{array} \qquad \boxed{3}$$

and is therefore "false," the subject would press the "false" button. If the number in the box had been "2," the subject would have pressed the "true" button.

A random table was used to construct the 140 addition problems, to determine placement of the "incorrect" digits, and to determine whether the problem was to be "true" or "false" with the restriction that the number of true and false problems be equal. The handwritten problems were then photographed as 35mm slides for presentation to the subject.

In order to guarantee that each subject was forced to work through the entire problem in order to arrive at a true or false decision, the number in the box was always either equal to (in the case of true answers) or one greater than (false answers) the actual number of incorrect digits. Such precautions were taken to make the time required to work all the problems as nearly similar as possible. If the number in

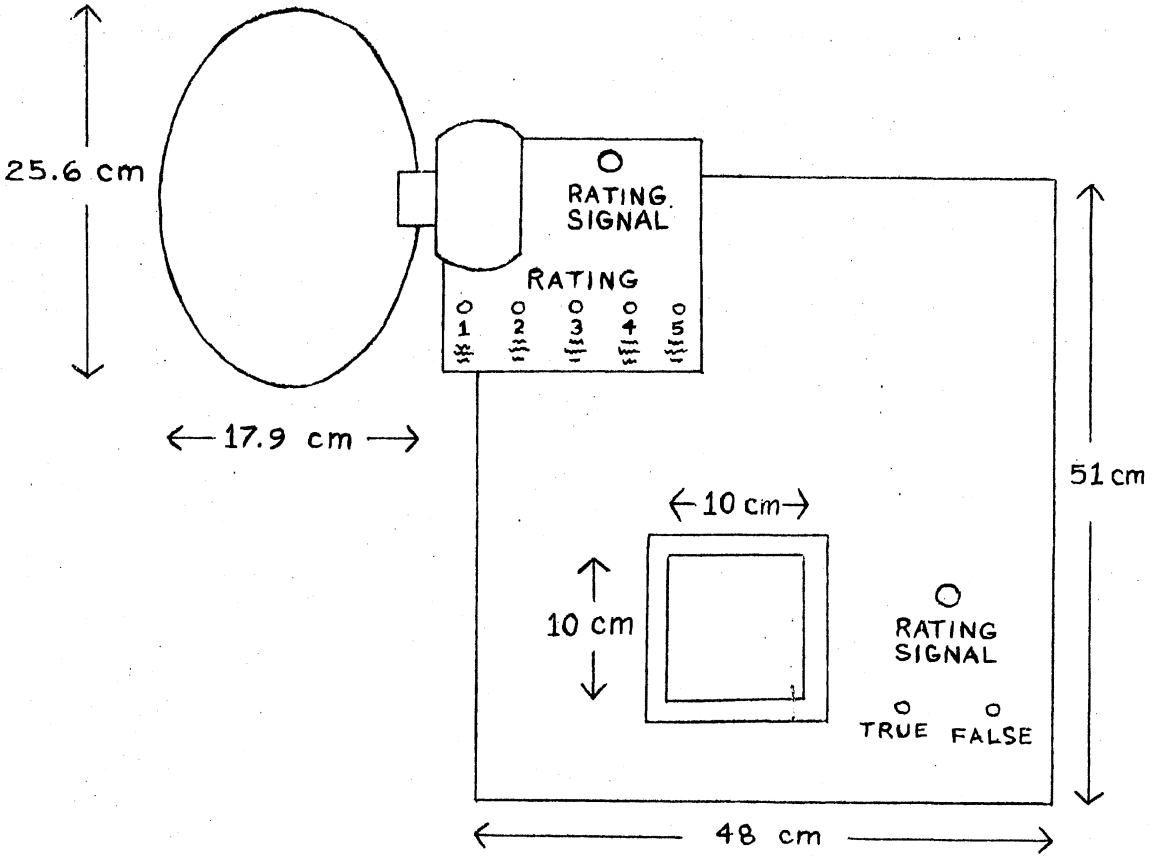

FIG. 1. Diagram of Apparatus Viewed from the Top Showing Placement of Screen, True-False Buttons, Rating Signal Lights, and Magic Window

the box were a "1," for example, and the subject discovered that the first two digits in the provided answer were both incorrect, he could correctly answer the problem without finding it necessary to work out the remaining sums. If the actual number of wrong digits consistently equalled or exceeded the number in the box, however, the subject would inevitably be required to check each sum in order to be sure he answered the problem correctly. The presented sums were always five-digit numbers so that subjects were never forced to tally more than five incorrect digits, and all subjects were given a "hint" that using the fingers of one hand was an easy way to keep a tally.

As soon as either a true or false response was made, the projector automatically advanced to the next problem. Since all the spaces in the circular slide tray of the projector were filled, the subject was able to repeat the problems as many times as necessary during the experimental session. The truth or falsity of each problem was indicated on a portion of the slide not visible to the subject. A patch that was either white (in the case of true problems) or black (false problems) was read by a photoelectric cell and compared with the subject's true or false response. Thus, the subject's responses were graded automatically, with correct responses activating one channel and incorrect responses activating a second channel of an event recorder located in an adjacent room.

Attached to the top of the apparatus, but to one side so that it could move freely, was a "Magic Window" (Wham-O Manufacturing Company), a children's toy available at many department stores. The toy is a "sandwich" made of two thin, flat, oval-shaped sheets of plexiglas, partially filled with sand-like granular substances. Approximately

one-half of the sand-like material is high-density, heavy, and blue in color, while the other half is low-density, light-weight, and white. When the position (attitude) of the toy is changed through rotation, placing, for example, the blue grains above the white, the blue substance "sinks" through the white while the white "floats" and swirls to the top, creating interesting, often intricate, and constantly changing visual patterns. The toy was attached to a small electric motor which the subject could operate by pressing a small push-button, allowing him to rotate the Magic Window at a very slow speed. The push-button also activated the "hit" channel of the event recorder so that the time the subject spent "playing" could be monitored.

Also mounted in the top of the apparatus was a row of five push-buttons with each button corresponding to one point of a five-point scale which the subject used to rate the degree of interest he felt in the task. Each button was clearly labelled with adjectives appropriate to the corresponding point on the scale (see Appendix C). Subject's ratings were recorded on a separate event recorder, also located in the adjacent cubicle, with one channel devoted to each of the five points on the scale. Ratings were requested at 10-minute intervals by an automatically triggered signal light which the subject turned off by making his rating response.

In the earlier study, subjects had been provided with feedback concerning the number of correct responses made. The apparatus constructed for the present study provided no such feedback, however, for a number of reasons. First, a number of subjects in the earlier study had indicated that the feedback counter helped to maintain their interest in the task by allowing them to structure their time around a certain number of

obtained correct answers, i.e., they would take a break after every ten problems or so; or by setting quotas for themselves, etc. Second, since the experimental task was designed to simulate working conditions experienced by many lower level white-collar workers (see Appendix D), it was felt that not providing immediate feedback as to the correctness of response was more natural than providing such information. Finally, it was believed that the elimination of the feedback would make the task even less stimulating and, therefore, more monotonous than that of the earlier study.

Procedure

Subjects were tested individually for three-hour sessions. Reasons for selecting a three-hour period have been described elsewhere (V. G. Ruder, Note 4).

When a subject agreed to participate he received a page of ten practice problems to take home and complete. (Pilot subjects indicated that ten problems provided an adequate "warm-up" experience.) When the subject arrived at the laboratory his practice problems were checked, and he was asked to remove his watch and leave any papers, pens, books, etc. with the experimenter. He was then shown the recording apparatus in the cubicle adjacent to the one in which he would be staying. Particular attention was drawn to the "hit" and "miss" channels to make it clear to the subject that the accuracy of his responses was being monitored; subjects were urged not to guess at the answers to the problems in the experimental task. The subject then proceeded to the experimental cubicle where he was given detailed instructions concerning the task, the toy, and the rating system (see Appendix D).

Briefly, the subject was told to try to get as many problems correct and as few incorrect as possible. He was also informed, however, that he was perfectly free to structure his time in any way he might like, i.e., that he might take rest breaks whenever he felt a need to do so or play with the toy as much or as little as he liked.

The subject was then asked to work through two or three problems with the experimenter present and was invited to ask any questions he might have had concerning the task, the toy, the ratings, or anything else regarding the experimental set-up. When all questions had been answered to the subject's satisfaction, the experimenter retired to an outer room where she remained throughout the experimental session.

In addition to the collection of data with respect to the dependent variables described below, the subjects were observed for short periods of time at regular intervals during the experimental session. One-minute observations of the subject's behavior were made by the experimenter every twenty minutes through a one-way mirror in the door of the experimental cubicle, and notes were made during each observation period concerning the subject's activity. Subjects were informed that the door was equipped with a one-way glass and that the experimenter would occasionally check to make sure the equipment was functioning properly, but that they should not feel that they were going to be watched constantly.

After three hours the subject was debriefed, thanked for his cooperation, and excused.

Dependent Variables

A number of dependent variables were examined in the present

experiment. Some of these were used in the earlier study, others were derived in an attempt to clarify ambiguities which existed in the earlier results.

Mean Length of Work Period. A "work period" was defined as that period of time in which the subject worked on the experimental task without pausing for a rest break. A work period, then, consisted of one or more consecutive "problem periods"--periods of time elapsing between button presses during which the subject was presumably working out a problem. Problem periods were defined operationally by the following procedure: Following each 10-minute period a 5-minute sample of behavior was analyzed. The amount of time between each button press was measured and recorded. Since the experimental session was divided into four quarters of 45 minutes each, three such samples were collected for each quarter. The median amount of time elapsing between button presses during the three samples of each quarter was calculated and arbitrarily designated as the maximum length of a problem period. A new maximum problem period was determined for each of the four quarters of the experimental session.

The procedure for determining problem periods (and thus work periods) accomplished two primary goals: First, the sampling technique greatly facilitated data reduction, a task which proved excessively time-consuming in the earlier study, while continuing to provide access to information concerning the subject's ability to persist in the performance of the experimental task. Second, calculating a new problem for each quarter of the session minimized practice and fatigue effects. It was suggested that the finding in the earlier study that all CSI

groups spent a greater proportion of their time in breaks during the first quarter of the session than during any of the succeeding three periods could have been due to an "inadequate criterion used to establish the 'problem period'," one that appeared to be too long after the initial portion of the session during which the subject was warming up to the experimental task (V. G. Ruder, Note 4). The computation of a new problem period for each quarter was intended, therefore, to correct for increases or decreases in the subject's ability to work the problems as the experimental session wore on.

The mean amount of time spent per work period was computed for each subject to test the hypothesis (based on the finding of the earlier study) that Medium CSI scorers work on monotonous tasks longer at a time before taking a break than either the High or Low CSI subjects.

Proportion of Time Spent in Work. While long mean lengths of work periods might appear to dictate that the subject spend a correspondingly large proportion of his time working problems, such a finding was not inevitable. It would have been possible, for example, for two subjects to have obtained very different mean length of work period scores, yet actually have spent proportionately the same amount of time on the experimental task. One subject could have interspersed short work periods with short breaks (producing a short mean length of work period), while the other, though spending the same proportion of time on the task, could have worked for a single long period followed by a long rest. To allow examination of such a possibility, proportion of time spent in work periods was analyzed as a variable apart from that of mean length of work periods with the expectation that Medium CSI scorers would work on the experimental task for a greater proportion of time

than would High or Low scorers.

Number of Problems Attempted and Proportion Answered Correctly. Although the primary purpose of the present study was to examine tolerance for monotonous situations and the ability to persist at a repetitive task, the data for number of problems attempted and for the proportion of those problems answered correctly (measures of "efficiency") for each subject were readily available. No a priori predictions were made, however, concerning either dependent variable.

Shifts in Activity. As explained in the Introduction, shifts in activity appeared to be a potentially useful dependent variable, and two such variables, total number of shifts and proportion of shifts from work to play (see below), seemed particularly helpful in testing the line of reasoning spelled out previously.

With the addition of the play option to the experimental situation, six different shifts in activity were made possible: (a) from work (the experimental task) to play (activating the toy), (b) from work to rest (doing nothing, daydreaming, stretching, etc.), (c) from play to work, (d) from play to rest, (e) from rest to work, and (f) from rest to play. The total number of shifts, regardless of nature and direction, were calculated for each subject to test the hypothesis that High CSI scorers, because of their higher need for stimulus variation, would make more shifts in activity than either the Medium or Low CSI groups. As in the earlier study, however, number of shifts presented the potential problem of dependency on length of work periods. It is apparent that subjects with long work periods would make fewer shifts in activity than would subjects who work for shorter periods of time.

The problem of dependency, however, was eliminated for a second dependent variable based on shifts: While Medium CSI scorers were expected to maintain long work periods in comparison with the other two groups, the High and Low subjects were predicted to look much alike on the length of work period variable, i.e., both groups were expected to show short work periods. Since the primary goal of the present study was to differentiate between the High scorers and the Low CSI subjects, one particular type of shift, that from work to play, appeared to be the most promising in making this distinction apparent. Once High CSI scorers had tired of the repetitive task it might be expected that, given a choice between rest (doing nothing) and play (an activity providing external variation while requiring little "cognitive effort"), they would more frequently choose to play. Low CSI scorers, on the other hand, thought not to need much change in their environment, would be expected to shift more often from work to rest, and should therefore show a smaller <u>proportion</u> of work-to-play shifts than High scorers.

Requesting visual stimulation was a variable studied by Lambert and Levy (1972) who presented slides chosen to "maximize the available information by minimizing their predictability" to subjects in a sensory isolation experiment. High sensation-seeking subjects were found to view slides at a higher rate than low scorers during the two-hour period, an effect shown in a significant sensation-seeking x time interaction. Although slide-viewing was the only form of stimulation available to the subjects in the Lambert and Levy study and, thus, is not entirely comparable to the present study, it seemed reasonable nevertheless to predict that the increased proportion of shifts to play (consisting of viewing a complex visual stimulus) expected for High CSI

scorers might not occur until late in the experimental session. Therefore, a significant CSI x Quarters interaction was expected.

Affect Ratings. Subjective affect ratings from the earlier study clearly indicated that all subjects, regardless of CSI group, became progressively more bored and disinterested in the task as the experimental session progressed. Pilot work using the new experimental task indicated, however, that the new task did not require quite the cognitive effort the task in the earlier study did. Thus, the new task, with the further addition of the toy, could conceivably have changed the subjective ratings concerning the task itself. No specific predictions regarding the subjective ratings were made, however.

Statistical Analysis

Inter-response intervals were measured for purposes of data analysis to the nearest millimeter (0.8 sec.). Missing cells at the end of the session for the High CSI male who left the experiment early were filled with mean scores for the remaining four High CSI males.

A Pearson *r* was computed between CSI scores on the BS subscale. Further, BS subscale scores were correlated with each of the dependent variables.

A priori *t* tests were made corresponding to the previously stated hypotheses, followed by seven analyses of variance, one for each of the dependent measures. Each analysis was based on a 3 x 2 x 4 factorial arrangement (High, Medium, and Low CSI scorers x Sex x four quarters of 45 minutes each) with repeated measures on the last factor (Winer, 1971, pp. 559-571). The model underlying the design of the present study (see Appendix E) requires that the order of presentation of the

repeated factor, Quarters, be randomized separately for each subject. Failure to meet this requirement may have resulted in a violation of the compound symmetry assumption of the model, lending a positive bias to F tests of the repeated factor and interactions involving that factor. The Greenhouse-Geiser conservative procedure was used to adjust the degrees of freedom downward, modifying the critical values for those F tests, and thereby compensating for the potential positive bias (Winer, 1971, pp. 523-524; Kirk, 1968).

Biomedical computer program No. BMD 08V was used to compute the analyses of variance. Pearson product moment correlation coefficients between scores on the BS subscale and each of the seven dependent variables were computed using the STP program for correlations from Western Michigan University (1973).

Post hoc examinations of the data were made using the Newman-Keuls comparison procedure and, where appropriate, the Scheffé technique.

CHAPTER IV

RESULTS

The mean CSI score for the original pool of subjects (n = 96) was 54.0 (SD = 12.51), a finding entirely in agreement with mean CSI scores reported in several other studies of Oklahoma State University students: M = 54.2 (SD = 13.1) and M = 53.6 (SD = 12.6) for two groups of undergraduates (Brown, Ruder, Ruder, & Young, 1974); M = 54.66 (SD = 12.39) (V. G. Ruder, Note 4); and M = 53.03 (SD = 11.49) (J. H. Ruder, Note 5).

A preliminary visual examination of CSI group means for the various dependent variables revealed differences in the hypothesized direction of two variables, proportion of time spent working and proportion of shifts from work to play (Table 4). Appropriate a priori comparisons were made for these two variables, followed by the seven previously mentioned analyses of variance.

Mean Length of Work Periods

The analysis of variance (ANOVA) for mean length of work periods resulted in no significant differences for any of three factors examined, CSI group, Sex, or Quarters, nor for any interactions involving these variables (Table 5).

Proportion of Time Spent in Work

An examination of Table 4 suggests that Medium CSI scorers obtained

TABLE 4

MEANS FOR THREE CSI GROUPS ON EACH OF SEVEN DEPENDENT VARIABLES

Variable	Low CSI	Medium CSI	High CSI	Predictions
Mean Length of Work Period (seconds)	37.31	34.99	30.66	M > H or L
Proportion of Time Spent Working	.56	.65	.52	M > H or L
Number of Problems Attempted	80.92	177.97	150.85	none
Proportion of Problems Answered Correctly	.85	.89	.88	none
Total Number of Shifts in Activity	27.22	35.88	30.05	H > M or L
Proportion of Shifts from Work to Play	.013	.006	.025	H > L
Mean Affect Ratings	2.47	3.00	2.00	none

TABLE 5

SUMMARY OF THE ANALYSIS OF VARIANCE FOR MEAN LENGTH OF WORK PERIODS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		188.19	.83
Sex	1		334.84	1.47
CSI x Sex	2		76.70	.34
Subjects Within Groups	24		227.20	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	52.42	1.05
CSI x Quarters	6	2	29.96	.60
Sex x Quarters	3	1	30.22	.61
CSI x Sex x Quarters	6	2	48.09	.96
Quarters x Subjects Within Groups	72	24	49.89	

a larger mean proportion score than either High or Low scorers, as had been predicted. An a priori t test, comparing the mean score for Medium CSI subjects with the combined means for the High and Low scoring subjects, resulted in a $t_{obs} = 1.57$ ($p < .07$).

A significant F value resulted for the Quarters factor in the overall ANOVA for proportion of time spent working (Table 6). The Newman-Keuls test indicated that all CSI groups spent a significantly greater proportion of time working during the first quarter of the experimental session than during the fourth quarter ($p < .01$; Table 7).

Number of Problems Attempted and Proportion of Problems Answered Correctly

The ANOVA for number of problems attempted resulted in one significant F ratio, that for Quarters (Table 8). The Newman-Keuls procedure revealed that all subjects attempted significantly more problems during the first quarter than during the last quarter of the experimental session ($p < .01$; Table 9). The ANOVA for proportion of problems answered correctly, however, resulted in no significant differences among any of the factors examined (Table 10).

Total Number of Shifts

The ANOVA for total number of shifts in activity resulted in a significant difference for the Quarters factor ($p < .01$; Table 11). The Newman-Keuls test showed significantly more shifts for all CSI groups during the first quarter than during each of the other three quarters ($p < .01$; $p < .05$; $p < .05$) and also significantly more shifts during

TABLE 6

SUMMARY OF THE ANALYSIS OF VARIANCE FOR PROPORTION OF TIME SPENT WORKING

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		.192	1.45
Sex	1		.090	.68
CSI x Sex	2		.009	.07
Subjects Within Groups	24		.133	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	.199	10.43**
CSI x Quarters	6	2	.015	.82
Sex x Quarters	3	1	.014	.76
CSI x Sex x Quarters	6	2	.015	.76
Quarters x Subjects Within Groups	72	24	.02	

**$p < .01$

TABLE 7

NEWMAN-KEULS TEST ON QUARTERS FOR PROPORTION OF TIME SPENT WORKING

Quarter	4	3	2	1	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Means	.48	.58	.58	.68			
4		.10	.10	.20**	4	4.91	.15
3			.00	.10	3	4.55	.14
2				.10	2	3.96	.12

[a] $s_{\bar{d}} = .031$

** $p < .01$

TABLE 8

SUMMARY OF ANALYSIS OF VARIANCE FOR NUMBER OF PROBLEMS ATTEMPTED

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		100,293.1	1.03
Sex	1		351,000.7	3.59
CSI x Sex	2		7,226.4	.43
Subjects Within Groups	24		97,767.9	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	7,226.4	4.49*
CSI x Quarters	6	2	3,449.1	2.14
Sex x Quarters	3	1	3,328.2	2.06
CSI x Sex x Quarters	6	2	1,986.2	1.23
Quarters x Subjects Within Groups	72	24		

*$p < .05$

TABLE 9

NEWMAN-KEULS TEST ON QUARTERS FOR NUMBER OF PROBLEMS ATTEMPTED

Quarter	4	3	2	1	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Means	115.83	137.10	140.10	153.30			
4		21.27	24.27	37.47**	4	4.91	35.99
3			3.00	16.20	3	4.55	33.35
2				13.20	2	3.96	29.03

[a] $s_{\bar{d}} = 7.33$

** $p < .01$

TABLE 10

SUMMARY OF THE ANALYSIS OF VARIANCE FOR PROPORTION OF PROBLEMS ANSWERED CORRECTLY

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		.016	.99
Sex	1		.001	.09
CSI x Sex	2		.009	.58
Subjects Within Groups	24		.016	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	.004	.36
CSI x Quarters	6	2	.005	.50
Sex x Quarters	3	1	.013	1.44
CSI x Sex x Quarters	6	2	.014	1.42
Quarters x Subjects Within Groups	72	24	.010	

TABLE 11

SUMMARY OF THE ANALYSIS OF VARIANCE FOR TOTAL NUMBER OF SHIFTS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		685.06	.92
Sex	1		1,732.80	2.32
CSI x Sex	2		52.72	.07
Subjects Within Groups	24		744.85	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	596.10	9.27**
CSI x Quarters	6	2	83.56	1.29
Sex x Quarters	3	1	36.20	.56
CSI x Sex x Quarters	6	2	25.69	.40
Quarters x Subjects Within Groups	72	24	64.32	

** $p < .01$

quarters two and three than during quarter four ($p < .05$; Table 12).

Proportion of Shifts from Work to Play

Table 4 shows the predicted pattern of means on the proportion of shifts from work to play variable, with the High CSI scorers appearing to shift more frequently than the Low scorers. A t test revealed the difference to be a nonsignificant one, however ($t_{obs} = 0.98$; $t_{.05, 24} = 1.71$).

Table 13 shows no statistically significant F ratios resulting from the ANOVA for proportion of shifts from work to play for CSI groups, Sex, or Quarters. The pattern of means for the CSI x Quarters interaction is in the hypothesized direction, however, and is illustrated in Figure 2. While the probability level of the interaction is not low ($p < .16$), a test of simple main effects was computed since the cell means followed the hypothesized change over time. The test revealed a significant difference among CSI groups during the third quarter ($p < .05$; Table 14).

Affect Ratings

The ANOVA of the affect ratings resulted in two significant F ratios, one for the CSI factor ($p < .05$), the second for Quarters ($p < .01$; Table 15). The Newman-Keuls procedure failed to locate a significant difference between any pair of CSI means (Table 16); however, since it appeared that the Medium scorers were less bored by the task than either the High or Low scoring subjects (Table 4), a Scheffé F ratio comparing a combination of the means for the High and Low CSI

TABLE 12

NEWMAN-KEULS TEST ON QUARTERS FOR TOTAL NUMBER OF SHIFTS

Quarters	4	3	2	1	r	$q_{.95}(r,24)$	$s_{\bar{d}}q_{.95}(r,24)$[a]
Means	25.23	30.93	31.23	36.13			
4		5.70*	6.00*	10.90**	4	3.90	5.69
3			.30	5.20*	3	3.53	5.15
2				4.90*	2	2.92	4.26

[a] $s_{\bar{d}} = 1.46$

* $p < .05$

** $q_{.99}(r,24) = 4.91$; $s_{\bar{d}}q_{.99}(r,24) = 7.17$; $p < .01$

TABLE 13

SUMMARY OF THE ANALYSIS OF VARIANCE FOR PROPORTION OF SHIFTS FROM WORK TO PLAY

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		.0035	1.14
Sex	1		.0052	1.70
CSI x Sex	2		.0046	1.51
Subjects Within Groups	24		.0031	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1		.57
CSI x Quarters	6	2		2.09[a]
Sex x Quarters	3	1		.42
CSI x Sex x Quarters	6	2		.82
Quarters x Subjects Within Groups	72	24		

[a] $p < .16$

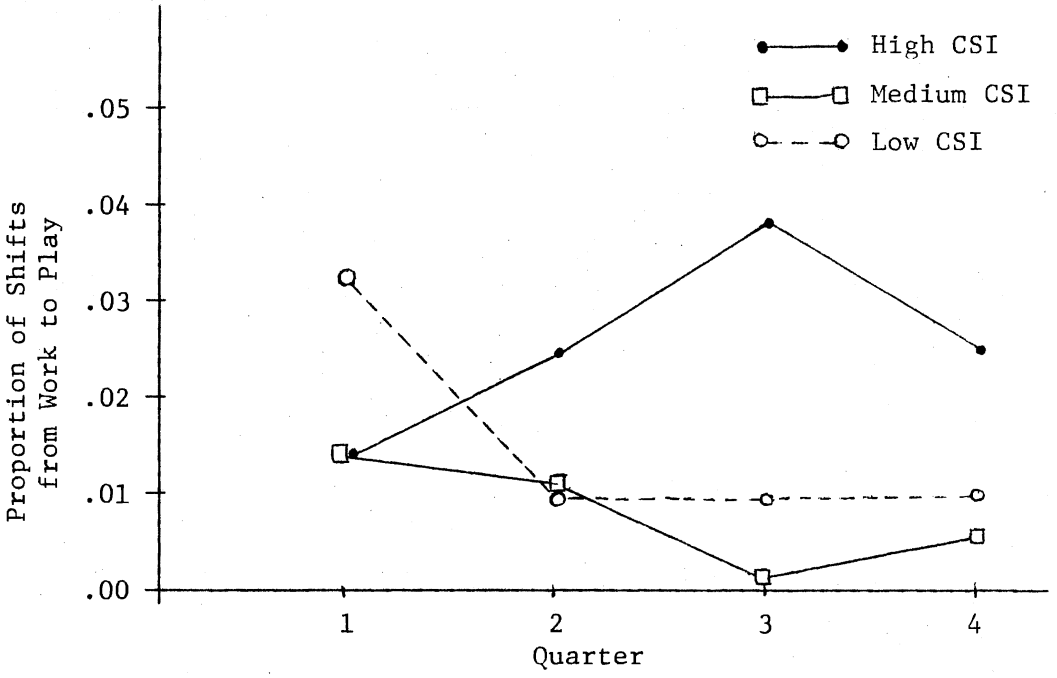

FIG. 2. Interaction Between CSI Scores and Quarters for Proportion of Shifts from Work to Play.

TABLE 14

SUMMARY OF THE TEST FOR SIMPLE MAIN EFFECTS FOR PROPORTION OF SHIFTS FROM WORK TO PLAY FOR CSI GROUPS AT EACH QUARTER

Source	df	MS	F
Between Subjects			
CSI at Quarter 1	2	.0010	.84
CSI at Quarter 2	2	.0010	.84
CSI at Quarter 3	2	.0045	3.78*
CSI at Quarter 4	2	.0015	1.26
Within Cells (pooled)	96	.00119	

* $p < .05$

TABLE 15

SUMMARY OF ANALYSIS OF VARIANCE
OF AFFECT RATINGS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		10.01	4.12*
Sex	1		.06	.03
CSI x Sex	2		.09	.04
Subjects Within Groups	24		2.43	
	Conventional	Conservative		
Within Subjects	90			
Quarters	3	1	12.09	26.17**
CSI x Quarters	6	2	.65	1.40
Sex x Quarters	3	1	.04	.09
CSI x Sex x Quarters	6	2	.19	.41
Quarters x Subjects Within Groups	72	24	.46	

* $p < .05$

** $p < .01$

scorers with the mean for the Medium group was calculated and found to approach significance ($F_{obs} = 6.42$; $p < .06$).

The Newman-Kuels test of the Quarters effect resulted in significant differences between quarter one and quarters two, three, and four ($p < .01$) and between quarter two and quarter four ($p < .01$), indicating that all subjects, regardless of CSI group, rapidly became bored (i.e., made lower interest ratings) soon after the first portion of the experimental session (Table 17). On the five-point rating scale the mean rating for quarter one was 3.37; for quarter two, 2.50; for quarter three, 2.19; and quarter four, 1.91.

The Boredom Susceptibility Scale

A Pearson r was computed between CSI scores and scores on the BS subscale of the SSS for those subjects who participated in the study, resulting in an r of .41 ($p < .02$).

Table 18 shows the correlations between BS scores and each of the seven dependent variables. None of the relationships reaches significance at the .05 level ($r_{.05,28} = .36$); however, those for total number of problems attempted ($r = .30$) and proportion of problems answered correctly ($r = .27$) approach the .10 alpha level, $r_{.01,28} = .31$.

Observational Behavior Sampling

No statistical analysis of the observational data gathered during the brief periods of behavior sampling was attempted. Instead, subject protocols were arranged by CSI group and examined for overall qualitative differences. Some sample protocols may be seen in Appendix F.

TABLE 16

NEWMAN-KEULS TEST ON CSI GROUPS
FOR AFFECT RATINGS

Group	1	3	2	r	$q_{.95}(r,24)$	$s_{\bar{d}}q_{.95}(r,24)$[a]
Mean	2.00	2.47	3.00			
1		.47	1.00	3	3.53	1.73
3			.53	2	2.92	1.43

[a] $s_{\bar{d}} = .49$

TABLE 17

NEWMAN-KEULS TEST ON QUARTERS
FOR AFFECT RATINGS

Quarter	4	3	2	1	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Mean	1.91	2.19	2.50	3.37			
4		.28	.59**	1.46**	4	4.91	.59
3			.31	1.18**	3	4.55	.55
2				.87**	2	3.96	.48

[a] $s_{\bar{d}} = .12$

TABLE 18

CORRELATIONS BETWEEN SCORES ON THE BOREDOM SUSCEPTIBILITY SUBSCALE AND EACH OF SEVEN DEPENDENT VARIABLES

Variable	r
Mean Length of Work Periods (seconds)	-.1321
Proportion of Time Spent Working	-.2101
Number of Problems Attempted	.3003
Proportion of Problems Answered Correctly	.2749
Total Number of Shifts in Activity	.1050
Proportion of Shifts from Work to Play	.1949
Affect Ratings	-.1328

Nearly all subjects, regardless of CSI group, were observed at one time or another performing such behaviors as "drumming" on the apparatus with their fingers, twisting strands of hair or running their fingers through their hair, whispering to themselves as they worked through the problems, rocking back and forth on the office-type chair provided for them, or bouncing their heels up and down rapidly or tapping the floor with their toes. A few subjects, however, produced some unusual responses. One High CSI female ended the experimental session by singing very loudly and clapping her hands in time to the music. Two High CSI scorers (one male, one female) attempted to look out of the experimental cubicle by shielding their eyes and peering through the one-way window. Another high-scoring male turned suddenly to the window in the door, stuck a thumb in each ear, wiggled his fingers, and made a face. One Medium CSI female pulled two loose nails from the apparatus and carved pictures and messages on the plastic screen and electrical tape surrounding it. Three subjects turned out the light in the experimental cubicle, one Medium CSI male only briefly, two Low CSI males for more than an hour. One High CSI male laid his head on his arms across the top of the apparatus and appeared to be sleeping for approximately 20 minutes.

A feature shared by all of these unusual behaviors is that they may be interpreted as attempts to escape from the experimental situation, an interpretation which appeared to warrant further investigation. Table 19 shows a frequency distribution of such extreme behaviors as they appeared among CSI groups for each of the three hours of the experimental session. "Extreme behaviors" were defined subjectively by the experimenter as responses which occurred relatively infrequently among

TABLE 19

FREQUENCY OF EXTREME BEHAVIORS FOR CSI GROUPS
AT EACH HOUR OF EXPERIMENTAL SESSION

	Hour			
CSI Group	1	2	3	Total
High	25	37	22	84 (46%)
Medium	9	16	26	51 (28%)
Low	15	21	11	47 (26%)
Total	49 (27%)	74 (41%)	59 (32%)	182

the majority of subjects and appeared to involve an "attempt to escape" from the experimental situation. For example, responses such as leaving the chair to attempt to peer through the one-way window or into the back of the apparatus, singing, pressing the response buttons on the apparatus in unusual ways, "prowling" around the experimental cubicle, or behaviors that indicated the subject might be sleeping or close to sleep, such as sitting with arms folded across chest, eyes closed, breathing deeply were included in the frequency count. According to Table 19, High CSI scorers produced 46 percent of the noted behaviors during the entire session, with the Medium CSI group showing 28 percent, and the Low CSI subjects 26 percent of the remaining unusual responses. During the three hours of the session, 27 percent of the behaviors were produced during the first hour, 41 percent during the second, and 32 percent during the third. From Figure 3, which graphs the frequency of unusual responses for the three CSI groups against time, it is apparent that the High and Low CSI subjects showed a similar pattern of responding with the number of extreme behaviors peaking during the second hour. As mentioned previously, however, the High and Low scoring subjects differed in absolute frequency of responding. Medium CSI scorers, on the other hand, showed a steady increase in the number of "escape" responses exhibited.

A second type of behavior pattern that was examined in some detail was the frequency of occurrence of grooming and comfort responses, such as the subject scratching his head, combing through his hair with his fingers, cleaning his fingernails, etc., and repetitive behaviors, such as drumming on the apparatus with his fingers, tapping toes on the floor, rocking back and forth in the chair, etc. Table 20 displays the response

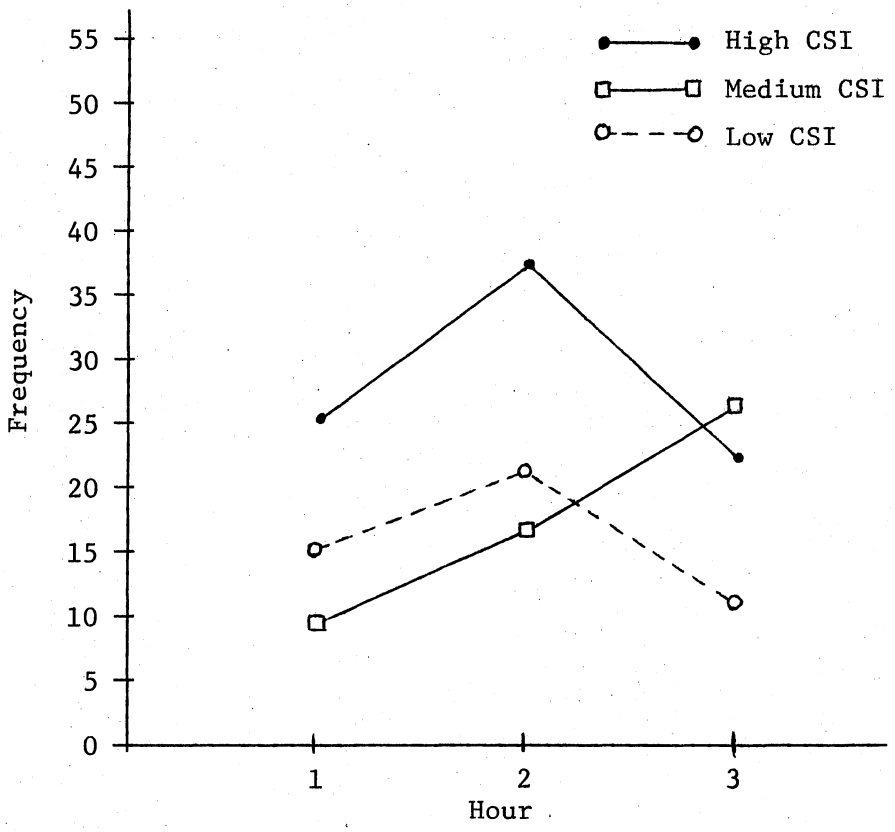

FIG. 3. Graph of Frequency Distribution of Extreme Behaviors for CSI Groups at Each Hour of Experimental Session.

frequencies by CSI group and number of hours into the experimental session, revealing that 43 percent of the grooming and repetitive behaviors were performed by High CSI scorers, 31 percent by the Medium group, and the remaining 26 percent by the Low CSI subjects. Twenty-eight percent of the responses were executed during the first hour of the session, 33 percent during the second, and 39 percent during the third. Figure 4 further shows that all three CSI groups showed similar trends in responding, i.e., a gradual increase over time, with the curve for the High groups appearing to be somewhat steeper than that of the Medium and Low CSI subjects.

TABLE 20

FREQUENCY OF GROOMING AND REPETITIVE BEHAVIORS FOR CSI GROUPS AT EACH HOUR OF EXPERIMENTAL SESSION

	Hour			
CSI Group	1	2	3	Total
High	22	32	35	89 (43%)
Medium	20	20	23	63 (31%)
Low	15	17	22	54 (26%)
Total	57 (28%)	69 (33%)	80 (39%)	206

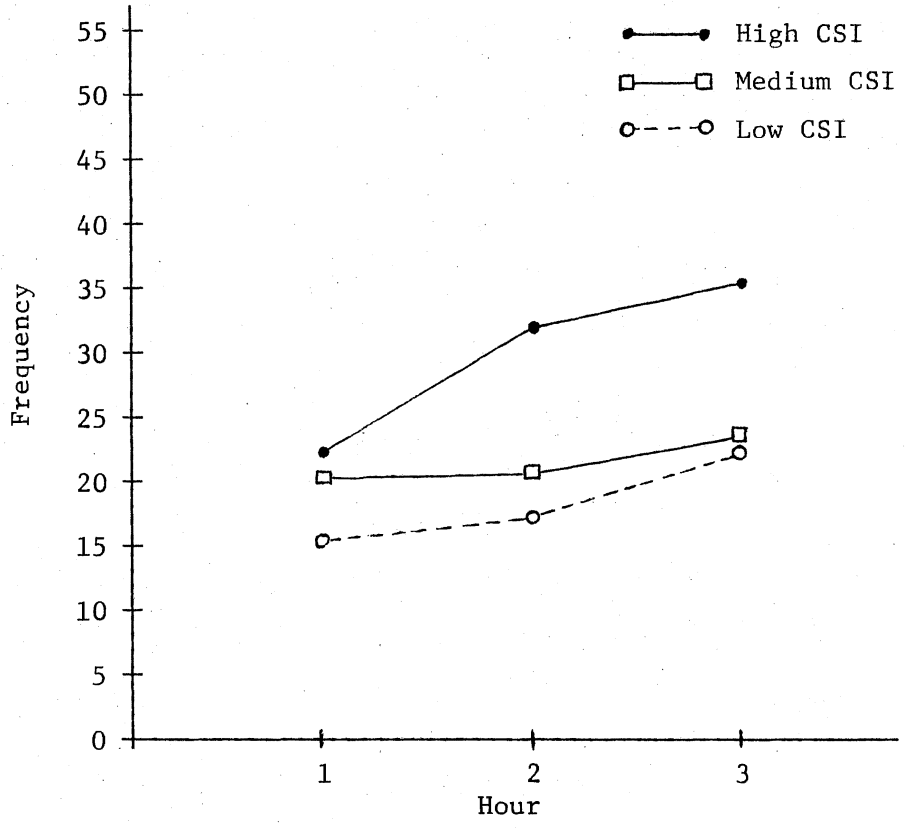

FIG. 4. Graph of Frequency Distribution of Grooming and Repetitive Behaviors for CSI Groups at Each Hour of Experimental Session.

CHAPTER V

DISCUSSION

Summary of the Findings

Need for Stimulus Variation. The inverted U-shaped function predicted on the basis of the 1974 study, in which Medium CSI scorers maintained longer mean lengths of work periods and spent a proportionately greater amount of time working than the High or Low scorers, was suggested for one of the two main variables in the present experiment, i.e., proportion of time spent working. It is possible that the addition of the toy to the experimental situation may have provided the Medium CSI subjects with a way to obtain their moderate level of stimulation that was "less painful" than working the arithmetic problems, thus decreasing their average length of working time relative to the other two groups. Perhaps, if this thesis is correct, it offers indirect support for the explanation offered for the main finding in the earlier report, i.e., that Medium CSI subjects were working to achieve their moderate level of stimulation; they were not, in other words, simply working "for work's sake."

It is also interesting to note that, while there were no statistically significant differences among CSI groups on the mean length of work period variable, the means ordered themselves in the manner originally predicted in the 1974 experiment (Table 4; V. G. Ruder, Note 4).

The unexpected reappearance of the inverted-U in the affect rating data suggests that either the addition of an alternative activity (playing with the toy), the change in the details of the repetitive task itself, or the combination of the two served to alleviate some of the negative-affect-producing properties of the experimental situation for the Medium CSI Scorers. Table 4 reveals that Medium CSI subjects reported feeling "neutral" toward the experimental task as a whole, while High and Low CSI subjects reported being "moderately bored" to "very bored." It will be recalled that the affect ratings were gathered during the performance of, and in reference to, a behavioral task. Subjects were specifically instructed to rate their feelings about the task at that moment; subjects were not asked how they would feel in a similar hypothetical "real life" situation, how someone else might feel under similar circumstances, or how they felt about the experimental situation in general. The only judgment the subject was asked to make was an immediate assessment of his affective reaction to the experimental task at approximate 10-minute intervals. While response bias is a frequent problem with self-report scales (see, for example, Nunnally, 1967), it is apparent from the data that subjects did not hesitate to express a full range of reactions, positive and negative, to the task.

It is interesting that the more positive affect ratings of the Medium CSI subjects in relation to those of the High and Low scorers were unaccompanied by any marked increase in productive effort. In contrast to the longer mean lengths of work periods and smaller proportions of time spent in rest breaks in the 1974 study, present Medium CSI scorers showed no significant difference between their mean lengths of

work periods and those of the High and Low scorers. Neither were the proportion-of-time-spent-working scores for the Medium CSI groups as markedly different from the scores of the High and Low subjects as in the previous study. This observation coincides with the now commonly accepted finding in industry that improved "working conditions" may lead to higher worker "satisfaction," but may not increase the absolute level of production (see, for example, Nicholson, 1973).

Further, while the n is far too small to allow any but the crudest observation, it is intriguing to note that of the three subjects who failed to complete the three-hour experimental session (i.e., gave the task a rating even "lower" than "1") none was a Medium CSI subject.

Finally, the observational behavior sampling also provided some interesting differences among the three CSI groups. As previously described and summarized in Table 19, the CSI groups ordered themselves in frequency of production of unusual, "escape" responses as might have been expected from consideration of individual differences in need for varied stimulus input. The High CSI scorers produced the greatest overall number of extreme responses, a finding in accord with their presumed higher need for stimulus variation. The Medium CSI group, with their correspondingly lower need for change, produced fewer extreme responses, while the Low scoring subjects produced fewest of all.

Frequency of grooming and repetitive responses followed the same general pattern as that for the extreme behavior data. The High CSI subjects produced the greatest number of grooming responses, followed in frequency by the Medium CSI scorers, followed, finally, by the Low CSI group. It may be reasonable to assume that both types of

responses, the extreme behaviors and the grooming and repetitive behaviors, are reflecting attempts to produce needed stimulus variation.

Time Effects. As in the 1974 study, some of the statistically stronger effects in the present experiment were those resulting from the time factor of four of the dependent variables: proportion of time spent working, number of problems attempted, total number of shifts in activity, and verbal ratings of affective reaction.

As previously noted, all CSI groups spent a significantly greater proportion of time working during the first quarter than during the last quarter of the period, and, as might be expected, attempted to work more problems during the first portion of the experimental session. The modified technique used to derive "problem periods," i.e., calculating a new median problem period for each 45-minute period, should have prevented labelling rest breaks taken late in the session as "problem periods," and leads to the fairly straightforward conclusion that the subjects simply became disinterested in the task and worked less as the session wore on. It should be noted, however, that while the quantity of output declined over time, there appeared to be no corresponding decline in quality of performance as indicated by the lack of significant effects in the analysis of variance for proportions of problems answered correctly.

Another variable which resulted in a significant change over time was that for total number of shifts in activity, with fewer shifts being made as the experimental session progressed. This result, however, does not lend itself to unambiguous interpretation for number of reasons. One of these is that discrepancies may exist between the

operational definitions of play (operating the Magic Window) and rest (doing anything other than working problems, making affect ratings, or operating the toy) used in the present study, and the more conventional uses of these terms. An examination of even a few of the observational protocols reveals that while the subjects were "resting," they in fact may have been sitting on the small table in the corner of the experimental cubicle doing deep breathing exercises, peering into the back of the apparatus housing, swinging back and forth in the swivel chair, carving pictures on the apparatus with a loosened nail, singing and clapping their hands, or making faces at the one-way mirror. Any of these activities would probably be better described as "play" than as "rest." Further, any of these overt responses, not to mention possible covert fantasies and imaginings, may have been perceived by the subject as more stimulating than playing with the provided toy, and are definitely types of activity different from simply sitting quietly, gazing about the room, taking a "rest break." In other words, many "shifts in activity" were unrecorded and therefore unanalyzed.

Returning to the toy, it is worth noting that even with the mild stimulation provided by the Magic Window, High CSI scorers tended to make more use of it as the experimental session progressed than did the Medium or Low CSI scorers, as indicated by the CSI x Quarters interaction in the analysis of variance for proportion of shifts from work to play. This finding concurs with that of the study by Lambert and Levy (1972) in which high sensation-seekers viewed slides at a faster rate than low sensation-seekers during a 2-hour sensory isolation experiment. The result may also offer indirect support of the Maddi,

et al. (1962, 1964) suggestion that desire for novelty and novelty of productions are negatively correlated. High CSI scorers, with their greater desire for novelty, may have found themselves less able to produce stimulating forms of activity to relieve the montony of the experimental task as the session wore on and were therefore more dependent on the already provided, readily accessible source of external stimulation. The lower scorers, conversely, may have experienced less relative increase in their desire for novelty and therefore found it easier to produce on their own what novelty they did desire.

As in the previous study verbal ratings of affective reactions progressively declined, indicating that all subjects viewed the task as becoming increasingly "humdrum" and "boring," although the drop in ratings in the present study was slightly less precipitous than in the 1974 work, as evidenced by the lack of significant differences between quarters two and three and between three and four (Table 17).

Berlyne (1967) discusses the possibility that the "discomfort of boredom is more likely to come from inordinately high arousal than from inordinately low arousal" (p. 30) and, further, describes evidence from studies of chimpanzees that increases in arousal are accompanied by increases in the proportion of time spent clinging to a human being and in the frequency of sucking, rocking, and grooming behaviors. Such findings appear to have particular relevance for the results of the observational data analysis and suggest that while the subjects reported that they were becoming increasingly bored and disinterested (Tables 15 and 17), their levels of arousal may, indeed, have been increasing, as indicated by the increasing frequency of grooming and repetitive activities (Table 20 and Figure 4).

In addition, many studies (see, for example, Berlyne & Koenig, 1966) have indicated that, when an organism's arousal level is unusually high, familiar stimuli are typically more reinforcing than novel ones. Such findings, together with the observation that High CSI subjects made fewer extreme, "novel" responses during the third hour of the experimental session than they had during the second, suggest yet another possible explanation of the CSI x Quarters interaction in the proportion-of-shifts-from-work-to-play variable (see Figure 2). High CSI scorers may have made greater use of the Magic Window toward the end of the experimental session because by that time it had become a familiar stimulus and, therefore, may have been more reinforcing for them than the further production of novel, unusual behaviors. The same sequence of events, i.e., an increase in frequency of extreme behavior production followed by a decrease in the last portion of the experimental session, appears to have occurred for the Low CSI group, and presumably the same explanation could hold for this group as well. The data for the Medium CSI scorers follow a different pattern, however, in that the Medium CSI scorers began the session by producing fewer extreme behaviors (Table 19 and Figure 3) than either the High or Low scoring groups, yet ended the session producing a higher frequency of unusual responses. And while the Medium CSI subjects' frequency of grooming and repetitive behaviors shows an increase over the 3-hour session (Table 20), the curve for the Medium CSI scorers appears to be flatter than that of the other two groups (Figure 4), suggesting that the rate of arousal increase may have been somewhat lower for them. It is possible, then, that the Medium CSI subjects simply had not been confined in the experimental situation for a period of time long enough to produce the

increase in arousal necessary to make the production of novel, extreme behaviors nonreinforcing. In other words, it is possible that, had the experiment been continued for a longer period of time, the Medium CSI scorers too would eventually have shown a decrease in frequency of extreme behavior production.

Boredom Susceptibility. The correlation between scores on the Change Seeker Index and the Boredom Susceptibility subscale of the SSS was significant. The correlation was somewhat lower than that usually reported for relationships between the CSI and SSS, a finding which is very probably due to the use of the subscale rather than the longer SSS. Further, the restriction in the nature of the content of the items may have been such that scores on the highly specific subscale of the SSS were unlikely to produce a high correlation with a global measure of stimulus seeking such as the CSI. In general, the BS subscale appeared no more successful in predicting the performance and affective reactions of subjects performing a monotonous cognitive task in a controlled laboratory situation than the CSI.

Concluding Remarks

While the present study was not designed to examine construct validity, it is apparent that any differences between such a study and the present one would be in degree rather than in kind. Any experimental study attempting to make an abstract phrase such as "need for stimulation" more explicit in terms of observable variables essentially serves to validate or "explicate" (Nunnally, 1967) that construct. Both the CSI and the SSS were based upon the construct of optimal level of stimulation and were designed to measure individual differences in such

optimal levels. The obvious fact that paper-and-pencil tests based upon this construct have not been particularly successful predictors of behavior in sensory deprivation or repetitive task conditions creates problems in the interpretation of research results. Failure to appropriately predict responses in experimental situations could be due to possible weaknesses in the theoretical constructs, in the paper-and-pencil tests designed to measure the constructs, or in the experimental design used to produce the criterion conditions.

Theoretical Constructs. Optimal stimulation theory has a great deal of intuitive appeal in addition to being compatible with a wide variety of data from both animal and human studies (Berlyne, 1967). The notion that individuals will strive to maintain an optimal level of stimulation has attracted the attention of motivation, learning, and personality theorists of both experimental and clinical persuasion and appears to have the support of a considerable body of physiological data, being closely related to work in arousal and orientation theory (see, for example, Berlyne, 1967; Buchsbaum, 1971, Zuckerman, 1971). In addition, correlational studies have revealed that individual differences in need for stimulation relate to many personality variables and self-reported behaviors in ways that optimal stimulation theory indicates they should (see, for example, Brown, Ruder, Ruder, & Young, 1974; Zuckerman, Neary, & Brustman, 1970; V. G. Ruder, Note 4). Zuckerman (Note 1) summarized the reaction of many when he wrote:

> A construct which can relate such diverse phenomena as sexual experience, drug usage, preference for complexity, risk taking, drinking, smoking, delinquency, and habituation of the orienting reflex, seems to hold some promise (p. 1).

Yet the recognition that changes in stimulation either up or down from the prevailing stimulus situation can sometimes be reinforcing carries with it a responsibility to indicate when one will be reinforcing, and when the other, and to predict how persons with varying optimal stimulation levels will behave in a situation offering a given level of arousal potential. This responsibility in turn requires a great deal of knowledge about the determinants of the optimal level and of arousal. Perhaps this is the area of weakness--a lack of factual information upon which to base accurate prediction. With regard to the concept of "arousal" as a whole, Berlyne suggests that:

> At the present stage of inquiry, we must be less concerned with identifying points or even regions on an arousal dimension than with detecting increases or decreases in arousal or distinguishing higher levels of arousal than lower levels. In other words, we are not ready for much, if anything, more than an ordinal scale of measurement (1967, p. 14).

Of special relevance to the present study, the notion of "boredom" is as yet ill-defined and little understood, and the question of whether arousal increases or decreases when the "intensity, novelty,' and complexity of stimulation become inordinately low" (Berlyne, 1967, p. 30) is still an open one. While the evidence from the present investigation's data on grooming and repetitive responses appear to lend support to the notion that arousal may increase during periods of boredom, the probable effects of such an increase upon the other behaviors examined in the present study are difficult to evaluate and the few suggestions made previously are, admittedly, highly speculative.

Paper and Pencil Measures of Need for Stimulation. No obvious fault appears attributable to the measurement instruments used in the present study, at least none that is not also shared by other personality inventories currently used in psychological research. The reasons for

selecting the CSI for use in the present series of studies are presented in the 1974 report and revolve primarily around the general nature of the scale as opposed to the more limited, "externalized" scope of the SSS. The two scales have repeatedly resulted in strong, significant correlations with one another and with other similar scales purporting to measure stimulus-seeking tendencies, suggesting that all such scales are indeed getting at some basic personality dimension.

Zuckerman (Note 1), however, admits that the SSS, originally developed as a possible predictor of responses to sensory deprivation, has been poorer in this than in any other area of prediction. Although the CSI has not been researched as thoroughly as the SSS, it is already apparent that it suffers some of the same predictive deficiencies that the Zuckerman et al. scale does in controlled laboratory situations. In a conversation with a student of Garlington (Note 6) one of the originators of the CSI, it was revealed that some difficulty had been encountered in attempting to behaviorally validate the scale. And while the results of the 1974 investigation on monotony were explained in terms of optimal stimulation theory, it must be pointed out that the results were not those predicted.

Behavioral Criteria. Another possible source of error in the present and preceding studies has been the design of the experimental situation itself, a problem more than likely shared with the attempts to relate sensation-seeking to sensory deprivation. Something appears to be "wrong" with the laboratory approach as it has been attempted thus far. Perhaps Zuckerman (Note 1) pinpointed the problem when he noted that:

> . . . the nature of the stimulation reinforcement may be crucial....The high sensation seeker does not need

> stimulation for its own sake but selectively seeks stimulation which is different and arousing (p. 34).

A criticism of the sensory deprivation research offered in the 1974 report was that the sensory deprivation situation is a "bizarre," seldom encountered, highly artificial situation, and the repetitive cognitive task was therefore set forth in the present study as a possible means of producing the crucial lack of stimulus-variation while maintaining a more natural atmosphere for the subject. However, it is possible that the subjects who participated in the present study, nearing the end of a semester of academic work, found an opportunity to "goof-off" for approximately three hours an intriguing diversion from school pressures and may not have responded to the monotonous situation "naturally."

The gap between natural and experimental conditions has not gone unnoticed in other areas of research. Recent investigators in the area of vigilance have concluded that "the data from laboratory vigilance research cannot be indiscriminately applied to the solution of the industrial inspection problems" (Belt & Halcomb, Note 4, p. 27) to cite only one example. Perhaps the situation may be found in the field approach, finding naturally occurring monotonous situations and developing appropriate dependent variables to be related to need for stimulation.

As is commonly the case, this study had its difficulties and, in the end, produced more questions than it answered. For example, does the fact that the main finding of the 1974 study was only partially replicated indicate that need for stimulation is not consistently related to tolerance for, or persistence at, a repetitive task, or does it simply reflect problems associated with the design of the present

experiment? Are there variables other than need for stimulation operating to produce the differences that did appear, for example, self-control, need for order, impulsivity, hypomania, or any of a number of dispositional variables found to relate to sensation-seeking (see, for example, Blackburn, 1969; Farley & Farley, 1967; Zuckerman & Link, 1968)? Would a task of a verbal nature, such as anagrams, clerical matching tasks, or recognizing misspelled words have yielded different results from the numerical task used? Is it possible that behavioral differences in reaction to monotonous situations are so subtle that only careful monitoring and analyzing of behavior through continuous observation by video-tape or similar means would detect them? Why is "boredom" so difficult to define and boredom susceptibility so hard to measure?

Awareness of previously uncontrolled variables and more precisely defined dependent variables may provide the essential missing pieces to what now appears a rather inconclusive array of findings. The words of Pavlov (1939) are appropriate for young and impatient scientists:

> Gradualness, gradualness, and gradualness. From the very beginning of your work, school yourselves to severe gradualness in the accumulation of knowledge....Never begin the subsequent without mastering the preceding. Never attempt to screen an insufficiency of knowledge even by the most audacious surmise and hypothesis... (p. 369).

The relationship between need for stimulation and monotony appears to be a topic worthy of pursuit. Alvin Toffler, in his popular book Future Shock (1970), has decried the dearth of experimental data on the impact of overstimulation on human performance. He views our technological society as rushing headlong into ever-increasing rates of change and novelty, creating an information flow so rapid that human beings can no longer adapt to it. Perhaps, instead, our nation's present economic

and environmental difficulties will begin to turn the tide, reversing the "progress; expand" philosophy to one of "simplify; conserve." What will happen to those whose optimal level of stimulation, "adaptive range" in Toffler's terminology, has stabilized at the higher level if they are confronted with a society that simply cannot afford to supply them with their "needed" stimulation. In a period of uncertainty, it would probably be well for us to be aware of potential difficulties that may lie ahead.

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APPENDIX A

CHANGE SEEKER INDEX

*1. I think a strong will power is a more valuable gift than a well-informed imagination.

2. I like to read newspaper accounts of murders and other forms of violence.

*3. I like to conform to custom and to avoid doing things that people I respect might consider unconventional.

4. I would like to see a bullfight in Spain.

*5. I would prefer to spend vacations in this country, where you know you can get a good holiday than in foreign lands that are colorful and "different."

6. I often take pleasure in certain non-conforming attitudes and behaviors.

*7. In general, I would prefer a job with a modest salary, but guaranteed security rather than one with large, but uncertain earnings.

8. I like to feel free to do what I want to do.

*9. I like to follow instructions and to do what is expected of me.

10. Because I become bored easily, I need plenty of excitement, stimulation, and fun.

*11. I like to complete a single job or task at a time before taking on others.

12. I like to be independent of others in deciding what I want to do.

13. I am well described as a meditative person, given to finding my own solutions instead of acting on conventional rules.

*14. I much prefer symmetry to asymmetry.

15. I often do whatever makes me feel cheerful here and now, even at the cost of some distant goal.

16. I can be friendly with people who do things which I consider wrong.

17. I tend to act impulsively.

*18. I like to do routine work using a good piece of machinery or apparatus.

19. People view me as a quite unpredictable person.

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*Items starred are scored for high change seeking if answered false.

20. I think society should be quicker to adopt new customs and throw aside old habits and mere traditions.

*21. I prefer to spend most of my leisure hours with my family.

*22. In traveling abroad, I would rather go on an organized tour than plan for myself the places I will visit.

23. I like to have lots of lively people around me.

24. I like to move about the country and to live in different places.

*25. I feel that what this world needs is more steady and "solid" citizens rather than "idealists" with plans for a better world.

26. I like to dabble in a number of different hobbies and interests.

27. I like to avoid situations where I am expected to do things in a conventional way.

*28. I like to have my life arranged so that it runs smoothly and without much change in my plans.

*29. I like to continue doing the same old things rather than to try new and different things.

30. I would like to hunt lions in Africa.

31. I find myself bored by most tasks after a short time.

*32. I believe that it is not a good idea to think too much.

*33. I always follow the rule: business before pleasure.

34. I enjoy gambling for small stakes.

35. Nearly always I have a craving for more excitement.

36. I enjoy doing "daring," foolhardy things "just for fun."

*37. I see myself as an efficient, businesslike person.

38. I like to wear clothing that will attract attention.

39. I cannot keep my mind on one thing for any length of time.

40. I enjoy arguing even if the issue isn't very important.

*41. It bothers me if people think I am being too unconventional or odd.

*42. I see myself as a practical person.

*43. I never take medicine on my own, without a doctor's ordering it.

44. From time to time I like to get completely away from work and anything that reminds me of it.

45. At times I have been very anxious to get away from my family.

46. My parents have often disapproved of my friends.

47. There are several areas in which I am prone to do things quite unexpectedly.

*48. I would prefer to be a steady and dependable worker than a brilliant but unstable one.

*49. In going places, eating, working, etc., I seem to go in a very deliberate, methodical fashion rather than rush from one thing to another.

50. It annoys me to have to wait for someone.

51. I get mad easily and then get over it soon.

52. I find it hard to keep my mind on a task or job unless it is terribly interesting.

53. For me planning one's activities well in advance is very likely to take most of the fun out of life.

54. I like to go to parties and other affairs where there is lots of loud fun.

55. I enjoy lots of social activity.

56. I enjoy thinking up unusual or different ideas to explain everyday events.

57. I seek out fun and enjoyment.

58. I like to experience novelty and change in my daily routine.

59. I like a job that offers change, variety, and travel, even if it involves some danger.

60. In my job I appreciate constant change in the type of work to be done.

61. I have the wanderlust and am never happy unless I am roaming or travelling about.

62. I have periods of such great restlessness that I cannot sit long in a chair.

63. I like to travel and see the country.

*64. I like to plan out my activities in advance, and then follow the plan.

65. I like to be the center of attention in a group.

66. When I get bored I like to stir up some excitement.

67. I experience periods of boredom with respect to my job.

*68. I admire a person who has a strong sense of duty to the things he believes in more than a person who is brilliantly intelligent and creative.

*69. I like a job that is steady enough for me to become expert at it rather than one that constantly challenges me.

*70. I like to finish any job or task that I begin.

*71. I feel better when I give in and avoid a fight, than I would if I tried to have my own way.

*72. I don't like things to be uncertain and unpredictable.

*73. I am known as a hard and steady worker.

74. I would like to job of foreign correspondent for a newspaper.

75. I used to feel sometimes that I would like to leave home.

76. I find my interests change quite rapidly.

77. I am continually seeking new ideas and experiences.

78. I like continually changing activities.

79. I get a lot of bright ideas about all sorts of things--too many to put into practice.

80. I like being amidst a great deal of excitement and bustle.

*81. I feel a person just can't be too careful.

82. I try to avoid any work which involves patient persistence.

83. Quite often I get "all steamed up" about a project, but then lose interest in it.

*84. I would rather drive 5 miles under the speed limit than 5 miles over it.

85. Most people bore me.

86. I like to find myself in new situations where I can explore all the possibilities.

*87. I much prefer familiar people and places.

88. When things get boring, I like to find new and unfamiliar experiences.

89. If I don't like something, I let people know about it.

*90. I prefer a routine way of life to an unpredictable one full of change.

*91. I feel that people should avoid behavior or situations that will call undue attention to themselves.

*92. I am quite content with my life as I am now living it.

93. I would like to be absent from work (school) more often than I actually am.

94. Sometimes I wanted to leave home, just to explore the world.

95. My life is full of change because I make it so.

APPENDIX B

THE BOREDOM SUSCEPTIBILITY SUBSCALE

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

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

3. *A. I can't stand watching a movie that I've seen before.
   B. There are some movies I enjoy seeing a second or even a third time.

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

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

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

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

8. *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.

9. A. I dislike people who do or say things just to shock or upset others.
   *B. When you can predict almost everything a person will do and say he or she must be a bore.

10. *A. I usually don't enjoy a movie or play where I can predict what will happen in advance.
    B. I don't mind watching a movie or play where I can predict what will happen in advance.

11. 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.

12. 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.

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

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*Item is scored for high Sensation Seeking if starred alternative is selected.

14. *A. A person should change jobs from time to time simply to avoid getting into a rut.
    B. A person should find a job which is fairly satisfying to him and stick with it.

15. A. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness.
    *B. I like to try new foods that I have never tasted before.

16. A. I enjoy looking at home movies or travel slides.
    *B. Looking at someone's home movies or travel slides bores me tremendously.

17. *A. I like to try new brands on the chance of finding something different or better.
    B. I stick to the brands I know are reliable.

18. *A. I would like to take up the sport of water-skiing.
    B. I would not like to take up water-skiing.

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

20. *A. I would like to take off on a trip with no pre-planned or definite routes, or timetable.
    B. When I go on a trip I like to plan my route and timetable fairly carefully.

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

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

23. *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.

24. *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.

25. 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.

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

27. 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.

28. 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.

29. A. I enjoy spending time in the familiar surroundings of home.
*B. I get very restless if I have to stay around home for any length of time.

30. A. The worst social sin is to be rude.
*B. The worst social sin is to be a bore.

31. A. I look forward to a good night of rest after a long day.
*B. I wish I didn't have to waste so much of a day sleeping.

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

33. A. I do not enjoy discussions where people get so "heated up" they end up insulting each other.
*B. I enjoy a heated intellectual argument even if people sometimes get upset.

34. 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.

35. *A. I have no patience with dull or boring people.
B. I find something interesting in almost every person I talk with.

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

APPENDIX C

SELF-RATING SCALE

5. very stimulated, interested, enthused, engrossed, enlivened, etc.
4. moderately stimulated, interested, enthused, engrossed, enlivened, etc.
3. neither interested nor uninterested, etc.
2. moderately bored, uninterested, apathetic, dull, humdrum, etc.
1. very bored, uninterested, apathetic, dull, humdrum, etc.

APPENDIX D

INSTRUCTIONS FOR EXPERIMENTAL TASK

The following instructions were read aloud to each subject:

This experiment has been designed to study work habits during a repetitive task which requires some degree of concentration and is similar in many ways to tasks such as bookkeeping, accounting, proofreading, etc. All we are going to ask is that you work a series of arithmetic problems--just like the ones on your practice sheet. Notice that each problem consists of adding three 4-digit numbers in your head and checking to see how many of the digits in the answer are wrong. Check the number of wrong digits you have found against the red number in this box [E indicates]. If the numbers match, the box is true, so press this True button [E indicates which button]. If the number of wrong digits you have found does not match the number in the box, the box is false, so press the False button. Each time you answer a problem, a new problem will be presented.

To get full credit for participating in this experiment you will need to do two things: (1) stay in this room until you are excused, and (2) do your best to get as many problems right and as few wrong as possible. If you will come with me I will show you the recording apparatus in the next room [E accompanies S to adjoining experimental room.]

This is where your responses to the problems will be recorded. The apparatus will also grade each of your responses. All of your correct responses will be recorded on this channel [E points to middle pen], and all of your misses will be recorded on this channel [E indicates pen on left]. This pen [E points to pen on far right] is for recording the galvanic skin response, but it isn't being used in this study. Just remember that even though you will not know whether you have gotten each problem correct or not, right and wrong answers are being recorded in here. So try to get as many right as you can. Let's go back to the other room now. [Reseat S at apparatus.]

Every once in a while these lights [E indicates] will come on. This will be a signal for you to make a rating of how you feel about the task at that moment. Notice that each of these buttons is labelled with a series of adjectives. To make your rating, select the button above the words that best describe the way you feel and give that button a sharp, fast jab [E demonstrates]. As you can see, the lights will then go off.

If the lights should go on while you are working a problem, you should finish that problem and then make your rating. After rating you may go on with your work.

There is one last thing I need to tell you about: [E points] our toy. This is a Magic Window. You may have seen

one on television. It's mounted on a small electric motor that you can operate by pushing this button [E demonstrates]. As you can see, the Magic Window will revolve slowly and continue to move as long as you hold down the button. Each time you release the button, the Window will stop.

Do you have any questions so far about the problems, the ratings, or the toy? [Answer any questions S may have.]

You are free to select your own work rate and pattern. Although you are expected to spend much of your time working the problems, don't be afraid to stop and rest for a while. You may sit and do nothing, daydram, walk around, do bend-and-stretch exercises, or you may play with the Magic Window--as much or as little as you like.

Since you may be in this room for up to four hours, and since you may not leave once the experiment has begun, you should take this opportunity to get a drink of water or visit the restroom. [Allow S to leave if he wishes to. When S has been reseated, continue with instructions.]

I would like you to go ahead and work two or three practice problems while I am here to make sure that you understand the procedure. Then we will stop to see if you have any final questions. [Have S work practice problems.]

Before I leave, I want to assure you that nothing else is going to happen to you while you are in this room. There is no electric shock and the walls won't suddenly start closing in. There is a one-way glass in the door, and I will come back to check on you periodically, but it's just to be sure that everything is working as it should, so please don't feel that you're on "Candid Camera."

I will be in the outer room the entire time that you are in here, and I will come and tell you when the experiment is over. I am going to the next room now to start the recording equipment. Please wait for the rating lights to go on before starting. When the lights do go on, make your first rating to turn them off, and then you may begin working the problems.

Remember--try for as many right answers and as few wrong ones as possible. Any final questions?

[E leaves.]

APPENDIX E

WINER'S CASE II--THREE FACTOR EXPERIMENT WITH REPEATED MEASURES ON ONE FACTOR

Model: $X_{ijkm} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \pi_{m(ij)} + \gamma_k + \alpha\gamma_{ik} + \beta\gamma_{jk} + \alpha\beta\gamma_{ijk} + \gamma_{km(ij)} + \varepsilon_{o(ijkm)}$

Summary of Analysis of Variance

Source of Variation	df	E(MS)†
Between subjects	npq - 1	
A	p - 1	$\sigma^2_\varepsilon + r\sigma^2_\pi + nqr\sigma^2_\alpha$
B	q - 1	$\sigma^2_\varepsilon + r\sigma^2_\pi + npr\sigma^2_\beta$
AB	(p - 1)(q - 1)	$\sigma^2_\varepsilon + r\sigma^2_\pi + nr\sigma^2_{\alpha\beta}$
Subj. w. groups error (between)	pq(n - 1)	$\sigma^2_\varepsilon + r\sigma^2_\pi$
Within subjects	npq(r - 1)	
C	r - 1	$\sigma^2_\varepsilon + \sigma^2_{\gamma\pi} + npq\sigma^2_\gamma$
AC	(p - 1)(r - 1)	$\sigma^2_\varepsilon + \sigma^2_{\gamma\pi} + nq\sigma^2_{\alpha\gamma}$
BC	(q - 1)(r - 1)	$\sigma^2_\varepsilon + \sigma^2_{\gamma\pi} + np\sigma^2_{\beta\gamma}$
ABC	(p - 1)(q - 1)(r - 1)	$\sigma^2_\varepsilon + \sigma^2_{\gamma\pi} + n\sigma^2_{\alpha\beta\gamma}$
C x subj. w. groups error (within)	pq(n - 1)(r - 1)	$\sigma^2_\varepsilon + \sigma^2_{\gamma\pi}$

†Assumes A, B, and C fixed factors.

Note - "In this design, when the pattern assumptions on the variance-covariance matrices are questionable, critical values of the conservative tests involving factor C have the form

$F_{1-\alpha}[1,pq(n-1)]$ instead of $F_{1-\alpha}[(r-1),pq(n-1)(r-1)]$,

$F_{1-\alpha}[(p-1),pq(n-1)]$ instead of $F_{1-\alpha}[(p-1)(r-1),pq(n-1)(r-1)]$."

Source: Winer, B. J. Statistical principles in experimental design. (2nd ed.) New York: McGraw-Hill, 1971. Pp. 560-563.

APPENDIX F

SAMPLE PROTOCOLS FROM BEHAVIOR OBSERVATIONS

Low CSI Female

1:29--working problems, sitting cross-legged in chair, smoking, being very still, sometimes whispering numbers to herself.

1:49--light off in experimental room; no observations made.

2:06--dark.

2:29--dark.

2:49--dark.

3:09--dark, sounds like she is playing with toy.

3:29--dark.

3:49--dark.

4:09--playing with toy, smoking; went back to working problems.

Medium CSI Male

5:33--working problems, sitting very straight, moving lips; slumped, put elbows on knees.

5:53--problems, hunched over machine, moving lips, banged response button with side of hand; sitting with thumb over true button.

6:13--problems, hunched over machine, moving lips.

6:33--problems, hunched over machine, moving lips; biting on finger; moving lips.

6:53--problems, hit response button with side of hand, grimaced, back to problems, not moving lips.

7:13--problems, moving lips, tapping foot; leaned back, stretched, frowned, back to problems.

7:33--problems, moving lips, working faster; swallowed audibly, deep breath, back to problems.

7:53--problems; playing with toy; back to problems, looked up and grinned, back to problems, moving lips.

8:13--problems; fidgeting more; leaned back, stretched, yawned; playing with toy.

High CSI Female

1:34--working problems, legs crossed at ankles to right of apparatus, rocking legs slightly; laughed; working quietly; scratched chin.

1:54--problems, leaning back in chair, facing door, legs crossed; shifted in chair, uncrossed and crossed legs other way, back to problems.

2:14--observation not made.

2:34--problems, shoes off, feet up on table, back to the door; rated--pushed "very bored" very hard; scraping at screen with thumb nail.

2:54--leaned way back in chair, feet up, face turned away from apparatus; rated; stood up, tried to look through window, looked behind apparatus, crouched down, looking into back of apparatus; stood up and worked problem, then pressed response button while looking into the back of apparatus; repeated process; rated (pressed button very hard); sat down, up again looking in back, sat down.

3:14--problems; playing with toy, turning toy with left thumb while at same time working problem out loud, pushing response button with right hand; smiled big, played with toy, back to problems.

3:34--toy, around and around, tapping it, around and around, stopped, tapped; back to problems; looking around room.

3:54--problems, feet on table, jiggling feet, but otherwise fairly quiet; rated, took her time doing it; back to problems.

4:14--toy, tapping it, turning it around, stopped, started again, tapping at toy.

Stayed a long time after experiment was over, talking. Tried to structure time; she figured there were 150 slides and used knob on edge of slide tray to figure how far around she had gone. Tried doing a problem every 60 seconds by counting, "One elephant...two elephants...three elephants..." Said she sat on the table and did deep breathing exercises and meditation. Is very interested in finding out how she scored on CSI and how research turns out. Claims she can entertain hereself for hours at a time.

VITA

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Thesis: THE CHANGE SEEKER INDEX AND RESPONSE TO MONOTONY: A REPLICATION

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