THE CHANGE SEEKER INDEX AND RESPONSE TO MONOTONY

By

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CHAPTER I

INTRODUCTION

Many workers have concluded that individuals strive to maintain an optimal or preferred level of stimulation. The optimal level of stimulation construct 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 the 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 (1954), Schultz (1965), and White (1959).

Several attempts have been made to devise measures of individual differences in the optimal level of stimulus input which people seek. Some of these measures have been designed to assess novelty-seeking tendencies at an overt level by behavior sampling techniques. Examples of this type are the Obscure Figures Test (Acker and McReynolds, 1965), the Maze Test (Howard, 1961), a "change in word completion task" (Howard and Diesenhaus, 1965), and the kinesthetic after-effect (KAE) task (see, for example, Sales, 1972). More common in the literature, however, are various scales which measure an individual's attitudes toward, or feelings about, participation in activities producing varying degrees of novel stimulus input. Scales of this type include an "originality" scale constructed by Barron (see Heist and Williams, 1957), the Change Seeker Index (Garlington and Shimota, 1964), the "change" scale of the Personality Research Form (Jackson, 1964), the Novelty Experiencing Scale (Pearson, 1970), the Similes Preference Inventory (Pearson and Maddi, 1966), the Stimulus-Variation Seeking Scale (Penney and Reinehr, 1966), and the Sensation-Seeking Scale (Zuckerman, Kolin, Price, and Zoob, 1964).

The most frequently used scales have been the Change Seeker Index (CSI), the Stimulus-Variation Seeking Scale (SVSS), and the Sensation-Seeking Scale (SSS).

Review of the Literature

Correlational Studies of Stimulus-Seeking

Variables relating to stimulus-seeking. Table 1 summarizes results from studies correlating need for stimulation with (a) a wide variety of dispositional variables, (b) a number of scales purporting to measure traits similar to sensation-seeking (e.g., originality, curiosity, preference for complexity, etc.), (c) several measures of aggression and hostility, (d) various measures of anxiety, (e) intelligence and aptitudes, (f) occupational interests and values, (g) variables relating to perception, (h) self-rated attitudes concerning sexual and political liberalism, (i) several demographic variables, and, finally, (j) a few miscellaneous variables, such as personal space, food preference, and some physiological measures.

From Table 1, several noteworthy relationships emerge. Among the most consistent of the personality findings are the strong positive relationships between hypomania and sensation-seeking with correlations ranging from .21 to .47; extraversion and impulsivity also show strong, reasonably consistent relationships. Negatively correlated with need for stimulation are traits such as orderliness, nurturance, deference, and repression. Sex appears to be a critical factor on the authoritarianism--dogmatism variable, with a significant negative correlation existing between that variable and sensation-seeking for males, but not for females.

The portion of Table 1 labelled "Stimulus-Seeking" shows the correlations between some of the less frequently used scales and the CSI, SSS, or SVSS. While a few nonsignificant correlations may be

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	Me	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]$\underline{t}$ test

[qq]$\underline{p} < .10$

[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

found, the vast majority of the findings are significant and positive, results which offer considerable support for the general validity of the need-for-stimulation construct.

Measures of aggression and hostility show no consistent relationship with need for stimulation, the correlations ranging from -.389 to .55. Anxiety, likewise, while often hypothesized to be negatively related to stimulus-seeking, has resulted, with few exceptions, in nonsignificant findings.

While Garlington and Shimota (1964) found no significant relationship between intelligence and CSI scores, sensation-seeking as measured by the SVSS and SSS have been found to correlate with several academic aptitudes in males. The relationships do not appear to hold as consistently in females, however.

Need for stimulation has been found to correlate positively with interest in occupations involving change, novelty, and a relatively loose structuring of activity, and with concern for aesthetic values. Fairly consistent relationships have also been found with field independence, liberal attitudes toward politics and sex, and age.

Table 2 summarizes several studies which examine differences in need for stimulation among various clinical diagnostic categories. While most of the comparisons resulted in significant differences in the hypothesized directions, it should be noted that stimulation-seeking is not generally perceived to be a "psychopathic" personality trait. Kish and Busse (1969), after analyzing correlations between the SSS and MMPI scales, concluded that "All in all, the present results suggest that whatever is measured by the SSS is more the characteristic of an emotionally 'healthy' individual than of an 'unhealthy' one [p. 62]."

TABLE 2

NEED FOR STIMULATION AS A FUNCTION
OF CLINICAL DIAGNOSIS

Diagnostic Category	Scale	p[a]	Reference
Psychotic vs. Personality Disorder	SSS	.05[b]	Thorne, 1971
Control vs. Psychopathic	SSS	n.s.	Blackburn, 1969
Schizophrenic vs. Character Disorder	CSI	.01	Garlington & Shimota, 1964
Neurotic vs. Character Disorder	CSI	.01	Garlington & Shimota, 1964
Schizophrenic vs. Control	SSS	.005	Kish, 1970a
Schizophrenic vs. Alcoholic	SSS	.01	Kish, 1970a
Schizophrenic vs. General Psychiatric	SSS	.01	Kish, 1970a

Note: Hypothesized direction of difference: category on left predicted lower in need for stimulation than category on right.

[a] t tests
[b] Kramer's test

Self-Reported Behaviors. While the majority of studies have examined hypothetical preferences and attitudes as summarized in Table 1, a few studies have attempted to correlate need for stimulation with actual, self-reported behaviors assumed to reflect attempts to effect stimulus change. For example, Schubert's (1964) suggestion that smoking, coffee drinking, or the use of other central nervous system stimulants such as caffeine pills (e.g., No-Doz) may be related to a trait of "arousal seeking" was confirmed for cigarette smoking in a later comparison of MMPI scores of smokers and nonsmokers in which smokers were reported as "being bored and seeking thrills" and as "behaving in a socially unacceptable fashion" (Schubert, 1965). Zuckerman, Neary, and Brustman (1970) found significantly more drug consumption, alcohol consumption, cigarette smoking, and heterosexual experimentation among high SSS men and women than among low SSS subjects. In a recent study of Brown, Ruder, Ruder, and Young (in press) the results of Zuckerman et al. on drug, alcohol, and cigarette consumption were confirmed using the CSI--for example, a correlation of .44 was found between CSI scores and frequency of marijuana use. Further, Brown et al. found CSI scores to correlate significantly with a wide variety of other self-reported behaviors which are believed to be indicative of high change-seeking, for example, attending "X"-rated movies (r=.34), riding motorcycles (.33), changing academic majors (.24), gambling for money (.34), receiving inconsistent school grades (.30), and cutting class (.44).

Experimental Studies of Stimulus-Seeking

In addition to the correlational studies, need for stimulation has

also been used as an independent variable in several experimental situations. For example, Kish (1970a) gave the SSS to a group of male chronic schizophrenic veterans and formed two groups, those scoring in the highest quartile and those scoring in the lowest quartile. High SSS schizophrenics were rated by ward personnel on a behavior questionnaire as being significantly less retarded than low-quartile patients. High-quartile subjects also tended to be rated as showing greater social interest and irritability. No significant differences were found on work motivation, though the mean ratings were higher for the upper-quartile than for the lower-quartile patients.

Zuckerman, Persky, Link, and Basu (1968) examined the effects of a great many experimental and subject variables on response to various degrees of sensory deprivation: sensory restriction, in which S was confined to a bed in a dark, sound-proof room; social isolation, in which S was confined in a lighted, sound-proof room where travel slides and/or recorded music were available; and social confinement, in which two Ss were together in a room similar to that for social isolation. These workers found that the SSS was not predictive of stress responses in either the sensory restriction or social isolation conditions. SSS scores did correlate negatively and significantly, however, with several variables in the social confinement situation. For example, SSS scores correlated with the depression scale of the Multiple Affect Adjective Check List (-.46), with the Somatic Symptom Check List (-.41), and with the Tedium Stress factor of the Myers Post-Isolation Questionnaire (-.49), indicating that high SSS Ss adapted relatively well to the apparently very stimulating condition of confinement with another person.

Brownfield (1966) found that three high scorers on the SSS showed symptoms of cognitive and perceptual disorganization, discomfort, and anxiety when placed in a sensory deprivation situation, while three lower scorers found the condition relaxing and enjoyable. While the meager n makes conclusions from the study tenuous at best, the results are consistent with many other findings.

Attempts to predict quitting behavior or restless body movement, with or without sensory deprivation, have proven relatively successful. For example, Zuckerman, Persky, Hopkins, Murtaugh, Basu, and Schilling (1966) found that high SSS Ss showed more body movement than low SSS scorers in both sensory deprivation and social isolation conditions. They also found that three of the four quitters were among the four highest scorers on the SSS. Zubek[1] has also reported that the SSS scores of a group of "quitters" in a one-week immobilization experiment were significantly higher than those of "stayers."

Hocking and Robertson (1969), however, have reported an unclear relationship between SSS scores and overt behavior during a sensory restriction experiment in that, while auditory and kinesthetic stimulation were requested more frequently by high SSS scorers than low, the difference failed to reach significance. Visual stimulation, on the other hand, was requested significantly more by low SSS than by high SSS Ss. The nonvarying, monotonous nature of the available stimulation was offered as one possible explanation for the failure to demonstrate the expected difference between high and low SSS scorers.

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[1]Personal communication to M. Zuckerman, 1966.

Rather than using scores on the SSS as an independent variable, Zuckerman, Schultz, and Hopkins (1967) formed groups of subjects on the basis of volunteering or not volunteering for either a sensory-deprivation study or for an experiment using hypnosis. Following the volunteering, the SSS was administered, and it was found that both male and female volunteers for the hypnosis experiment and male volunteers for the sensory-deprivation experiment scored significantly higher than the nonvolunteers in each group.

Selection of a Measure of Need for Stimulation

Although the SSS is the scale most frequently cited in the literature, two lines of evidence suggest that the CSI may be a broader and more sensitive paper-and-pencil measure of stimulus need.

The first of these lines of evidence derives from the patterns of intercorrelations among the three most frequently cited scales. Two separate groups of investigators (McCarroll, Mitchell, Carpenter, and Anderson, 1967; Stock and Looft, 1969) have reported similar constellations of intercorrelations, with the correlation between the CSI and SSS (ranging from .72 to .82) and the correlation between the CSI and the SVSS (.77 to .82) being higher than the correlation between the SSS and SVSS (.60 to .65). These statistics suggest that information obtained with the CSI overlaps to a considerable extent with that obtainable from either the SSS or the SVSS, but that the latter two scales are sampling a more limited range of responses relating to stimulation-seeking.

The second line of evidence stems from a number of studies in which two or more measures of stimulus-seeking have been correlated with several other, quite different measures of the individual's preference

for variety or complexity. For example, Farley (1971) found that the CSI is more closely related than the SSS to performance on both the Similes Preference Inventory, a scale held to measure tendency toward active seeking and production of novelty, and to a word completion test of tendency toward variety. McReynolds (1971) has reported a higher correlation between the CSI and the Behavior Choice Scale (BCS), a measure of an S's willingness to participate in a novel psychological experiment, than between the SSS and BCS. Further, Looft and Baranowski (1971) found that correlations between the CSI, SSS, and SVSS and tasks designed to measure "preference for visual complexity" are moderately low, but that once again correlations between the visual tasks and the CSI are higher than is the case for either the SSS or the SVSS. Finally, Looft (1971) has reported that the CSI relates more closely to self-reported political liberalism than does either the SSS or SVSS.

In addition to the correlational evidence favoring the CSI over the SSS, several other factors influenced the final selection. For example, the CSI, being a longer scale than the SSS, has a more satisfactory split-half reliability coefficient: r=.68 for males, .74 for females on the SSS; r=.92 for college students on the CSI (Zuckerman, Kolin, Price, and Zoob, 1964; Garlington and Shimota, 1964). Further, the SSS is apparently chiefly concerned with need for stimuli from exteroceptive sources (Pearson, 1970) while the CSI was designed to measure need for variation in stimulus input from both internal and external sources (Garlington and Shimota, 1964). The exploratory nature of the present research required that a measure of more general applicability be employed. Finally, McCarroll, Mitchell, Carpenter, and Anderson (1967) have suggested that the "SSS may measure changing characteristics while

the...CSI may be measuring something more stable [p. 855]," a quality which also seemed desirable for the measure to be used in the present study.

Statement of the Problem

While Garlington and Shimota (1964) report data supporting the CSI's reliability and validity, no rigorous behavioral experimentation comparable in nature to the work reported on the SSS has yet been undertaken. Further, most experimental studies of need for stimulation have examined its effect on response to sensory deprivation, severe social isolation, or other equally "bizarre" laboratory conditions. Schultz (1965) has argued that the key variable in sensory restriction studies is the lack of stimulus variation rather than lack of stimulation *per se*. A monotonous, repetitive task would appear to offer the same sort of minimization of stimulus variation while providing a more natural, realistic situation for *S*. The present study, therefore, examined both persistence in performance and affect during during execution of a repetitive task as a function of need for stimulus variation or change.

CHAPTER II

METHOD

Subjects

The CSI was administered to 60 introductory psychology students at Oklahoma State University, and from this group 30 were selected for participation in the study. Three groups were formed, each consisting of five males and five females. The first group was made up of Ss scoring highest on the CSI (High CSI Scorers), the second group was composed of Ss who clustered most closely about the mean of the large group (Medium CSI Scorers), and the third group consisted of Ss scoring lowest on the CSI (Low CSI Scorers). Table 3 shows the means and standard deviations for each of the CSI groups. The Ss were not aware of the basis for their selection, and no reference to the previously administered CSI was made. One male was excluded from the subject pool because, due to the extreme lowness of his score (CSI=26), no comparable female could be obtained.

The subject-selection process accomplished two primary objectives, maximizing the differences in mean CSI scores among the three groups and avoiding problems associated with volunteer bias. Zuckerman, Schultz, and Hopkins (1967), for example, found that students who volunteer for participation in experiments concerned with sensory deprivation or hypnosis tend to have higher preferred levels of stimulus input than students who do not volunteer.

TABLE 3

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

CSI Group	M	SD
High	68.50	10.49
Males	68.60	9.18
Females	68.40	10.49
Medium	54.10	1.59
Males	54.00	2.00
Females	54.20	1.30
Low	40.90	5.55
Males	40.40	5.03
Females	41.40	6.58

The Ss received a small credit toward their final course grade for their participation.

The Change Seeker Index

The Change Seeker Index (CSI) is a self-report inventory designed to measure one's need for variation in stimulus input from both cognitive and external sources (Garlington and Shimota, 1964). It 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 B). Garlington and Shimota (1964) report split-half reliability coefficients for the CSI for two separate groups of college students. For the first group (n=80) r=.85, corrected for attenuation, .92. The second group (n=50) of students yielded an r=.80; corrected, .89. A test-retest correlation of .91 was obtained for one group of psychiatric patients retested after 7 to 10 days. For a combined group of 44 soldiers and college students retested after three months, the correlation was .77.

Garlington and Shimota also report that validation studies are in progress, but as preliminary evidence of the CSI's validity offer two correlations: r=.30 (n=71) between the CSI and the Graves Art Judgment Test, and r=.30 (n=74) between the CSI and the Welsh Revised Art Scale, scales often assumed to measure preference for visual complexity. A recent study by Brown, Ruder, Ruder, and Young (in press), which correlated the CSI with a wide variety of self-reported behaviors judged to be reflective of a high need for stimulus change, offers strong additional evidence in support of the concurrent validity of the questionnaire.

Apparatus

The basic apparatus consisted of a large wooden cabinet, 154 cm. long, 60 cm. wide, and 37 cm. deep, mounted on a long table. The cabinet housed a Kodak Carousel Projector; a white noise generator, which served to muffle noises outside the laboratory cubicle; and the timing circuitry involved in signaling S's subjective ratings (see below).

In the center of the front panel of the cabinet was a small screen (12 cm. x 12 cm.) on which three simple multiplication problems were backprojected simultaneously (see Figure 1). Each problem consisted of a six-digit number multiplied by a single-digit number. An answer, correct or slightly incorrect, was also provided. For example, in the following three problems, shown in the format used in the present study, only the first two are correct.

555,925 x 9
= 5,003,325

557,847 x 6
= 3,347,082

587,449 x 5
= 3,037,245

The third answer should read 2,937,245. Immediately to the right of each problem were two push-buttons (one for "true" and one for "false"), and to the left a small panel light indicated which problem S was to work. When a response was made to the first problem (pressing either the "true" or "false" button), the panel light beside that problem went off, and the one below it lit up. The light sequence acted as a guide to S should he have chosen to take a break from the experimental task in the middle of a slide, and it also prevented S from answering the problems in any order but the correct one. Following a "true" or

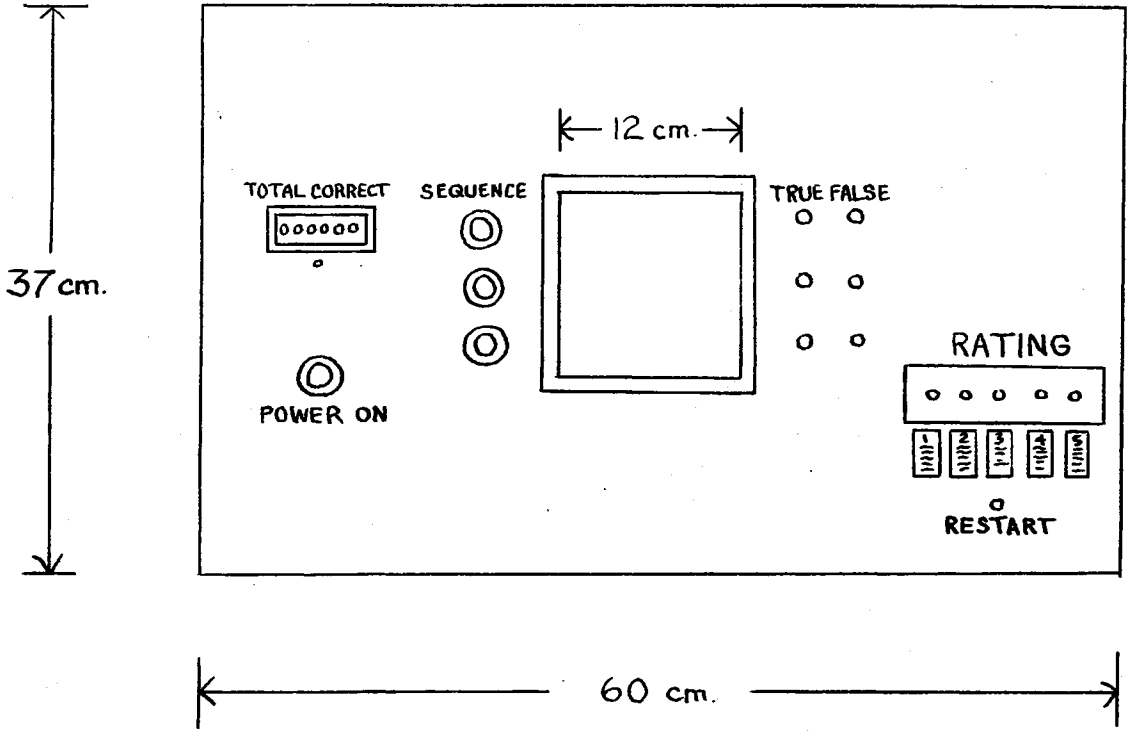


FIG. 1. Diagram of Front Panel of Cabinet Showing Placement of Counter, Sequence Lights, Screen, True-False Buttons, and Rating Buttons

"false" response to the last problem on each slide the projector automatically advanced to the next slide with another set of three problems.

Since all 140 spaces in the circular slide tray were filled (providing a total of 420 individual problems), and since S was not allowed to have paper or pencil, it was unlikely that particular problems could be remembered. To further increase the similarity among problems, however, all the six-digit numbers began with a "5." Repetition of the entire sequence of problems as many times as necessary was thus made possible.

The apparatus was so programmed that true and false responses were "graded" automatically, with each correct response activating a counter mounted to the left of the screen, clearly visible to S. All correct responses were recorded on one channel of a four-channel event recorder located in an adjoining room; incorrect responses were recorded on a second channel.

Also mounted in the front of the apparatus, at the extreme right of the cabinet's front panel, was a row of five push-buttons, with each button corresponding to one point of the five point scale which S used in rating the degree of interest he felt in the task. Each button was clearly labeled with adjectives appropriate to the corresponding point on the scale (see Appendix C). S's ratings were recorded on a second ten-channel event recorder, with one channel devoted to each of the five points on the scale.

A timing mechanism was so incorporated in the circuitry that approximately every ten minutes a button press to the last problem on a slide shut off the projector rather than advancing to the next slide. Pressing one of the rating buttons served to (1) activate one of the

five channels on the second recorder, (2) turn the projector back on, and (3) advance the projector to the next slide. Periods during which the projector was deactivated were recorded on a third channel of the four-channel event recorder by an oscillating signal.

Procedure

Ss were tested individually for three-hour sessions. A three-hour period was selected for a number of reasons: (a) Zuckerman, Albright, Marks, and Miller (1962) found few reports of manifest anxiety during the first two hours of perceptual isolation, with a marked increase occuring during the third hour. (b) Pilot work previously conducted in our laboratory demonstrated that Ss often did not take breaks until well into the second hour of the session and, in addition, did not report that they were "bored" until a similar amount of time had elapsed. (c) Finally, since it seemed desirable that the Ss not know exactly how long the experimental session would last (Fiske and Maddi, 1961), they were asked to sign up for four-hour time blocks; anything longer than four hours would have made obtaining Ss extremely difficult.

The experimental task consisted of a long series of simple multiplication problems in which S multiplied, without aid of paper and pencil, a six-digit number by a single-digit number with answers provided. About 50% of the time, however, the provided answer was slightly incorrect. It was S's task to determine whether the answer given was indeed the correct one and then press the appropriate button indicating whether the mathematical statement was "true" or "false." As soon as one problem was completed, the button press introduced the next.

When S arrived he was asked to remove his watch and was advised that since he could not leave the experimental room once the session began, he might wish to use the rest room, get a drink of water, etc. When S returned, he was seated comfortably, and E described the study as one concerned with "student work habits." Detailed instructions concerning the use of the apparatus, the nature of the multiplication problems and the rating scale were given (see Appendix D). Briefly, he was told to do as many problems as he could, and he was informed that he might wish to take an occasional break (stand and stretch, walk around, sit doing nothing, etc.).

Because pilot studies had revealed that Ss occasionally underestimated the subtlety of the incorrect answers and made hasty responses on the basis of a rapid, superficial examination of the problem, incentive to perform in a reasonably accurate manner was provided in the instructions: S was told that he must achieve a certain (hypothetical) minimum number of correct responses before full credit would be awarded for participation in the experiment. Though the exact number of problems was never specified, S was assured that as long as he was "fairly persistent" he would have no difficulties obtaining the full number of available points.

S was also told that at regular intervals throughout the experimental session he would be signaled to rate his feelings of interest in the experimental task on a five-point scale which ranged from "very bored" and "uninterested" at one end to "very stimulated" and "interested" at the other. At such a point, S was instructed to estimate his degree of interest in the task at that moment and record his response by pushing the appropriate rating button. The instructions stressed that

the ratings were to be made promptly after the removal of the problems; he was not to take a break at that particular moment. Immediately after the rating had been completed, S was free either to resume work or take a break.

S was not told exactly how long he would be required to stay, but that E would come and inform him when his time was up. It was clear, however, that his stay would not exceed four hours.

At the completion of the instructions, as E left the experimental room, S was reminded to work through the first four slides (twelve problems) at a "comfortably fast pace" to insure that "the equipment was operating properly" and that S did in fact understand the procedure. During this time E observed S through a one-way glass to be sure that S did indeed work steadily; this was necessary in order to insure an accurate performance measure upon which to establish the maximum "problem period" (see below).

E then retired to an outer room where she remained throughout the experimental session. After three hours S was asked to do six more problems as quickly and as accurately as he could (see below), after which he was thanked for his cooperation and excused.

Dependent Variables

A number of dependent variables were included in the present experiment, and, due to the lack of previous work dealing with tolerance for (rather than efficiency under) boredom or monotony, several a priori assumptions were made concerning the ways in which these dependent measures were expected to vary with CSI scores. This being the case, it

was assumed that the following relationships would tend to support the conclusion that the CSI is a reasonably accurate predictor of one's reaction to a monotonous situation and would further illuminate the nature of the optimal level of stimulation construct.

Mean Length of Work Period

A "work period" was defined as that period of time in which S worked on the experimental task without taking a "break" (see below). A "problem period" was defined by the following procedure: (a) S was required to work the first twelve multiplication problems at a "comfortably fast pace" without pausing for a break; the median amount of time required to work a problem was calculated and arbitrarily designated as the maximum length of time allowed to elapse following a button-press which was not to be considered a break. (b) At the end of the experimental session, S was requested to work six more problems as "rapidly and as accurately" as he could; the shortest amount of time required to complete a problem was designated as the minimum length of time allowed to elapse following a button-press which was not to be considered a "guess" (see below). Briefly, then, a problem period was defined as any amount of time spent on a problem which was less than or equal to some maximum value (i.e., the median amount of time required to work the first twelve problems) but greater than or equal to some minimum value (i.e., the shortest amount of time required to solve a problem during the final six problems). Put another way, a problem period was defined as any amount of time too short to allow a break but too long to constitute a guess.

A "work period," consisted of one or more consecutive "problem periods."

The mean amount of time spent per work period was calculated for each S to test the hypothesis that Ss with a high need for change in their stimulus input (High CSI Scorers) work for shorter periods of time before taking a break than people with a lower need for stimulus variability (Low CSI Scorers).

Variance in Length of Work Period

Variance measures have long been associated with efficiency in production under conditions of monotony, with high variability in performance characterizing a bored operator (see, for example, Burtt, 1948). This is what might be expected on an a priori basis, since people who work at tasks which involve little stimulus variability may lose interest in the task and become distractable, with any external stimulus change diverting their attention; or they may resort to day-dreams or fantasized experiences which provide internal stimulus variation. High CSI Scorers were expected to be especially susceptible to such variability in performance. In the present study, a relatively large variance in the length of work periods was therefore expected of High CSI Scorers, while Low CSI Scorers were expected to work at a more consistent, steadily paced level.

Proportion of Time Spent in Passive Breaks

Two kinds of "breaks" were examined, "passive breaks" and "active breaks" (see below). Passive breaks were periods during which S was not working at the experimental task and were operationally defined as

any amount of time between two button-presses which exceeded the maximum amount of time qualifying as a problem period. In other words, a passive break was measured by subtracting the maximum problem period possible from the total interval separating two button-presses.

Since persons obtaining high scores on the CSI are assumed to have a high need for change in their stimulus input, it was expected that High CSI Scorers should quickly tire of the monotonous experimental task and spend proportionately more time in passive breaks, providing themselves with opportunities for limited physical exercise (e.g., standing and stretching, walking around the experimental cubicle, etc.), daydreaming or fantasizing, or simply loafing. Low CSI Scorers, on the other hand, with their corresponding low need for stimulus variation, were expected to spend proportionately less time in passive breaks.

Mean Length of Passive Breaks

The aversive nature of a repetitive task for persons needing a great deal of change in their stimulus input led to the expectation that High CSI Scorers would take longer passive breaks than persons requiring a lower level of stimulus input variation.

Proportion of Time Spent in Active Breaks

Active breaks, in contrast to passive breaks, while also periods during which S was not actually working at the experimental task, were responses involving use of the apparatus in a manner that may be appropriately described as "guessing," i.e., simply pushing buttons on the apparatus rather than working out the problems. Active breaks were operationally defined as any amount of time between two button presses

which was shorter than the minimum amount of time qualifying as a problem period. High CSI Scorers, using reasoning similar to that for passive breaks, were expected to quickly tire of the experimental task; yet for them "doing nothing" might be expected at times to be a poor alternative, particularly for individuals needing a great deal of external stimulation. Therefore, it was expected that High CSI Scorers would spend proportionately more time in active breaks than would Low CSI Scorers.

Mean Length of Active Breaks

Again, the aversive nature of the repetitive task for persons needing a great deal of change in their stimulus input led to the expectation that High CSI Scorers would take longer active breaks than members of the Low CSI group.

Verbal Ratings

High CSI Scorers were expected to have more negative feelings (i.e., lower mean verbal ratings) about the monotonous task and hence rate themselves more often in the lower portion of the scale than Low CSI Scorers. In addition, the rating scale provided a check on the assumed boredom-inducing nature of the experimental task.

Statistical Analysis

Inter-response intervals were measured for purpose of data analysis to the nearest 1/16 inch (7.5 secs.). Time spent in performing the ratings (indicated on a separate channel of the tape by oscillating signals) was not included in calculating either work periods or breaks.

The oscillating signal also served to coordinate data between the two event recorders. Variance in S's rate of working meant that the number of ratings that S made varied slightly from one 45-minute period to the next, with nearly all Ss making from four to six ratings within each of the four periods of the experimental session.

Passive and Active Break proportion scores were transformed using the Arcsin transformation for proportions (Snedecor, 1956, pp. 318-319).

Although an accuracy-of-response measure was not analyzed statistically, visual inspection of the hit and miss channels did serve to illuminate the nature of "active breaks."

Preplanned comparisons, corresponding to the previously stated hypotheses, were made using t tests, followed by seven analyses of variance, one for each of the dependent variables. Each analysis of variance was based upon a 3 x 2 x 4 factorial arrangement (High, Medium, and Low CSI Scorers x Sex x Four Time-Periods of 45 minutes each) with repeated measures on the last factor (Winer, 1971, pp. 559-571). The model underlying the design (see Appendix E) requires that order of presentation of the repeated factor, in this case Periods, be randomized separately for each S. Because it was obviously not possible to randomize presentation of Periods and thus meet this requirement, the pooled variance-covariance matrix (pooled across levels of CSI and sex) may not have had the necessary symmetry pattern. Violating the compound symmetry assumption of the model lends a positive bias to F tests of the repeated factor and interactions involving this factor. To compensate for this bias, the Greenhouse-Geiser conservative procedure was used to adjust the degrees of freedom downward, thereby modifying the critical values for those F tests (Winer, 1971, pp. 523-524, and

Kirk, 1968, pp. 287-288; see Appendix E).

Biomedical computer program No. BMD 08V was used for the analysis of variance. Significant main effects were further explored using the Newman-Keuls procedure.

CHAPTER III

RESULTS

The mean CSI score for the original pool of Ss (n=60) was 54.66 (SD=12.39). It is interesting that the mean for the present sample of Oklahoma State University students is higher than the mean reported by Garlington and Shimota (M=47.70, SD=13.00, for college students). McCarroll, Mitchell, Carpenter, and Anderson (1967), however, report a quite comparable mean (54.70) for University of Arkansas undergraduates.

Table 4 contains the means for each of the seven dependent variables summarized by the CSI group. As the hypotheses stated previously involved only the High and Low CSI groups, a preliminary visual examination of the scores indicated that only one of the seven relationships, that for mean length of Passive breaks, was in the predicted direction. An *a priori* *t* test revealed no significant difference between the mean length of Passive breaks of High and Low SCI Scorers (t_{obs}=.71).

Following the *a priori* test, analyses of variance were performed as previously described.

Mean Length of Work Periods

The analysis of variance (ANOVA) for mean length of work periods revealed a significant difference ($p<.05$) among the three CSI groups (Table 5). Visual examination of the group means suggested that Medium CSI scorers worked, on the average, for longer periods of time before

TABLE 4

MEANS FOR THREE CSI GROUPS ON EACH OF SEVEN DEPENDENT VARIABLES

Variable	High CSI	Medium CSI	Low CSI	Predictions[a]
Mean Length of Work Period (seconds)	48.60	72.83	42.68	High < Low
Variance in Length of Work Periods	27.02	75.66	32.36	High > Low
Proportion of Time Spent in Passive Breaks (transformed scores)	.21	.15	.21	High > Low
Mean Length of Passive Breaks (seconds)	26.78	23.32	22.65	High > Low
Proportion of Time Spent in Active Breaks (transformed scores)	.09	.10	.11	High > Low
Mean Length of Active Breaks (seconds)	10.58	12.38	12.75	High > Low
Mean Affect Ratings	2.40	2.30	2.37	High < Low

[a]Only predictions concerning the Low and High groups were made; no attempt was made to predict the performance of the Medium group.

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		181.16	3.99*
Sex	1		125.97	2.77
CSI x Sex	2		31.78	.70
Subj. W. Groups	24		45.44	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	9.01	1.17
CSI x Periods	6	2	11.71	1.52
Sex x Periods	3	1	9.92	1.29
CSI x Sex x Periods	6	2	18.07	2.35
Periods x Subj. W. Groups	72	24	7.69	

*$p < .05$

taking a break than did either High or Low CSI scorers; however, the Newman-Keuls test failed to show significant differences among the three means (Table 4; Table 6).

Neither the Sex nor the Periods factors resulted in significant F ratios (Table 5).

Variance in Length of Work Periods

The ANOVA indicated no significant differences in amount of variance in the length of work periods for any of the three factors examined, CSI group, Sex, or Periods. There were also no significant interactions among the variables (Table 7).

Proportion of Time Spent in Passive Breaks

Significant F values resulted for two main effects, CSI Level ($p<.01$) and Periods ($p<.05$) in the ANOVA for proportions of time spent in passive breaks (Table 8). The Medium CSI scorers appeared to spend less of their time in Passive breaks than did either the High or Low CSI scorers, but as was found for the Mean Length of Work Period variable, the Newman-Keuls procedure failed to reveal a significant difference between any pair of means (Table 4; Table 9).

For the Periods factor, however, the Newman-Keuls comparison procedure indicated that all CSI groups spent a significantly greater ($p<.01$) amount of time in Passive breaks during the first quarter of the experimental session than during any of the other three periods (Table 10).

TABLE 6

NEWMAN-KEULS TEST ON CSI GROUPS FOR
MEAN LENGTH OF WORK PERIODS

Group	Low	High	Medium	r	$q_{.95}(r,24)$	$s_{\bar{d}}q_{.95}(r,24)$[a]
Means	5.69	6.48	9.71			
Low		.79	4.02	3	3.53	7.52
High			3.23	2	2.92	6.22

[a] $s_{\bar{d}} = 2.13$

TABLE 7

SUMMARY OF THE ANALYSIS OF VARIANCE OF VARIANCES IN LENGTH OF WORK PERIODS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		28,520.26	2.13
Sex	1		36,450.58	2.72
CSI x Sex	2		201.20	.02
Subj. W. Groups	24		13,392.69	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	5,658.49	1.53
CSI x Periods	6	2	5,181.68	1.40
Sex x Periods	3	1	4,145.12	1.12
CSI x Sex x Periods	6	2	8,341.11	2.25
Periods x Subj. W. Groups	72	24	3,703.76	

TABLE 8

SUMMARY OF THE ANALYSIS OF VARIANCE OF PROPORTION OF TIME SPENT IN PASSIVE BREAKS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		443.91	6.56**
Sex	1		68.18	1.01
CSI x Sex	2		137.53	2.03
Subj. W. Groups	24		67.62	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	55.30	6.93*
CSI x Periods	6	2	9.68	1.21
Sex x Periods	3	1	5.54	.69
CSI x Sex x Periods	6	2	24.06	3.02
Periods x Subj. W. Groups	72	24	7.98	

*$p<.05$ (conservative)

**$p<.01$

TABLE 9

NEWMAN-KEULS TEST ON CSI GROUPS FOR PROPORTIONS OF TIME SPENT IN PASSIVE BREAKS

Group	Medium	High	Low	r	$q_{.95}(r,24)$	$s_{\bar{d}}q_{.95}(r,24)$[a]
Means	15.39	20.87	21.41			
Medium		5.48	6.02	3	3.53	9.18
High			.54	2	2.92	7.59

[a] $s_{\bar{d}} = 2.60$

TABLE 10

NEWMAN-KEULS TEST ON PERIODS FOR PROPORTIONS OF TIME SPENT IN PASSIVE BREAKS

Periods	3	4	2	1	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Means	18.02	18.57	19.16	21.14			
3		.55	1.14	3.12**	4	4.91	2.55
4			.59	2.57**	3	4.54	2.36
2				1.98*	2	3.96	2.06

[a] $s_{\bar{d}} = .52$

* $q_{.95}(2,24) = 2.92$; $s_{\bar{d}}q_{.95}(2,24) = 1.52$; $p<.05$

** $p<.01$

Mean Length of Passive Breaks

The ANOVA indicated no significant difference in the mean length of Passive breaks between CSI groups, sexes, or periods; nor were there any significant interactions (Table 11).

Proportion of Time Spent in Active Breaks

The ANOVA of scores for proportion of time spent in active breaks revealed two significant main effects, Sex and Periods (Table 12). Males spent significantly more time in active breaks than did females. The Newman-Keuls procedure showed that all groups spent significantly more time in active breaks ($p<.01$) in periods two, three, and four than they did in the first period (Table 13).

Mean Length of Active Breaks

No significant differences resulted from the ANOVA of data on mean length of active breaks (Table 14).

Verbal Ratings

The ANOVA of the verbal ratings resulted in a highly significant F value for the Periods factor (Table 15). The Newman-Keuls test revealed significant differences between all pairs of means, indicating that all groups became progressively more bored with the experimental task (i.e., made lower interest ratings) as the experimental session progressed (Table 16). On the five-point rating scale the mean rating for Period One was 3.29; for Period Two, 2.42; for Period Three, 2.04; and for Period Four, 1.67. No differences among CSI groups or between sexes were found.

TABLE 11

SUMMARY OF THE ANALYSIS OF VARIANCE FOR
MEAN LENGTH OF PASSIVE BREAKS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		3.47	.29
Sex	1		32.38	2.70
CSI x Sex	2		16.81	1.40
Subj. W. Groups	24		12.00	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	5.36	1.75
CSI x Periods	6	2	.85	.28
Sex x Periods	3	1	5.45	1.78
CSI x Sex x Periods	6	2	1.47	.48
Periods x Subj. W. Groups	72	24	3.06	

TABLE 12

SUMMARY OF THE ANALYSIS OF VARIANCE OF PROPORTIONS OF TIME SPENT IN ACTIVE BREAKS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		27.54	.25
Sex	1		649.79	5.93*
CSI x Sex	2		1.31	.01
Subj. W. Groups	24		109.63	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	376.87	20.32***
CSI x Periods	6	2	2.16	.12
Sex x Periods	3	1	7.07	.38
CSI x Sex x Periods	6	2	6.06	.33
Periods x Subj. W. Groups	72	24	18.55	

*$p<.05$

***$p<.001$ (conservative)

TABLE 13

NEWMAN-KEULS TEST ON PERIODS FOR PROPORTIONS OF TIME SPENT IN ACTIVE BREAKS

Period	1	2	3	4	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Means	5.05	9.93	11.76	13.18			
1		4.88**	6.71**	8.13**	4	4.91	3.88
2			1.83	3.25	3	4.54	3.59
3				1.42	2	3.96	3.13

[a] $s_{\bar{d}} = .79$

**$p<.01$

TABLE 14

SUMMARY OF THE ANALYSIS OF VARIANCE FOR MEAN LENGTH OF ACTIVE BREAKS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		.95	.19
Sex	1		16.20	3.18
CSI x Sex	2		.68	.13
Subj. W. Groups	24		5.09	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	6.50	2.94
CSI x Periods	6	2	1.82	.82
Sex x Periods	3	1	.65	.29
CSI x Sex x Periods	6	2	4.04	1.83
Periods x Subj. W. Groups	72	24	2.21	

TABLE 15

SUMMARY OF THE ANALYSIS OF VARIANCE
OF VERBAL RATINGS

Source	Degrees of Freedom		MS	F
Between Subjects	29			
CSI	2		.11	.04
Sex	1		4.07	1.51
CSI x Sex	2		1.77	.66
Subj. W. Groups	24		2.69	
	Conventional	Conservative		
Within Subjects	90			
Periods	3	1	14.44	36.10***
CSI x Periods	6	2	.23	.58
Sex x Periods	3	1	1.09	2.73
CSI x Sex x Periods	6	2	.38	.95
Periods x Subj. W. Groups	72	24	.40	

***p<.001 (Conservative)

TABLE 16

NEWMAN-KEULS TEST ON PERIODS
FOR VERBAL RATINGS

Periods	1	2	3	4	r	$q_{.99}(r,24)$	$s_{\bar{d}}q_{.99}(r,24)$[a]
Means	1.67	2.04	2.42	3.29			
1		.37*	.75**	1.62**	4	4.91	.59
2			1.13**	1.25**	3	4.54	.54
3				.87**	2	3.96	.48

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

*$q_{.95}(2,24) = 2.92$; $s_{\bar{d}}q_{.95}(2,24) = .35$; $p<.05$

**$p<.01$

CHAPTER IV

DISCUSSION

Need for Stimulus-Variation

Although the present study failed to support the predicted relationships, the obtained findings nevertheless appear explicable in terms of a theory based on the optimal-level-of-stimulation construct. The finding that Medium CSI scorers work, on the average, for longer periods of time before taking a break than either High or Low CSI scorers suggests that the Medium scorers had a need for stimulation high enough to make "doing nothing" more aversive than the experimental task, yet low enough to prevent the monotony of the task from becoming too unpleasant. According to this interpretation, Low CSI scorers, with their corresponding low need for stimulation, were relatively content to sit idly in passive breaks. High CSI scorers, on the other hand, who may have found both the experimental task and its alternative, doing nothing, equally unacceptable, may have discovered that the change in activity induced by shifting back and forth between the cognitive task and passive breaks was in itself stimulating. Their high need for stimulation, in other words, may have made the monotony of both the task and the passive break so intolerable as to force frequent change in activity.

An examination of the means on two dependent variables, mean length of work period and proportion of time spent in Passive breaks (Table 4), supports such an interpretation. The Low CSI scorers had the shortest

work periods while spending the most time on Passive breaks, while the High CSI group ranked second on both dependent variables. Further, though not statistically significant, the pattern of means for variance in length of work periods shows that High CSI scorers obtained the smallest variance, strengthening the thesis that those Ss needing a great deal of variation in their stimulus input rarely devoted long periods of time to single work periods.

While the work period and passive break results are largely complementary, it should be noted that two possible interpretations are suggested by the data. One possibility is that the two variables were dependent, such that an increase in length of work periods automatically dictated a decrease in the proportion of time spent in passive breaks. Such dependence was not inevitable, however. It would have been possible, for example, for two subjects to obtain the same proportion of time spent in Passive breaks score, yet differ in their mean lengths of work periods. One S could have interspersed short work periods with short breaks, while the other, though obtaining an identical Passive break score, could have worked for a single long period, then taken a long break.

Period Effects

Some of the statistically stronger effects in the present study were those resulting from the Periods factor for three of the dependent variables, proportion of time spent in Passive breaks, proportion of time spent in Active breaks, and verbal ratings of affective reaction.

As noted earlier in the Results section, all CSI groups spent a greater proportion of their time in Passive breaks during the first

quarter of the experimental session than during any of the succeeding three periods. (It should also be noted that the pattern of means over quarters for proportion of time spent in Active breaks is an approximate mirror image of those for Passive breaks.) Three alternatives offer themselves as possible explanations for such Period effects. The first of these is that the result was due to practice effects and to an inadequate criterion used to establish the "problem period" and, consequently, the "work periods." In other words, the median length of time required to do the first 12 problems may have provided a criterion that proved "too long" after the initial portion of the experimental session. Ss appear to have improved dramatically in their ability to multiply numbers after the first 45 minutes had passed, and short passive "mini-breaks" could have been undertaken between problems during the later periods which escaped detection. Correcting a "criterion problem," however, is not an easy task. Selecting problems from the end of the three-hour session for the determination of the problem period would have given a much more sensitive measure of Passive breaks, but would also in all likelihood have resulted in "false positives" in the detection of breaks at the beginning of the session--much as the present criteria may have resulted in "false negatives" in the latter portion. Using problem periods from the middle portion of the experimental session in defining the criterion would also have created difficulties, however, in that there would always have been the possibility that S would break too often to allow an accurate determination of a "problem period." A signal to S, either visual or auditory, that he was not to break for a specified period of time may have introduced unwanted

stimulus variation, but this approach might have been more preferable in the end.

A second possible explanation is that the significant Periods effect was due to an instructional influence. In the instructions, Ss were informed that they were free to take breaks; however, they were also told that they were required to achieve some hypothetical "reasonable" number of correct answers to receive full credit for having participated in the study (see Appendix D). While the latter statement was intended to insure the collection of at least minimal amounts of data, it was not intended to be particularly threatening. Even so, it is possible that at the beginning of the session Ss felt free to work at a comfortable pace and take breaks, but as the session progressed, began to fear that they were not going to achieve their "reasonable number of correct answers." This interpretation receives some support in the significant Periods effect for proportion of time spent in Active breaks. Since Active breaks have been thought to be "guesses," or simple "button-pushing," they may have represented an easy way for S to elevate the number of correct responses on the counter mounted in the apparatus. Thus, the Periods effect for both of the proportion measures may have represented S's initial willingness to proceed leisurely, followed by a later concern for his total number of correct responses, resulting in bouts of Active breaks later in the experimental session.

A third alternative explanation is the one most compatible with the theory of optimal level of stimulation, i.e., that Ss in all CSI groups initially found Passive breaks to be sufficiently novel alternatives to the monotony of the experimental task, but that as the session wore on Passive breaks likewise became very dull and monotonous. The Ss may

then have begun taking Active breaks, guessing the answers to the problems, or simply playing with the apparatus, to introduce more stimulus variation.

A third significant Periods effect occurred in the verbal ratings. An examination of the mean ratings (Table 4) makes the interpretation of this finding rather straightforward: The Ss, regardless of CSI group, became increasingly "uninterested" and "apathetic" as the experimental session progressed. Such a result provides strong evidence that the repetitive, cognitive task was indeed perceived as a monotonous one.

Sex Differences

Although significant sex differences in CSI scores have not been reported in the literature (see for example Brown, Ruder, Ruder, and Young, in press; Garlington and Shimota, 1964; Stock and Looft, 1969), there appears to be a tendency for males to score slightly higher than females. An examination of means reported for males and females in the present study (Table 3) indicates, however, that not only was the difference not a significant one but that the usual trend was reversed.

Sex proved a significant factor on one of the dependent variables, proportion of time spent in Active breaks. Males spent a significantly greater proportion of their time in Active breaks than did females. Since Active breaks involved taking some liberties with the experimental task, the apparatus, or both, the finding is perhaps not entirely surprising: The data suggest that the female Ss were less likely to depart from the format prescribed in the instructions than were the males, a finding which supports the well documented contention that

females are more submissive and eager to please (see, for example, Hovland and Janis, 1959; Douvan, 1960). An interpretation that females tolerate monotony more successfully than males, however, does not appear to be warranted in that no significant sex difference resulted for the type of break for which explicit permission was given, i.e., the Passive break.

Possible Applications

Many instructors have stood before their classes wondering why a third of the group has stopped attending altogether and why half is spending the hour leisurely reading the campus newspaper rather than taking notes. Perhaps the results of the present experiment when considered with some correlational data from another study (Brown, Ruder, Ruder, and Young, in press) suggest some possible explanations.

While other interpretations are possible, it might be reasonable to hypothesize that the students eagerly taking notes are those with a moderate need for stimulus variation. Those looking over the paper may have a lower need for stimulation and, like the Low CSI Scorers in the present study, they appear content to simply relax for the duration. Finally, it is possible that students with a high need for variation in their stimulus input are the ones who do not attend class. A highly significant correlation between class-cutting and need for stimulation supports such a thesis (Brown, Ruder, Ruder, and Young, in press), while further evidence is supplied by the observation that obtaining "High CSI Scorers" for the present study was more difficult a task than finding Ss for the other two groups; the high scorers simply were not in class when the sign-up sheets were distributed.

Perhaps the students with a high need for stimulation are also the students who are heard to complain, "But I studied for hours for this exam and still got a D!" or who lament, "The reading assignments are too long," or "I just can't seem to concentrate on this stuff." Hunt (1965, p. 247) has suggested that "infants who are exposed to a variety of inputs each day may develop a kind of . . . 'addiction to change'." Or, to put it in Piaget's familiar words, "The more a child has seen and heard, the more he wants to see and hear." If such an "addiction" early in life is translated into what Fiske and Maddi (1961) refer to as a "high characteristic curve of activation" which is maintained throughout adulthood, we may find that contemporary life has served to produce a large number of students whose need for stimulation is too great to be satisfied by traditional academic experiences.

The problem also appears to extend into the area of occupational interests, for Kish and Donnenwerth (1969) have found numerous positive correlations between need for stimulation and vocations which can be characterized as requiring "flexibility, interest, change, novelty, and complexity, and a relatively loose structuring of activity [p. 555]." In addition, Charlens (1969) has suggested that high need-for-novelty Ss were more discriminating concerning novelty in their environment and were more sensitive to small variation; therefore, they imposed more rigid standards on jobs they could like and liked fewer jobs than did the medium and low need-for-novelty groups.

The finding that different levels of need for stimulation result in differences in the ability to tolerate a monotonous cognitive task offers, when combined with the many relationships summarized in Table 1, impressive evidence that need for stimulation represents a significant

personality dimension, an understanding of which could allow for more useful planning of academic activities, more realistic vocational counseling, and perhaps even a re-examination of some of our child-rearing practices. In other words, need for stimulation may be a variable of major importance to questions of mental health.

REFERENCES

Acker, M., & McReynolds, P. The Obscure Figures Test: An instrument for measuring "cognitive innovation." Perceptual and Motor Skills, 1965, 21, 815-821.

Acker, M., & McReynolds, P. The "need for novelty": A comparison of six instruments. The Psychological Record, 1967, 17, 177-182.

Berlyne, D. E. Motivational problems raised by exploratory and epistemic behavior. In S. Koch (Ed.), Psychology, a study of a science. Vol. 5. New York: McGraw-Hill, 1963. Pp. 284-364.

Blackburn, R. Sensation seeking, impulsivity, and psychopathic personality. Journal of Consulting and Clinical Psychology, 1969, 33, 571-574.

Bone, R. N., & Choban, M. C. Sensation-Seeking Scale, Form IV, and field independence. Perceptual and Motor Skills, 1972, 34, 34.

Brown, L. T., Ruder, V. G., Ruder, J. H., & Young, S. D. Stimulation-seeking and the Change Seeker Index. Journal of Consulting and Clinical Psychology, in press.

Brownfield, C. A. Optimal stimulation levels of normal and disturbed subjects in sensory deprivation. Psychologia, 1966, 9, 27-38.

Burtt, H. E. Applied psychology. Englewood Cliffs, N. J.: Prentice-Hall, 1948.

Charlens, A. M. Need for novelty and occupational preference. Perceptual and Motor Skills, 1966, 22, 697-698.

Dember, W. N., & Earl, R. W. Analysis of exploratory, manipulatory, and curiosity behaviors. Psychological Review, 1957, 64, 91-96.

Douvan, E. Sex differences in adolescent character processes. Merrill-Palmer Quarterly, 1960, 6, 203-211.

Farley, F. H. Measures of individual differences in stimulation seeking and the tendency toward variety. Journal of Consulting and Clinical Psychology, 1971, 37, 394-396.

Farley, F. H., & Dionne, M. T. Value orientations of sensation-seekers. Perceptual and Motor Skills, 1972, 34, 509-510.

Farley, F. H., & Farley, S. V. Extroversion and stimulus-seeking motivation. Journal of Consulting Psychology, 1967, 31, 215-216.

Farley, F. H., & Farley, S. V. Impulsiveness, sociability, and the preference for varied experience. Perceptual and Motor Skills, 1970, 31, 47-50.

Fiske, D. W., & Maddi, S. R. (Eds.) Functions of varied experience. Homewood, IL: Dorsey, 1961.

Garlington, W. K., & Shimota, H. E. The Change Seeker Index: A measure of the need for variable stimulus input. Psychological Reports, 1964, 14, 919-924.

Hebb, D. O., & Thompson, W. R. The social significance of animal studies. In G. Lindzey (Ed.), Handbook of social psychology. Cambridge, Mass.: Addison Wesley, 1954. Pp. 532-562.

Heist, P., & Williams, P. A. Manual for the Omnibus Personality Inventory. University of California, Berkeley: Center for the Study of Higher Education, November, 1957.

Hocking, J., & Robertson, M. Sensation Seeking Scale as a predictor of need for stimulation during sensory restriction. Journal of Consulting and Clinical Psychology, 1969, 33, 367-369.

Hovland, C. I., & Janis, I. L. (Eds.) Personality and Persuasibility. New Haven, CT: Yale University Press, 1959.

Howard, K. I. A test of stimulus-seeking behavior. Perceptual and Motor Skills, 1961, 13, 416.

Howard, K. I., & Diesenhaus, H. I. Personality correlates of change-seeking behavior. Perceptual and Motor Skills, 1965, 21, 655-664.

Hunt, J. McV. Intrinsic motivation and its role in psychological development. In D. Levine (Ed.), Nebraska Symposium on Motivation, 1965. Lincoln: Univ. of Nebraska Press, 1965. Pp. 189-282.

Jackson, D. N. Personality Research Form. Form A. University of Western Ontario, London, Canada, 1964.

Kirk, R. E. Experimental design: Procedures for the behavioral sciences. Belmont, CA: Brooks/Cole, 1968.

Kish, G. B. Reduced cognitive innovation and stimulus-seeking in chronic schizophrenia. Journal of Consulting Psychology, 1970, 26, 170-174. (a)

Kish, G. B. Cognitive innovation and stimulus-seeking: A study of the correlates of the Obscure Figures Test. Perceptual and Motor Skills, 1970, 30, 95-101. (b)

Kish, G. B., & Busse, W. Correlates of stimulus-seeking: Age, education, intelligence, and aptitudes. Journal of Consulting and Clinical Psychology, 1968, 32, 633-637.

Kish, G. B., & Busse, W. MMPI correlates of sensation-seeking in male alcoholics: A test of Quay's hypothesis applied to alcoholism. Journal of Clinical Psychology, 1969, 25, 60-62.

Kish, G. B., & Donnenwerth, G. V. Interests and stimulus seeking. Journal of Counseling Psychology, 1969, 16, 551-556.

Kish, G. B., & Donnenwerth, G. V. Sex differences in the correlates of stimulus seeking. Journal of Consulting and Clinical Psychology, 1972, 38, 42-49.

Leuba, C. Toward some integration of learning theories: The concept of optimal stimulation. Psychological Reports, 1955, 1, 27-33.

Looft, W. R. Conservative, liberals, radicals, and sensation-seekers. Perceptual and Motor Skills, 1971, 32, 98.

Looft, W. R., & Baranowski, M. D. An analysis of five measures of sensation seeking and preference for complexity. The Journal of General Psychology, 1971, 85, 307-313.

McCarroll, J. E., Mitchell, K. M., Carpenter, R. J., & Anderson, J. P. Analysis of three stimulation-seeking scales. Psychological Reports, 1967, 21, 853-856.

McReynolds, P. Behavioral choice as a function of novelty-seeking and anxiety-avoidance motivations. Psychological Reports, 1971, 29, 3-6.

Palmer, R. D. Visual acuity and stimulus-seeking behavior. Psychosomatic Medicine, 1970, 32, 277-284.

Pearson, P. H. Relationships between global and specified measures of novelty seeking. Journal of Consulting and Clinical Psychology, 1970, 34, 199-204.

Pearson, P. H., & Maddi, S. R. The Similes Preference Inventory: Development of a structured measure of the tendency toward variety. Journal of Consulting Psychology, 1966, 30, 301-308.

Pedersen, D. M. Relations among sensation seeking and simulated and behavioral personal space. The Journal of Psychology, 1973, 83, 79-88.

Penney, R. K., & Reinehr, R. C. Development of a stimulus-variation seeking scale for adults. Psychological Reports, 1966, 18, 631-638.

Sales, S. M. Need for stimulation as a factor in preference for different stimuli. Journal of Personality Assessment, 1972, 36, 55-61.

Schubert, D. S. P. Arousal seeking as a motivation for volunteering: MMPI scores and central-nervous-system-stimulant use as suggestive of a trait. Journal of Projective Techniques & Personality Assessment, 1964, 28, 337-340.

Schubert, D. S. P. Arousal seeking as a central factor in tobacco smoking among college students. The International Journal of Social Psychiatry, 1965, 11, 221-225.

Schultz, D. P. Sensory restriction: Effects on behavior. New York: Academic Press, 1965.

Snedecor, G. W. Statistical methods. Ames, Iowa: Iowa State Univ. Press, 1956.

Stock, W. A., Looft, W. R. Relationships among several demographic variables and the Change Seeker Index. Perceptual and Motor Skills, 1969, 29, 1011-1014.

Thorne, G. L. Sensation Seeking Scale with deviant populations. Journal of Consulting and Clinical Psychology, 1971, 37, 106-110.

White, R. W. Motivation reconsidered: The concept of competence. Psychological Review, 1959, 66, 297-333.

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

Zuckerman, M., Albright, R. J., Marks, C. S., & Miller, G. L. Stress and hallucinatory effects of perceptual isolation and confinement. Psychological Monographs, 1962, 76 (30, Whole No. 549).

Zuckerman, M., Kolin, E. A., Price, L., & Zoob, I. Development of a sensation-seeking scale. Journal of Consulting Psychology, 1964, 28, 477-482.

Zuckerman, M., & Link, K. Construct validity for the Sensation-Seeking Scale. Journal of Consulting and Clinical Psychology, 1968, 32, 420-426.

Zuckerman, M., Neary, R. S., & Brustman, B. A. Sensation-Seeking Scale correlates in experience (Smoking, drugs, alcohol, "hallucinations," and sex) and preference for complexity (designs). Proceedings of the 78th Annual Convention of the American Psychological Association, 1970, 5, 317-318.

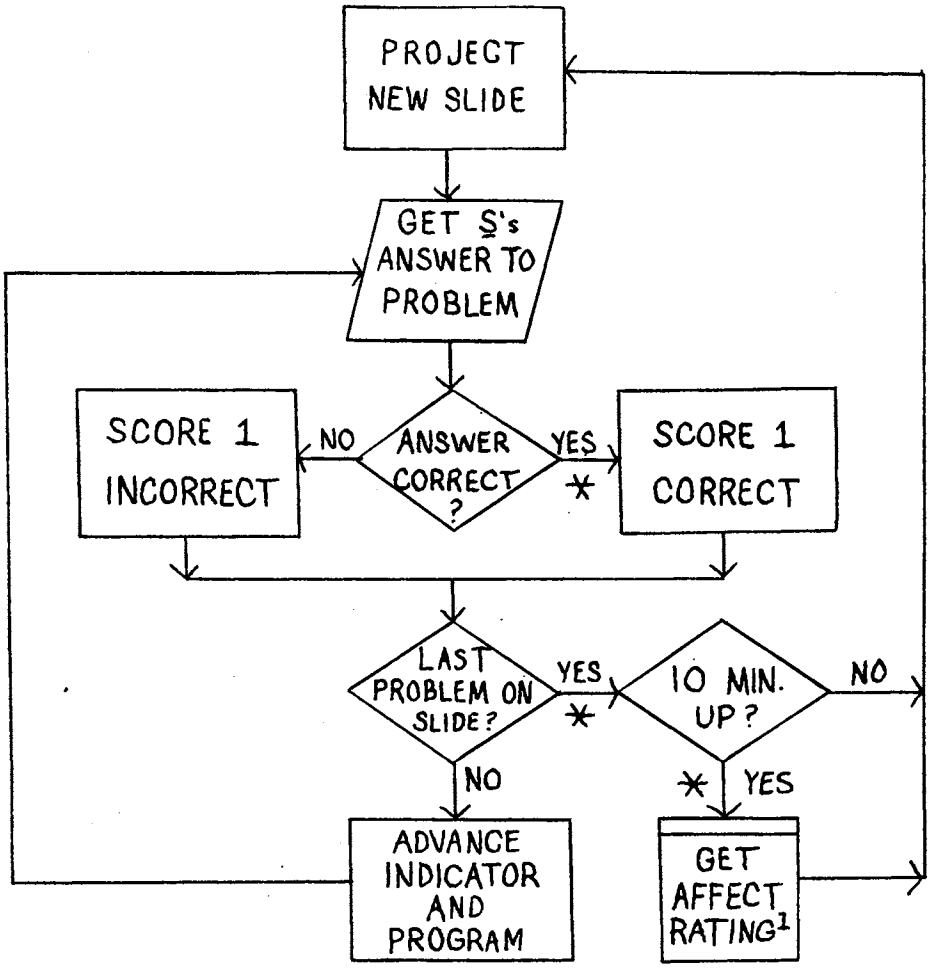
Zuckerman, M., Persky, H., Hopkins, T. R., Murtaugh, T., Basu, G. K., & Schilling, M. Comparison of stress effects of perceptual and social isolation. Archives of General Psychiatry, 1966, 14, 356-365.

Zuckerman, Persky, H., Link, K., & Basu, G. K. Experimental and subject factors determining responses to sensory deprivation, social isolation, and confinement. Journal of Abnormal Psychology, 1968, 73, 183-194.

Zuckerman, M., Schultz, D. P., & Hopkins, T. R. Sensation seeking and volunteering for sensory deprivation and hypnosis experiments. Journal of Consulting Psychology, 1967, 31, 358-363.

APPENDIX A

APPARATUS LOGIC



① cuts off projector, gets affect rating by S, starts projector, and goes to "start slide" sequence (a)

APPENDIX B

THE 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.

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 doing 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 the job of a 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 experience.

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 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 MULTIPLICATION TASK

The following instructions were read aloud to each S after he had been asked to remove his watch:

> This is a study concerning student work-habits, and we are going to ask you to work a series of multiplication problems. We would like you to pretend that these problems constitute a lab assignment for one of your classes, and that you've just come to the lab to do it. Moreover, we would like you to pretend that your girlfriend (boyfriend) out running errands and is planning on meeting you here at the lab when she (he) is through. She (He) wasn't sure exactly how long her (his) errands would take, but she (he) did promise to be back by five o'clock (noon) at the latest. Since the assignment is rather long, you have planned to try to get as much of it finished as you can before your girlfriend (boyfriend) arrives.
>
> Now, let's look at the problems. Notice that each problem consists of a 6-digit number times a single-digit number. You are to multiply the two numbers in your head. Down here [E indicates] an answer is provided and your task is to decide whether the answer is true or false. If the answer is true, push the "true" button to the right of that problem, and likewise, if the answer is false, push the "false" button. The problems are correct about 50% of the time. When the problems are wrong, they're only slightly off. It will therefore be necessary for you to work through the problem to decide whether the answer is true or false. Over here [E indicates] is a counter that will tell you how many of the problems you answer correctly.
>
> Each time you work a problem and push either the "true" or "false" button, the panel light to the left of that problem will go off and the next one down will come on. When you get to the bottom problem on the screen and answer it, a new set of problems will be shown, the bottom light will go off, and the top one will come on again. The lights will show you which problem you need to answer next and will help you keep your place if you should decide to stop and rest for a while. If you make an error in calculations and choose the wrong button, follow the light to the next problem anyway. Do not try to go back and correct your mistake (it won't be counted anyway).
>
> 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) get a reasonable number of problems correct. There is no specific "magic number" of correct answers that you have to reach. We know that the number correct will vary from one person to another, but we do have some rough idea of the range within which most people work. All we ask is that you work reasonably hard, and as long as you are fairly persistent you will have nothing to worry

about. Since there is no end to the problems, working faster won't get you out any sooner, but you can feel free to take breaks when you get tired.

Every once in a while, when you answer the last problem on a slide, the screen will go dark instead of presenting a new series of problems. As soon as this happens you are to decide how stimulated, interested, enthused, etc. or how bored, uninterested, apathetic, etc. you feel. Rate your feelings from the last time you made a rating until that moment. Notice that each of these buttons is labelled [E points] with a series of adjectives. Push the button which best describes the way you feel. Then, as soon as you have done that, push the "restart" button to present the next set of problems. It is important that you make your rating as soon as the screen goes dark and that you get the problems back on as quickly as possible. If you want to take a break after the problems are back on, that's fine. Just don't take a break after you have made your rating, but before you have pushed the "restart" button.

Since you will be in this room for quite some time, and since you may not leave once the experiment has begun, you may wish to use the restroom or get a drink of water before you start to work.

[Allow S to leave if he wants to. As S returns, turn on recorders. When S is re-seated, continue with instructions.]

Now, let's go back and work some problems. I will go through the first one and then you are to complete the next one while I watch. Then we will stop to see if you have any questions. [E works first problem, answers it, notes correct response on counter. S works next problem.]

Please be sure to push the buttons smoothly, but firmly. Occasionally, you will hear some extra clicks, but they are simply part of the apparatus and have nothing whatever to do with the experiment. I would also like to assure you that nothing else is going to happen to you while you are in this room. There will be no electric shock or unpleasant stimulus or tricks of any kind.

Although we don't want you to work at such a pace that it is uncomfortable, we would like for you to work through the first 12 problems (four slides) as quickly, but also as accurately, as you can. After that you may work at a more leisurely pace if you like. You may want to stop and stretch, walk around, etc. every so often. Feel free to do so.

I will be sitting in the outer room while you're in here, and I will come and tell you when your time is up.

Remember, you are to pretend that you are working on a lab assignment, and that you want to complete as much of it as possible before your girlfriend (boyfriend) comes, so work as rapidly as is comfortable for you.

Any questions?

Remember to work the first 12 problems (four slides) as rapidly and as accurately as you can; after that you may slow down if you wish. [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.

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