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The Sensation Seeking Scale as a Predictor of Need for Sensory Stimulation

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THE SENSATION SEEKING SCALE
AS A PREDICTOR OF NEED
FOR SENSORY STIMULATION

by

John C. Hocking, Jr.

A Thesis
Submitted to the
Faculty of the School of Graduate
Studies in partial fulfillment
of the
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July 1967
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John C. Hocking, Jr.
MASTER'S THESIS

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INTRODUCTION

Recent research in curiosity, exploratory, and manipulatory behavior has suggested that much behavior seems to be directed at increasing as well as decreasing sensory stimulation.

Experimental studies utilizing animals such as mice (Barnes, Kish and Wood, 1959), rats (Girdner, 1953; Kish, 1955; Marx, Henderson and Roberts, 1955), and rhesus monkeys (Fox, 1962), have demonstrated the reinforcing effects of light onset and light increment. Changes in either direction of light intensity have also been found rewarding to rats (Berlyne and Koenig, 1961) and monkeys (Moon and Lodahl, 1956). In studying the effects of auditory stimulation on rats, Barnes and Kish (1961) have shown that both the onset of low auditory stimulation and the termination of intense auditory stimulation can be reinforcing. These experiments suggest that not only decrement but also increment in external sensory stimulation is rewarding to animals.

The fact that both decrements and increments in sensory stimulation are sought by organisms has led to the development of the concept of optimal stimulation (Leuba, 1955) and some modifications of it (Hebb, 1955; Berlyne, 1960; Fiske and Maddi, 1961; Duffy, 1962; and Schultz, 1965).

Leuba concluded from some of the studies mentioned above that an organism will make those responses which shift the level of overall incoming stimulation away from extremely low or high
Citing research on the functions of the reticular activating system and of cortical arousal, Hebb (1955) has argued similarly for an optimal level of arousal. The studies reviewed by Hebb suggest that the RAS regulates sensory stimulation input and output, and is responsible for maintaining an optimal level of continuous and changing sensory stimulation upon which cortical arousal is dependent. According to Hebb, when sensory input to the RAS is low and consequently cortical arousal is low, the organism will repeat those responses which produce increased stimulation and corresponding higher arousal. On the other hand, excessive innervation of cortical arousal caused by intense sensory bombardment disrupts behavior.

Schultz (1965) has suggested that curiosity, exploratory, and manipulatory behavior are behavioral mechanisms aimed at a common goal, the maintenance of optimal variation of sensory input. Schultz has postulated the concept of sensoristasis, a drive state in which a constant range of varied sensory input is sustained in order that cortical arousal may be maintained at an optimal level. Hence an organism will attempt to maintain the appropriate level of cortical arousal by either increasing or decreasing incoming sensory stimulation. Optimal levels of stimulation which facilitate behavior may shift as functions of task and subject variables.

According to Schultz, conditions of sensory restriction and sensory bombardment are disruptive of the sensoristatic balance.
Consequently, when there is considerable sensory overload, the organism will act to reduce stimulation to a level conducive to its current behavior. Conversely, when there is a lack of incoming sensory stimulation, as in sensory deprivation experiments, the organism will act to increase available forms of stimulation. Data from these sensory deprivation experiments suggest that human subjects demonstrate a need for stimulation.

Thus, Bexton, et. al. (1954) found that their subjects became bored with the deprivation environment and listened to recorded messages to which they would not ordinarily listen, including old stock market reports, repetitions of the song, "Home on the Range," and talks for small children on the dangers of alcohol.

Subjects in Vernon and McGill's (1960) study were permitted to push a button illuminating a viewing box containing a line and two circles. These investigators hypothesized that if subjects spent time viewing the figures, they were expressing a need for stimulation. Those, subjects which quit before the completion of 72 hours of sensory deprivation spent more time looking into the box than subjects remaining for the entire experimental period.

Zuckerman and Haber (1964) found that subjects who were stressed by a previous experience in perceptual isolation made significantly more responses for visual and auditory stimulation than low-stress subjects. Total response measures increased as a function of time spent in isolation.

Goldstein (1965) compared the amount of time spent by confined
and nonconfined subjects in button-pressing for visual and auditory stimulation. Subjects confined in sensory deprivation spent more time button-pressing than did nonconfined subjects.

Ansfield (1965), in comparing the effects of different types of isolation environments, has suggested that motor activity emitted during isolation seemed to reflect efforts by subjects to augment or supplement the particular type of sensory stimulation available. He found that significantly more motor activity was emitted by subjects experiencing dark and quiet conditions during isolation than by subjects experiencing more structured, yet invariant, audio-visual conditions.

Thus research with animals and humans suggests that under conditions of restricted stimulation, organisms will attempt to increase the levels and types of sensory stimulation and thereby arrive at an optimal level of stimulation.

Zuckerman's (1964) Sensation Seeking Scale (SSS) was developed to quantify the concept of optimal level of stimulation. The SSS is a forced-choice paper and pencil questionnaire which measures preferences for such items as intensities in sensation (heat, cold, noise, taste, and colors), familiarity as opposed to novelty, routine as opposed to irregularity, and security as opposed to adventure, and thus measures an individual's "need" for stimulation. Zuckerman hypothesized that an individual who scores high on the SSS has a high "need" for stimulation and consequently seeks a relatively high level of sensory stimulation, which would be his
optimal level. An individual who scores low on the SSS has a lower "need" for stimulation and his optimal level of stimulation is lower. Zuckerman's published research shows that the SSS has moderate reliability ($r's = .68$ and $.74$ for college males and females, respectively), and has a significant negative correlation with an anxiety inventory.

The present study attempted to clarify the predictive qualities of the SSS as an indicator of individual "need" for stimulation. In order that the need for stimulation could be measured quantitatively, subjects in this experiment were permitted to button-press for visual, auditory, and kinesthetic stimulation while in deprivation. Assuming that button-pressing by the subjects while in deprivation would reflect their need for stimulation, the experimenter hypothesized that the total button-presses would be related to individual "needs" for stimulation as indicated by the SSS. Therefore, high scorers on the SSS, because of their "need" for stimulation, would be characterized by more button-pressing activity while in deprivation. The low scorers, because of their lower "need" for stimulation, would display less button-pressing activity. In addition, high scorers were also compared with low scorers in terms of preferences for types of stimulation.
METHOD

Subjects

Zuckerman's Sensation Seeking Scale (See Appendix A) was administered to 214 male students enrolled in three undergraduate psychology courses at Western Michigan University. From this distribution the 15 highest scorers and the 15 lowest scorers on the SSS were initially selected as experimental subjects. The inability of some individuals to serve as subjects necessitated seven substitutions. These were made for three high need subjects and for four low need subjects by selecting available subjects in successive scoring order. The mean scores on the SSS of the high need group and the low need group were 23.3 (S.D. .90) and 8.0 (S.D. 1.81), respectively. (See Appendix B)

Apparatus

A small isolation cubicle (9' long, 6' wide, 7' high) including a bed was used for the experiment. The cubicle was located in the subbasement of a college classroom building. The interior of the cubicle was dark and extraneous auditory stimuli was masked by the blower noise of an air-conditioning unit.

While in the deprivation room subjects were able to indicate when they wanted visual, auditory, and kinesthetic stimulation by pressing a button unit. Three door-bell buttons were mounted on a piece of wood (3"x 6"x ½") which subjects were encouraged to place
on the bed beside themselves. In order that the buttons could be
distinguished in the dark, one indentation was made on the visual
stimuli button, two indentations on the auditory stimuli button,
and no indentations on the kinesthetic stimuli button which was
in the middle position.

These stimulation-request buttons were connected to three
indicator lights located in the experimenter's room adjacent to
the cubicle. These lights, powered by an Eveready Ignitor Dry
Cell (1½ volt), notified the experimenter when the subject was
pressing the buttons requesting stimulation. The indicator lights
were situated on the desk at which the experimenter sat throughout
the experimental period. The experimenter's room was dark except
for an Amp
cubicle. These lights, powered by an Eveready Ignitor Dry
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were situated on the desk at which the experimenter sat throughout
the experimental period. The experimenter's room was dark except
for an Amp
visual stimuli consisted of illumination of the deprivation
cubicle by a Penetray's Motorized Color Wheel illuminated by a 150
watt reflector spotlight. The color wheel rotated amber, blue,
green, and red at 4 rpm. This unit was located on a stand at the
foot of the bed. When the visual stimuli button was pressed by the
subject, the experimenter activated the color wheel by a toggle
switch. An Amperite Delay Relay switch (115c15) limited the length
of time which the light would remain on in the cubicle to 15
seconds. A red fluorescent indicator light (1/3 watt) enabled
the experimenter to know when the color wheel was operating.

Auditory stimuli consisted of four piano notes which were
played through a 6-inch speaker located near the head of the bed.
These notes were recorded on a circular tape which was played on a Concord 320 tape recorder. The tape was played for 15 seconds, one revolution, each time the auditory stimulation-request button was pressed.

Subjects were given instructions to restrict their movements to a minimum. Whenever they pressed the kinesthetic stimulation-request button, subjects were permitted freedom of movement, both on and off the bed. Subjects were limited to a 15 second period of free movement per button-press. The experimenter notified subjects by an intercom buzzer when the 15 seconds had elapsed. Since the bed springs emitted squeaking noises which could be heard by the experimenter, it was possible to keep a record of movements during periods when the kinesthetic button was not pressed.

Procedure

The Sensation Seeking Scale (SSS) was administered to 214 male undergraduate students at Western Michigan University. At the time of administration the SSS was explained as a screening device which the experimenter was using for research purposes. Subjects were assigned to the two experimental groups by an assistant to insure that the experimenter did not know any particular subject's classification. The experimenter contacted by telephone the 15 highest scorers and the 15 lowest scorers on the SSS. These individuals were informed that they had scored in the range of a particular measure in which the experimenter was interested. If they agreed
to participate as subjects for the experiment, they were told that
their participation would require three hours because the research
involved sensory deprivation.

When the subjects reported individually for the experiment,
y they were met in the first floor hallway. Before going to the
basement area where the deprivation room was located, subjects
were advised that they would be occupied for a period of time and
therefore should take care of toilet needs. Subjects were then
taken to the basement area where the SSS was readministered (rho =
.93, see Appendix B) and a brief questionnaire prepared by the
experiment er was completed. The questionnaire (see Appendix C)
included items found significant in previous studies as well as
items which the experimenter thought might differentiate between
the two groups. The following instructions were read to the
subjects by the experimenter:

For this experiment you are asked to remain in the room
for a period of time not more than three hours or until you
voluntarily leave. You are asked to lie on the bed in the
supine position, that is, on your back. You are to stay
awake. Please keep movements to a minimum and do not talk.
You will be able to get several forms of stimulation if
you push a certain button. If you push the button with one
mark on it, a light will go on for a period of time. If you
push the button with two marks on it, tones will be played
for a period of time. If you push the button in the middle
position, you are permitted to move from the supine position
for a period of time. You may move around or get off the
bed until a buzzer is sounded. When the buzzer sounds, please
return to the supine position on the bed. The use of the
buttons is entirely up to you. This experiment is not an
endurance test or a test of will-power. People react in
many ways and there is no correct pattern for which we are
looking. The experimenter will remain next door in the
observation room throughout the experiment. You will not
be hurt in any way. Do you have any questions?

Subjects were given demonstrations of each form of stimulation. Wrist watches were removed so that subjects would be unable to tell how much time had elapsed.

Data were collected in order that the button-pressing behavior of the subjects while in deprivation could be quantified. The three hour period was divided into 18 ten minute units and the button-pressing responses were accumulated for each ten minute interval.

At the completion of the three hour period the experimenter talked informally with the subjects. The purpose of the experiment was not explained to subjects. They were asked not to discuss the experiment with anyone.
RESULTS

Data were collected in order that the button-pressing responses which high need and low need subjects made during deprivation could be compared. Termination by two low need subjects before the completion of the three hour experimental period limited comparisons to the first two hours of deprivation.

A summary of the statistical analysis of the difference in total button-pressing responses between the two groups is presented in Table 1.

Table 1

| Test of Significance between Total Button Presses of High Need and Low Need Subjects |
|---------------------------------|-----|-----|-----|
|                                | Mean | S.D. | SD_x| t   |
| High Need                      | 88.67| 179.25| 46.32| 0.70|
| Low Need                       | 52.73| 83.98 | 21.70|     |

The obtained t-value was not significant at the .05 level of confidence. Thus, the hypothesis that there was no difference in total button-presses for stimulation by the high need and the low need groups was not rejected at the .05 level of significance. However, the high need group showed significantly more variability than the low need group (F=4.45, df=14,11, p<.01).

Comparisons of the button-presses by high and low need subjects for each type of stimulation were made to see if these responses would differentiate between the two groups. Table 2 summarizes
during the first two hours of deprivation.

Table 2

Tests of Significance between Mean Responses of High Need and Low Need Ss

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>High Need Mean</th>
<th>S.D.</th>
<th>SDx</th>
<th>Low Need Mean</th>
<th>S.D.</th>
<th>SDx</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>27.67</td>
<td>58.52</td>
<td>15.11</td>
<td>26.60</td>
<td>36.46</td>
<td>9.11</td>
<td>0.06</td>
</tr>
<tr>
<td>Auditory</td>
<td>34.27</td>
<td>82.76</td>
<td>21.37</td>
<td>10.27</td>
<td>4.45</td>
<td>1.15</td>
<td>1.12</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>26.73</td>
<td>65.04</td>
<td>16.79</td>
<td>15.87</td>
<td>13.44</td>
<td>3.47</td>
<td>0.63</td>
</tr>
</tbody>
</table>

These t-values were not significant at the .05 level of confidence. Thus, the responses of the two groups for the three types of stimulation did not differ.

In order to explore the effects of early termination of two low need subjects, estimates of their responses if they had continued the entire experimental period were computed. Responses by these subjects in the third hour were projected by averaging their mean responses for the first two hours. This procedure resulted in no change in the results. (See Table 3, Appendix D)

Although the response measures did not significantly differentiate between high and low need subjects, graphical representations of the responses of the two groups suggest that there were some differences over time. Each group's mean response output per ten minute intervals for visual, auditory, and kinesthetic stimulation are shown in Figures 1, 2, and 3, respectively.
Figure 1. Mean button-pressing responses for visual stimulation.
Figure 2. Mean button-pressing responses for auditory stimulation.
Figure 3. Mean button-pressing responses for kinesthetic stimulation.
While the graphs suggest some differences, inspection of Table 4 (see Appendix E) indicates that the responses of two high need subjects account for most of the differences between the two groups. The exclusion of these two subjects would result in a reverse effect; without them the mean responses of the high need group would be lower than the mean responses of the low need group. The responses of one low need subject for visual and kinesthetic stimulation raised the mean responses of the low need group.

To determine whether there were preferences for any sensory modality, the percentages of each individual's responses for visual, auditory, and kinesthetic stimulation in relation to his total button-presses were computed. Preference was defined as more than 50% of total button-presses. None of the high need subjects showed a preference for visual stimulation, two subjects preferred auditory stimulation, and six subjects preferred kinesthetic stimulation. Six low need subjects preferred visual stimulation, none preferred auditory stimulation, and one subject preferred kinesthetic stimulation.

None of the questionnaire items differentiated between the high and low need groups at the .05 level of confidence. Only one item, smoking, showed any significance to the SSS at the .10 level of confidence. That is, more high need subjects, in comparison to low need subjects, did smoke.
DISCUSSION

The concept of optimal stimulation as well as recent experimental studies suggests that subjects in sensory deprivation will attempt to increase available forms of stimulation to an optimal level.

Zuckerman's Sensation Seeking Scale was designed to quantify the concept of optimal stimulation. He hypothesized that the SSS measures an individual's "need" for stimulation; individuals who score high on the SSS have a higher need for stimulation than individuals who score low.

The experimenter hypothesized that high scorers on the SSS, due to their higher need for stimulation, would respond more for stimulation while in deprivation than low scorers, who have a lower need for stimulation. Since the statistical comparison between the total button-pressing responses of high need and low need subjects was not significant, the hypothesis was not substantiated. High need subjects did not button-press for stimulation significantly more than low need subjects. Comparisons of the button-presses by subjects for each type of stimulation did not differentiate between the two groups. In terms of individual preference for the three sensory modalities, more of the high need subjects preferred kinesthetic to visual or auditory stimulation, and more low need subjects preferred visual to auditory or kinesthetic stimulation. In the absence of any research directed toward this difference, one can
only speculate at this point as to why kinesthetic stimulation is preferred by high need subjects and visual stimulation is preferred by low need subjects.

The lack of significant results suggests that the SSS does not measure "need" for stimulation. On the other hand, certain factors in the experimental design of this study might account for the failure of the SSS to predict individual "need" for stimulation.

The failure of the total button-pressing response rates to increase as a function of time spent in deprivation raises the question of whether satisfactory sensory deprivation was attained. Since previous research (Vernon and McGill, 1960; Zuckerman and Haber, 1965) has demonstrated that button-pressing increases as a function of deprivation time, the results of this study suggest that the period of deprivation was not of sufficient length to initiate the need for sensory stimulation. Previous studies have used longer deprivation periods, in some cases up to two weeks.

The deprived environment may have been more tolerable than the experimenter anticipated. Prior instructions as to the required length of stay in deprivation may have significantly affected toleration (Francis, 1964). Subjects were told that the experimental period would not exceed three hours. The instructions given subjects may have failed to neutralize such cognitive sets as perceiving the button-pressing situation as an endurance test or a test of "will-power" (Zuckerman and Haber, 1965).

Another explanation could be offered for the failure of this
study to differentiate between high and low need subjects. Zubek (1963) has commented, "The performance of exercises may provide sufficient variability of kinesthetic and proprioceptive stimulation to counteract most of the effects of unvarying stimulation from the visual and auditory sense modalities." Complete restriction of movement might have yielded different results. That is, without kinesthetic stimulation to compensate for the deprivation of visual and auditory stimulation, the high need subjects might have compensated by a higher rate of button-presses.

Only one of the questionnaire items, smoking, showed any significance to the SSS. Hull and Zubek (1962) found that subjects who remained in isolation for a full week were more likely to be nonsmokers. This study tentatively supported their conclusion at the .10 level of confidence. That is, more high need subjects, in comparison to low need subjects, did smoke.

In summary, there was no difference in total button-presses for stimulation by the high need and the low need groups. Comparison of the button-presses by high and low need subjects for each type of stimulation did not differentiate between the two groups. In terms of individual preference, more of the high need subjects preferred kinesthetic to visual or auditory stimulation, and more of the low need subjects preferred visual to auditory or kinesthetic stimulation. Either the SSS does not measure "need" for stimulation or certain factors in the experimental design may have accounted for the lack of significant results.
SUMMARY

This experiment was designed to clarify the predictive qualities of Zuckerman's Sensation Seeking Scale as an indicator of individual "need" for stimulation.

The SSS was administered to 214 male undergraduate psychology students at Western Michigan University. From this distribution the 15 highest scorers and the 15 lowest scorers on the SSS were selected as experimental subjects. These subjects were placed individually in a sensory deprived environment for three hours. They were permitted to button-press for visual, auditory, and kinesthetic stimuli while in deprivation.

The experimenter hypothesized that the amount of button-pressing would be related to individual "needs" for stimulation as indicated by the SSS. High scorers on the SSS, because of their higher "need" for stimulation, would show more button-pressing activity while in deprivation. Low scorers on the SSS, because of their lower "need" for stimulation, would display less button-pressing activity.

Statistical comparisons of button-pressing responses made by high need and low need subjects proved not significant. High need subjects did not button-press for stimulation more frequently than low need subjects. Button-pressing responses for each type of stimulation failed to differentiate between the two groups. Some difference in sensory modality preference was noted as six high
need subjects preferred kinesthetic stimulation and six low need subjects preferred visual stimulation.

A questionnaire including items found significant in previous studies was given to subjects. Only one item, smoking, showed any significance to the SSS. More high need subjects, in comparison to low need subjects, smoked.
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APPENDIX A

The following items were adapted from the Sensation Seeking Scale (Form II). Only items found significant for either males or both sexes were used. The number preceding each item indicates its number in Form II. The boldfaced letter indicates the selection scored in the sensation seeking direction.

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

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

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

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

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

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

7. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don’t know well.
9. A. I would not like to try any drug which might produce strange and dangerous effects on me.

B. I would like to try some of the new drugs that produce hallucinations.

10. A. I would prefer living in an ideal society where everyone is safe, secure, and happy.

B. I would have preferred living in the unsettled days of our history.

11. A. I sometimes like to do things that are a little frightening.

B. A sensible person avoids activities that are dangerous.

14. A. If I were a salesman I would prefer a straight salary, rather than the risk of making little or nothing on a commission basis.

B. If I were a salesman I would prefer working on a commission if I had the chance to make more money than I could on a salary.

15. A. I would like to take up the sport of water skiing.

B. I would not like to take up water skiing.

16. A. I don't like to argue with people whose beliefs are sharply divergent from mine, since such arguments are never resolved.

B. I find people that disagree with my beliefs more stimulating than people who agree with me.
17. A. When I go on a trip I like to plan my route and timetable fairly carefully.
    B. I would like to take off on a trip with no preplanned or definite routes or timetables.

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

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

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

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

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

27. A. When I go on a vacation I prefer the comfort of a good room and bed.
    B. When I go on a vacation I would prefer the change of camping out.
28. A. The essence of good art is in its clarity, symmetry of form, and harmony of colors.
   B. I often find beauty in the "clashing" colors and irregular forms of modern paintings.

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

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

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

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

Test and Retest Scores of High and Low Need Subjects on the SSS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Test</th>
<th>Retest</th>
<th>Subject</th>
<th>Test</th>
<th>Retest</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.B.</td>
<td>23</td>
<td>21</td>
<td>B.B.</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>T.C.</td>
<td>23</td>
<td>-</td>
<td>B.B.</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>S.C.</td>
<td>23</td>
<td>23</td>
<td>D.B.</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>G.F.</td>
<td>25</td>
<td>25</td>
<td>S.D.</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>J.H.</td>
<td>24</td>
<td>26</td>
<td>T.D.</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>D.H.</td>
<td>24</td>
<td>25</td>
<td>J.E.</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>L.J.</td>
<td>23</td>
<td>20</td>
<td>L.H.</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>J.K.</td>
<td>23</td>
<td>19</td>
<td>P.K.</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>J.P.</td>
<td>22</td>
<td>23</td>
<td>R.K.</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>B.P.</td>
<td>23</td>
<td>23</td>
<td>T.L.</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>B.R.</td>
<td>25</td>
<td>25</td>
<td>G.M.</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>P.R.</td>
<td>22</td>
<td>20</td>
<td>G.N.</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>C.S.</td>
<td>24</td>
<td>12</td>
<td>D.T.</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>D.T.</td>
<td>23</td>
<td>24</td>
<td>G.T.</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>B.W.</td>
<td>23</td>
<td>22</td>
<td>K.W.</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Biographical Questions

1. How many children are there in your family?

2. In what order in the family were you born? (Circle one)
   1  2  3  4  5  6  7  8  9

3. How often do you go to the movies? (Check one)
   - Regularly (3-4 times per month)
   - Frequently (at least once per month)
   - Occasionally (5-6 times per year)
   - Rarely (Once or twice in several years)
   - Never

4. How many hours do you watch T.V. per week? (Circle one)
   0-2  2-5  5-10  10-20  More than 20

5. How often do you read magazines, newspapers, or books? (Besides textbooks)
   - Daily
   - Frequently (at least once per week)
   - Rarely
   - Never

6. Do you smoke? (Check one)
   - Regularly (at least a pack per day)
   - Frequently (at least a pack per week)
   - Occasionally
   - Rarely
   - Never

7. In what extracurricular activities (sports, clubs, etc.) did you participate in high school?

8. What groups (sports, clubs, organizations, etc.) do you belong to now?

9. What kinds of physical activities do you enjoy? (For example, walking, running, swimming, etc.)
Table 3

Tests of Significance between Mean Responses of High Need and Low Need Ss during Three Hours of Deprivation

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>Mean</th>
<th>S.D.</th>
<th>$S_{Dx}$</th>
<th>Mean</th>
<th>S.D.</th>
<th>$S_{Dx}$</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>37.26</td>
<td>71.12</td>
<td>18.44</td>
<td>43.00</td>
<td>80.34</td>
<td>20.74</td>
<td>0.21</td>
</tr>
<tr>
<td>Auditory</td>
<td>46.13</td>
<td>15.26</td>
<td>3.95</td>
<td>13.67</td>
<td>12.55</td>
<td>29.06</td>
<td>1.11</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>36.17</td>
<td>78.59</td>
<td>20.29</td>
<td>27.47</td>
<td>86.54</td>
<td>22.34</td>
<td>0.30</td>
</tr>
</tbody>
</table>
APPENDIX E

Table 4
Total Button-Pressing Responses made by High Need Subjects during the First Two Hours of Deprivation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Visual</th>
<th>Auditory</th>
<th>Kinesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.B.</td>
<td>8</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>T.C.</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>S.C.</td>
<td>3</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>G.F.</td>
<td>179</td>
<td>289</td>
<td>0</td>
</tr>
<tr>
<td>J.H.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D.H.</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>L.J.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>J.K.</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>J.P.</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B.P.</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>B.R.</td>
<td>19</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>P.R.</td>
<td>36</td>
<td>16</td>
<td>138</td>
</tr>
<tr>
<td>C.S.</td>
<td>160</td>
<td>171</td>
<td>225</td>
</tr>
<tr>
<td>D.T.</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>B.W.</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

\[ \bar{x} = 27.67 \quad \bar{y} = 34.27 \quad \bar{z} = 26.73 \]
Table 4 (cont.)

Total Button-Pressing Responses made by Low Need Subjects during the First Two Hours of Deprivation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Visual</th>
<th>Auditory</th>
<th>Kinesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.B.</td>
<td>40</td>
<td>42</td>
<td>5</td>
</tr>
<tr>
<td>B.B.</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>P.B.</td>
<td>24</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>S.D.</td>
<td>19</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>T.D.</td>
<td>23</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>J.E.</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>L.H.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>P.K.</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>R.K.</td>
<td>33</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>T.L.</td>
<td>17</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>G.M.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G.N.</td>
<td>32</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>D.T.</td>
<td>147</td>
<td>28</td>
<td>169</td>
</tr>
<tr>
<td>G.T.</td>
<td>45</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>K.W.</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ \begin{align*}
\$ & = 399 \\
\bar{X} & = 26.60 \\
\bar{Y} & = 10.27 \\
\bar{T} & = 15.87
\end{align*} \]