The Role of Manifest Anxiety in Complex Learning.

Clifford Whipple Brackenridge

*Louisiana State University and Agricultural & Mechanical College*

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THE ROLE OF MANIFEST ANXIETY IN COMPLEX LEARNING

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in

The Department of Psychology

by

Clifford Whippie Brackenridge
A.B., Western Michigan College, 1940
M.A., Northwestern University, 1953
August, 1956
ACKNOWLEDGMENT

My sincere appreciation to Dr. C. E. Noble for his constant assistance and direction throughout this experiment; to Dr. T. W. Richards for his criticisms, support, and encouragement; and to the other members of my committee, members of the Psychology Department, and my fellow graduate students for helping in so many ways during the course of this investigation.
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ABSTRACT

The purpose of this study was to investigate the relationship between manifest anxiety and complex trial-and-error learning. It is generally assumed that anxiety under certain conditions aids the learning process whereas under other conditions anxiety is a source of interference. In order to delineate this relationship further, the interactions of three levels of anxiety with three levels of task complexity over 40 practice trials were studied. Anxiety was defined in terms of performance on the Taylor Manifest Anxiety Schedule. The complexity level refers to the number of possible available responses on the Selective Mathometer, a multiple-response device developed by Noble to investigate compound trial-and-error learning as a function of response availability. It was predicted that the low-anxious subjects would do better initially than the high-anxious subjects on all tasks, and that the latter would suffer an increasing decremental effect with increasing task complexity. A further expectation was that as mastery was approached, the effect of anxiety might be facilitative with respect to the dominant correct response. These hypotheses were drawn from the Hull-Spence theory regarding the relationship between acquisition of habit.
tendencies and drive level.

There were 288 subjects drawn from a group of 1005 under-graduate students whose scores on the Taylor Schedule had been obtained earlier. They were assigned on the basis of their scores on this test to high, medium and low anxiety groups. These groups were further divided into the three levels of complexity.

Each subject practiced for 40 trials on the task of discovering which one of the keys available to him would turn on a green reward lamp when a specific stimulus word was on the screen. The stimulus words were four paralogs known to be low in meaningfulness and familiarity. These four stimuli, presented in invariant sequence, comprised a trial. Therefore, the subject had four choice points per trial with instructions to make as many choices as possible for each stimulus duration to facilitate his finding the correct pushbutton to turn on the reward light for that stimulus.

The results indicate that manifest anxiety as defined by the Taylor Schedule does not influence performance in learning a compound trial-and-error sequence. This is true whether the behavior is measured in terms of erroneous responses or first correct responses at each choice point. The analysis of variance reveals very
significant main effects of both complexity (response availability) and stage of practice, as well as the interaction between these two variables. Chi-square tests of goodness of fit to evaluate position preference and accuracy on the initial choice on Trial 1, revealed a significant position preference but a random distribution of initial correct choices.

These results appear to indicate that the Hull-Spence theory regarding drive and complexity interaction is not supported when complexity is defined by manipulating response availability rather than by inferring complexity from performance data expressed in terms of difficulty. The findings, however, cast less doubt upon the logical structure of the theory than upon the continued theoretical linkage of motivation and anxiety, where the latter is measured by means of manifest anxiety questionnaires.
INTRODUCTION

Though psychologists understand little of a quantitative nature about factors that aid or hinder learning behavior in man, it is generally assumed that motivation is a powerful influence. Certain experiments suggest that in classical conditioning, the simplest kind of learning problem, motivation serves as an aid but that with increased complexity of the task the drive factor may lose its facilitating properties and result in impairment. The present investigation is an attempt to determine how level of motivation and degree of complexity interact in determining human performance in a trial-and-error learning situation.

Recent experimental studies (4, 14, 24, 26, 27, 28, 30) have investigated the relationship between human learning and the level of manifest anxiety (A) as measured by self-ratings on the Taylor (29) Anxiety Schedule (A). The assumptions underlying the use of this questionnaire were as follows: (a) the strength of the motivational (drive) level of Ss will be reflected in their state of general reactivity, (b) the latter behavior is associated with variations in internal anxiety (emotionality), and (c) that the intensity of latent anxiety can be ascertained by a printed test consisting of items describing
clinically-accepted overt (manifest) symptoms of this state. The theoretical formulations which surround this procedure follow those of Hull (5) relating response strength \( R \) to drive \( D \) in animals, wherein all habit tendencies \( H \) activated in a given stimulus situation are multiplied by the value of the total effective drive then operating, i.e., \( R = f (H \times D) \).

Taylor (28) predicted that anxious \( Ss \) (those obtaining high \( A \) scores) would perform at a higher level in a simple learning situation like classical eyelid conditioning than nonanxious \( Ss \) (those obtaining low \( A \) scores). This prediction was confirmed by Taylor (28) and later substantiated by Spence and Taylor (26) in a study of anxiety and the strength of the unconditioned stimulus.

In complex learning it is often found, however, that anxious \( Ss \) do not perform as well as nonanxious \( Ss \). In studies of animal behavior it is evident that task factors interact with strength of stimulus in habit acquisition. Yerkes and Dodson (31), in 1908, studied the acquisition of a white-black discrimination habit by mice under three levels of difficulty defined in terms of brightness differences. The stimulus was a shock applied whenever \( S \) made an erroneous choice. This was studied in varying strengths from a weak stimulus of just
over the threshold, through medium strengths to just under an injurious level. The general result was that the most rapid acquisition occurred when discrimination was easiest. In this condition the relationship held that the stronger the shock the faster the learning occurred. However, when the discrimination was of medium or greatest difficulty, the medium shock level was optimal.

Using three levels of food deprivation, Macduff (9) found that with increasing drive, performance by white rats on a 16-unit T-maze as measured by trials, errors, and time, improved with the strength of the drive. Kendler (6, 7) has reported a study in which an irrelevant thirst need was systematically varied in conjunction with the relevant hunger need. Using a Skinner box, he demonstrated that response evocation was significantly affected by the presence of an irrelevant need. The alien drive strength presumably had the effect of increasing response tendency up to a certain value but beyond this produced a decreasing effect. These experiments appear to show that, in animals, the task as well as the specific needs are important in determining the effects of drive on performance.

Studies of learning in human Ss also indicate that task variables must be considered along with motivational
variables. McKinney (12) studied the effects of induced stress upon the learning of a maze, a list of nonsense syllables, and a motor task, as well as solving a group of multiplication problems. The "stressor" for one group was an automatic clock buzzing each minute. A second group had the buzzing clock plus an automatic interval timer ringing at the end of six minutes. The Ss had been told that this interval was adequate for an average person to complete the task. A control group had neither buzzer nor timer. The results indicated that strong emotion adversely affects learning of these types. McKinney discussed his findings in terms of the consequences of the whole learning situation on the fixation of specific acts.

Malmo and Amsel (10), using serial rote learning of nonsense syllables, found significant differences between the performances of a group of psychiatric patients with severe anxiety (defined as the opinion of the attending psychiatrist) as the predominant symptom and a control group of nonpsychiatric (normal) Ss. There was an elevation of the anterior portion of the serial position error curve in the patient group. It was suggested that anxiety-produced interference between the relevant responses and the irrelevant responses, caused by the patients' anxiety-state, was responsible for the observed
In a study of the influence of anxiety on serial rote learning, Montague (13) reasoned that high anxiety (as measured by A scores) would increase the difference between stronger and weaker response tendencies, and that performance should thus vary with task characteristics. He used three 12-item verbal learning tasks varying in the relative number and strengths of correct and incorrect tendencies. This was achieved by manipulating both intralist similarity and the association value of nonsense syllables. Results consistent with expectation were obtained with the most difficult lists, but the anxious Ss were superior in learning the easiest list. It is not clear whether this interaction is the kind of thing Hull and Spence would predict from their theoretical position. Spence (25) has recently argued, however, that if the S-R tendencies are "single" and "isolated", then a high A value should produce facilitation in trial-and-error learning just as it is presumed to do in classical conditioning.

Following up Montague's lead, Taylor and Spence (30) demonstrated the superiority of non-anxious Ss over anxious Ss in performance on a serial verbal T-maze, using a memory drum and the words "left" and "right" as the anticipatory responses. Theoretically, the strengths
of the competing anticipatory and perseverative response tendencies also influence performance at each choice point. The number of errors made by the anxious group should be greater than those made by the nonanxious group on the difficult choice points, while the number of errors made by the anxious Ss on the easiest choice points should be less than those of the nonanxious, or at least not greater. The results substantiated the predictions with regard to difficult choices, but only on the easiest first choice was the anxious group superior.

Farber and Spence (4), using a 10-choice stylus maze and selecting their Ss also on the basis of A scores, found that the nonanxious Ss performed better than anxious Ss measured by both errors and trials to a criterion. They also found that the superiority of the nonanxious group varied with the level of difficulty of the choice point, as previously determined by an unselected group. In other words, the more difficult choice points impaired the performance of the anxious group more than they did the nonanxious group. Even at the easiest choice points the anxious Ss made more errors, as in the Taylor-Spence (30) study. It is possible that few or no competing responses were being elicited at these points because of the ease of learning, but no conclusions regarding habit interference at the choice points of the
maze are possible except as inferred from an individual S's performance. This matter is regarded by Spence as of crucial importance for his theory regarding the influence of motivational factors on learning.

Controlling the relative strength of the correct response in the initial response hierarchy, Ramond (24) reported a significant superiority of his nonanxious Ss when the initially weaker of two responses in a verbal learning situation was the correct one. This control was accomplished on the basis of an ingenious pairing of two different stimulus words with the same pair of response words. One response word had high initial association value while the other had a low value. The two stimulus words for each pair had a high association value. The difference between groups was not significant in the case of the initially stronger response word being correct. Ramond accounts for this finding on the basis of the principles of stimulus generalization and oscillation.

Further study of the relationship between anxiety and complex learning appeared to require the use of a task in which the available responses might be clearly and objectively specified at each choice point, and where complexity could therefore be defined independently of the performance data which usually define the concept of difficulty. Noble (17), using a multiple-choice device
called the Selective Mathometer (21), investigated compound trial-and-error learning as a function of response availability \( \overline{N_R} \). \( \overline{N_R} \) refers to the number of possible overt responses that can be made at any one point in the learning sequence. In accordance with expectation, it was found that increasing \( \overline{N_R} \) from 4 to 14 exerted a significant retarding effect on the trials to mastery (17, 18). There was also an interaction between \( \overline{N_R} \) and amount of practice. The Mathometer thus seems to satisfy the task characteristics desired for the present investigation. Recently Noble (16, 20) has outlined a derivation of the relationship between difficulty and complexity \( = f \overline{N_R} \) which will clarify the following predictions insofar as the term complexity is concerned.

Theoretically, the difficulty of learning an integrated behavior sequence should be some positive function of the level of motivation as well as of the number of alternative reactions available at each choice point. This follows from the assumption that an increased drive level multiplies the habit strengths of all response tendencies, thus producing a smaller net reaction potential for the correct response \( (R^+) \). This difference in favor of the probability of incorrect responses \( (R^-) \) should increase with further increases in \( \overline{N_R} \). Now, assuming that manifest anxiety correlates with differences in motivational
level, then Ss with high A scores should do poorest on, say, four-choice Mathometer tasks. Furthermore, the differences between high A and low A scorers should be accentuated in their performance on more complex tasks; e.g., when $N_R$ is increased to six or ten. This is explainable in Hull's theory on the basis of increasing the pooled excitatory potential ($E$) associated with the competing, incorrect ($R_i$) tendencies. Thus, the greater the habit interference the greater the number of $R_i$'s, and the greater the resulting impairment of proficiency.

Specifically, the present experiment investigated paced four-link heterogeneous compound trial-and-error learning with immediate serial reinforcement under three conditions of $N_R$ and three levels of A over a period of 40 trials. By using an intermediate group of Ss displaying medium anxiety on Taylor's test, an attempt was made to explore the area between the two extremes of A-scores typically reported up to the time of the inception of this study. It was predicted that all performance curves would originate at first choice probability values equal to the reciprocal of $N_R$, with the highly anxious Ss doing worst in each group and the relative decrements increasing with $N_R$. Whether the relative inferiority of Ss with high A scores would be overcome by extended practice
was regarded as an empirical matter. Theoretically, as Ss approach mastery the dominant reaction tendency should begin to be facilitated by high motivation; however, the more complex tasks ought to delay the point in training at which such a cross-over might occur.
PROCEDURE

Subjects: The Ss were selected from undergraduate courses at Louisiana State University on the basis of their scores on the revised form of the Taylor Anxiety Schedule (29). Under the title of "Biographical Inventory" this was administered to 580 Ss during the 1954 summer session, to 269 Ss during the fall semester of 1954, and to 156 Ss during the fall semester of 1955. All administrations were accomplished in a group setting. A copy of the Biographical Inventory is shown as Appendix A.

The resulting distribution of scores at LSU (N = 1005) was quite comparable to that obtained by Taylor at Iowa (N = 1971) (29). The $\chi^2$ of the difference between the two distributions is 59.51 with 41 df; the normal deviate equivalent of 1.91 is not significant. The median score for the LSU distribution was 15.6, the 80th centile was 23.02, and the 20th centile was 9.21. The Ss for the High Anxiety group (HA) were chosen randomly from those having scores of 23 and above; the Medium Anxiety group (MA) included Ss scoring from 14 to 18 inclusive; and the Low Anxiety group (LA) those with scores of 9 below. This placed about 20% of the total
distribution in each category. The frequency distribution of LSU scores is shown as Appendix B.

The comparison of the scores of males and females at Iowa showed the women to have a higher mean score but not significantly so (29). In the LSU sample the mean for males is 15.73 \((N = 634)\) and for females is 17.16 \((N = 371)\). A \(t\) of the difference in form between the two distributions was 41.96 with 41 df; the normal deviate equivalent of .16 is not significant. A \(t\)-test of the difference between the means was 2.82 which is significant beyond the 1% point.

Matarazzo, Ulett, Guze, and Saslow (11) found a small but significant (1% point) negative relationship \((N = 101)\) between \(A\) level and one measure of intelligence (score on the ACE test). In the present sample no relationship was found between \(A\) and grade point average nor between \(A\) and scores on an abbreviated version of the Wechsler-Bellevue Test of adult intelligence. To check this relationship in the LSU population, 209 Ss were randomly selected for whom ACE scores were available. The correlation between \(A\) and ACE scores was -.17 which is not significantly different from zero. This result agrees with that found in a recent study at LSU by Noble and Farese (22) in which no relationship \((N = 209)\) was found.
between A and selected portions of the SRA Primary Mental Abilities battery. In view of failure to find a relationship between anxiety and measures of intelligence, this factor was permitted to vary randomly in the selection of Ss for the present study.

There were 96 Ss in each N group. Each of these groups was subdivided into three A groups of 32 Ss each. This made a total of 288 Ss in all nine conditions. Assignment to the three treatments within each level of anxiety was random with the restriction that an attempt was made to match the three complexity groups with regard to mean A-scores. This technique resulted in a larger proportion of females in the HA groups than in the LA groups which, in view of the sex differences found on A scores, favored the hypotheses being investigated.

Apparatus. The Selective Mathometer was the learning device used. Described in detail by Noble and Farese (21), it consists essentially of a semicircular array of 19 push-button reaction keys. Each key has a removable wooden cover so that it can be made either available or non-available. Stimuli are presented automatically by electronically-controlled slide projection at a 3.70 sec. rate, with an exposure duration of 2.00 sec. and a dark period of 1.70 sec. Following a correct response S is
reinforced by a green lamp which lights above the response panel. Time of occurrence, sequence, and duration of all responses are automatically recorded. Trial, correct, and error data are also cumulated by magnetic counters.

The stimuli were four paralogs known from previous research to have low familiarity (15) and low meaningfulness (14). These four items were prepared as 2" x 2" slides together with two opaque slides to constitute a single trial sequence. Stimulus presentation followed an invariant random sequence for all experimental conditions with an intertrial interval of 7.40 sec.

The three experimental conditions involved the ratio of the number of relevant responses to available responses and were as follows: 4/4, 4/6, and 4/10. The response keys on S's panel were numbered from left to right. Keys 4, 8, 12, and 16 were chosen as correct (R+) for all three conditions. These were the same keys as used by Noble in his studies (17, 18) on response availability. The corresponding incorrect keys (R-) are shown below:
The instructions to $S$ were essentially a statement that he was being tested for problem solving ability. He was given an explanation and demonstration of the apparatus and told that he was to push the buttons to find which one would turn on the green light for each stimulus. The instructions used in this experiment differed from those used previously (17, 18) in that $S$s were given a set for high reactivity. It was felt that increasing the tendency to respond rapidly would emphasize differences between anxious and nonanxious groups. Therefore $S$ was not required to return the hand to the resting point before making the next button-pushing response. Questions were answered in general terms of the instructions. A copy of the complete instructions is shown as Appendix C.

Most $S$s did not appear to relate being requested to serve in this part of the experiment with having taken the anxiety test at some previous date. Those who did were told that they had been randomly selected from the college population for this research, which seemed to
satisfy them.

Method. A $40 \times 3 \times 3$ Type III design (8) was used in which each condition of $N_R$ and each level of $A$ was administered under the $2^4$ possible permutations of four reactions, with $S$s assigned without bias to each cell. Since 32 $S$s appeared in each of the nine treatment combinations, it was necessary to randomly select an additional 8 of the possible $2^4$ permutations to complete the total, the same additional 8 being used in all cells. All $S$s were given 40 trials by the modified correction procedure.

In order to obtain as much naivety in $S$s as possible, they were requested after completing the task not to discuss it with their school mates. An $S$ was rejected when he failed to comply with the instructions, when $E$ made an error, or when there were apparatus failures. There were 33 $S$s rejected for all reasons.
RESULTS

The mean and median $A$ levels for the nine experimental groups are shown in Table 1. Due to the heterogeneity of the form and variance of the distributions, and the fact that deliberate restrictions were imposed, no statistical test of differences is indicated. The comparability of the groups is evident upon inspection.

The total correct first choice scores ($1R^+$) for each $S$ in blocks of 5 trials were submitted to a $4 \times 3 \times 3$ Type III analysis of variance (8) which is summarized in Table 2. Only the first 20 trials were considered in order to avoid extreme heterogeneity and skewness of the form and variance in the frequency distributions as the curves approach the asymptote of task mastery. This restricted the possible scores to the middle 80% range which makes the analysis comparable to that presented by Noble (18). It can be seen that the over-all differences due to $N^R$ are significant, as are these attributable to practice. The latter effects result from the fact that the probability that the first response ($R^P$) made at a choice point will be correct increases due to the habit factor. The $N^R$ effects are due to habit interference arising from different numbers of
Table 1

Mean and Median Scores on the Manifest Anxiety Schedule for the Different Experimental Groups

<table>
<thead>
<tr>
<th>Anxiety Level</th>
<th>Degree of Complexity</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$N_R = 4$</td>
</tr>
<tr>
<td>LA</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.41</td>
</tr>
<tr>
<td>Median</td>
<td>6.93</td>
</tr>
<tr>
<td>MA</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>15.81</td>
</tr>
<tr>
<td>Median</td>
<td>15.87</td>
</tr>
<tr>
<td>HA</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>27.84</td>
</tr>
<tr>
<td>Median</td>
<td>26.87</td>
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</table>
Table 2

Summary of Analysis of Variance of First Choice Correct Scores (LR+) Based on Trials 1-20

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (availability)</td>
<td>2</td>
<td>2,542.96</td>
<td>33.04</td>
<td>.001</td>
</tr>
<tr>
<td>C (anxiety)</td>
<td>2</td>
<td>60.42</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>B x C</td>
<td>4</td>
<td>40.77</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>Error (b)</td>
<td>279</td>
<td>76.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (practice)</td>
<td>3</td>
<td>6,478.63</td>
<td>573.84</td>
<td>.001</td>
</tr>
<tr>
<td>A x B</td>
<td>6</td>
<td>39.74</td>
<td>3.52</td>
<td>.005</td>
</tr>
<tr>
<td>A x C</td>
<td>6</td>
<td>8.71</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>A x B x C</td>
<td>12</td>
<td>13.73</td>
<td>1.22</td>
<td>&gt;.20</td>
</tr>
<tr>
<td>Error (w)</td>
<td>837</td>
<td>11.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1151</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
available responses. As \( N^R \) increases the rate of rise of the \( LR^+ \) scores decreases which is shown by the highly significant interaction between these variables.

There are no differences in \( A \) effects revealed by this analysis except in the three-factor interaction. An \( F \) of 1.55 (\( df = 12/837 \)) would be necessary for significance at the 10% point.

Since the two performance measures (\( LR^+ \) and \( R^- \)) are experimentally independent, an analysis of variance of the error scores was appropriate. This was done on the same basis as that for \( LR^+ \), using total \( R^- \) in blocks of five trials per \( S \) as cell entries. A summary of this analysis can be seen in Table 3. The results are the same as those of Table 2 in that \( N^R \) and practice produce significant over-all effects as well as a two-factor interaction. Again there are no main effects nor interactions involving \( A \).

To explore the possibility that there might be some initial effect which was being obscured by pooling the first five trials, a 5 x 3 x 3 Type III analysis of variance similar to the foregoing was performed on individual \( R^- \) trial scores. Each of the 32 entries per cell was a single \( S \)'s score on one trial. The summary of this analysis is shown in Table 4. As is noted in this table, the
Table 3
Summary of Analysis of Variance of Error Scores (R=) Based on Trials 1-20

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (availability)</td>
<td>2</td>
<td>20,972.82</td>
<td>40.61</td>
<td>.001</td>
</tr>
<tr>
<td>C (anxiety)</td>
<td>2</td>
<td>596.80</td>
<td>1.16</td>
<td>&gt;.20</td>
</tr>
<tr>
<td>B x C</td>
<td>4</td>
<td>494.82</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>Error (b)</td>
<td>279</td>
<td>516.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (practice)</td>
<td>3</td>
<td>26,127.68</td>
<td>364.15</td>
<td>.001</td>
</tr>
<tr>
<td>A x B</td>
<td>6</td>
<td>635.26</td>
<td>8.85</td>
<td>.001</td>
</tr>
<tr>
<td>A x C</td>
<td>6</td>
<td>69.60</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>A x B x C</td>
<td>12</td>
<td>82.25</td>
<td>1.15</td>
<td>&gt;.20</td>
</tr>
<tr>
<td>Error (w)</td>
<td>837</td>
<td>71.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1151</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4

Summary of Analysis of Variance of Error Scores ($R^-$)
Based on Trials 1-5

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (availability)</td>
<td>2</td>
<td>1,942.08</td>
<td>62.89</td>
<td>.001</td>
</tr>
<tr>
<td>C (anxiety)</td>
<td>2</td>
<td>30.88</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>B x C</td>
<td>4</td>
<td>19.64</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>Error (b)</td>
<td>279</td>
<td>29.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Ss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A (practice)</td>
<td>4</td>
<td>83.10</td>
<td>16.80</td>
<td>.01</td>
</tr>
<tr>
<td>A x B</td>
<td>8</td>
<td>12.89</td>
<td>2.61</td>
<td>.05</td>
</tr>
<tr>
<td>A x C</td>
<td>8</td>
<td>4.57</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>A x B x C</td>
<td>16</td>
<td>4.28</td>
<td>&lt;1.00</td>
<td></td>
</tr>
<tr>
<td>Error (w)</td>
<td>1116</td>
<td>4.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1439</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
same variables as observed before in Tables 2 and 3 are contributing significant differences to the groups' scores.

The mean $R_{-\text{scores}}$ for these first five trials in the various levels of $A$ in each $N_{-}$ condition are presented in Table 5. It can be seen that the means decrease in all three levels in $4/4$ but increase before decreasing in both the $4/6$ and $4/10$ conditions. The rise of mean scores in $\text{MA}$ and $\text{HA}$ is considerably different from $\text{LA}$ in $4/10$ from Trial 1 to Trial 2. However, this difference disappears on Trials 3 and 4.

The error curves which were used in these analyses are shown in Fig. 1. The anxiety factor was not considered since it failed to influence performance. The mean total $R_{-\text{scores}}$ for 96 $S$s are plotted against stage of practice. The curve parameters denote the total number of available responses. The rise in mean number of errors from Trial 1 to Trial 2 in the $4/6$ and $4/10$ conditions is consistent with the data reported by Noble (19) in a study of the effect of increasing the number of choice points upon Mathometer performance.

To describe acquisition curves in multiple-choice compound trial-and-error learning, Noble (17) has proposed the following rational equation:
Table 5

Mean Error Scores ($R^-$) on Trials 1-5 for Three Availability ($N_R$) Conditions in Three Anxiety ($A$) Levels

<table>
<thead>
<tr>
<th>Anxiety Level</th>
<th>$N_R$</th>
<th>Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>LA</td>
<td>4/4</td>
<td>4.41</td>
</tr>
<tr>
<td></td>
<td>4/6</td>
<td>5.47</td>
</tr>
<tr>
<td></td>
<td>4/10</td>
<td>8.12</td>
</tr>
<tr>
<td>MA</td>
<td>4/4</td>
<td>4.34</td>
</tr>
<tr>
<td></td>
<td>4/6</td>
<td>5.78</td>
</tr>
<tr>
<td></td>
<td>4/10</td>
<td>7.12</td>
</tr>
<tr>
<td>HA</td>
<td>4/4</td>
<td>5.31</td>
</tr>
<tr>
<td></td>
<td>4/6</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>4/10</td>
<td>8.18</td>
</tr>
</tbody>
</table>

24
Figure 1

Error \( (R_-) \) Curves as a Function of Practice \( (N) \) with Response Availability \( (N_R) \) as the Parameter
MEAN ERRORS ($\bar{R}$)

ORDINAL NUMBER OF TRIAL ($N$)

ORDINAL NUMBER OF TRIAL ($N$)

0 10 20 30 40
\[ R_p = a(i)^r^N \]

where \( R_p \) = the probability of a correct first choice (1R+)

\( a \) = the asymptote or limit of \( R_p \), taken as 1.00

\( i \) = the initial probability at the outset of learning, given by the reciprocal of \( N_R \)

\( r \) = a rate parameter calculated by empirical curve-fitting

\( N \) = the number of practice trials

Figure 2 shows how closely the theoretical acquisition curves developed from a curve fitting analysis of Equation [1] fit the empirical data. The equations for the three \( N_R \) conditions are:

\[ R_p = 1.00 (0.250)^{842^N} \quad (N_R = 4) \quad [2] \]

\[ R_p = 1.00 (0.167)^{881^N} \quad (N_R = 6) \quad [3] \]

\[ R_p = 1.00 (0.100)^{896^N} \quad (N_R = 10) \quad [4] \]

The goodness of fit is indicated by coefficients of determination of .994, .999, and .996 for Equations [2], [3], and [4] respectively. On the average, 99.6% of the variance in \( R_p \) is accounted for by Equation [1].

The parameter \( r \) increases numerically (decreases in slope) with increases in \( N_R \), which can be seen in Fig. 2.
Figure 2

Compound Trial-and-Error Learning ($R_P$) as a Function of Practice ($N$) with Response Availability ($N_R$) as the Parameter. The Origins are Rational.
PROBABILITY OF CORRECT RESPONSE ($R_p$)

ORDINAL NUMBER OF TRIAL ($N$)
as differences in the rate at which the three groups approach the asymptote. This finding is consistent with the significant practice x availability interaction shown in Tables 2, 3, and 4 and confirms Noble's (17) earlier study employing military personnel. As a further indication of the dependence of difficulty upon $N_0 R$, the inflection points for the three curves are at 1.76, 4.59, and 7.59 trials for the 4/4, 4/6, and 4/10 conditions respectively.

There are some noticeable discrepancies in the data. The $R$-value on Trial 1 in the 4/10 data is .078, whereas it should be .127 reading from the fitted curve. This difference between the two points is not significantly different from chance, however. By a $z$-test for proportions, the difference of .047 is found to be only 1.40 times the $\sigma$ of .035. This is in contrast to a significant difference in one of the studies reported by Noble and Farese (22). Often such decrements are due simply to omissions but other systematic factors may be present.

On the possibility that $A$ might interact with position preference to produce some of the above effects, $\chi^2$ tests of independence on the first response of the first trial for the 4/4 and 4/6 conditions were run. The $\chi^2$ resulting from the $4 \times 3$ matrix was 3.99 with 6 df and
the one from the 6 x 3 matrix was 11.04 with 10 df. Neither approached significance at the 5% point. Therefore, the three levels of A were grouped in each N condition for the following tests. By a $\chi^2$ test for the multiple category case, the hypothesis that all keys should be chosen with equal frequency may be evaluated. For 4/4 this means that 25% of 96 or 24 responses should be made to each key on the very first response on Trial 1. For the 4/4 condition the $\chi^2$ was 23.92 with 3 df, for the 4/6 it was 39.62 with 5 df, and for the 4/10 it was 22.38 with 9 df. These are all significantly different from chance beyond the 1% point.

Chi-square tests of goodness of fit were computed also to evaluate the hypothesis of random correct responding on the initial choice (1R+) on Trial 1. The resulting $\chi^2$ was less than unity in each N group, indicating that although there is a position preference it does not interfere with group 1R+ scores. In all groups the initial responses tended to pile up around Key number 12, which is slightly to the right of center as S faces the response panel. These findings are in line with other data from Mathometer performance (19).

Serial position effects were investigated for the nine treatment combinations by plotting mean R- scores
at each choice point ($n = 32$) during the first five trials. There was no evidence for a bowed serial position gradient which is consistent with all the other experiments (17, 18) as well as with a recent study of task length (19).
DISCUSSION

The results clearly refute the hypothesis that motivational strength as defined by A scores influences behavior in complex trial-and-error learning under these conditions. This is consistent with a recently published report of another study at Louisiana State University under the direction of Noble (22) in which correlations between Mathometer performance in a $4/10$ condition ($N = 103$) and $A$ for $R^+$ and $R^-$, were $.048$ and $.061$ respectively. There are several possible reasons why manifest anxiety did not correlate with performance in the present experiment in the way that other investigators have reported.

One important factor seems to be task differences. As we have seen, previous experiments using a verbal maze, a stylus maze, paired associate learning, or serial rote learning have all inferred the degree of task complexity, either from logical considerations or from the performance data. Now many would perhaps assume that complexity, defined as number of possible solutions, and difficulty of task are linearly related. For the Selective Mathometer, however, Noble (16) has shown this relation to be curvilinear in the form

$$N = c \log_e (nPm)$$

\[5\]
where $N =$ difficulty, calculated as the median trials to mastery

$q =$ an empirical parameter denoting the performance criterion

$n_{Pm} =$ task complexity, calculated as the number of permutations

This appears to be an important point in the consideration of the theoretical explanation by Spence of the results in previous studies using $A$ scores to select $S$s. If it is true that competing responses are differentially affected by differences in drive level, then being able literally to point at the number of competing (sequences of) responses in the task should clearly show this effect. In the current study it did not do so. This is true in spite of the fact that there are profound differences in complexity as indicated by the three $N_R$ conditions; i.e., the $n_{Pm}$ values corresponding to $N_R$ values of 4, 6, and 10 are 24, 360, and 5040 respectively. As pointed out by Noble (19) the Mathometer is a genuine sequential learning device of the "competitional" or habit interference type.

The question of the strengths of the competing $R+$ and $R-$ tendencies has also been advanced as an important consideration (4, 13, 24, 30). This refers to the fact
that drive supposedly multiplies all associative bonds in a given habit family hierarchy. The results of this study provide no evidence that R-1's are differentially prepotent among A levels. If the Spence-Taylor analyses were correct, this effect should have appeared at least in the early portions of the error curves of Fig. 2. However, examination of the component A level portions of these curves failed to reveal any support for this viewpoint, as shown in Table 5.

The results of the present study confirm the position taken by Child (2) and Farber (3) that caution should be exercised in the use of A scores. Child (2) in commenting on the usefulness of the Taylor Schedule said, "...difficulties...may generally be encountered when a complex personality scale comes to be used not for some practical aim for which discrimination may be useful, even if the basis of discrimination is not understood, but instead for theoretical purposes which require relating scores to a single theoretically defined intervening variable (2, p. 151)."

Farber (3) states that the Taylor Schedule was never intended for all the uses to which it has been put, and certainly not as an optimum predictor of just any sort of performance. Thus it seems that Spence and
his associates are still trying to answer the question raised by Taylor (28) when she originally presented the Manifest Anxiety Schedule. This question was: Are the observed differences between anxious and nonanxious Ss in rate of conditioning due to D, H, or to the interaction of associative and non-associative variables?

Axelrod, Cowen, and Heilizer (1) recently attempted to validate the findings of Farber and Spence (4) regarding the relationship between stylus maze performance and scores on the Taylor Manifest Anxiety schedule. In contrast to the Farber and Spence findings, no significant differences were found among anxiety groups with respect either to total errors or trials to criterion. Axelrod and his associates suggest that the Farber-Spence conclusions may have been based on an inappropriate method of analysis of the data. One important difference in the two studies is the level of difficulty of choice points in the two standardization groups, one from Iowa and one from the University of Rochester. These latter results are consistent with those being reported in this study. When the difficulty level of choice points is consistent and specific from group to group, the effects of A disappear.

It is quite possible that some of the basic
assumptions underlying the use of Taylor's Inventory are faulty. That is, the theoretical coordination of A and D may have been premature. Of course this does not necessarily imply that the general (i.e., abstract) structure of the Hull-Spence theory is in error; it may only mean that Taylor's choice of empirical defining operations was inappropriate.

Some incidental evidence bearing on this point has been presented by O'Connor, Lorr, and Stafford (23), who performed a factor analysis of the responses to the so-called critical items. They found no common factor but five individual factors instead. The five factors were identified as: chronic worry, increased physiological reactivity, sleep disturbances, sense of personal inadequacy, and motor tension. It would seem that performance data would depend upon what responses each individual S had learned to make to anxiety. This view is discussed by Malmo and Amsel (10) in terms of the relationship of the drive stimulus (S_D) to the response in question. If S_D is conditioned to competing responses, it will impede performance. That is, if task-relevant responses were elicited, S's performance might be facilitated while task-irrelevant responses would have the opposite effect. This may be an important consideration when evaluating the differences between verbal and motor performance. The S_D
encountered by Ss in the former situation may lead to more irrelevant responses than those encountered in the latter.

If one were willing to accept the risk of Type II error, the practice x availability x anxiety interaction could be regarded as indicating that there are significant differences in the effects of anxiety at various stages of practice in the three availability conditions. A possible theoretical implication would be that a more precise method of varying motivational level might reveal a quantifiable relationship between this factor and the $r$ parameter of Equation [1]. This might therefore be a productive area for further research.

In conclusion, it would seem that the use of $A$ scores as an indication of $D$ has very limited value in attempting a theoretical account of motivational factors in human behavior, to say nothing of the interaction of $D$ with practice and task variables. The present findings, however, do provide additional quantitative clarification of the role of response availability in human trial-and-error learning.
SUMMARY

This study investigated the relationship between manifest anxiety and compound trial-and-error learning on the Selective Mathometer. Three levels of manifest anxiety (high, medium, and low) were defined in terms of scores on the Taylor Manifest Anxiety Schedule. The task involved paced four-link heterogeneous compound trial-and-error learning with immediate serial reinforcement under three conditions of response availability \( N_R \) and task length held constant. The ratios of correct to available responses were \( 4/4, 4/6, \) and \( 4/10 \). Two hundred and eighty-eight human Ss were used in a \( 40 \times 3 \times 3 \) factorial design where a repeated measurement was stage of practice over 40 trials.

No significant effects of \( A \) were found either as main effects or in interactions. This was true of first correct choice scores as well as error scores. It was found that \( N_R \) exerted a highly significant retarding effect upon the rate of trial-and-error learning. There were significant effects of \( N_R \) and practice as well as of their interaction.

The results were discussed with regard to their implications for the Hull-Spence theory of drive effects in complex learning situations.
REFERENCES


APPENDIX A

BIOGRAPHICAL INVENTORY

Do not write or mark on this booklet in any way. Your answers to the statements in this inventory are to be recorded only on the separate Answer Sheet.

Print your name, the date, the date of your birth, age, sex, etc., in the blanks provided on the Answer Sheet. Use only the special pencil provided for this test; this pencil must be used because the Answer Sheet will be checked by a machine. If your special pencil runs out of lead, get another pencil from the Examiner. Do not use any other type of pencil. After you have completed filling in the blanks, finish reading these instructions.

The statements in this booklet represent experiences, ways of doing things, or beliefs or preferences that are true of some people but are not true of others. You are to read each statement and decide whether or not it is true with respect to yourself. If it is true or mostly true, blacken the answer space in Column A on the Answer Sheet in the row numbered the same as the statement you are answering. If the statement is not usually true or is not true at all, blacken the space in column B in the
numbered row. You must answer the statement as carefully and honestly as you can. There are no correct or wrong answers; we are interested in the way you work and in the things you believe.

Remember: Mark the answer space in column A if the statement is true or mostly true; mark the answer space in column B if the statement is false or mostly false. Be sure the space you blacken is in the row numbered the same as the item you are answering. Use only the first two columns, the ones labeled A and B. Mark each item as you come to it; be sure to mark one, and only one, answer space for each item. Here is an example:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>•</td>
</tr>
<tr>
<td>!</td>
<td>•</td>
</tr>
<tr>
<td>!</td>
<td>•</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

If you would like to be an artist, that is, if the statement is true as far as you are concerned, you would mark the answer space under A. If the statement is false, you would mark the space under B.

If you have any questions, please ask them now.

DO NOT MARK ON THIS BOOKLET
1. I would rather win than lose in a game.
2. I am often the last one to give up trying to do a thing.
3. There is usually only one best way to solve most problems.
4. I do not tire quickly.
5. I am often sick to my stomach.
6. I am in just as good physical health as most of my friends.
7. I am about as nervous as other people.
8. I think that I feel more intensely than most people do.
9. I have had periods in which I carried on activities without knowing later what I had been doing.
10. There is something wrong with my mind.
11. I have very few headaches.
12. My hearing is apparently as good as that of most people.
13. I work under a great deal of strain.
14. I cannot keep my mind on one thing.
15. I do not like everyone I know.
16. I worry over money and business.
17. I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others.
18. I frequently notice my hand shakes when I try to do something.
19. I prefer work that requires a great deal of attention to detail.

(Go right on to the next page.)
20. My neck spots with red often.
21. I seem to be about as capable and smart as most others around me.
22. I have a cough most of the time.
23. I often become so wrapped up in something I am doing that I find it difficult to turn my attention to other matters.
24. I blush as often as others.
25. I have diarrhea ("the runs") once a month or more.
26. I worry quite a bit over possible troubles.
27. I practically never blush.
28. I have very few quarrels with members of my family.
29. I think nearly everyone would tell a lie to keep out of trouble.
30. I am against giving money to beggars.
31. Once in a while I put off until tomorrow what I ought to do today.
32. I can sleep during the day but not at night.
33. I am often afraid that I am going to blush.
34. I cannot understand what I read as well as I used to.
35. I have nightmares every few nights.
36. My hands and feet are usually warm enough.
37. I sweat very easily even on cool days.
38. When embarrassed, I often break out in a sweat which is very annoying.

( Go right on to the next page. )
39. I have been told that I walk during sleep.
40. I am almost never bothered by pains over the heart or in my chest.
41. I do not often notice my heart pounding and I am seldom short of breath.
42. I have used alcohol excessively.
43. I feel hungry almost all the time.
44. Often my bowels don't move for several days at a time.
45. I like to know some important people because it makes me feel important.
46. I find it hard to make talk when I meet new people.
47. People often disappoint me.
48. I have a great deal of stomach trouble.
49. I prefer doing one thing at a time to keeping several projects going.
50. My parents and family find more fault with me than they should.
51. At times I lose sleep over worry.
52. I dislike to change my plans in the midst of an undertaking.
53. I wake up fresh and rested most mornings.
54. My sleep is restless and disturbed.
55. I have reason for feeling jealous of one or more members of my family.
56. I often dream about things I don't like to tell people.

(Go right on to next page)
57. I love my mother.

58. Some of my family have habits that bother and annoy me very much.

59. I make me impatient to have people ask my advice or otherwise interrupt me when I am working on something important.

60. I find it hard to set aside a task that I have undertaken, even for a short time.

61. My table manners are not quite as good at home as when I am out in company.

62. My mother is a good woman.

63. Most nights I go to sleep without thoughts or ideas bothering me.

64. I love my father.

65. I never miss going to church.

66. I am easily embarrassed.

67. My feelings are hurt easier than most people.

68. My father is a good man.

69. My people treat me more like a child than a grown-up.

70. I would like a position which requires frequent changes from one kind of task to another.

71. I usually maintain my own opinion even though many other people may have a different point of view.

72. Once in a while I feel hate towards members of my family whom I usually love.

73. I usually expect to succeed in things I do.

(Go right on to the next page.)
74. I easily become impatient with people.

75. If I could get into a movie without paying and be sure I was not seen, I would probably do it.

76. It makes me uncomfortable to put on a stunt at a party even when others are doing the same sort of thing.

77. I often find myself worrying about something.

78. I often worry about my health.

79. My family does not like the work I have chosen (or the work I intend to choose for my life work).

80. I like to study and read about things that I'm working at.

81. The only interesting part of newspapers is the "funnies".

82. I wish I could be as happy as others.

83. I am usually calm and not easily upset.

84. My sex life is satisfactory.

85. I find it easy to stick to a certain schedule, once I have started on it.

86. I cry easily.

87. I feel anxious about something or someone almost all of the time.

88. Children should be taught all the main facts of sex.

89. Criticism or scolding hurts me terribly.

90. It takes a lot of argument to convince most people of the truth.

91. I do not read every editorial in the newspaper every day.

(Go right on to the next page.)
92. I wish I were not bothered by thoughts of sex.
93. I am very religious (more than most people).
94. I am happy most of the time.
95. I believe women ought to have as much sexual freedom as men.
96. I believe there is a God.
97. I believe in a life hereafter.
98. A minister can cure disease by praying and putting his hand on your head.
99. It makes me nervous to have to wait.
100. At times I am so restless that I cannot sit in a chair for very long.
101. I frequently find it necessary to stand up for what I think is right.
102. I do not enjoy having to adapt myself to new and unusual situations.
103. Sometimes I become so excited that I find it hard to get to sleep.
104. My soul sometimes leaves my body.
105. Sometimes when I am not feeling well I am cross.
106. At times I am all full of energy.
107. I have often felt that I faced so many difficulties I could not overcome them.
108. At times I have a strong urge to do something harmful or shocking.
109. I prefer to stop and think before I act even on trifling matters.

(Go right on to the next page.)
110. I am liked by most people who know me.

111. Sometimes I am sure that other people can tell what I am thinking.

112. At times I have been worried beyond reason about something that really did not matter.

113. As a youngster I was suspended from school one or more times for cutting up.

114. No one seems to understand me.

115. I would not like the kind of work which involves a large number of different activities.

116. I try to follow a program of life based on duty.

117. I do not have as many fears as my friends.

118. I refuse to play some games because I am not good at them.

119. I often think "I wish I were a child again."

120. Often I can't understand why I have been so cross and grouchy.

121. At times I feel like swearing.

122. More often than others seem to, I do many things that I regret afterwards.

123. I have been afraid of things or people that I knew could not hurt me.

124. I believe in law enforcement.

125. I have kept a careful diary over a period of years.

126. I wish I were not so shy.

127. It would be better if almost all laws were thrown away.

(Go right on to the next page.)
128. My interests tend to change quickly.
129. I enjoy children.
130. I usually find that my own way of attacking a problem is best, even though it doesn't always seem to work in the beginning.
131. I am never happier than when alone.
132. Even when I am with people I feel lonely much of the time.
133. I am afraid when I look down from a high place.
134. At times I feel like smashing things.
135. I get angry sometimes.
136. I certainly feel useless at times.
137. At periods my mind seems to work more slowly than usual.
138. I find it hard to keep my mind on a task or job.
139. Most any time I would rather sit and day dream than to do anything else.
140. I have difficulty in starting to do things.
141. I dislike having to learn new ways of doing things.
142. I like a great deal of variety in my work.
143. I brood a great deal.
144. Most of the time I feel blue.
145. I am more self-conscious than most people.
146. I have the wanderlust and am never happy unless I am roaming or traveling about.

(Go right on to the next page.)
147. At times it has been impossible for me to keep from stealing or shoplifting something.
148. I am a methodical person in whatever I do.
149. I have often met people who were supposed to be experts who were no better than I.
150. What others think of me does not bother me.
151. Once in a while I laugh at a dirty joke.
152. I am the kind of person who takes things hard.
153. I am a very nervous person.
154. Sometimes I feel as if I must injure either myself or someone else.
155. I have not lived the right kind of life.
156. I certainly have had more than my share of things to worry about.
157. If people had not had it in for me I would have been much more successful.
158. I am usually able to keep at a job longer than most people.
159. I believe I am being followed.
160. I think it is usually wise to do things in a conventional way.
161. I always finish tasks I start, even if they are not important.
162. Someone has been trying to influence my mind.
163. Life is often a strain for me.
164. At times I think I am no good at all.
165. I do not always tell the truth.
166. I have never felt better in my life than I do now.

(Go right on to the next page.)
167. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose.

168. I am not at all confident of myself.

169. Someone has control over my mind.

170. People who go about their work methodically are almost always the most successful.

171. I sometimes keep on at a thing until others lose their patience with me.

172. At one or more times in my life I felt that someone was making me do things by hypnotizing me.

173. When I have undertaken a task, I find it difficult to set it aside, even for a short time.

174. I believe I am being plotted against.

175. Sometimes unimportant thoughts will run through my mind and bother me for days.

176. Often I cross the street in order not to meet someone I see.

177. Someone has been trying to poison me.

178. Someone has been trying to rob me.

179. I often find myself thinking of the tune or phrases for days at a time.

180. I like to let people know where I stand on things.

181. I gossip a little at times.

182. I have a work and study schedule which I follow carefully.

183. At times I feel that I am going to crack up.

184. There are persons who are trying to steal my thoughts and ideas.

185. I often feel as if things were not real.

(Go right on to the next page.)
186. I usually check more than once to be sure that I have locked a door, put out the light, or something of the sort.

187. I don't like to face a difficulty or make an important decision.

188. I commonly hear voices without knowing where they come from.

189. I am sure I am being talked about.

190. I am very confident of myself.

191. I have never done anything dangerous for the thrill of it.

192. When I am with people I am bothered by hearing very queer things.

193. I commonly wonder what hidden reason another person may have for doing something nice for me.

194. It is always a good thing to be frank.

195. Once in a while I think of things too bad to talk about.

196. When in a group of people I have trouble thinking of the right things to talk about.

197. I get mad easily and get over it soon.

198. I see things or animals or people around me that others do not see.

199. Evil spirits possess me at times.

200. I have a lot more fears than my friends do.

201. I like to visit places where I have never been before.

202. At times I am afraid of losing my mind.

203. I am not afraid to handle money.

(Go right on to the next page.)
204. Sometimes I enjoy hurting persons I love.

205. I can easily make other people afraid of me, and sometimes do for the fun of it.

206. I have a habit of collecting various kinds of objects.

207. It does not bother me particularly to see animals suffer.

208. Sometimes I am strongly attracted by the personal articles of others such as shoes, gloves, etc., so that I want to handle or steal them though I have no use for them.

209. I have periods in which I feel unusually cheerful without any special reason.

210. At times my thoughts have raced ahead faster than I could speak them.

211. Sometimes at elections I vote for men about whom I know very little.

212. I have more trouble concentrating than other people seem to have.

213. Everything tastes the same.

214. I have taken a good many courses on the spur of the moment.

215. No one cares much what happens to you.

216. I believe that promptness is a very important personality characteristic.

217. My interests change very quickly.

218. My way of doing things is apt to be misunderstood by others.

219. It is the slow, steady worker who usually accomplishes the most in the end.

220. I am always careful about my manner of dress.

(Go right on to the next page.)
221. Any man who is able and willing to work hard has a good chance of succeeding.

222. I usually dislike to set aside a task that I have undertaken until it is finished.

223. I am inclined to go from one activity to another without continuing with any one for too long a time.

224. I prefer to do things according to a routine which I plan myself.

225. I always put on and take off my clothes in the same order.
APPENDIX B

Frequency Distribution of Manifest Anxiety Scores for 1005 Students at Louisiana State University

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APPENDIX C

Instructions to Subjects

"This is a test of problem solving ability. With a slide projector I am going to show you, one at a time, a series of words on this screen. As each word appears on the screen, your job will be to find out which of these buttons (E points) is connected with it. You find this out by trying a button. Push it down quickly, like this (demonstrates). Use the forefinger of either your right or your left hand, but use only one hand during the test.

"When a word appears on the screen, make a choice, by pressing one of the buttons. If you are right a green light will come on indicating a correct choice (demonstrates). Then after a moment, another word will appear on the screen. Make a choice for this one also. Let's say you're wrong on this one. The green light will not come on, indicating that you haven't selected the right button. In that case quickly try another button.

"It is important that you make a choice every time a word appears, but do not press any buttons when there is nothing on the screen. If you do it will not be counted.
"Try to find the correct button for each word as quickly as possible. I will show a series of four words following which the screen will be dark for a few moments and then another series will begin. This sequence of four problems is called a trial. You will complete the test when you have run through forty trials. Your goal is to solve as many problems correctly as you can in 40 trials. In other words, you want to turn on as many green lights as possible during the test. Any questions?

"We are now ready to begin the test. The slides will be shown in rapid order, so you must work fast to keep up. Ready? Here is the first word--make your first choice."
VITA

Clifford W. Brackenridge was born in Saugatuck, Michigan on May 4, 1917. He graduated from high school there in 1935. He received a Bachelor of Arts degree from Western Michigan College in 1940. From 1942 to 1945, he served in the Army and Air Force. Northwestern University granted him a Master of Arts degree with Psychology as the major course of study in 1953.

He was a graduate assistant in the Psychology Department at Louisiana State University from July 1953 to July 1955, the first year on the Baton Rouge campus and the second in New Orleans at Charity Hospital and the L.S.U. Medical School Department of Neuropsychiatry.

Since August 1955 he has been a Fellow in Clinical Psychology at Southeast Louisiana Hospital.
Candidate: Clifford Whipple Brackenridge

Major Field: Clinical Psychology

Title of Thesis: THE ROLE OF MANIFEST ANXIETY IN COMPLEX LEARNING

Approved:

Clyde F. Roble
Major Professor and Chairman

Howard Hill
Dean of the Graduate School

EXAMINING COMMITTEE:

Robert Thompson

J. V. Kohansky

Charles Walter

Joseph G. Dennis

Date of Examination:

July 20, 1956