MANIFEST ANXIETY AND TASK AS DETERMINERS OF
PERFORMANCE IN PAIRED ASSOCIATE LEARNING

APPROVED:

Major Professor

Minor Professor

Dean of the School of Education

Dean of the Graduate School
MANIFEST ANXIETY AND TASK AS DETERMINERS OF
PERFORMANCE IN PAIRED ASSOCIATE LEARNING

THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

Bill Rondol Brown, B. A.
Denton, Texas
August, 1965
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>iv</td>
</tr>
</tbody>
</table>

## Chapter

<table>
<thead>
<tr>
<th>I. INTRODUCTION</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. PROCEDURE</td>
<td>13</td>
</tr>
</tbody>
</table>

- Subjects
- Description of Instruments
- Collection of Data
- Scoring and Statistical Design

<table>
<thead>
<tr>
<th>III. RESULTS</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. DISCUSSION</td>
<td>30</td>
</tr>
<tr>
<td>V. CONCLUSIONS</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>40</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>BIBLIOGRAPHY</th>
<th>44</th>
</tr>
</thead>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Means and Standard Deviations of Performance of Restrictive Groups on the Paired-Associate Tasks</td>
<td>22</td>
</tr>
<tr>
<td>II. Means and Standard Deviations of Performance of Non-Restrictive Groups on Paired-Associate Tasks</td>
<td>23</td>
</tr>
<tr>
<td>III. Summary of the Analysis of Variance of Performance of Restrictive Groups on List I</td>
<td>25</td>
</tr>
<tr>
<td>IV. Summary of the Analysis of Variance of Performance of Restrictive Groups on List II</td>
<td>26</td>
</tr>
<tr>
<td>V. Summary of the Analysis of Variance of Performance of Non-Restrictive Groups on List I</td>
<td>26</td>
</tr>
<tr>
<td>VI. Summary of the Analysis of Variance of Performance of Non-Restrictive Groups on List II</td>
<td>27</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

The behavior of the human organism is made exceedingly complex by the continual modification of his responses through learning. Therefore, in furthering an understanding of man's behavior, the scientist must determine the conditions and variables which influence this learning. Because of its complexity, it is necessary to study analytically learning under the control conditions of the laboratory; however, if learning is to be studied under such conditions, it is imperative that a precise definition be made. Kimble and Garmezy refer to learning as a relatively permanent change in a behavioral tendency in the organism that occurs as a result of reinforced practice and the diversified conditions that accompany practice. It is quite obvious that this definition identifies learning as an intervening variable and also differentiates learning and other processes that underlie changes in behavior.

One of the basic distinctions in the field of learning is that between learning and performance. In this distinction, the discrimination is between the underlying process theoretically produced by reinforced practice and the manifestations of the underlying process; consequently, the experimenter, beginning with this basic distinction, is
led to investigate the factors that might conceivably influence the distinguished variables. In regard to the present study, the experimenter concerned himself with certain factors other than learning ability which might enhance or inhibit the process of learning. Specifically, the present study was concerned with the possibility that the effects of manifest anxiety upon experimental performance of a complex task is a function of the relative number and the strength of incorrect response tendencies elicited in a given situation.

The studies which are reviewed below have all attempted to manipulate drive by the selection of subjects, rather than by the usual method of varying certain antecedent conditions; they were concerned with the effect of motivational level on human performance. Specifically, this method has consisted in selecting two groups of subjects on the basis of their having obtained extreme scores on a test of manifest anxiety developed by Taylor (23, 24). The basic assumption made in such studies was that a subject's effective drive strength is a direct function of his score on this test of manifest anxiety. Thus subjects with high scores on the Taylor Anxiety Scale were assumed to have high drive strength, while those with low scores on the Taylor Anxiety Scale were assumed to have low drive strength.

Sarason (19, 20, 22) studied anxiety as a measure of drive and found that high anxious subjects are detrimentally affected by verbally administered communications which
possess high motivating properties. The results of these experiments indicated that as task complexity increases, the disadvantages of high anxiety to low anxiety appear to increase. The measure of drive was operationally derived from scores on the Manifest Anxiety Scale.

Farber and Spence (5), Taylor and Spence (25), Taylor and Chapman (25), Korchin et al (9), Nicholson (15), Castenada et al (2), Osler (17), Lazarus et al (19), Gaier (6), Deese et al (4), Beam (1), and others have reported relevant studies. In the majority of these experiments a kind of verbal multiple-T maze or a stylus maze was utilized. In both types of tests it was found that where several incorrect response tendencies were relatively high in the habit-family hierarchy, high anxious subjects' performance was poorer than the low anxious subjects'. When high anxiety and low anxiety subjects were matched for total score, significant evidence was found that on the easy choice points high anxiety subjects performed better than did low anxiety subjects; however, on the most difficult choice points the opposite was found to be true. Thus, in these studies there existed correlations between high anxiety and low anxiety subjects' performance at the choice point.

Lipman and Griffith (11) stated that anxiety should facilitate performance where a correct response tendency is dominant. However, performance should be lower on tasks
where incorrect response tendencies are dominant. The subjects were administered the Manifest Anxiety Scale individually within six months of their performance on a concept formation task. The data indicated an advantage of low anxious subjects relative to high anxious subjects as the experimental task became more difficult.

On the basis of these studies it appears anxious (high drive) and non-anxious (low drive) groups differ in respect to drive level rather than general learning ability. A higher anxiety or motivational level, however, will not always result in superior performance. As Taylor and Spence (26) point out, the effect of added drive upon performance will depend mainly upon the nature of the task to be performed. If the task is a simple one in which there is but a single stimulus-response tendency, the higher drive will lead to a higher level of response. But in more complex learning situations which involve a hierarchy of competing responses, the effect of a higher drive level will depend upon both the number of responses in this hierarchy and the relative strength of the correct response as compared with the habit strengths of the incorrect responses. In a situation in which there are many competing S-R tendencies, particularly in a situation in which the correct response is initially weaker in habit strength than one or more incorrect responses, it can be shown that the effect of higher drive strength will be opposite to that found in the conditioning experiments; i.e., it will lead to poorer
performance. This prediction follows from the assumption that drive multiplies indiscriminately the habit strengths of all responses, subsequently, in this competing-response situation, increasing the amounts by which the excitatory strengths of the incorrect responses exceed that of the correct response.

This theoretical expectation has also been confirmed in more complex learning situations; however, in the studies reported previously there exists no experimental manipulation of the difficulty or complexity variable. The existence of competing responses is deduced from the fact that a given choice point in a T maze presents above average difficulty in learning of the subject. Lucas (12) has made a rather more quantitative approach to this problem by varying experimentally the amount of response competition. For example, the experimental variable introduced was the extent to which, in a list of consonants presented in a memory test, some of the consonants are repeated in different locations within the list. The results indicate that the greater the number of duplications the greater the inferiority in performance of a high anxiety group.

Montague (15) also investigated the effects of anxiety upon experimental performance as a function of the relative number and strength of correct and incorrect tendencies elicited in the experimental situation. Three verbal learning tasks, made to vary in the relative number of correct and incorrect tendencies elicited by the manipulation of intra-
list similarity and association value of the nonsense syllables employed, were given to independent groups of twenty anxious and twenty non-anxious subjects. Performance measures were in the predicted direction; i.e., anxious subjects performed less well than non-anxious subjects on the difficult task with many incorrect tendencies, and showed greater improvement of performance as the task became easier, and surpassed non-anxious subjects on the task with the least number of incorrect tendencies.

Raymond (18) investigated the effect of differences in motivational level upon performance in a verbal learning situation as a function of the relative strength of the correct and incorrect responses in the initial hierarchies. Motivational level was assumed to be positively related to scores on the Taylor Manifest Anxiety Scale, and was varied by selecting two groups of subjects, one anxious (high drive) and one non-anxious (low drive), on the basis of their having obtained extreme scores on this test. The relative strength of the correct response was controlled in two ways: (a) the hierarchy was restricted by forcing subjects to choose, on each presentation, one of two responses; (b) one of the two available responses was made stronger than the other on the basis of scaling techniques. The following results were obtained: (a) non-anxious subjects responded correctly significantly more often than did anxious subjects on those presentations in which the weaker response was correct;
(b) there existed no significant differences between the performance of the anxious subjects on those presentations in which the stronger response was correct. It was concluded by Raymond that the effects of differences in drive strength depended upon whether the correct response was the stronger or the weaker in the hierarchy.

If one assumes, as does Hull (7), that response strength is a multiplicative function of drive strength, i.e., that $R = f(D \times H)$, then it follows that the higher the level of $D$, the greater will be the strength of any given response tendency. Anxiety is assumed to have at least two of the functional properties of primary drives as these are treated in the Hull-Spence (7) formulation of the roles of drive and drive reduction; that is to say, its reduction should be reinforcing or should intensify any response tendencies that are present during its period of evocation. Within this framework, the strength of response tendencies is conceived to be a multiplicative function of their habit strengths and the general drive level of the responding organism.

On this assumption that scores on the Manifest Anxiety Scale reflect a difference in drive, the findings of the previously surveyed studies are in line with Hull's theoretical formulation that a drive is multiplicative of the organism's habit strength. Spence (5, 26) proposes the derivation from Hullian theory that anxiety, acting as a drive, strengthens already existing response tendencies which are incorrect as
far as performance of a complex task is concerned; consequently, high anxiety showed far poorer performance than low anxiety in situations where several incorrect response tendencies are relatively high in the habit family hierarchy.

An alternate hypothesis has been proposed by Mandler (14) and Sarason (21). These writers assume that anxiety produces certain responses which interfere with the efficient learning or performance of complex tasks. Their theory thus presents an alternative to that of Spence. Where Spence assumes that anxiety, acting as a drive, strengthens already existing responses which are incorrect as to the relevant task, Mandler and Sarason hypothesize that anxiety produces interfering responses which cause a decrement in learning and/or performance.

Eysenck (3) surmises that the Hullian theory would lead one to predict that in a complex situation in which the correct (strong) response was the predominant one, high anxiety should lead to better performance, whereas on the alternative theory it would be predicted that high anxiety would interfere with performance in such a situation.

The purpose of the present study was to investigate the relationship between drive level, defined in terms of scores on the Taylor Manifest Anxiety Scale, and performance in a complex paired-associate learning task, in which an attempt was made to control the number and strength of the competing responses. Performance was observed on two kinds of test presentations. In the second, the strong or correct response
was the dominant response. In the first, the weak or incorrect response was the dominant response. Having made the assumption that the variable of intralist similarity and association value of items should affect the number and strength of correct and incorrect tendencies in a verbal learning situation, the following hypotheses were proposed:

A. Performance measures for low anxious subjects will show a relatively greater increment than those for the high anxious subjects as the associative value of task items decreases and as intralist similarity is increased, i.e., as the ratio of potential incorrect (weak) to correct (strong) responses increases.

B. Performance measures for high anxious subjects will show a relatively greater increment than those for the low anxious subjects as the associative value of task items increases and as intralist similarity is increased, i.e., as the ratio of potential correct (strong) to incorrect (weak) responses increases.
CHAPTER BIBLIOGRAPHY


CHAPTER II

PROCEDURE

Subjects

The subjects involved in this study were eighty-seven male and female students enrolled in the introductory psychology classes at North Texas State University. The subjects ranged in chronological age from eighteen to twenty-three, the mean age being 18.4. There were fifty-nine males and twenty-eight females. All the subjects were second-semester freshmen students enrolled in the spring semester of 1965. The subjects were tested during the regular classroom periods.

Description of Instruments

The Taylor Manifest Anxiety Scale (5) and two paired-associate learning tasks were administered to the subjects to test the hypotheses stated in Chapter I.

Taylor Manifest Anxiety Scale

The Taylor scale was derived from approximately two hundred items of the Minnesota Multiphasic Personality Inventory. These items were submitted to five clinicians who selected sixty-five items, then narrowed their choice down to fifty items which were selected for use as a measuring instrument of manifest anxiety. Normative data are available, based upon 1,971 students who took the test at Iowa.
The validity of the scale would appear to depend on the validity of the MMPI since the items in the scale were derived from the MMPI. Hoyt and Magoon (4) and Holzman, Calvin, and Bitterman (3) have conducted separate studies which tend to support the validity of the Taylor Scale. Buss (1) found, however, that the majority of the fifty items on Taylor's scale were not valid predictions of clinical criteria of manifest anxiety. Taylor (5) reports that the test-retest coefficient for the Taylor Scale was found to be .82 over a five month period, and .81 for a period of from nine to seventeen months. No information was available on test-retest for a one month period. A copy of the Taylor Scale is included in the Appendix.

Paired-Associate Learning Tasks

The paired-associate learning tasks consisted of two separate lists of two syllable adjectives, each printed in capital letters on 35-mm slides. The first list involved ten pairs of words, each pair consisting of a stimulus word and a response word which had no association value. The second list involved ten pairs of words, each pair consisting of a stimulus word and a response word which had a high association value. Thus, it may be stated that in List I, the weaker response was predominantly the correct response to be made. In List II the strong response was predominantly the correct response for each pair of words. Habit strength here was thought of as being equivalent to the association value.
holding between the words, as defined by Haagan (2). Because of the high intra-similarity values of both List I and List II, the experimenter felt it safe to assume that both paired-associate lists represented equally complex tasks as reflected by competition among responses. The intra-similarity of the word pairs, as well as the vividness of the words involved, was also defined by Haagan (2).

Thus, the word-pairs were scaled in terms of (a) similarity of meaning (b) closeness of associative connection and (c) vividness of connotation. The individual words also were rated for familiarity. Similarity of meaning was defined as the degree to which the words denote the same or similar objects, actions, or conditions. Similarity may vary in amount from an extreme in which the words may be used interchangeably without modification or distortion of meaning to words that are unrelated in meaning. Closeness of associative connection was described as the degree to which words are associated in thought or the immediacy or consistency with which one word calls another to mind. By vividness of connotation was meant the clarity of the impressions which words arouse. The vividness of a word is related chiefly to the number and intensity of the connotative connections which it possesses. Familiarity was defined in terms of the degree to which the meaning and use of words was known to the individual. The criteria for "greatest familiarity" was an immediate recognition and absolute certainty of the meaning and use of
the word. The lowest degree of familiarity was associated with words for which there was no recognition.

Haagan (2) utilized 280 judges in rating 400 word pairs in terms of major dimensions mentioned above. He reported reliability coefficients of 0.92 for intralist similarity, 0.91 for association, and 0.86 for the vividness dimension. The word pairs utilized in the present study are reported in the Appendix.

Collection of Data

The Taylor Scale was first administered to the study group during regular classroom periods. The subjects were not informed of the nature of the test. Upon completion of the scale, the subjects were asked to participate in the verbal learning tasks. A Kodak Carousel slide projector was utilized in presenting to the subjects, on a group basis, the two lists of two-syllable adjective pairs; however, to minimize the effect of practice (the same subjects were utilized on both lists) the lists were administered three weeks apart, with List I being given first.

The word pairs were presented in their entirety for a total of two trials, after which only the stimulus word was given for a total of twelve trials. Each pair, and subsequently each stimulus word, was exposed on a white screen for two seconds. There was allowed an interval of four seconds between the disappearance of a word and the appearance of the next. The interval between the disappearance of the
final pair and the appearance of the stimulus word for the
next trial was six seconds.

Instructions were of the usual type for paired-associative
learning, requiring correct spelling of the response word for
each pair and encouraging an attempted response for each
exposure. Each subject was provided with a data pad and
instructed as to the appropriate columns to be used on each
trial. As each stimulus word was exposed, the subjects anti-
ipated the response word with which it was paired and wrote
that response word in the appropriate column. The correct
response word was then exposed, paired with the stimulus word
in order for the subject to check immediately the correctness
of his response. There were a total of 120 possible responses
for each list. Each list was prepared in two orders, both
using the same sequence, but with different orders beginning
respectively with first and sixth pairs of the basic lists.
This procedure was utilized to prevent serial learning.

Scoring

On the Taylor Manifest Anxiety Scale, the scores were
recorded as the number of anxiety-indicative items chosen.
Subjects scoring below a MAS score of 7 were designated as the
low anxious (LA) group. Subjects scoring above a MAS score of
29 were designated as the high anxious (HA) group. The cut-
off score approximated the percentile ranges utilized in
studies previously reviewed, in which a large population was
studied; however, the HA range was broadened to increase the
chance of obtaining a large sample. The middle anxious subjects were drawn from those students scoring between the 45th and 55th percentiles in this administration of the Taylor Scale. Levels of anxiety, in terms of the Taylor Scale scores, were as follows:

LA . . . . . . . . . . 2 — 7
MA . . . . . . . . . . 17 — 19
HA . . . . . . . . . . 29 — 38

Since the experimenter was also interested in the ability of the Taylor Scale to differentiate among the whole range of anxiety scores in regard to the criterion of performance on a verbal task, the high-anxious, low-anxious, and middle-anxious groups were formulated, for purposes of comparison with the above restrictive groupings, in such a way that the whole range of scores was considered. The low-anxious group was designated as the lower one-third of the distribution of anxiety scores while the high-anxious group was designated as the upper one-third of the distribution. The middle anxious subjects were drawn from the middle one-third of the distribution. The levels of anxiety in terms of these non-restrictive classifications of Taylor scores were as follows:

LA . . . . . . . . . . 2 — 12
MA . . . . . . . . . . 13 — 20
HA . . . . . . . . . . 21 — 38

On each paired-associate learning list, the number of errors made by the subject in responding to the stimulus words
was tabulated. Omissions of response words and misspelled response words were scored as errors. A high performance level of the verbal tasks was interpreted to be the result of a high degree of learning of the stimulus-response associations; furthermore, this degree of learning was assumed to be the result of the interaction of anxiety level, the nature of the task, and the sex of the subject.

Statistical Design

The basic statistical design consisted of a 2 x 3 factorial analysis of variance conducted separately for each list of words. The two principal factors were sex (male or female) and anxiety (high, middle, and low). To accomplish this segmentation, a separate distribution was set up for each sex and the appropriate percentiles computed for each of the two sets of data. Statistically, it was decided that it was more feasible to conduct a separate analysis of variance for each of the two lists, rather than using a more complex factorial design which would deal with both lists simultaneously. Interpretation of results in regard to the specific hypotheses was also made easier by separate analysis.

In order to make some conclusions about the discriminatory ability of the Taylor Scale, the same statistical method was utilized on the non-restrictive anxiety groups which consisted of the entire range of scores made on the Taylor Scale; consequently, it was then found to be feasible to compare differences obtained between these less differentiated groups and those
groups discussed in the preceding paragraph which were formulated by more restricted percentile ranges.
CHAPTER BIBLIOGRAPHY


CHAPTER III

RESULTS

In the first chapter two hypotheses were presented, and in order to test them, a 2 x 3 factorial analysis of variance was conducted separately for each learning task, i.e., each of the two word lists. However, in order to determine the discriminatory value of the Taylor scale, the statistical analysis was applied separately to restrictive and non-restrictive anxiety groups.

A summary of the performance data for the restrictive HA, MA, and LA groupings is presented in Table I.

TABLE I

MEANS AND STANDARD DEVIATIONS OF PERFORMANCE ERRORS OF RESTRICTIVE GROUPS ON THE PAIRED-ASSOCIATE TASKS

<table>
<thead>
<tr>
<th>Anxiety Level</th>
<th>List I</th>
<th>List II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>22.00</td>
</tr>
<tr>
<td>Middle</td>
<td>11</td>
<td>23.91</td>
</tr>
<tr>
<td>Low</td>
<td>14</td>
<td>15.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>15.40</td>
</tr>
<tr>
<td>Middle</td>
<td>11</td>
<td>19.00</td>
</tr>
<tr>
<td>Low</td>
<td>14</td>
<td>11.86</td>
</tr>
</tbody>
</table>

22
Several trends are evident in Table I. The performance scores (number of errors made) of the HA males and the HA females exceeded the number of errors made by the LA males and the LA females; furthermore, this trend was present in both List I and List II. In both pair-associate lists, however, the MA males and the MA females' total errors were greater than those exhibited by either the HA or LA male and female groups. At all anxiety levels, the female subjects demonstrated fewer errors than did their male counterparts. This trend held consistently on each list of words. Also, it was observed that both male and female subjects, at each of the three anxiety levels, made fewer errors in regard to List II than was exhibited on List I.

Table II contains a summary of the performance data for the non-restrictive groups.

TABLE II
MEANS AND STANDARD DEVIATIONS OF PERFORMANCE ERRORS OF NON-RESTRICTIVE GROUPS ON THE PAIRED-ASSOCIATE TASKS

<table>
<thead>
<tr>
<th>Anxiety Level</th>
<th>List I</th>
<th></th>
<th></th>
<th>List II</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>High</td>
<td>18</td>
<td>20.28</td>
<td>7.27</td>
<td>9</td>
<td>15.00</td>
<td>5.91</td>
</tr>
<tr>
<td>Middle</td>
<td>20</td>
<td>21.30</td>
<td>11.15</td>
<td>11</td>
<td>17.82</td>
<td>6.01</td>
</tr>
<tr>
<td>Low</td>
<td>21</td>
<td>18.76</td>
<td>9.73</td>
<td>7</td>
<td>16.71</td>
<td>4.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>List II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
<td>N</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>High</td>
<td>18</td>
<td>13.62</td>
<td>5.97</td>
<td>9</td>
<td>13.89</td>
<td>4.12</td>
</tr>
<tr>
<td>Middle</td>
<td>20</td>
<td>16.20</td>
<td>9.60</td>
<td>11</td>
<td>11.73</td>
<td>4.37</td>
</tr>
<tr>
<td>Low</td>
<td>21</td>
<td>13.43</td>
<td>6.10</td>
<td>7</td>
<td>13.14</td>
<td>6.11</td>
</tr>
</tbody>
</table>
It was noted that on both pair-associate tasks, the females made fewer errors than did the male subjects. This trend was evident at all anxiety levels. There existed no observable trends in regard to differences between performance scores of HA, MA, and LA groups, except that in all cases the HA subjects (males and females) demonstrated a greater number of performance errors than was exhibited by either the LA groups or the MA groups. Also, the HA males made a larger quantity of errors on List I than did the LA male subjects. In the opposite direction, the HA female group tended to make fewer performance errors than did the LA female group in regard to List I. Both HA males and HA females showed fewer errors on List II than did the LA males and the LA females on the same task. Finally, it was observed that all groups made fewer errors in regard to List II than was demonstrated on List I.

As previously mentioned, a 2 x 3 factorial analysis of variance was conducted separately for the two learning tasks; moreover, performance scores for restrictive and non-restrictive groups were analyzed separately. The two factors and their respective treatment conditions were: anxiety (high, middle, and low); and sex (male and female). The summaries of the separate analyses of variance for each of the two pair-associate tasks are grouped under restrictive and non-restrictive groupings.
The summary of the analysis of variance of performance by the restrictive anxiety groups for List I is contained in Table III.

### TABLE III

**SUMMARY OF THE ANALYSIS OF VARIANCE OF PERFORMANCE OF RESTRICTIVE GROUPS ON LIST I**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (S)</td>
<td>168.0327</td>
<td>1</td>
<td>168.0327</td>
<td>2.4445</td>
</tr>
<tr>
<td>Anxiety (A)</td>
<td>251.1303</td>
<td>2</td>
<td>115.5601</td>
<td>1.5026</td>
</tr>
<tr>
<td>A x S</td>
<td>86.4986</td>
<td>2</td>
<td>43.2493</td>
<td>.5622</td>
</tr>
<tr>
<td>Error</td>
<td>3615.2283</td>
<td>57</td>
<td>65.9197</td>
<td>. .</td>
</tr>
<tr>
<td>Total</td>
<td>4120.9158</td>
<td>52</td>
<td>. .</td>
<td>. .</td>
</tr>
</tbody>
</table>

The results as given in Table IV make obvious the fact that there were no significant differences among (a) the anxiety means (b) the sex means, and (c) the interaction means. The three F-ratios presented in Table III were all less than the critical value of significance (4.08) for the required .05 level.

Table IV presents the analysis of variance of performance by the restrictive anxiety groups for List II.
TABLE IV

SUMMARY OF THE ANALYSIS OF VARIANCE OF PERFORMANCE OF RESTRICTIVE GROUPS ON LIST II

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>d f</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (S)</td>
<td>131.4142</td>
<td>1.</td>
<td>131.4142</td>
<td>2.2167</td>
</tr>
<tr>
<td>Anxiety (A)</td>
<td>169.7984</td>
<td>2.</td>
<td>84.8542</td>
<td>1.4313</td>
</tr>
<tr>
<td>A x S</td>
<td>52.7628</td>
<td>2.</td>
<td>26.3814</td>
<td>.4450</td>
</tr>
<tr>
<td>Error</td>
<td>2786.2429</td>
<td>47.</td>
<td>59.2817</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3140.1283</td>
<td>52.</td>
<td>. .</td>
<td>. .</td>
</tr>
</tbody>
</table>

The three F-ratios presented in Table IV were all less than the critical value of significance (4.08) for the required .05 level; consequently, it was concluded that there existed no significant differences among the anxiety means and the sex means, nor was there any significant interaction among the means of the variables.

Table V presents a summary of the analysis of variance of the non-restrictive groups' performance on List I.

TABLE V

SUMMARY OF THE ANALYSIS OF VARIANCE OF PERFORMANCE OF NON-RESTRICTIVE GROUPS ON LIST I

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>d f</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (S)</td>
<td>234.5092</td>
<td>1.</td>
<td>234.5092</td>
<td>2.9880</td>
</tr>
<tr>
<td>Anxiety (A)</td>
<td>56.3278</td>
<td>2.</td>
<td>28.1639</td>
<td>.3588</td>
</tr>
<tr>
<td>A x S</td>
<td>31.5497</td>
<td>2.</td>
<td>15.7748</td>
<td>.2009</td>
</tr>
<tr>
<td>Errors</td>
<td>6278.6858</td>
<td>80.</td>
<td>78.4835</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6601.0725</td>
<td>85.</td>
<td>. .</td>
<td>. .</td>
</tr>
</tbody>
</table>
The results reported in Table V show that there exists no significant differences among (a) the anxiety means (b) the sex means, and (c) the interaction means. The three F-ratios presented in Table V were all less than the critical value of significance (3.92) for the required .05 level.

Table VI contains a summary of the analysis of variance of the non-restrictive groups' performance in regard to List II.

**TABLE VI**

**SUMMARY OF THE ANALYSIS OF VARIANCE OF PERFORMACE OF NON-RESTRICTIVE GROUPS ON LIST II**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>d f</th>
<th>Mean Square</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (S)</td>
<td>105.7817</td>
<td>1.</td>
<td>105.7817</td>
<td>1.1706</td>
</tr>
<tr>
<td>Anxiety (A)</td>
<td>40.9957</td>
<td>2.</td>
<td>20.4978</td>
<td>.4206</td>
</tr>
<tr>
<td>A x S</td>
<td>52.8583</td>
<td>80.</td>
<td>26.4291</td>
<td>.5423</td>
</tr>
<tr>
<td>Error</td>
<td>3898.5487</td>
<td>80.</td>
<td>48.7318</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4098.1844</td>
<td>85.</td>
<td>. . .</td>
<td>. . .</td>
</tr>
</tbody>
</table>

The three F-ratios reported in Table VI were all less than the critical value of significance (3.92) for the required .05 level; consequently, it was concluded that there were no significant differences among the anxiety means or the sex means. Also, there were no significant interaction effects among the variables.
Thus, it was found that there existed no significant differences among any of the group performance means in regard to List I and List II. Although it was a strong temptation to test for significant differences between specific groups, and the hypotheses presented earlier were tenable to such an analysis, the fact that none of the reported F-ratios approached significance rendered unjustifiable the use of such a statistical procedure (1).
CHAPTER BIBLIOGRAPHY

CHAPTER IV

DISCUSSION

The results in Table III, as presented in Chapter III, showed that there existed no significant differences among the performance means of HA, LA, and MA groups; consequently, the hypothesis that performance measures for LA subjects should show a relatively greater increment than those for the HA subjects as the associative value of task items decreases and as intralist similarity is increased was rejected. It was observed, although no significant differences existed, that the performance trends for both restrictive and non-restrictive anxiety groups on List I tended to be in the predicted direction. That is to say, the HA subjects' performance errors showed a slightly greater increment than did LA subjects as the ratio of potential incorrect (weak) to correct (strong) responses increased. This observation is compatible with the Hull-Spence theory which contends that effective drive multiplies the habit strength of both strong and weak responses. Thus, this theory would propose that where the weak response is higher in the initial hierarchy than is the strong one, the amount by which its excitatory strength exceeded that of the correct response would have been increased. The effect of this should be to lower the probability of occurrence of the correct responses, thus
increasing the number of errors and retarding learning. Since this retardation is directly proportional to the amount of the above mentioned effective drive, the theory would predict the performance of the anxious subjects to be inferior to that of the non-anxious ones. However, the insignificant differences reported in Table III and Table V would seem to question the relevancy of these theoretical assumptions in determining the effects of anxiety upon performance.

On the other hand, there were no conclusions made as to the relevancy of Sarason's (4) theoretical formulations to the results obtained on List I, but since Sarason's hypothesis would predict essentially the same result on List I as Spence's theory, the question of the validity of the drive-concept in determining the effects of anxiety upon task performance would have to be considered.

Table IV and Table VI reported the results of performance on List II for the restrictive and for the non-restrictive groups. There were no significant differences among the error means of the HA, MA, and LA groups; consequently, the second hypothesis, presented in Chapter I, that performance measures for HA subjects will show a relatively greater increment than those for the LA subjects as the associative value of task items increased and as intralist similarity was increased was rejected. Although no significant differences were found, the slight observable differences between the means tended to be in the direction that Sarason's (4)
theoretical formulations would predict. That is to say, the HA group demonstrated poorer performance on List II than did the LA group, even as the ratio of potential strong to weak responses increased. However, no definite conclusions were reached as to the relevancy of Sarason's theoretical assumptions that anxiety produces certain new responses which interfere with the efficient learning of performance of complex tasks.

The results reported in Chapter III also showed that there were no significant differences between performance values of males and females; moreover, this was true at all three levels of anxiety. Although not significant, there was some slight tendency for the females to exhibit fewer errors on both word lists than did the males; but no conclusions may be drawn from such slight differences.

Essentially, the preceding study constituted an attempt to experimentally validate the Taylor Manifest Anxiety Scale, and involved an attempt at construct validity; however, there are certain methodological considerations which must be discussed in relationship to such a study. Jessor and Hammond (2) have discussed such difficulties; they state that when a construct implies a relationship between variables, these variables must be designated independently of any test of that relationship. Thus, the scale has been employed both to establish the validity of the construct (drive) and simultaneously to establish the construct validity of the scale. Under such
confounding dual purposes, failure of the data to fulfill the predicted outcome cannot be taken as substantive evidence for the presence or the absence of construct validity in the Taylor scale.

Kausler and Trapp (3) have suggested a way out of this protracted dilemma. These writers state that research in this area should begin to utilize experimentally induced drive states. Thus, they recommend positive, nonemotional, approach drives in preference to negative, emotional, avoidance drives, such as shock or threat of shock, which contain so many theoretical problems in their own right.

The results reported in Chapter III would seem to support the hypothesis that the Taylor scale lacks sufficient discriminatory value. Although differences among performance means of the restrictive groups were slightly more differentiated than those among the non-restrictive groups, these differences did not appear to be gross. This slight trend would support the viewpoint that the Taylor scale differentiates between high and low extreme anxiety groups more effectively than it does among individuals falling along the whole range of anxiety scores.

Another source of error which was believed to have affected the results is that the Taylor scale is not measuring anxiety which is situationally induced. Although whether or not the scale measures anxiety in the sense of long-term anxiety proneness is also debatable, the fact is that the paired-associate learning involved here would not be extremely conducive to the
arousal of long-term anxiety. The word-pairs were rated for vividness with the expectation that the resulting emotional reaction by the subjects would increase the anxiety level; however, such reactions would be essentially situational, temporary anxiety reactions. Thus, the anxiety differentiation by the Taylor scale would become less meaningful, even if the assumption is made that it measures a sustained anxiety drive. The results reported in Chapter III do not lend substantial support to the ability of the Taylor scale to discriminate among anxiety levels.

In regard to the discriminatory value of the Taylor scale, another possible source of error might have been in the fact that in the subject groups utilized in the present study there was a noticeable scarcity of extremely high anxiety scores, while there existed an over-abundance of extremely low scores in this administration of the Taylor scale. Had a much larger sample been utilized, more precise conclusions could have perhaps been proposed in regard to the discriminatory value of the Taylor scale as a measure of anxiety level.

Another variable which was believed to have affected the results was that there existed a probable lack of ego-involvement by the subjects in the learning tasks. Although the scaled vividness of the stimulus and response words conceivably helped increase ego-involvement, it would be in error to assume that every person answered each question on the Taylor scale truthfully; however, the effect of this variable was
assumed to be minimized by the coding procedures and the biographical inventory technique utilized in the administration of the Taylor scale.

The fact that more errors were evident in the performance of the majority of the subjects on List II than was evident on List I would have to be considered in interpreting the reported results. The obvious differences in complexity of the two tasks must assuredly restrict the conclusions that may be expounded as to the nature of the interference effect of anxiety as a drive, or whether or not it possesses drive properties. It was assumed, however, that both tasks qualified as being complex since all the subjects experienced a great deal of difficulty in learning the correct responses. It can not be contended that the complexity variable was equal in regard to the two tasks; consequently, no trends could be noted.

Comparison of performance scores between the two tasks was considerably enhanced by not demanding perfect scores, but rather designating a subject's performance score as the number of errors made in a certain number of trials. Also differences among the abilities of the subjects were minimized somewhat by the utilization of this technique.

Finally, as there were certain problems inherent in the experimental procedures utilized in this study, the same subjects were administered both learning tasks; however, the fact that the lists were administered three weeks apart helped
reduce the practice effect. Because of separate factorial analyses of variance were utilized, the statistical assumption of the independent groups was not violated.


CHAPTER V

CONCLUSIONS

The hypothesis that low anxious subjects should perform more efficiently than high anxious subjects as the associative value of task items decreases and as intralist similarity increases was tested. Although the observable trends were in the predicted direction, no significant differences were found to exist; consequently, the hypothesis was rejected.

The hypothesis that high anxious subjects should perform more efficiently than the low anxious subjects as the associative value of task items increases and as intralist similarity increases was also tested. The observable trends of the performance data were in the opposite direction from that which was predicted, but no significant differences were found to exist. Thus the hypothesis was rejected.

Further statistical analysis revealed that there were no significant differences between performance measures of males and females, although there was a trend for females to make fewer errors than did males. No specific conclusions were made as to the relevancy of the sex variable, except that the existing trend would warrant more intensive future study.

It was not feasible to make any precise conclusions about the validity of the two different theoretical formulations.
concerning the effect of anxiety as a drive upon performance. The fact that no significant differences were found to exist in any of the situations, but that certain trends did exist, would seem to lend support to the hypothesis that in a learning task, both theories are somewhat relevant in describing the nature of anxiety's effect upon performance. It would seem that other variables, such as degrees of stress, etc., must be investigated in order to determine the specific conditions under which each drive theory might effectively explain the observed phenomena.

Perhaps one of the most significant findings of the present study was the pointing out of some possible inadequacies of the Taylor Manifest Anxiety Scale as a valid discrimination instrument of anxiety levels; the scale seemed to be more effective in differentiating between the extremes of the scale than among anxiety groups involving the complete range of the Taylor scale. There were so many methodological problems inherent in such a measurement that no definite conclusions were made as to the validity of the drive-concept of anxiety.

Because the Taylor scale appears not to measure anxiety which is situationally determined, and because there remains the question of whether or not it effectively differentiates among various anxiety levels of any type, it would be advisable in future studies of this type to use an instrument other than the Taylor scale.
APPENDIX

BIOGRAPHICAL INVENTORY

T  F  1. I do not tire quickly.
T  F  2. I am troubled by attacks of nausea.
T  F  3. I believe I am no more nervous than most others.
T  F  4. I have very few headaches.
T  F  5. I work under a great deal of tension.
T  F  6. I cannot keep my mind on one thing.
T  F  7. I worry over money and business.
T  F  8. I frequently notice my hand shakes when I try to do something.
T  F  9. I blush no more often than others.
T  F  10. I have diarrhea once a month or more.
T  F  11. I worry quite a bit over possible misfortunes.
T  F  12. I practically never blush.
T  F  13. I am often afraid that I am going to blush.
T  F  14. I have nightmares every few nights.
T  F  15. My hands and feet are usually warm enough.
T  F  16. I sweat very easily even on cool days.
T  F  17. Sometimes when embarrassed, I break out in a sweat which annoys me greatly.
T  F  18. I hardly ever notice my heart pounding and I am seldom short of breath.
T  F  19. I feel hungry almost all of the time.
T  F  20. I am very seldom troubled by constipation.
T  F  21. I have a great deal of stomach trouble.
T  F  22. I have had periods in which I lost sleep over worry.
T  F  23. My sleep is fitful and disturbed.
T  F  24. I dream frequently about things that are best kept to myself.
T  F  25. I am easily embarrassed.
T  F  26. I am more sensitive than most other people.
T  F  27. I frequently find myself worrying about something.
T  F  28. I wish I could be as happy as others seem to be.
T  F  29. I am usually calm and not easily upset.
T  F  30. I cry easily.
T  F  31. I feel anxiety about something or someone almost all the time.
T  F  32. I am happy most of the time.
T  F  33. It makes me nervous to have to wait.
T  F  34. I have periods of such great restlessness that I cannot sit long in a chair.
T  F  35. Sometimes I become so excited that I find it hard to get to sleep.
T  F  36. I have sometimes felt that difficulties were piling up so high that I could not overcome them.
T  F  37. I must admit that I have at times worried beyond reason over something that really did not matte
T  F  38. I have very few fears compared to my friends.
T  F  39. I have been afraid of things or people that I know could not hurt me.
T  F  40. I certainly feel useless at times.
T  F  41. I find it hard to keep my mind on a task or job.
T  F  42. I am unusually self-conscious.
T  F  43. I am inclined to take things hard.
T  F  44. I am a high-strung person.
T  F  45. Life is a strain for me much of the time.
T  F  46. At times I think I am no good at all.
T  F  47. I sometimes feel that I am about to go to pieces.
T  F  48. I shrink from facing a crisis or difficulty.
T  F  49. I am entirely self-confident.
**PAIRED ASSOCIATE TASK**

**List I**

<table>
<thead>
<tr>
<th>WICKED</th>
<th>CLUMSY</th>
</tr>
</thead>
<tbody>
<tr>
<td>STERILE</td>
<td>HAUGHTY</td>
</tr>
<tr>
<td>SULLEN</td>
<td>BRAZEN</td>
</tr>
<tr>
<td>HORRID</td>
<td>VALIANT</td>
</tr>
<tr>
<td>SAVAGE</td>
<td>JOYOUS</td>
</tr>
<tr>
<td>SINFUL</td>
<td>AWKWARD</td>
</tr>
<tr>
<td>BARREN</td>
<td>SNOBBISH</td>
</tr>
<tr>
<td>SULKY</td>
<td>SHAMELESS</td>
</tr>
<tr>
<td>AWFUL</td>
<td>FEARLESS</td>
</tr>
<tr>
<td>BRUTAL</td>
<td>MERRY</td>
</tr>
</tbody>
</table>

**List II**

<table>
<thead>
<tr>
<th>WICKED</th>
<th>EVIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STERILE</td>
<td>FRUITLESS</td>
</tr>
<tr>
<td>SULLEN</td>
<td>MOROSE</td>
</tr>
<tr>
<td>HORRID</td>
<td>GRUESOME</td>
</tr>
<tr>
<td>SAVAGE</td>
<td>RUTHLESS</td>
</tr>
<tr>
<td>SINFUL</td>
<td>CORRUPT</td>
</tr>
<tr>
<td>BARREN</td>
<td>FRIGID</td>
</tr>
<tr>
<td>SULKY</td>
<td>MOODY</td>
</tr>
<tr>
<td>AWFUL</td>
<td>GHASTLY</td>
</tr>
<tr>
<td>BRUTAL</td>
<td>CRUEL</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY

Books


Articles


Kausler, Donald H. and E. Phillip Trapp, "Methodological Considerations in the Construct Validation of Drive-Oriented Scales," Psychological Bulletin, LVI (1959), 138-140.


"A Personality Scale of Manifest Anxiety," Journal of Consulting Psychology, XX (1956), 384-.


Unpublished Materials