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Increased Recall for Low Anxious Subjects Using Increased Anxiety

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INCREASED RECALL FOR LOW ANXIOUS SUBJECTS USING INCREASED ANXIETY

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SUBJECTS USING INCREASED ANXIETY

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INCREASED RECALL FOR LOW ANXIOUS SUBJECTS

USING INCREASED ANXIETY

Charles E. Webb April 1975 39 pages

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A sample of 14 low anxious (LA) male and 18 LA female subjects was drawn from introductory psychology classes. The effect of increased state anxiety, using differing instruction procedures, upon serial recall learning was studied. The Multiple Affect Adjective Check List was used as a measure of anxiety, and a Hull memory drum with nonsense syllables was used as the learning task. Results indicated that there was a significant ($p < .05$) increase in learning for females but no significant increase in learning for males. This study is in agreement with the majority of studies which found differences due to sex. The female subjects gave results more consistent with drive theory in relationship to increased state anxiety and learning than male subjects. A hypothesis to explain why males do not yield as consistent results as females in relation to increased anxiety and learning is stated. Implication for further research is also discussed.

CHAPTER I

Review of the Literature

The studies of learning and levels of anxiety have been of interest to scientists for many years. One of the first theories of learning and anxiety was proposed by the Yerkes-Dodson Law (1908). Others such as Spence (1960) have continued to be in agreement with the Yerkes-Dodson Law (1908) and have continued to find the basic relationships between learning and levels of anxiety to prove consistent with the Yerkes-Dodson Law (1908). The studies dealing with learning and anxiety can be divided into two groups: learning and trait anxiety and learning and state anxiety.

Learning and Trait Anxiety

Trait anxiety is defined as a continual anxiety proneness or level of mood over an extended or indefinite period of time. The earliest studies dealing with anxiety dealt with it in a trait anxiety context.

Spence (1960) believed that fear (trait anxiety) functioned as an energizing drive with a person. Spence's (1960) concept of anxiety was in agreement with the Yerkes-Dodson Law (1908) in that the relationship between

fear, conceptualized also as a drive, and learning was curvilinear. A low drive or trait anxiety level facilitates learning only slightly or not at all. A high drive level interferes with learning so that performance is similar to or inferior to that obtained with a low drive level. A moderate drive or trait anxiety level stimulates optimal performance in learning by providing enough incentive to increase performance but not an excessive amount so as to interfere with performance.

The Yerkes-Dodson Law (1908) states that the relationship between drive and performance is a function of task complexity. The optimal drive level is higher when the task is simple than when it is complex. For example, a high drive level which facilitates performance on a simple task may disrupt performance on a more complex task. Thus the amount of trait anxiety and the level of difficulty of a particular task should be considered when conducting anxiety studies. The following studies provide confirmation of the Yerkes-Dodson Law (1908) and Spence's (1960) concept of trait anxiety as an energizing drive.

A study by Stennet (1957) was performed with a tracking apparatus using subjects under no incentive, moderate incentive, and excessively high incentive. Incentives were defined as the opportunity to earn a certain amount of money and the avoidance of electric shock. The results

obtained by Stennet (1957) were consistent with the Yerkes-Dodson Law (1908) in that the no incentive and excessively high incentive conditions yielded a greater number of errors than did the moderate incentive condition.

A study by Matarazzo, Ulett, and Saslow (1955) indicated the Yerkes-Dodson Law (1908) to be true for anxiety proneness in relationship to learning. Using the scores from the Taylor Manifest Anxiety Scale (TMAS) seven different groups were formed. Subjects were required to learn a stylus maze to a criterion of three consecutive correct performances. The results indicated that the maximum speed of performance was obtained by those subjects with TMAS scores in the middle range of anxiety.

There are studies which support the Yerkes-Dodson Law (1908) which states that the relationship between drive and performance is a function of task complexity. The Yerkes-Dodson Law (1908) is supported by Montague's (1953) study which included a serial learning task of nonsense syllables with high anxious (HA) and low anxious (LA) groups based on their TMAS scores. Both the HA and the LA groups learned two lists of twelve nonsense syllables each. The study by Montague (1953) determined that the difficult (or complex) list was more than three times as hard to learn compared to the easy (simple) one. Results on the easy list indicated that the HA subjects were able to give an average of a little better than one syllable more than LA subjects. On

the difficult list the results were reversed. Also, Korchin and Levine (1957) indicated partial validation of the Yerkes-Dodson Law (1908). A simple and a complex paired-associate learning task was given to both HA and LA groups. The LA and HA groups learned the simple task at the same rate of speed, but the LA group learned the complex task at a more rapid rate of speed than the HA group.

Thus the Yerkes-Dodson Law (1908) appears to be in agreement with Spence's (1960) concept of trait anxiety as an energizing drive to the extent that the relationship between trait anxiety as a drive and learning are curvilinear. Learning will proceed more slowly for a more complex task at high trait anxiety levels than a less complex task at high levels, and learning will occur faster for a less complex task at high trait anxiety levels than a less complex task at low anxiety levels. For a task of moderate difficulty the optimal drive level conceptualized as trait anxiety would be a moderate amount of trait anxiety.

Learning and State Anxiety

State anxiety is defined as the anxiety response that fluctuates over time from the immediate moment to a day. In the same way that a moderate amount of trait anxiety increases performance, a moderate amount of state anxiety also appears to increase performance. In earlier studies

situational conditions such as testlike conditions defined state anxiety.

In general, investigators such as Mandler and Sarason (1952), Nicholson (1958), Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) evaluated the effects of testlike conditions on HA and LA subjects for conceptual learning performance tasks. The most consistent finding for the studies was that under stress of testlike conditions, the performance of the HA subjects was poorer than that of LA subjects.

The Mandler and Sarason (1952) study was designed to investigate the influence of anxiety, as evoked by a testing situation, on the performance of intelligence test items. The study by Mandler and Sarason (1952) indicated that an intervening report of success or failure between intelligence test items elicited improved performance for the low anxiety group but depressed scores for the high anxiety group.

Sarason, Mandler, and Craighill (1952) did a follow-up study from the study by Mandler and Sarason (1952). Sarason et al. (1952) investigated the effect of anxiety inducing instructions (state anxiety) on learning. Instructions were used to arouse test or achievement anxiety on the Wechsler-Bellevue Digit Symbol subtest. High and low scores from an anxiety questionnaire were used to select a HA and a LA group. The results showed LA subjects always performed better than the HA subjects when test anxiety

instructions were given. Although the LA subjects performed better than the HA subjects under anxiety induced conditions, the results were not always statistically significant.

Morris and Liebert (1969) studied the effects of timed and untimed performance of low- and high-worry subjects. Worry was defined by Morris and Liebert (1969) on the basis of a subject's response to 15 worry items taken from the TMAS. Worry could be thought of as similar to anxiety. Timed subtests of the Wechsler Adult Intelligence Scale (WAIS) were administered to 48 subjects, only half of whom were aware of being timed. Low-worry subjects who were timed were superior to those who were untimed. High-worry subjects tended to perform inferior to low-worry subjects under the timed rather than the untimed conditions. Morris and Liebert (1969) indicated that the Worry X Timing interaction closely paralled the Anxiety X Timing interactions found by Sarason et al. (1952). Thus it appears that overt timing of subjects altered the state anxiety of subjects which may have led to differences in performances.

Katchmar, Ross, and Andrews (1958) designed an experiment to determine the effects of two levels of anxiety, three levels of failure stress, and three levels of ego involvement on the performance of a complex verbal coding task. Time, error, and frequency of blocking scores were used as measures of performance. Results from the study by Katchmar et al. (1958) indicated that the LA group decreased

their average time following stress instructions, i.e. their performance increased. The LA group also made fewer incorrect choices following stress instructions. Medium anxious (MA) and HA groups increased their average time following stress instructions, i.e. their performance decreased. The MA and HA groups also committed a greater number of incorrect choices, and frequency of blocking increased on the poststress trials. Thus it appears that failure stress (increased state anxiety) increased performance for the LA group and decreased performance for the HA group.

Chansky (1958) investigated the effect of induced stress or threat on reading speed, reading comprehension, and delayed recall of reading material. Threat was induced under the guise of using the reading test as a quick scoring intelligence test. Results showed that HA subjects as measured by the TMAS read more slowly, understood less, and recalled less one week after reading than did LA subjects. The tendency for LA subjects to perform better than HA subjects appeared stronger in the threat group than in the control group.

The Nicholson (1958) study was designed to investigate the comparison of the verbal learning performance of high and low anxiety subjects under task-orienting instructions and ego-orienting instructions. The results of the study by Nicholson (1958) indicated that under task-orienting

instructions (low state anxiety) HA and LA subjects gave an equal number of correct responses for a serially learned nonsense syllable task. Under ego-orienting instructions (increased state anxiety) HA subjects gave fewer and LA subjects gave a greater number of correct responses than in the task-orienting instructions.

A later study by Sarason, Kestenbaum, and Smith (1972) found similar results for increased state anxiety as did Nicholson (1958). Sarason et al. (1972) indicated the adverse effects of increased state anxiety on serial learning for HA subjects. Before taking a serial learning test, two groups of HA and two groups of LA subjects received different 5 minute pretest interviews. The first group of HA and LA subjects received an interview exploring the subject's attitudes toward being tested and graded, which was anxiety provoking. The second group of HA and LA subjects received an interview exploring the general topic of life at the university, which was not anxiety provoking. Each group was then tested on a serial learning task. The results indicated that the test anxiety interview had a decidedly negative effect on HA but not on LA subject's scores. The non anxiety provoking interview had a positive effect on both HA and LA subjects.

Sarason's (1961) study manipulated anxiety and experimental instructions on a performance task of difficult anagrams. Three levels of trait anxiety were used, and two

sets of instructions were used. One set of instructions posed a personal threat (state anxiety) to the subject, and the other set was designed to reassure the subject. Results indicated that HA subjects under threat conditions performed at a lower level than did low or middle anxious subjects. Under non threat conditions HA subjects performed better than low and middle anxious subjects.

The study by Paul and Eriksen (1964) investigated the effects of test anxiety on real-life examinations. Using trained examiners, an experimental examination was administered which maximized reduction of anxiety (test anxiety). Subjects had earlier taken a similar examination under anxiety induced conditions. Results indicated HA subjects as measured by the Test Anxiety Questionnaire (TAQ) performed significantly better under the reduced anxiety conditions than the anxiety conditions. The LA subjects performed better under the anxious conditions than under the reduced anxiety conditions.

O'Neil, Hansen, and Spielberger (1969) investigated the relationship between state anxiety (A-State) and trait anxiety (A-Trait) for performance on a computer assisted instruction (CAI) task. College males with extreme scores on the A-Trait scale of the State-Trait Anxiety Inventory (STAI) were given difficult and easy CAI learning material by an IBM 1500 system. The system also presented the STAI A-State scale before, during, and after the learning

task. The findings confirmed that high A-State subjects made significantly more errors on the difficult materials than low A-State subjects.

A later study by O'Neil (1972) employed a similar design as the O'Neil et al. (1969) study, using negative and no feedback groups composed of female subjects. This later study failed to support the conclusions drawn by O'Neil et al. (1969). High A-State subjects made fewer errors than low A-State subjects on the difficult performance task.

It appears from the majority of the studies that maximum performance occurs for HA subjects when state anxiety is reduced and for LA subjects when state anxiety is increased. The present study will attempt to verify increased performance for LA subjects when state anxiety is increased.

Summary

The Yerkes-Dodson Law (1908) is in agreement with the drive theory of Spence (1960) to the extent that a moderate amount of trait anxiety should provide the best performance on a learning task of moderate difficulty.

In terms of drive theory and state anxiety it appears that decreasing state anxiety for a HA subject and increasing state anxiety for a LA subject will increase performance. Studies which supported this assumption were: Mandler and Sarason (1952), Sarason et al. (1952), Morris and

Liebert (1969), Katchmar et al. (1958), Chansky (1958), Sarason (1961), Paul and Eriksen (1964), and O'Neil et al. (1969). O'Neil (1972) disclosed contradictory data. Thus if a moderate amount of state anxiety is present in a subject, then the subject should have increased learning performance for a moderately difficult task.

Problem and Hypothesis

The evidence concerning a moderate amount of state anxiety to increase task performance on a moderately difficult task leads to the question: does a moderate amount of state anxiety for LA subjects increase recall performance for a moderately difficult task?

The null hypothesis is if state anxiety is increased in LA subjects, then there will be no significant increase in recall performance.

CHAPTER II

Method

Subjects

The subjects were 14 male and 18 female college undergraduate students chosen from the introductory psychology classes at Western Kentucky University. Both male and female subjects were chosen because prior research indicated that the variable of sex could be important in studies dealing with anxiety and learning. Chapeau (1968) found results consistent with drive theory for females but not males. Katahn and Dean (1964) reported that in a study of anxiety and learning females gave results more consistent with drive theory than males. Katahn and Branham (1968) indicated males gave more consistent results than females, and Katahn and Lyda (1966) indicated no differences in anxiety and learning for men and women. Thus Campeau (1968) concluded that sex as a variable needed to be controlled in experiments dealing with anxiety scales. All subjects in the experimental and the control groups were LA subjects as measured by the Multiple Affect Adjective Check List (MAACL).

Apparatus

An experimental room 6 feet by 8 feet was used. One four foot table and two chairs were used in the well

lighted room. A piece of cardboard 10 inches high by 18 inches long was placed on the table between the subject and the experimenter. The cardboard was placed between the subject and the experimenter so that the subject when seated would not be able to observe any of the materials the experimenter had placed on his side of the table or observe any scoring activity the experimenter conducted on his side of the table. The subject and experimenter sat next to each other approximately 1½ feet apart. White noise was present during the entire experiment. The white noise was played through a speaker in the ceiling of the experimental room.

The two recall tasks consisted of two different lists of nonsense syllables typed in capital letters on an endless white tape. The lists of nonsense syllables were presented on a standard Hull-type memory drum. Each syllable appeared in the drum aperature for two seconds with a one second interval between syllables. Each list contained six consonant, vowel, consonant, (CVC) nonsense syllables of low similarity and low association value (Montague, 1953) making the lists moderately difficult. The words in list one and two in the order of presentation are given in Table 1.

An instructional booklet in a 9 inch by 11½ inch Manila folder was used by the experimenter to administer the experimental procedure to the subjects. Six 2 inch lines on each half of a 5 inch by 8 inch page were used to

Table 1

Moderately Difficult Nonsense Syllables

List 1	List 2
DYF	BEK
VOD	JEV
FEX	WAH
PEQ	NIR
KAM	PYX
ZUG	YIT

record the subject's memory responses. Fourteen anagrams with the anagram instructions at the top of a 8½ inch by 11 inch page were used for the anxiety producing task. An English essay (Laird, 1964, pp. 249-254) was used for the neutral task. Each of the subjects in the male and female control groups read the English essay. The content of the essay was a description of well written English paragraphs with a number of well written examples.

Design

The 14 males were divided into two groups, an anxiety experimental group and a neutral control group. A coin toss was used to decide into which group the first male was placed. Every other male was then placed in the experimental or control group so that there were seven males in each group. The same procedure was used in dividing 18 females into another anxiety and another control group. Thus, the study was a randomized group (experimental versus control) design with four groups. The four groups included all males divided into two groups, an experimental and a control group, and all females divided into two groups, an experimental and a control group.

The independent variable, change in anxiety, was the difference in the two anxiety scores taken before each of the two recall tasks. The anxiety scores were measured by the Today form of the MAACL. The dependent variable, recall, was the number of correctly serial recalled

nonsense syllables. For a nonsense syllable to be considered correct the three CVCs had to be printed in correct order, and the correct position within the six sets of CVCs had to be printed correctly on the 5 inch by 8 inch page. The maximum possible number correct was six and the minimum number correct was zero.

Procedure

Screening for LA subjects was conducted in the following manner: A teacher's permission was obtained by the experimenter to screen for LA subjects from an undergraduate psychology class. The experimenter told the class that he was conducting a preliminary test for a research project and asked for voluntary cooperation in filling out the General form of the MAACL. The MAACL was passed out to the subjects and the instructions were read aloud by the experimenter while the subjects read the instructions silently. The experimenter told the class he would return at the next class period to ask for volunteers for the research project, a simple memory test.

The experimenter scored the MAACLs. Scores which were 3 or less were considered as LA. The experimenter returned during the next class period and asked for volunteers whom the experimenter knew were in the LA range. The experimenter told the class that the selected subjects were chosen at random. The subjects signed up for a 20 minute time period and were given the location of the experimental room.

After the subject had arrived at the experimental room, the subject was greeted by the experimenter and seated at the table in front of the memory drum. The experimenter sat at the table to the right of the subject with the cardboard piece between the subject and the experimenter to prevent the subject from seeing what the experimenter had on top of the table. The following instructions were given to all subjects:

> (The Today form of the MAACL was placed in front of the subject.) Please put your name on the first line. I'd like you to read the instructions silently while I read them aloud. (Read instructions. The word "today" was blackened out in the instructions. The MAACL instructions read as follows: On this sheet you will find words which describe different kinds of moods and feelings. Mark a X in the boxes beside the words which describe how <u>you feel now</u>. Some of the words may sound alike, but we want you to <u>check all the words</u> that <u>describe</u> your feelings. Work rapidly. The above MAACL instructions were used to obtain the subject's present state anxiety.) Any questions? (Reread parts of the instructions to clarify questions.) Go ahead and begin. (Take finished test.)

(A folded 5 inch by 8 inch piece of white paper was placed in front of the subject. On each half of the paper were six 2 inch lines.) This is an experiment of recall. When I turn the machine on you will see three letters before you for two seconds followed by three different letters during the next two seconds, and so forth. This will occur a total number of six times. When I turn the machine off, print the first three letters on the first line of this piece of paper, the second three letters on the second line and so forth, exactly in the same order as they appeared to you. You will have 45 seconds to print your answers. Look here for the first three letters. (Point to the ** on the memory drum where the first CVC nonsense syllable will appear.) Try to do the best you can on the memory task. Do you have any questions? (Reread parts of the instructions to clarify questions.) Ready begin. (Turn memory drum on for first recall list. Stop memory drum after the subject has seen the sixth CVC.)

The following anxiety inducing instructions were given to those subjects in the experimental group after completion of the first memory task:

O.K. (Take sheet and score without the subject seeing the experimenter score the answers.) You

didn't do very well for a college student. You did below average compared to most college students. Most students get at least (Figure two more than the subject actually got correct.) two, three, four, or five correct. (If the subject actually got five or all six correct, say five correct.) Most college students found this memory task to be relatively easy.

(Place the sheet of 14 difficult anagrams in front of the subject. The top half of the sheet with the directions for the anagrams was folded under, out of the view of the subject. See Table 2 for the anagram list. Thirteen of the anagrams were extracted from the study by Sarason (1961). The fourteenth anagram, number 6 in Table 2, was the word "pleonasm" inserted by this writer into the original list of thirteen anagrams.) Ability to organize material such as the letters before you has been found to be directly related to intelligence level. High school students with an I.Q. of 100 and most college students should be able to successfully complete this task. You will have 4 minutes to complete it. (Unfold the top of the anagram sheet so that the subject can read the directions.) Read the directions silently while I read them aloud. On this page you will see a

Table 2

List of 14 Difficult Anagrams

1. ETLHHA
2. ETROS
3. RECMI
4. CNEGAH
5. NMGOINR
6. MNLPSAEO
7. NSPWAE
8. SUTCBII
9. SCLIAO
10. EUSUORN
11. RSANEO
12. IMTCELA
13. SPRUUE
14. ELSAUX

series of disarranged words. Your job will be to rearrange each group of letters so that they make a meaningful English word. Start when you are instructed and stop when the instructor says stop. Write your name at the top of the page when given the signal to begin. Any questions? (Reread parts of the instructions to clarify questions.) Begin. (Allow 4 minutes to pass.) Stop. (Take anagram list.)

(Place a second Today form of the MAACL in front of the subject.) Place your name on the first line. I'd like you to read these instructions silently while I read them aloud. (Read instructions. The word "today" was blackened out in the instructions thus making the instructions read the same way as previously stated.) Any questions? (Reread parts of the instructions to clarify questions.) Go ahead and begin. (Take finished test.)

(Place the unwritten side of the folded 5 inch by 8 inch page in front of the subject.) You will be shown a different list of three letters using the same procedure as before. When I turn the machine off, print the first three letters on the first line of this piece of paper, the second three letters on the second line and so forth exactly in the same order as they appeared to you. You

will have 45 seconds to print your answers. Try to do the best you can on this memory task. Do you have any questions? (Reread parts of the instructions to clarify questions.) Ready begin. (Turn memory drum on for the second recall list. Stop memory drum after the subject has seen the sixth CVC.)

After completion of the second recall task the subject was told that the instructions which were given to him were deceptive. The subject was told that both the anagrams and the recall lists were difficult and not to worry if he did not do well. The experimenter answered other questions from the subject and admonished the subject not to discuss this experiment with anyone until the completion of the semester.

The following neutral instructions were given to those subjects in the control group after completion of the first memory task:

O.K. (Take sheet and score without the subject seeing the experimenter score his answers.) Fine, I'd like you to take this English essay and read it to yourself. When you are finished place it face down on the table. Begin. (Allow 4 minutes to pass. If the subject is not finished in 4 minutes ask him to stop reading by saying, "O.K.

if you are not finished, just stop reading." Take the essay from the subject.)

(Place a second Today form of the MAACL in front of the subject.) Place your name on the first line. I'd like you to read these instructions silently while I read them aloud. (Read instructions, ask if there are any questions and take finished test.)

(Place the unwritten side of the folded 5 inch by 8 inch page in front of the subject.) You will be shown a different list of three letters using the same procedure as before. When I turn the machine off print the first three letters on the first line of this piece of paper, the second three letters on the second line and so forth exactly in the same order as they appeared to you. You will have 45 seconds to print your answers. Try to do the best you can on this memory task. Do you have any questions? (Reread parts of the instructions to clarify questions.) Ready begin. (Turn memory drum on for second recall list. Stop memory drum after the subject has seen the sixth CVC.)

After completion of the second recall task, the subject was asked if he had any questions. The experimenter

answered the subject's questions and admonished the subject not to discuss this experiment with anyone until the completion of the semester.

In the experimental groups if the subject did not show an increase in anxiety score on the second administration of the Today form of the MAACL the subject was not used in the study because the anxiety inducing instructions did not yield an increase in anxiety. In the control groups if the subject did show an increase in anxiety score the subject was not used in the study because the neutral instructions or some other variable yielded an increase in anxiety. These procedures were continued until seven males and nine females were successfully run in each of the two experimental and two control conditions.

Scoring of the Data

The analysis of data in this investigation consists of two main parts: (1) analysis of mean changes in recall scores for the first recall task compared to the second recall task for the male experimental group versus the male control group and (2) analysis of mean changes in recall scores for the first recall task compared to the second recall task for the female experimental group versus the female control group.

The scoring was calculated by totaling the correct number of recalled nonsense syllables for each of the two recall tasks for each subject. The change between the

first and second recall scores was computed for each subject within each of the four groups. The result was either an increase, a decrease, or no change in the recall scores. The mean change between the recall scores for the first and second tasks was computed for each of the four groups. The mean change in recall score was found by totaling each individual's change in recall score within each group and dividing by the number of subjects in each group.

CHAPTER III

Results

For each of the four groups the range and mean change in anxiety score between the first and second administrations of the MAACL are shown in Figure 1.

An analysis of mean changes in recall scores between the first and second recall tasks for the experimental versus the control group was completed separately for males and females. To establish if the mean changes were significant for the experimental group compared to the control group a t-test between the pairs of means for males and a t-test between the pairs of means for females was calculated (Edwards, 1950, pp. 69-96). The results of these tests are shown in Table 3.

The difference between the mean changes in recall scores for the male experimental group and the male control group was not significant, t (12) = .4784, $p < .05$. The null hypothesis, that there is no significant increase in recall performance for male subjects, is therefore accepted.

The difference between the mean changes in recall scores for the female experimental group and the female control group was significant, t (16) = 1.7905, $p < .05$. The null hypothesis, that there is a significant increase in recall performance for female subjects, is accepted.

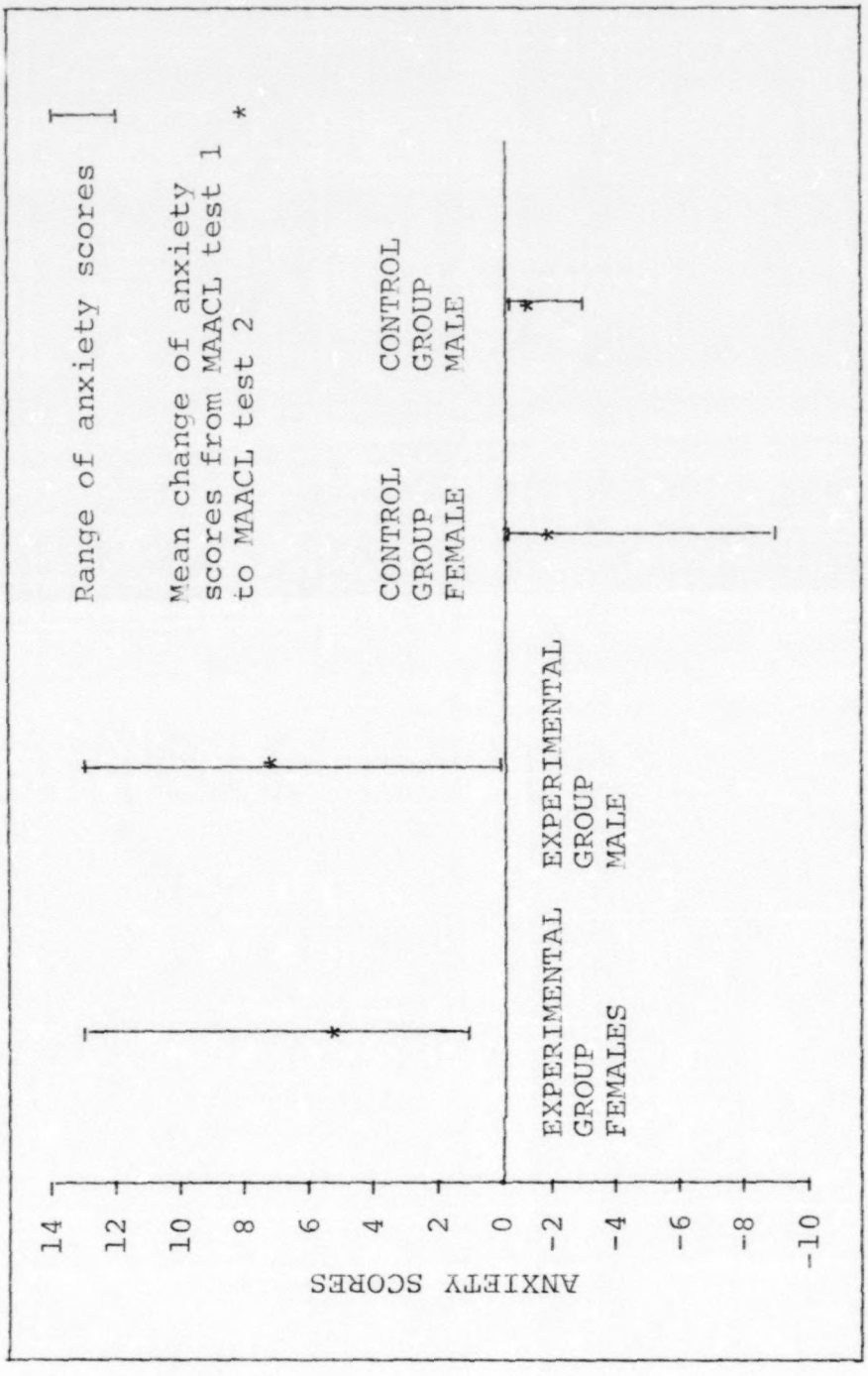

Figure 1. Range and mean change in anxiety scores between the first and the second administration of the MAACL.

Table 3

Results of t-Tests Between Mean Changes in Recall Scores

Subjects	Mean Change in Recall Scores from Recall Test 1 to Recall Test 2		df	t value
	Experimental Group Anxiety Inducing Instructions	Control Group Neutral Instructions		
Males	1.0	0.5714	12	0.4784 NS
Females	1.2222	0.0	16	1.7905*

NS = Not statistically significant at the .05 level of confidence for a one-tailed test.

* = Statistically significant at the .05 level of confidence for a one-tailed test.

It may be concluded from the results of this research that anxiety instructions had a significant effect upon the increase of performance for females but not for males.

CHAPTER IV

Discussion

The conclusion that anxiety instructions had a significant effect upon the increase of performance for females but not for males leads to a partial validation of the Yerkes-Dodson Law (1908). In the present study female subjects conformed to the general theory of the Yerkes-Dodson Law (1908) in that a moderate amount of anxiety significantly increased their recall performance. The confirmation of the hypothesis for increased recall given a moderate amount of anxiety lends support to the general theory of the Yerkes-Dodson Law (1908) which states that the relationship between fear conceptualized as drive or anxiety and learning is curvilinear. The present study validates that portion of the general theory which deals with the low to moderate levels of anxiety for females. The present study does not deal with the portion of the general theory which deals with moderate to high levels of anxiety.

Male subjects did not conform to the general theory of the Yerkes-Dodson Law (1908). The results indicated that when anxiety levels increase, recall scores increase. This finding is in accordance with the general relationship between anxiety and learning. The results also indicated that

for either no increase or decrease in anxiety level, recall scores also increased. Even though there was an increase in recall scores when the anxiety level increased, there was also a corresponding smaller increase when the anxiety level was not increased which resulted in a non significant increase.

The fact that there was a corresponding increase in recall scores even though there was no increase in anxiety may be explained by the hypothesis advanced by Sarnoff, Lighthall, Waite, Davidson, and Sarason (1958). The hypothesis by Sarnoff et al. (1958) states that our culture makes it much more difficult for a boy than for a girl to admit explicitly to anxiety (or weakness). If this hypothesis is correct a boy might try to cover up or not admit anxiety which may be actually present. A male who was in a situation such as the neutral control group where a certain amount of anxiety may have existed, may have a greater tendency than a female to try to cover up or not admit his state anxiety. After administration of the first recall memory test and reading the English essay there might have been stimuli which caused increased anxiety in both males and females. The males, according to the hypothesis of Sarnoff et al. (1958), would have a greater tendency to not report their state anxiety using the self-report MAACL.

Sarason, Davidson, Lighthall, and Waite (1958) and Sarason (1963) have shown in their studies that boys get lower anxiety scores than girls. The authors interpret this fact as a reflection of a kind of learned defensiveness or suppression of anxiety in boys. In the present study 67 per cent of the females and 54 per cent of the males had to be discarded because they had an increase in anxiety score even though they received the neutral instructions. The smaller percentage of males compared to females who were discarded may be an indication of the greater defensiveness or suppression of anxiety in males. For some of the males in the neutral group who reported either a decrease or no change in self-report anxiety there may have been some increase in state anxiety which was organismically present but not reported correctly during the second administration of the MAACL. This unreported increase in anxiety could explain the small observed increase in mean recall change for the neutral group.

Further research would be needed to determine if there were actually an increase in state anxiety when there was no self-report increase in state anxiety using the MAACL. One way to approach the problem of inaccurate self-reporting procedures would be to use physiological measures. Using heart rate, measures of skeletal, and measures of visceral muscular movements may be one avenue of approach to measuring physiological changes or no changes in state anxiety.

Another measure that may be related to amount of defensiveness is the amount of social desirability. It would be hypothesized that a high degree of defensiveness or suppression of anxiety would be positively correlated with a high degree of social desirability. Both suppression of anxiety and social desirability are measures of acceptable social behavior for males. A high positive correlation between social desirability and LA might indicate that a male who scored high in social desirability would also have a high degree of defensiveness or suppression of anxiety. This high positive correlation would lend support to the hypothesis of Sarason et al. (1958) and Sarason (1963). If a LA male subject scored high on social desirability and also showed increased learning even though there was no increase in reported state anxiety, it may be concluded that defensiveness against admitting increased anxiety may be operating in this situation. From the present research and the hypothesis advanced by Sarnoff et al. (1958) there is ample opportunity for further research in this area.

The limitations of the present study are numerous and implications for further research are warranted. The effects of increased anxiety, i.e. the increase in recall scores of LA subjects, may vary if other types of anxiety instructions were given. No attempt has been made to study the effect of different types of anxiety instructions on recall

learning. The operational definition of correct recall, i.e. a serially remembered CVC, is only one aspect of rote memory. There has been little effort made in this study to assess the results of different operational definitions of recall scoring. The increase in rote memory with increased anxiety may be operational in a natural or a real life setting. The variable of a natural setting as opposed to a laboratory setting is an area for further research. The variance effects across populations have not been studied in the present study and would be of interest for generalizing across different populations. Generalizations from the current study can only be drawn to other undergraduate psychology students at Western Kentucky University.

Organismic variables, i.e. the actual state of a subject before he begins the experiment, may affect performance. A clearer understanding and quantification of these variables may aid in learning about interaction effects with the independent variable of anxiety.

Experimenter effects are always a possibility, although the magnitude of effect is an unknown quantity. An added control for experimenter expectancy effects would have been to place each set of instructions on a tape recorder rather than have the experimenter read the instructions to each subject.

In conclusion, the following hypothesis was derived from the Yerkes-Dodson Law (1908): If state anxiety is

increased in LA subjects, then there will be a significant increase in recall performance. This hypothesis was supported for female subjects but not supported for male subjects. This study was in agreement with the majority of studies, Chapeau (1968) and Katahn and Dean (1964), dealing with drive theory, anxiety, and learning which found differences due to sex. The majority of studies indicated and this study supports the finding that female subjects gave results more consistent with drive theory in relationship to increased anxiety and learning than male subjects. A hypothesis to explain why males do not yield as consistent results as females in relation to increased anxiety and learning has been stated, and implications for further research have been indicated.

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