68-13,268

SWEENEY, Christopher John, 1940-
THE EFFECTS OF STRESS AND ACHIEVEMENT ANXIETY ON ACADEMIC TEST PERFORMANCE.

The University of Oklahoma, Ph.D., 1968
Education, psychology

University Microfilms, A XEROX Company, Ann Arbor, Michigan

Downloaded from SHAREOK. Persistent Handle URL: https://hdl.handle.net/11244/2360

THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE EFFECTS OF STRESS AND ACHIEVEMENT ANXIETY ON ACADEMIC TEST PERFORMANCE

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

CHRISTOPHER JOHN SWEENEY

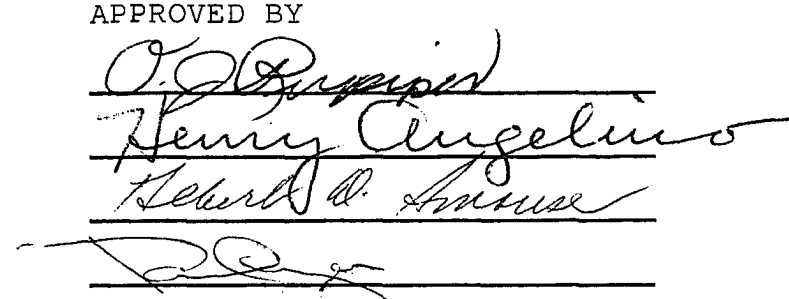
Norman, Oklahoma

1968

THE EFFECTS OF STRESS AND ACHIEVEMENT ANXIETY

ON ACADEMIC TEST PERFORMANCE

APPROVED BY



DISSERTATION COMMITTEE

ACKNOWLEDGMENTS

This dissertation represents the efforts of several people. The author is grateful to Dr. Omer J. Rupiper, major professor and committee chairman, for his continual guidance throughout the period of the doctoral program and for his expert advice and suggestions on this research problem. I wish to thank Dr. Henry Angelino and Dr. Paul Unger for their aid and encouragement during the doctoral program and for their helpful recommendations on the manuscript. Appreciation is extended to Dr. Albert D. Smouse and Mr. David C. Munz who supplied many ideas in the formulation and construction of this investigation and gave many valuable criticisms of the manuscript.

Finally, a special debt of gratitude goes to my wife, Nancy, and son, Chris, Jr., for their support, patience, and good faith during my tenure as a graduate student.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS iii

LIST OF TABLES v

LIST OF FIGURES vi

Chapter

I. INTRODUCTION 1

Review of Relevant Literature on the History of Anxiety
Review of Relevant Literature on the Measurement of Anxiety
Other Relevant Literature
Summary

II. THE PROBLEM AND PROCEDURES 16

Statement of Problem
Operational Definitions
Hypotheses
General Statement of Procedures
The Instrument
The Subjects
The Anxiety Treatments

III. THE DESIGN AND STATISTICAL ANALYSIS 26

IV. DISCUSSION 34

V. SUMMARY AND IMPLICATIONS 42

REFERENCES 45

APPENDIX A 51

APPENDIX B 56

APPENDIX C 60

LIST OF TABLES

Table		Page
1.	Means and Standard Deviations for the Respective Anxiety Reaction Types for the Normal Anxiety Group	29
2.	Analysis of Variance Summary Table of the Performance Criterion as a Function of Anxiety Treatments and Achievement Anxiety Types	30
3.	Raw Scores on Dependent Criterion for High-affecteds Under Varying Anxiety Treatments	52
4.	Raw Scores on Dependent Criterion for Facilitators Under Varying Anxiety Treatments	53
5.	Raw Scores on Dependent Criterion for Low-affecteds Under Varying Anxiety Treatments	54
6.	Raw Scores on Dependent Criterion for Debilitators Under Varying Anxiety Treatments	55
7.	Variance of Achievement Anxiety Types Under the Anxiety Treatments	57
8.	F_{max} Ratios for Homogeneity of Variance for the Achievement Anxiety Types Within the High, Normal and Low Anxiety Treatments	58
9.	F_{max} Ratios for Homogeneity of Variance for the Achievement Anxiety Types Across the Anxiety Treatments	59

LIST OF FIGURES

Figures — Page

1. Multiple-classification Analysis of Variance for the Experimental Design 27

2. Inverted-U Curve Representing Mean Scores on the Performance Criterion as a Function of Arousal Levels for the Achievement Anxiety Types in the Normal Anxiety Group 35

3. Inverted-U Curve Representing Mean Scores on the Performance Criterion as a Function of Arousal Levels for the Achievement Anxiety Types in the Low and Normal Anxiety Groups 37

4. Inverted-U Curve Representing Mean Scores on the Performance Criterion as a Function of Arousal Levels for the Achievement Anxiety Types in the Low, Normal, and High Anxiety Groups 39

5. Mean Performance Scores on the Performance Criterion of the Achievement Anxiety Types in the Low, Normal, and High Anxiety Groups 40

THE EFFECTS OF STRESS AND ACHIEVEMENT ANXIETY ON ACADEMIC TEST PERFORMANCE

CHAPTER I

Introduction

Educational psychologists have invested a great deal of time and energy in attempting to enumerate, define, and control those factors which influence and often distort the assessment of academic achievement. When such assessment is based on test-taking behavior, these factors might roughly be divided into two classes, stimulus variables and organismic, or personality, variables. Obviously overt behavior involved in test taking is an interaction between the two classes of variables, and this study is concerned with some of these interactions.

Included in the class of stimulus variables are the form and content of questions, verbal or nonverbal, structured or relatively unstructured, oral or written, etc. Item sequencing has long been thought to be related to the assessment of academic achievement. Recommendation to arrange test items in an order of increasing difficulty is the usual suggestion (Munz, 1968). Nevertheless, little empirical research has been reported on the relationship between

achievement test performance and the sequencing of test items. The personality variable conjointly investigated in this study was anxiety, more specifically, test-taking anxiety.

In contrast to the little research reported on item sequencing, there has been a great deal of research involving the hypothetical construct of anxiety and related variables in the personality category. Since the advent of the anxiety scales in the early 1950's (Taylor, 1951, 1953; Mandler and Sarason, 1952; Welsh, 1952; Freeman, 1953) anxiety as a variable related to achievement and learning has been systematically studied (Child, 1954; Carrier, 1956; Alpert and Haber, 1960; Sarason, 1960; Sperber, 1961; Diamond, 1965; Stakenas, 1965).

In order to account for the lack of conclusive findings with respect to item sequencing, Smouse and Munz (1968) hypothesized that test-taking anxiety interacted with item sequencing to produce behavior that could be efficiently explained by the inverted-U curve. This hypothesis will be elaborated later.

Relevant Literature on the History of Anxiety

That anxiety is a central concept in psychology is more than adequately borne out by the amount of literature dealing with it. However, harmony in conceiving and defining anxiety has not been achieved.

Freud (1936) found anxiety an appropriate topic for his theorization. He postulated that anxiety was an unpleasant state accompanied by increased motor activity and efferent phenomena (Freud, 1936, p. 70). Moreover, it was a signal of threat, a reaction to danger which could be terminated by a number of defense mechanisms. Freud extended his theory of anxiety to include three types - normal, neurotic, and moral.

The environmental and social position of the neo-Freudians followed Freud's orientation to anxiety. Sullivan (1948) believed that anxiety was transmitted early in life by the "mothering one." Apprehension arose out of the disapproving attitudes of those important to the individual. Through appearance, voice inflections, and looks, the transference of anxiety was accomplished by rather covert communication. By association, other aspects of the environment took on anxiety-transmitting attributes. Horney (1945) partially based her theory of personality on the concept of basic anxiety. The disruptive forces of the noxious stimuli in the environment, hampering the interrelations between child and parents, were sufficient to produce basic anxiety.

Rollo May (1950) looked upon anxiety in a more subjective and individual fashion. May defined anxiety as an "Apprehension cued off by a threat to some value which the individual holds essential to his existence as a personality (1950, p. 191)."

Still another direction was taken by Spence (1956) who, like Hull (1943), assumed that in a learning situation a stimulus and response were mediated by hypothetical constructs. Simply and efficiently stated, Spence postulated that drive (D) multiplied by habit strength (H) equalled response (R): $R = D \times H$. Spence looked on anxiety as a drive with energizing potentials. In situations where there was only one response tendency and the drive increased, there then followed a corresponding increase of R. However, situations of this sort, that is, those in which there was only one response tendency, were not common; more generally situations were found in which there were larger numbers of competing response tendencies. In these cases, D energized H multiplicatively according to the initial strength of H. In this hierarchy, the strongest response tendency was most likely to occur. Spence followed his theorization to logical conclusion: whether anxiety was debilitating or facilitating depended upon the initial hierarchy of response tendencies and the complexity of the task at hand.

Relevant Literature on the Measurement of Anxiety

Experimentation with anxiety using human subjects did not flourish until the appearance of the Manifest Anxiety Scale (Taylor, 1951). Since then the experimental output on anxiety has increased tremendously (Levy, 1961).

Taylor's Manifest Anxiety Scale (MAS), developed in 1951 (Taylor, 1951) and published in 1953 (Taylor, 1953), was constructed with items drawn from the Minnesota Multiphasic Personality Inventory (MMPI). Taylor initially submitted 200 items from the MMPI to five clinicians who acted as judges and rated the items. The ability to detect clinical anxiety was the criterion by which the items were selected for inclusion in the scale. Sixty-five of the 200 items were thus chosen. These 65 items were subsequently reduced to 50 items. As a gauge of general state, the MAS measured a person's predisposition to anxiety.

A subject's score on the MAS was computed by counting the number of times he gave the anxious response. Many of the items asked for a general, overall appraisal by the test-taker, e.g., "I feel anxious about something or someone almost all of the time"; "I am often sick to my stomach"; "Sometimes I become so excited that I find it hard to get to sleep"; "I practically never blush." These questions supposedly tapped an individual's inclination to experience anxiety as a chronic state, rather than an individual's inclination to experience anxiety in a specific and/or passing situation. Thus, the MAS was based upon two assumptions:

> . . . first, that variation in drive level of the individual is related to the level of internal anxiety or emotionality, and second, that the intensity of this anxiety could be ascertained by a paper and pencil test consisting of items describing what have been called overt and manifest symptoms of this state (Taylor, 1953, p. 285).

The MAS was intended by Taylor to be an instrument for the selection of subjects for motivational experimentation and has been put to many uses.

Another scale which measured anxiety as a trait was the Institute for Personality and Ability Testing (IPAT) Anxiety Scale (Cattell, 1957; Cattell & Scheier, 1958 & 1961). This scale, consisting of forty items, was developed by factor analyzing numerous personality traits. Some specimen items from the scale tend to indicate how it can measure anxiety as a trait: "I always have enough energy when faced with difficulties"--a. Yes, b. In between, c. No; "As a child I was afraid of the dark"--a. Often, b. Sometimes, c. Never; "In discussion with some people, I get so annoyed that I can hardly trust myself to speak"--a. Sometimes, b. Rarely, c. Never.

Freeman approached the problem of measuring anxiety (Freeman, 1953) from a different direction. The testee was asked to "judge the behavior of other people (p. 12)." The rationale for this technique was that the respondent would "project his unconscious identifications for revelation of his personal anxiety characteristics (p. 11)." This scale contained 56 items and measured anxiety as a chronic trait.

Zuckerman (1960) developed a versatile scale, the Multiple Affect Adjective Check List (MAACL), which, with a simple change of directions, can be used to measure anxiety as a trait or state. The MAACL measured hostility and

depression along with anxiety, another example of its versatility. The final anxiety scale consisted of twenty-one adjectives--eleven anxiety-plus adjectives and ten anxiety-minus adjectives. The advantages of the MAACL were its administrative simplicity and its adaptability as a measuring instrument.

In contrast to the previous scales, Mandler and Sarason (1952) constructed the Test Anxiety Questionnaire (TAQ) to measure anxiety not as a personality trait, but as a reaction to a specific situation. In opposition to the concept of anxiety as a fixed unidimensional personality trait, they treated anxiety as a multidimensional factor. Mandler and Sarason thus maintained that the measuring device should concern itself with the specific situation for which it was intended; their interest focused upon the academic test situation. The TAQ asked questions not about general feelings concerning anxiety but about anxiety in testing situations. The final TAQ consisted of 35 items (Sarason and Gordon, 1953, p. 447). The testee was asked a series of questions designed to elicit a subjective evaluation toward a testing situation; questions on attitudes towards tests were also interwoven.

Alpert and Haber (1960) devised the Achievement Anxiety Test which was a variation of the TAQ. The scale was specifically designed to indicate the presence or absence of both the facilitating and debilitating effects of anxiety

in test performance. The Achievement Anxiety Test was built upon a five-point scale and consisted of two separate sub-tests (a facilitating scale and a debilitating scale). It was intended to identify individuals who were facilitated in performance by test-taking stress and individuals who were debilitated in performance by test-taking stress. The two separate sub-scales may be joined to constitute a nineteen-item questionnaire.

In general, the various scales measured anxiety either as a general proneness or as a situational reaction. The need for both types can be logically argued. The chief proponent of the former was Taylor (1953); the major representative of the latter was Mandler and Sarason (1952). Alpert and Haber (1960) proposed a variation of the Mandler-Sarason position.

Other Related Research

Carrier (1956) in using high and low stress groups investigated the relationship of stress conditions and the personality factors of permeability (tendency to be influenced by internal and external stimuli), stability (nervous tension and desurgency), need for achievement (need for success in competition), and need for affiliation (maintaining positive relations with others). High stress was created on the course examination by both verbal instructions and situational conditions. Students were informed that there would be penalties for guessing, yet each question had to be answered;

the room assignment and proctor were both unfamiliar. In the low stress group, the examination was administered by the regular instructor who created a friendly atmosphere and gave no verbal instructions for the guessing penalty. Also, a special form of the examination with space for optional comments was used. Carrier found that individuals most affected by stress were highly permeable females, females low in need achievement, highly permeable and highly stable females, females low in need achievement and need for affiliation, and males low in stability.

Sperber (1961) studied the effects of test anxiety under high and low anxiety test situations. The subjects were Air Force recruits who were undergoing testing for placement in specialized vocational training. It was assumed that this situation was a naturally and inherently stressful one. In the high stress condition, the subjects were given instructions that they should be able to complete the tests in the allotted time. However, the tasks assigned were either unsolvable or impossible to solve within the given time limits. In the low stress treatment the subjects were informed that the testing was experimental and that is was, therefore, not part of the regular testing program.

Sperber found the following: under high stress, high test-anxious individuals, subjects scoring in the upper quartile of the TAQ, out-performed low test-anxious individuals, subjects scoring in the lower quartile of the TAQ, on the

Number Matching Test; under high stress, the performance of high test-anxious subjects was superior to high test-anxious subjects under low stress; under low stress, low test-anxious individuals scored better than high test-anxious individuals on the Letter Substitution and Number Matching Tests; under low stress, the performance of low test-anxious subjects was superior to low test-anxious subjects under high stress on the Letter Series Test. Sperber theorized about his findings by discussing the complex interaction of anxiety, motive, and task variables.

In a thorough investigation, Alpert and Haber (1960) attempted to evaluate various anxiety scales and their relationship to test performance. The anxiety instruments included the Achievement Anxiety Test (AAT) (Alpert and Haber, 1960), the Freeman Anxiety Scale (AS) (Freeman, 1953), the Mandler-Sarason Test Anxiety Scale (TAS) (Mandler and Sarason, 1952), the Taylor Manifest Anxiety Scale (MAS) (Taylor, 1953), and the Welsh Anxiety Index (AI) (Welsh, 1952). This study had three major purposes: first, to measure the relationship between general and specific (test situation) anxiety scales; second, to measure the relationship between aptitude and anxiety; and third, to measure "the effect of anxiety upon academic performance (Alpert and Haber, 1960, p. 207)." Alpert and Haber found that the intercorrelations of the AI, AS, and MAS, all classified as general anxiety scales, ranged from .32 to .39. The AAT+ (facilitating sub-scale of the

AAT), AAT- (debilitating sub-scale of the AAT), and the TAS, classified as specific anxiety scales, intercorrelated from .40 to .64. The correlations between the general and specific scales ranged from .24 to .38. On the basis of these data, Alpert and Haber (1960) concluded that this appeared to "throw some doubt on the comparability and, therefore, the substitutability of a general anxiety scale for a specific anxiety scale (p. 209)."

Alpert and Haber subsequently correlated both the general and specific scales with measures of academic performance (grade-point averages), and found that the specific scales were significantly correlated with measures of academic performance while the general scales were not. From these findings Alpert and Haber (1960) claimed that "specific anxiety scales and general anxiety scales measure, to a significant extent, something different (p. 209)." Further, the AAT+ sub-scale coupled with the AAT- sub-scale was found to be a better predictor of academic achievement when compared to a single debilitating scale such as the AAT- of the TAS.

In an attempt to test the findings of Mandler and Sarason (1952), Grooms and Endler (1960) partially replicated the original work. A sample of 91 students in the introductory psychology course at Pennsylvania State University was used. Grooms and Endler trichotomized this sample into high anxious, medium anxious, and low anxious groups on the basis of data obtained from the Test Anxiety Questionnaire.

It was found that anxiety served as a modifier variable (a dichotomized or trichotomized independent variable leading to differential relationships between a predictor variable and a criterion) for predicting grades for high anxious subjects.

Gordon and S. B. Sarason (1955) investigated the extent to which test-taking anxiety was related to a more generalized pattern of anxiety. They found that those individuals who experienced test anxiety also tended to experience general anxiety.

Harleston (1962) reported the effects of test anxiety interacting with stress, task difficulty, and failure anxiety on performance. A modified form of the Test Anxiety Scale was used. Harleston (1962) found that test anxiety was a significant factor in performance and that anxiety was "dependent upon task, situational, and organismic variables (p. 567)."

Smouse and Munz (1968) studied the interaction of anxiety and item sequencing on performance. Their sample consisted of 113 students enrolled in an introductory psychology course at the University of Oklahoma. Smouse and Munz used achievement on the final examination for the course as the dependent criterion and dichotomized the subjects into high and normal anxiety treatments with three variations of test item sequencing, that is, hard-to-easy, easy-to-hard, and random. No statistically significant *F* ratios were found

in the main effects or interaction of anxiety treatments and item sequencing. They concluded that the notion that an easy-to-hard arrangement facilitated test anxiety adaptability and that a hard-to-easy sequence disrupted test anxiety adaptability appeared to have no general justification.

In a further study Munz and Smouse (1968) hypothesized that when item sequence interacted with achievement anxiety personality types performance was significantly affected. They used three item sequences, easy-to-hard, random, and hard-to-easy. These item arrangements were randomly assigned to four personality types based on the Alpert-Haber Achievement Anxiety Test (Alpert and Haber, 1960), that is, facilitators, debilitators, high affecteds, and non-affecteds. Munz and Smouse found that the achievement anxiety types interacted with item sequencing and produced a significant effect on performance scores. In a post hoc effort to explain their findings, they hypothesized that differential stress levels were generated by the three arrangements of the items and that the various achievement anxiety types interacted in a way which could be explained by the inverted-U hypothesis.

The inverted-U hypothesis was initially postulated in the early 1900's by Yerkes and Dodson (1908). This hypothesis implied that there was an arousal level most beneficial to a task. A drive level too low to affect performance was just as detrimental as a high drive level which inhibited performance. As the drive level increased the

performance also increased, but only up to a certain point; the performance then decreased even as the drive level continued to increase (Levitt, 1967, pp. 116-120).

Munz and Smouse (1968) made two assumptions in their hypothesis about the inverted-U curve. First, they assumed that the achievement anxiety types initially fell on the inverted-U curve in this manner: the debilitators and non-affecteds fell on the extreme ends of the arousal levels, high and low respectively, with the debilitators slightly higher in performance; the facilitators and high affecteds fell in the intermediate range of arousal level with the high affecteds slightly higher in both arousal level and performance. Second, they assumed that the three sequence arrangements of the items produced different degrees of arousal, increasing in order from random, to easy-to-hard, to hard-to-easy. In order to test these assumptions, the present study examined the relationship between stress levels, achievement anxiety personalities and academic performance on a randomly sequenced item format.

Summary of Literature

1. A major problem and handicap in the study of anxiety has been the lack of harmony in defining this construct. This situation obviously produces confusion in interpreting various studies.

2. The appearance of anxiety scales, especially the Taylor Manifest Anxiety Scale, spurred a great number of researchers to investigate anxiety.

3. The most recent views differentiated between state anxiety, an arousal to a specific situation, and trait anxiety, a chronic predisposition to respond anxiously in general.

CHAPTER II

THE PROBLEM AND PROCEDURES

Introduction

This study was an outgrowth of the work of Munz and Smouse (1968) who provided information on the interaction of test item arrangements and various anxiety achievement types. More specifically the major problem area of this study was the comparison of subjects with varying levels of test anxiety in a situation where performance was assessed under different degrees of stress. The experimentally independent stress conditions were high, normal, and low in nature and the performance criterion was the course final examination.

Statement of the Problem

This study was designed to investigate the influence of high, normal, and low stress conditions interacting with achievement anxiety types of academic test performance. The basis for defining the achievement anxiety types was the Achievement Anxiety Test (Alpert and Haber, 1960).

Operational Definitions

For purposes of this investigation important terms to be used are defined in the following manner:

1. Achievement Anxiety Personality Types

   a. Debilitators--from a sample of 242 students enrolled in an introductory educational psychology course at the University of Oklahoma, those thirty subjects with the lowest scores on the Achievement Anxiety Test (AAT) (Alpert and Haber, 1960) after the debilitating scores (AAT-) were subtracted from the facilitating scores (AAT+).

   b. Facilitators--from a sample of 242 students enrolled in an introductory educational psychology course at the University of Oklahoma, those subjects with the highest scores on the AAT after the debilitating scores (AAT-) were subtracted from the facilitating scores (AAT+).

   c. High-Affecteds--from a sample of 242 students enrolled in an educational psychology course at the University of Oklahoma, those subjects with the highest scores on the AAT after the debilitators and facilitators have been selected and the remaining scores summed (absolute value) and ranked.

   d. Low-Affecteds--from a sample of 242 students enrolled in an introductory educational psychology

course at the University of Oklahoma, those thirty subjects with the lowest scores on the AAT after the debilitators and facilitators have been selected and the remaining scores summed (absolute value) and ranked.

2. Performance Criterion--the number of correct choices made on the final examination of the introductory educational psychology course at the University of Oklahoma. The final examination consisted of 100 randomly sequenced multiple choice items with four alternatives for each item.

3. Anxiety Treatments

a. High--a condition created by anxiety-provoking instructions and sustained by constant supervision.

b. Low--a condition created by a special format of the final examination and by verbal instructions.

c. Normal--a condition where normal test-taking procedures prevailed.

4. Abbreviations

a. AAT--Achievement Anxiety Test (Alpert and Haber, 1960).

b. AAT+--one of the two sub-scales of the AAT which measures a facilitating effect of test anxiety.

c. AAT---one of the two sub-scales of the AAT which measures a debilitating effect of test anxiety.

Hypotheses

The following hypotheses were formulated:

Hypothesis 1: Under the normal anxiety treatment, debilitators and low-affecteds obtain a significantly lower mean score on the performance criterion than the high-affecteds.

Hypothesis 2: As a main effect, differential reactions to test-taking anxiety, as measured by the AAT, significantly affects scores on the performance criterion.

Hypotheses 1 and 2 are in accordance with the recent findings of Munz and Smouse (1968).

Hypothesis 3: Anxiety treatments (high, low, and normal) and achievement anxiety types as measured by the AAT (debilitators, facilitators, low-affecteds, and high-affecteds) interact to produce a statistically significant effect on the mean scores of the performance criterion.

Hypothesis 4a: Debilitators obtain a significantly higher mean score on the performance criterion in the low anxiety treatment than in the normal anxiety treatment.

Hypothesis 4b: The mean scores obtained on the performance criterion by the debilitators in the high and normal anxiety treatments do not differ significantly.

Hypothesis 5a: Low-affecteds obtain a significantly higher mean score on the performance criterion in the high anxiety treatment than in the normal anxiety treatment.

Hypothesis 5b: The mean scores obtained on the performance criterion by the low-affecteds in the low and normal anxiety treatments do not differ significantly.

General Statement of Procedures

Subjects were 120 students enrolled in an introductory course in educational psychology at the University of Oklahoma. They were pre-selected on the basis of data obtained from the AAT, which afforded the assignment of a score indicative of test-taking anxiety. On the basis of these scores, the subjects were categorized into one of four achievement anxiety personality types (debilitator, facilitator, high-affected, or low-affected) and each type was then randomly assigned to one of three anxiety treatments (low, normal, or high). The dependent variable was the score obtained on the final examination of the course.

The Instrument

The Alpert-Haber Achievement Anxiety Test (Alpert and Haber, 1960) was specifically designed to indicate the presence or absence of the facilitating and debilitating effects of anxiety on test performance. Each type of test anxiety, facilitating and debilitating, was measured by a sub-test of items. The two sub-tests together form a nineteen item questionnaire. For the facilitating sub-scale, Alpert and Haber (1960, p. 213) reported a test-retest reliability coefficient of .83 for a ten week interval and .75

for an eight month interval; for the debilitating sub-scale, test-retest reliability coefficients of .87 for a ten week interval and .76 for an eight month interval were also indicated.

The Subjects

The 120 subjects for this study were selected from a population of 242 students enrolled in three sections of an introductory educational psychology course at the University of Oklahoma. Ten days prior to the final examination, the students enrolled in the three sections of the introductory educational psychology course were asked to complete the AAT. Before distributing the AAT the following instructions were given to serve as an introduction:

> My name is Mr. _____. I am a research assistant. As you are probably aware, most large universities are continually engaged in research. This includes our own institution. We have been in the past and are at present attempting to validate a particular scale. The more students who complete this short questionnaire, the better our validation procedures will be. I have obtained permission to administer this scale to you. The information obtained from this scale will be used strictly for research purposes only.
>
> The questionnaires will now be distributed. When you receive your copy, place your name, section number, and proper sex in the appropriate spaces. Read the directions carefully and begin. Remember, this information will be used for research purposes only.

For inclusion in the subsequent experimental procedures, it was necessary that each individual fully identify himself on the AAT. Because Davids (1955) found that performance on an anxiety questionnaire was directly affected by

an individual's motivation for filling out such a questionnaire, it was emphasized that information obtained from the scale would be used strictly for research purposes only.

On the basis of the data supplied by the questionnaire, the subjects were categorized into one of four different personality types. Subjects were selected in the following manner: for each of the 242 students an AAT- score and an AAT+ score were obtained. The AAT- score was subtracted from the AAT+ score. The 242 questionnaires were then ordered from the highest AAT+ score to the lowest AAT- score. The 30 students with the highest AAT+ scores were defined as facilitators and the 30 students with the lowest AAT- scores were defined as debilitators. The AAT+ scores and the AAT- scores of the remaining 182 students were then summed (absolute value) and ranked in order. From this ranking, the 30 students with the highest combined scores were defined as high-affecteds and the 30 students with the lowest combined scores were defined as low-affecteds. Thus, the total working sample of 120 subjects comprised equal divisions of four achievement anxiety personality types with 30 subjects in each type. Each achievement anxiety personality type was then randomly assigned to one of three groups. The result was three groups with 10 facilitators, 10 debilitators, 10 high-affecteds, and 10 low-affecteds within each group. The three groups were then randomly assigned to one of three anxiety treatments.

The Anxiety Treatments

The anxiety treatments took place during the final examination of the introductory course in educational psychology at the University of Oklahoma. The treatment for the NAG was conducted under a normal test-taking situation.

The treatment for the HAG was conducted under a high anxiety test-taking situation. The graduate assistant who was the head proctor for the final examination was selected for his ability to deliver and execute the anxiety-provoking instructions in the most successful fashion. For the final examination, this graduate assistant arrived at the assigned room about five minutes late. Upon entering the room he informed the students than an unfortunate occurrence had recently taken place. It had been brought to his attention that the originally-constructed final examination had been secured by some students and thus a new test had to be hurriedly constructed. The present form of the examination had been constructed with items taken from the more obscure sections of the lectures and assigned readings. If the students found the items more difficult and did not perform as well as usual, that was unfortunate. The hope was that the examination was not so difficult as to adversely affect grades. After these instructions were completed and the test materials distributed, two assistants proctored the examination. They moved around the room and looked over the students' shoulders

during the entire test session. (If analysis of the data revealed a statistically significant anxiety effect the scores would be adjusted on the basis of variance accounted for by the anxiety treatment).

The treatment for the LAG was conducted under a low anxiety test-taking situation. The reduction of anxiety was accomplished by a method employed by McKeachie, Pollie, and Speisman (1955) and Calvin, McGuigan, and Sullivan (1957). A special format of the final examination was used. Like the NAG and HAG, the LAG received the same examination which consisted of 100 randomly presented multiple-choice items. The difference was in format construction. The answer sheet was divided into two parts, one-half displayed the usual format while the other half contained a blank line beside each place for responding. The instructions given were: "Circle the best answer for each item. Feel free to make any comments about the items in the space provided." The setting up of these conditions have been found to reduce anxiety (McKeachie, Pollie, and Speisman, 1955; Calvin, McGuigan, and Sullivan, 1957). McKeachie, Pollie, and Speisman (1955) concluded their study in this way:

> It is suggested that classroom examinations help determine the students' perception of the manner in which the instructor's power to assign grades will be used. Individual anxiety in the situation is partially a function of achievement motivation. Anxiety inhibits performance. Giving students an opportunity to write comments aids not only in reducing the threat but also in channeling the release of anxiety (p. 98).

Coupled with this, the graduate assistant in the LAG created a relaxing atmosphere prior to the distribution of the examinations.

In summary, 120 subjects were pre-selected from data obtained from the Achievement Anxiety Test (Alpert and Haber, 1960). The 30 subjects comprising each of the four achievement anxiety personality types were randomly assigned to the three anxiety treatment groups. These three groups contained 40 subjects each--10 debilitators, 10 facilitators, 10 high-affecteds, and 10 low-affecteds.

CHAPTER III

DESIGN AND STATISTICAL ANALYSIS

Design

The experimental design for this study is explicit from Figure 1 which graphically depicts the twelve-cell two-part analysis of variance design for analyzing the influence of anxiety treatments, achievement anxiety personality types, and the interaction between the two main effects on the performance criterion. This three by four factorial analysis had equal observations in each cell.

Statistical Analysis

The principal statistical techniques used in analyzing the data obtained for this study (Appendix A) were the *t* test for differences between means and the three by four multiple-classification analysis of variance. The application of the *t* test of differences between means and the multiple-classification analysis was made after two basic assumptions were met: first, that the samples were randomly selected, and second, that the population variances of the groups were homogeneous (Downie and Heath, 1965, p. 141; Lindquist, 1953, p. 73). The assumption of randomness was

Achievement Anxiety Personality Types	Anxiety Treatments		
	Low	Normal	High
Facilitator	Cell #1 n=10	Cell #2 n=10	Cell #3 n=10
Debilitator	Cell #4 n=10	Cell #5 n=10	Cell #6 n=10
High-Affected	Cell #7 n=10	Cell #8 n=10	Cell #9 n=10
Low-Affected	Cell #10 n=10	Cell #11 n=10	Cell #12 n=10

Fig. 1. Multiple-classification analysis of variance for the experimental design.

satisfied by the random assignment procedures described in the previous chapter. Homogeneity of variance was verified by applying a series of F_{max} tests on the data. (See Appendix B). The variances of the sub-groups was calculated and the smallest variance was divided into the largest variance. The quotients yielded from these divisions were F_{max} values which, in turn, were interpreted for statistical significance by the use of the Table of F_{max} (Walker and Lev, 1953, pp. 462-463). Since the F_{max} values were not statistically significant it was concluded that the variances were homogeneous (Walker and Lev, 1953, pp. 190-192).

The first hypothesis predicted that the mean scores on the performance criterion of the low-affecteds and debilitators in the normal anxiety group would be significantly different from the mean score on the performance criterion of the high-affecteds in the normal anxiety group. After F_{max} ratios were computed and the variance found to be homogeneous, the pooled variance formula for t was used (Popham, 1967, p. 145) with 18 degrees of freedom. The hypothesis was only partially supported. The mean score of the debilitators was significantly different from the mean score of the high-affecteds (t = 2.719, degrees of freedom = 18, significant at the .05 level); but the mean score of the low-affecteds was not significantly different from the mean score of the high-affecteds (t = 1.345, degrees of freedom = 18, not significant). The mean scores and standard deviations for the

achievement anxiety types for the normal anxiety group are reported in Table 1.

TABLE 1

Means and Standard Deviations for the Respective Anxiety Reaction Types for the Normal Anxiety Group

Anxiety Types	N	M	S.D.
High-affecteds	10	77.8	7.857
Facilitators	10	76.8	10.293
Low-affecteds	10	73.9	4.725
Debilitators	10	68.7	7.086

Hypotheses 2 and 3 were directly concerned with the dependent measure, that is, the performance criterion, which consisted of the total number of correct responses given by each subject. These data were subjected to a 3 (anxiety treatments) X 4 (achievement anxiety types) analysis of variance.

Hypothesis 2 had predicted that, as a main effect, differential reactions to test-taking anxiety would significantly affect scores on the performance criterion; hypothesis 3 had predicted that the anxiety treatments would interact with the achievement anxiety types to produce a significant effect on the scores of the performance criterion.

As shown in Table 2, statistical analysis of the dependent measure indicated a significant main effect for

the achievement types (F = 3.48, degrees of freedom = 3/108, significant at the .05 level). This result supported hypothesis 2.

TABLE 2

Analysis of Variance Summary Table of the Performance Criterion as a Function of Anxiety Treatments and Achievement Anxiety Types

Source of Variation	df	MS	F
Anxiety Treatments (A)	2	204.77	2.76
Achievement Types (B)	3	258.47	3.48*
A X B	6	89.10	1.20
Within (error)	108	74.15	
Total	119		

*$p < .05$

On the other hand, as shown in Table 2, statistical analysis failed to support hypothesis 3. The interaction between the anxiety treatments and the achievement anxiety types did not produce a significant F ratio (F = 1.20, degrees of freedom = 6/108, not significant).

Hypotheses 4a and 4b made predictions about the debilitators, those subjects scoring relatively high on the debilitating scale and relatively low on the facilitating scale. In hypothesis 4a it was predicted that the mean score on the performance criterion of the debilitators in the low anxiety treatment would be significantly higher than the mean

score on the performance criterion of the debilitators in the normal anxiety treatment. The prediction in hypothesis 4b was that the mean scores obtained on the performance criterion by the debilitators would be statistically the same in both the high and normal anxiety treatments. Since these were *a priori* hypotheses, after an F_{max} ratio was computed and the variance found to be homogeneous, the pooled variance formula for *t* was used (Popham, 1967, p. 145), with 18 degrees of freedom in both cases. Hypothesis 4a was supported by the results (*t* = 2.0685, degrees of freedom = 18, significant at the .05 level); hypothesis 4b was also supported by the results (*t* = 0.3233, degrees of freedom = 18, not significant).

Hypotheses 5a and 5b made predictions about the low-affecteds, those subjects scoring relatively low on both the facilitating and debilitating scales. In hypothesis 5a it was predicted that the mean score on the performance criterion of the low-affecteds in the high anxiety treatment would be significantly higher than the mean score on the performance criterion of the low-affecteds in the normal anxiety treatment. The prediction in hypothesis 5b was that the mean scores obtained on the performance criterion by the low-affecteds would be statistically the same in both the low and normal anxiety treatments. Since these were *a priori* hypotheses, after an F_{max} ratio was computed and the variance found to be homogeneous, the pooled variance formula for *t*

was used (Popham, 1967, p. 145) with 18 degrees of freedom in both cases. Hypothesis 5a was not supported by the results (t = 0.3281, degrees of freedom = 18, not significant); the t value for hypothesis 5b failed to reach a significant level and thus, this hypothesis was supported by the data analyzed (t = 0.0560, degrees of freedom = 18, not significant).

Summary of Results

1. Hypothesis 1 was partially supported. The debilitators' mean score on the performance criterion in the normal anxiety treatment was significantly lower than the high-affecteds' mean score on the performance criterion in the same treatment; however, the low-affecteds' mean score on the performance criterion in the normal anxiety treatment was not significantly different from the mean score on the performance criterion in the same treatment.

2. Statistical analysis yielded a significant F ratio for anxiety achievement types as a main effect in support of hypothesis 2.

3. Statistical analysis failed to yield a significant F ratio for the interaction between the anxiety treatments and the achievement anxiety types. Thus, hypothesis 3 was not supported.

4. Hypotheses 4a and 4b were both supported. The debilitators' mean score on the performance criterion in

the low anxiety group was significantly higher than the debilitators' mean score on the performance criterion in the normal anxiety group. This supported hypothesis 4a. The debilitators' mean score on the performance criterion in the normal and high anxiety groups was statistically the same. This supported hypothesis 4b.

5. The low-affecteds' mean score on the performance criterion in the high and normal anxiety groups was statistically the same. This result did not support hypothesis 5a. The low-affecteds' mean score on the performance criterion in the low and normal anxiety groups was statistically the same. This result supported hypothesis 5b.

CHAPTER IV

DISCUSSION

The two predictions made about the performance of the debilitators and low-affecteds within the low anxiety group, that is, hypotheses 4a and 5b, were both supported by the analysis of the data obtained. No predictions were made about the performance of the high-affecteds and facilitators because of their position on the inverted-U curve. Figure 2 shows how the four achievement anxiety types fell on the inverted-U curve within the normal anxiety group. Since the debilitator's arousal level was very high, the debilitators were placed on the high-arousal side of the inverted-U curve according to their performance. Merely by inspection the difference between the arousal level of the debilitators and low-affecteds can be seen. The high-affecteds and facilitators clustered around the apogee of the inverted-U curve, indicating little difference in degree of arousal and performance. The inverted-U curve is interpreted in this manner: as the arousal level increases the performance may also increase but only up to a certain point; the performance then begins to decrease even as the arousal level continues to increase. Thus, because no real distinction could be made

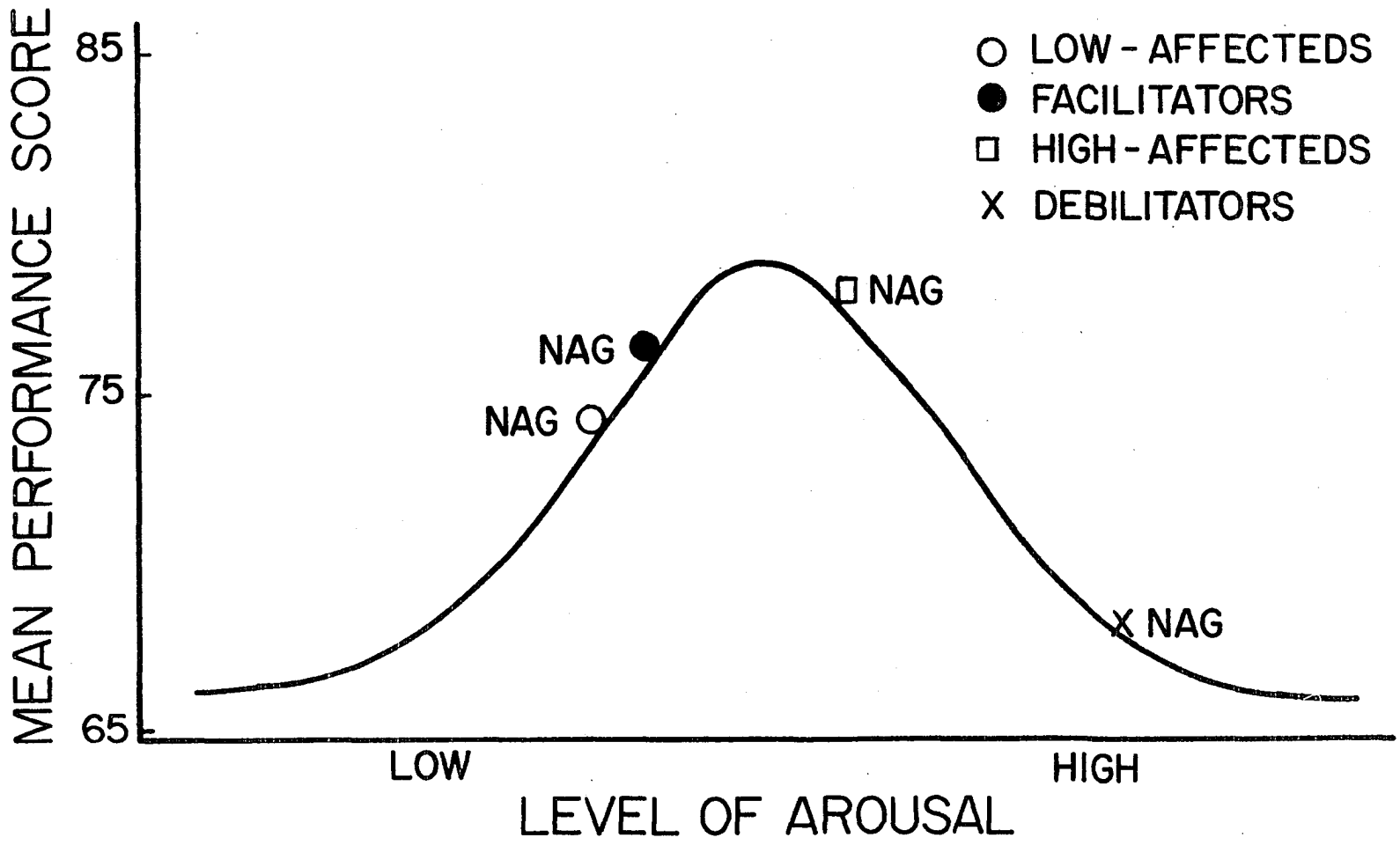


Fig. 2.--Inverted-U curve representing mean scores on the performance criterion as a function of arousal levels for the achievement anxiety types in the normal anxiety group.

between the arousal level and performance of the high-affected and facilitator, and because of their position near the apogee of the inverted-U curve, no hypotheses were made concerning them.

Munz and Smouse (1968) found that the initial positions of the high-affecteds and facilitators were near the apogee of the inverted-U curve. They also found that the mean performance score of the high-affecteds was significantly higher than the mean performance score of the debilitators and low-affecteds. In the present study, only the mean performance score of the debilitators was significantly lower than the mean performance score of the high-affecteds. Contrary to what was predicted (hypothesis 1), the low-affected group was found to function higher in both arousal level and performance in the normal anxiety group.

The results concerning the debilitators in the low anxiety group were particularly germane to the regular classroom testing situation. By an independent manipulation of anxiety level the mean score of the debilitators was significantly raised. Thus, when the debilitator's drive level was decreased his mean score on the performance criterion was increased. Figure 3 shows the mean score performances on the inverted-U curve of the four achievement anxiety types within the low and normal anxiety groups. In accordance with the inverted-U hypothesis, the drive level of intermediate intensity is most beneficial in stimulating optimal performance.

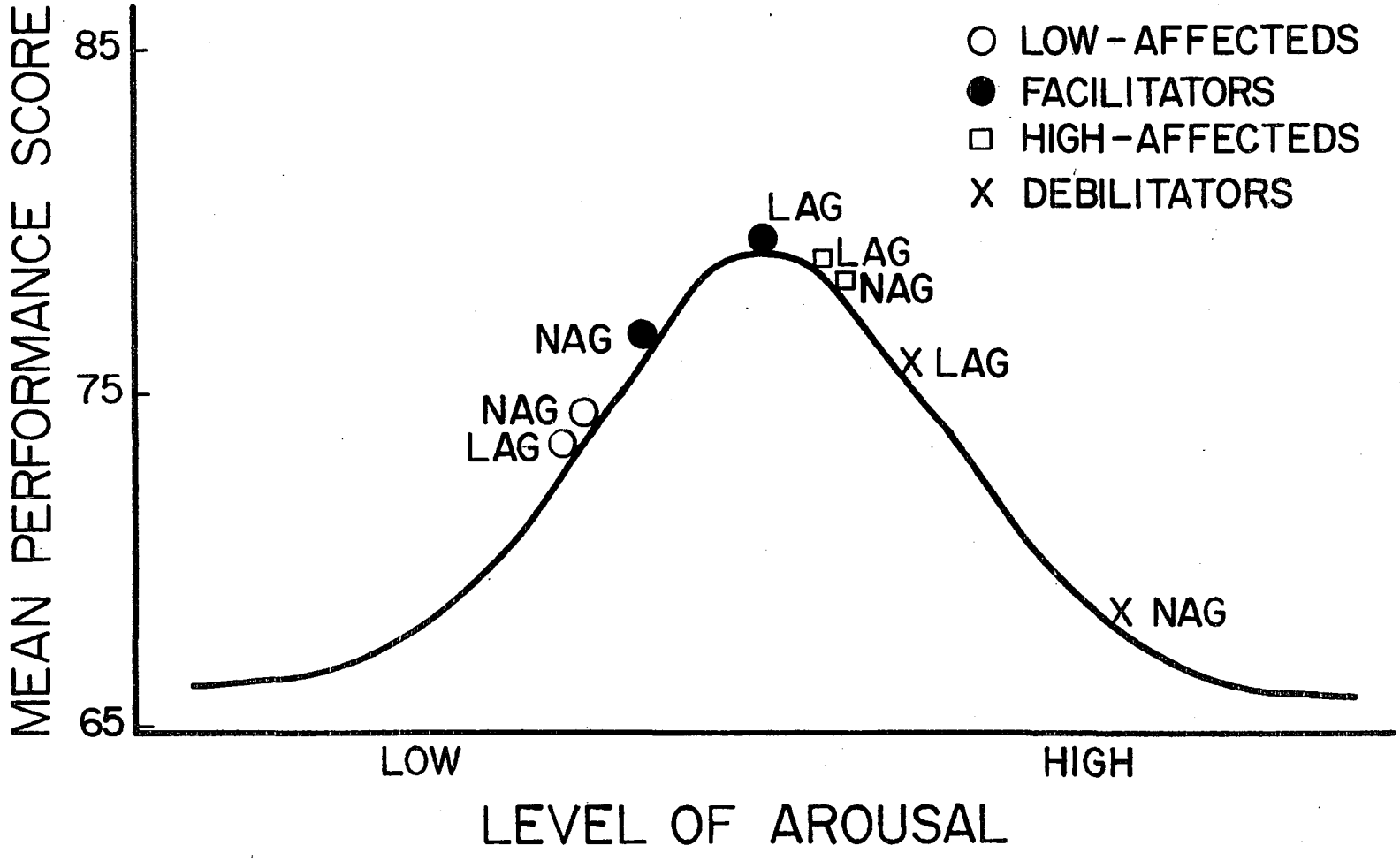


Fig. 3.--Inverted-U curve representing mean scores on the performance criterion as a function of arousal levels for the achievement anxiety types in the low and normal anxiety groups.

Although there was insufficient evidence to make predictions about the high-affecteds and facilitators for reasons stated above, it was interesting to note their reactions under the various anxiety treatments. As indicated in Figure 4 the high anxiety treatment successfully depressed the performance of the high-affecteds, who under normal circumstances performed in a superior manner. In addition, the performance of the facilitators under the high anxiety treatment is also noteworthy. Their mean scores on the performance criterion were statistically the same for both the high and normal treatments, yet their arousal level increased under high anxiety. Increases or decreases in the arousal level near the apogee of the inverted-U curve, that is, in the intermediate range of stress, do not significantly affect the performance of the achievement anxiety types. Increases or decreases near the low and high extremes of the arousal level produce significant effects on performance.

The fluctuations of the arousal levels of the facilitators and high-affecteds under the high anxiety treatment and the corresponding fluctuations in their mean performance scores have implications for future research. The significant depression of the performance of the high-affecteds should be further investigated by formulating a priori predictions on their performance under varying stress levels.

In conclusion, the findings have direct relation to classroom testing situations. Figure 5 showed the mean

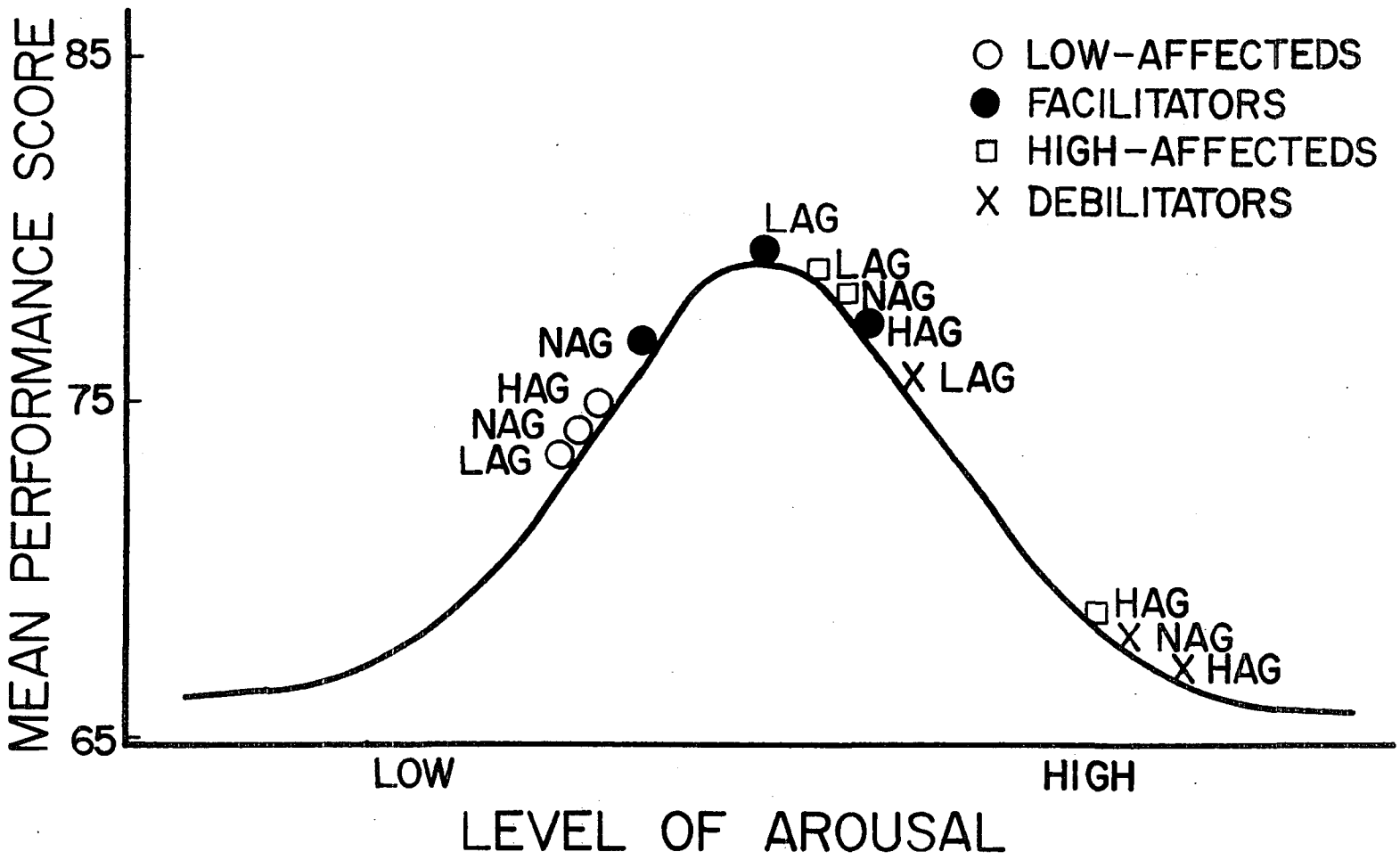


Fig. 4.--Inverted-U curve representing mean scores on the performance criterion as a function of arousal levels for the achievement anxiety types in the low, normal, and high anxiety groups.

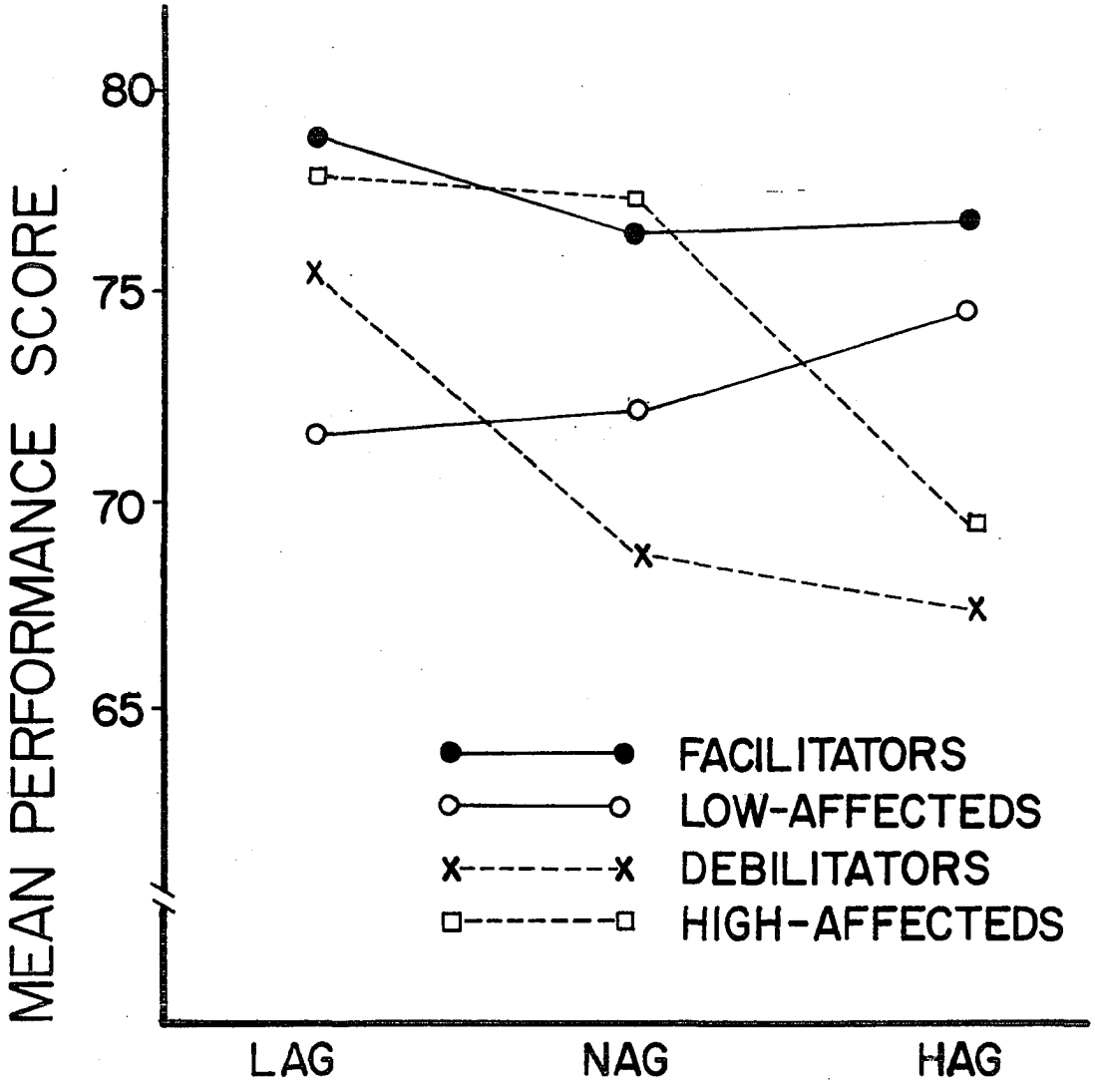


Fig. 5.--Mean performance scores on the performance criterion of the achievement anxiety types in the low, normal, and high anxiety groups.

performance scores of the four achievement anxiety types under the three anxiety treatments. The least amount of variance attributable to personality factors was found in the low anxiety treatment. Thus, if one were attempting to estimate a group's familiarity with a defined content of subject matter, the low anxiety situation could afford performance scores with the least amount of variance attributable to personality factors. However, if personality factors were deemed justifiable components of a criterion, a high anxiety atmosphere might be most appropriate.

CHAPTER V

SUMMARY AND IMPLICATIONS

Summary

This study was designed to investigate the influence of high, normal, and low stress conditions interacting with achievement anxiety types on academic performance. The subjects who participated in this study were 120 students selected from a population of 242 students enrolled in the introductory educational psychology course at the University of Oklahoma.

The achievement anxiety personality types were chosen on the basis of data obtained from the Achievement Anxiety Test. The Achievement Anxiety Test was specifically designed to indicate the presence or absence of the facilitating or debilitating effects of anxiety on test performance. Each type of anxiety, facilitating or debilitating, was measured by a sub-test of items. The Achievement Anxiety Test afforded an anxiety score indicative of test-taking anxiety and on this basis each subject was categorized into one of four achievement anxiety types (debilitators, facilitators, high-affecteds, or low-affecteds). Each achievement anxiety type was then randomly assigned to one of three anxiety

treatments (low, normal, or high). The dependent variable was the score obtained on the course final examination.

Based on the results of the analysis of the data and with consideration for the limitations imposed by the design of the experiment, the sample, and the instrument used for the selection of subjects, the following conclusions are suggested:

1. The mean performance score of debilitators, as judged by the Achievement Anxiety Test (Alpert and Haber, 1960), can be raised upward significantly by manipulating the anxiety level downward.

2. Mean performance scores under low anxiety afford the least amount of variance attributable to personality factors.

3. Achievement anxiety personality types function on the inverted-U curve.

Implications

On the basis of the findings of this study, the following recommendations for future research are suggested:

1. Research is needed to clearly identify the differential reactions of the facilitators to varying levels of anxiety.

2. The present study should be replicated to ascertain if the significant finding concerning the debilitators can be repeated.

3. The present study should be replicated with other populations, for example, high school populations, to see whether the findings are generalizable to those populations. In so doing the parameters of external validity would be correspondingly broadened.

4. The significant depression of the performance of the high-affecteds should be studied further by making *a priori* predictions about their performance under varying stress levels.

REFERENCES

Alpert, R., & Haber, R. Anxiety in academic achievement. Journal of Abnormal and Social Psychology, 1960, 61, 207-215.

Calvin, A., McGuigan, F., & Sullivan, M. A further investigation of the relationship between anxiety and classroom examination performance. Journal of Educational Psychology, 1957, 48, 240-244.

Carrier, N. Stress, personality, and performance on course examinations. (Doctoral dissertation, University of Michigan) Ann Arbor, Mich.: University Microfilms, 1956. No. 57-2251.

Cattell, R. Handbook for the I. P. A. T. anxiety scale. Champaign, Ill.: Institute for Personality and Ability Testing, 1957.

Cattell, R., & Scheier, I. The nature of anxiety: A review of thirteen multivariate analyses. Psychological Reports, 1958, 4, 351-388.

Cattell, R., & Scheier, I. The meaning and measurement of neuroticism and anxiety. New York: Ronald Press, 1961.

Child, I. L. Personality. Annual review of psychology, 1954, 5, 149-170.

Davids, A. Relations among several objective measures of anxiety under different conditions of motivation. Journal of Consulting Psychology, 1955, 19, 275-279.

Dember, W., Nairner, F., & Miller, F. Further validation of the Alpert-Haber achievement anxiety test. Journal of Abnormal and Social Psychology, 1962, 65, 427-428.

Diamond, L. The effects of anxiety and stress on children's performance. (Doctoral dissertation, Catholic University of America) Ann Arbor, Mich.: University Microfilms, 1965. No. 66-8807.

Dollard, J., & Miller, N. Personality and psychotherapy. New York: McGraw-Hill, 1950.

Downie, N., & Heath, R. Basic statistical methods. New York: Harper and Row, 1965.

Edwards, A. Experimental design in psychological research. New York: Holt, Rinehart and Winston, 1960.

Eriksen, C., & Paul, G. Effects of test anxiety on "real life" examinations. Journal of Personality, 1964, 32, 480-494.

Freeman, M. The development of a test for the measurement of anxiety: A study of its reliability and validity. Psychological Monographs, 1953, 67 (3, Whole No. 353).

Freud, S. The problem of anxiety. New York: Psychoanalytic Quarterly Press, 1936.

Gordon, E., & Sarason, S. The relationship between "test anxiety" and "other anxieties". Journal of Personality, 1955, 23, 317-323.

Grooms, R., & Endler, N. The effect of anxiety on academic achievement. Journal of Educational Psychology, 1960, 51, 299-304.

Harleston, B. Test anxiety and performance in problem-solving situations. Journal of Personality, 1962, 30, 557-573.

Horney, K. Our inner conflicts. New York: Norton, 1945.

Hull, C. Principles of behavior. New York: Appleton-Century-Crofts, 1943.

Kessen, W., & Mandler, G. Anxiety, pain and inhibition of distress. Psychological Review, 1961, 68, 396-404.

Levitt, E. The psychology of anxiety. Indianapolis: Bobbs-Merrill, 1967.

Levy, L. Anxiety and behavior scientists' behavior. American Psychologist, 1961, 16, 66-68.

Lindquist, E. Design and analysis of experiments in psychology and education. Boston: Houghton-Mifflin, 1953.

McKeachie, W., Pollie, D., & Speisman, J. Relieving anxiety in classroom examinations. Journal of Abnormal and Social Psychology, 1955, 50, 93-98.

Mandler, G., & Sarason, S. A study of anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 166-173.

Mandler, G., & Cowen, J. Test anxiety questionnaires. Journal of Consulting Psychology, 1958, 22, 228-229.

May, R. The meaning of anxiety. New York: Ronald Press, 1950.

Milholland, J. Note on the further validation of the Alpert-Haber achievement anxiety test. Journal of Abnormal and Social Psychology, 1964, 69, 236.

Munz, D. The effects of item difficulty sequences on achievement testing scores under two conditions of anxiety. Unpublished Master's thesis, University of Oklahoma, 1968.

Munz, D., & Smouse, A. The interaction effects of item sequencing and achievement anxiety reaction on academic performance. Journal of Educational Psychology, 1968, in press.

Pervin, L. Aptitude, anxiety and academic performance: A moderator variable analysis. Psychological Reports, 1967, 20, 215-221.

Popham, W. Educational statistics - use and interpretation. New York: Harper and Row, 1967.

Ruebush, B. Anxiety. In H. W. Stevenson (Ed.) Child psychology. The Sixty-second yearbook of the National Society for the Study of Education, Part I, Chicago: University of Chicago Press, 1963. Pp. 460-516.

Sarason, I. Empirical findings and theoretical problems in the use of anxiety scales. Psychological Bulletin, 1960, 57, 403-415.

Sarason, S., Mandler, G., & Craighill, P. The effect of differential instructions on anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 561-565.

Sarason, S., & Gordon, E. The test anxiety questionnaire: Scoring norms. Journal of Abnormal and Social Psychology, 1953, 48, 447-448.

Smouse, A., & Munz, D. The effects of anxiety and item difficulty sequence on achievement testing scores. Journal of Psychology, 1968, 68, 181-184.

Spence, K. Behavior theory and conditioning. New Haven, Conn.: Yale University Press, 1956.

Sperber, Z. Test anxiety and performance under stress. Journal of Consulting Psychology, 1961, 25, 226-233.

Stakenas, R. Evaluative stress, fear of failure and academic achievement. (Doctoral dissertation, University of Michigan) Ann Arbor, Mich.: University Microfilms, 1965. No. 66-6710.

Sullivan, H. The meaning of anxiety in psychiatry and life. New York: William A. White Institute of Psychiatry, 1948.

Taylor, J. The relationship of anxiety to the conditioned eyelid response. Journal of Experimental Psychology, 1951, 41, 81-92.

Taylor, J. A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 1953, 48, 285-290.

Walker, H., & Lev, J. Statistical inference. New York: Holt, Rinehart and Winston, 1953.

Weiner, G. The interaction among anxiety, stress instructions and difficulty. Journal of Consulting Psychology, 1959, 23, 324-328.

Welsh, G. An anxiety index and an internalization ratio for the MMPI. Journal of Consulting Psychology, 1952, 16, 65-72.

Yerkes, R., & Dodson, J. The relation of strength of stimulus to rapidity of habit-formation. Journal of Comparative Neurology and Psychology, 1908, 18, 459-482.

Zuckerman, M. The development of an affect adjective check list for the measurement of anxiety. Journal of Consulting Psychology, 1960, 24, 457-462.

Zuckerman, M., Lubin, B., Vogel, L., & Valerius, E. Measurement of experimentally induced affects. Journal of Consulting Psychology, 1964, 28, 418-425.

APPENDIX A

TABLE 3

Raw Scores on Dependent Criterion for High-affecteds Under Varying Anxiety Treatments

Subject	Anxiety Treatment	Raw Score
1	High	68
2	High	57
3	High	78
4	High	80
5	High	71
6	High	72
7	High	56
8	High	64
9	High	65
10	High	78
11	Normal	78
12	Normal	81
13	Normal	79
14	Normal	69
15	Normal	80
16	Normal	82
17	Normal	86
18	Normal	73
19	Normal	88
20	Normal	62
21	Low	76
22	Low	76
23	Low	70
24	Low	93
25	Low	57
26	Low	77
27	Low	89
28	Low	89
29	Low	83
30	Low	72

TABLE 4

Raw Scores on Dependent Criterion for Facilitators Under Varying Anxiety Treatments

Subject	Anxiety Treatment	Raw Score
31	High	74
32	High	84
33	High	60
34	High	82
35	High	80
36	High	71
37	High	71
38	High	79
39	High	87
40	High	82
41	Normal	59
42	Normal	75
43	Normal	75
44	Normal	87
45	Normal	77
46	Normal	74
47	Normal	90
48	Normal	79
49	Normal	89
50	Normal	63
51	Low	93
52	Low	73
53	Low	75
54	Low	86
55	Low	83
56	Low	58
57	Low	86
58	Low	82
59	Low	77
60	Low	76

TABLE 5

Raw Scores on Dependent Criterion for Low-affecteds Under Varying Anxiety Treatments

Subject	Anxiety Treatment	Raw Score
61	High	71
62	High	86
63	High	79
64	High	79
65	High	75
66	High	79
67	High	67
68	High	69
69	High	68
70	High	74
71	Normal	79
72	Normal	75
73	Normal	70
74	Normal	80
75	Normal	72
76	Normal	71
77	Normal	72
78	Normal	77
79	Normal	65
80	Normal	78
81	Low	73
82	Low	87
83	Low	85
84	Low	55
85	Low	67
86	Low	69
87	Low	86
88	Low	66
89	Low	72
90	Low	77

TABLE 6

Raw Scores on Dependent Criterion for Debilitators Under Varying Anxiety Treatments

Subject	Anxiety Treatment	Raw Score
91	High	60
92	High	92
93	High	67
94	High	53
95	High	68
96	High	70
97	High	58
98	High	70
99	High	72
100	High	64
101	Normal	59
102	Normal	73
103	Normal	71
104	Normal	58
105	Normal	81
106	Normal	69
107	Normal	72
108	Normal	70
109	Normal	72
110	Normal	62
111	Low	58
112	Low	70
113	Low	77
114	Low	78
115	Low	78
116	Low	77
117	Low	83
118	Low	79
119	Low	81
120	Low	72

APPENDIX B

TABLE 7

Variance of Achievement Anxiety Types Under the Anxiety Treatments

Type	Treatment	Variance
High-affecteds	High	72.3220
Facilitators	High	64.6666
Low-affecteds	High	37.1220
Debilitators	High	111.3777
High-affecteds	Normal	61.7333
Facilitators	Normal	105.9550
Low-affecteds	Normal	22.3222
Debilitators	Normal	50.2333
High-affecteds	Low	115.7333
Facilitators	Low	91.6555
Low-affecteds	Low	105.1222
Debilitators	Low	51.5666

TABLE 8

F_{max} Ratios for Homogeneity of Variance for the Achievement Anxiety Types Within the High, Normal and Low Anxiety Treatments

Anxiety Type	Treatment	k	n	Variance	F_{max}
Debilitators	High	4	9	111.3777	3.0003
Low-affecteds	High	4	9	37.1220	
Facilitators	Normal	4	9	105.9550	4.7466
Low-affecteds	Normal	4	9	22.3222	
High-affecteds	Low	4	9	115.7333	2.2443
Debilitators	Low	4	9	51.5660	

TABLE 9

F_{max} Ratios for Homogeneity of Variance for the Achievement Anxiety Types Across the Anxiety Treatments

Anxiety Type	Treatment	k	n	Variance	F_{max}
High-affecteds	Low	3	9	115.7333	1.8747
	High	3	9	61.7333	
Facilitators	Normal	3	9	105.9550	1.6384
	High	3	9	64.6666	
Low-affecteds	Low	3	9	105.1222	4.7093
	Normal	3	9	22.3222	
Debilitators	High	3	9	111.3777	2.2172
	Normal	3	9	50.2333	

APPENDIX C

ACHIEVEMENT ANXIETY TEST

NAME_____ SEX_____

SECTION NUMBER_____

Instructions:
Indicate the degree to which each item applies to you by circling the desired number.

For example: I like animals.
1 2 3 4 (5)

Not at all — Very much

1. Nervousness while taking an exam or test hinders me from doing well.

5 4 3 2 1

Always — Never

2. I work most effectively under pressure, as when the task is very important.

5 4 3 2 1

Always — Never

3. In a course where I have been doing poorly, my fear of a bad grade cuts down my efficiency.

1 2 3 4 5

Never — Always

4. When I am poorly prepared for an exam or test, I get upset, and do less well than even my restricted knowledge should allow.

1 2 3 4 5

This never happens to me — This almost always happens to me

5. The more important the examination, the less well I seem to do.

5	4	3	2	1
Always				Never

6. While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous.

5	4	3	2	1
I always forget				I am always nervous during an exam

7. During exams or tests, I block on questions to which I know the answers, even though I might remember them as soon as the exam is over.

5	4	3	2	1
This always happens to me				I never block on questions to which I know the answers

8. Nervousness while taking an exam helps me do better.

1	2	3	4	5
It never helps				It often helps

9. When I start a test, nothing is able to distract me.

5	4	3	2	1
This is always true of me				This is not true of me

10. In courses in which the total grade is based mainly on <u>one</u> exam, I seem to do better than other people.

1	2	3	4	5
Never				Almost always

11. I find that my mind goes blank at the beginning of an exam and it takes me a few minutes before I can function.

5	4	3	2	1
Always				Never

12. I look forward to exams.

1	2	3	4	5
Never				Always

13. I am so tired from worrying about an exam, that I find I almost don't care how well I do by the time I start the test.

1	2	3	4	5
I never feel this way				I almost always feel this way

14. Time pressures on an exam causes me to do worse than the rest of the group under similar conditions.

5	4	3	2	1
Time pressure always seems to make me do worse than others				Time pressure never seems to make me do worse than others

15. Although "cramming" under pre-examination tension is not effective for most people, I find that if the need arises, I can learn material immediately before an exam, even under considerable pressure, and successfully retain it to use on the exam.

5	4	3	2	1
Always				Never

16. I enjoy taking a difficult exam more than an easy one.

5	4	3	2	1
Always				Never

17. I find myself reading exam questions without understanding them and I must go back over them so that they will make sense.

1	2	3	4	5
Never				Almost always

18. The more important the exam or test, the better I seem to do.

5	4	3	2	1
This is true of me				This is not true of me

19. When I don't do well on a difficult item at the beginning of an exam, it tends to upset me so that I block on even easy questions later on.

1	2	3	4	5
This never happens to me				This almost always happens to me