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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

AN EXPERIMENTAL STUDY OF DIFFERENCES IN TEST PERFORMANCE AS A FUNCTION OF DIFFERENT INTENSITIES OF CHRONIC ANXIETY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

BY

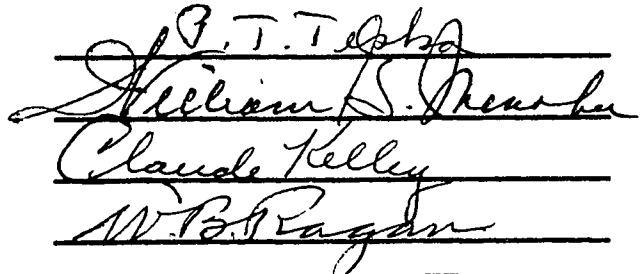
ROSE EMBLY McCOY

Norman, Oklahoma

1963

AN EXPERIMENTAL STUDY OF DIFFERENCES IN TEST PERFORMANCE AS A FUNCTION OF DIFFERENT INTENSITIES OF CHRONIC ANXIETY

APPROVED BY



DISSERTATION COMMITTEE

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TABLE OF CONTENTS

		Page
ACKNOWLEDGMENTS		iii
LIST OF TABLES		vi
LIST OF FIGURES		ix
CHAPTER		
I	THE PROBLEM: BACKGROUND AND SCOPE	1
	Introduction	1
	Theoretical Orientation	8
	Statement of the Problem	11
	Operational Definitions	13
	Limitations of the Study	15
	Significance of the Study	16
II	REVIEW OF RELATED LITERATURE	20
	Problem of Definition	20
	Description of Anxiety Indices	24
	Validation and Properties of the Taylor Manifest Anxiety Scale	27
	Related Studies	38
III	EXPERIMENTAL DESIGN	62
	Hypotheses	63
	Sample	70
	Instruments of Measure	70
	Procedure	73
	Statistical Treatment of the Data	76
IV	PRESENTATION AND ANALYSIS OF DATA	77
	Results	78
	Summary	112
V	SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	114
	Conclusions	117
	Recommendations	120

Page

BIBLIOGRAPHY 122

APPENDIX A 125

APPENDIX B 137

APPENDIX C 143

APPENDIX D 148

LIST OF TABLES

Table		Page
1.	Frequency Distribution of Sample by Age and Sex	71
2.	Frequency Distribution of Subjects According to Experimental Group, Sex, and Anxiety Level	72
3.	Test of Significance of Difference among Variates, Analysis of Variance, Completely Randomized Design	79
4.	Significance of Difference between Means among Groups	82
5.	Chi-Square Frequencies of Above the Median and At-Below the Median Test Performance between High and Low Anxiety Subjects	87
6.	Chi-Square Frequencies of Above the Median and At-Below the Median Test Performance between High and Medium Anxiety Subjects	88
7.	Chi-Square Frequencies of Above the Median and At-Below the Median Test Performance between Low and Medium Anxiety Groups	89
8.	Differences of Means among Anxiety Groups on Experimental Test	91
9.	Test of Significance of Difference among Variates, Analysis of Variance, Completely Randomized Design (Male Sample)	96
10.	Significance of Difference between Means among Male Groups	98
11.	Test of Significance of Difference among Variates, Analysis of Variance, Completely Randomized Design (Female Sample)	99
12.	Significance of Difference between Means among Female Groups	102

Table | Page

13. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Anxiety Level (Control Group) 103

14. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Anxiety Level (Affect Group) 103

15. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Anxiety Level (Reasons Group) 104

16. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Anxiety Level (Permissive Group) 104

17. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Anxiety Level (Non-Achieving Group) 105

18. Frequency Distribution of Subjects According to Anxiety Level and Sex 106

19. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Commenting on Test Items (Affect Group) 107

20. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Commenting on Test Items (Reasons Group) . . . 107

21. Cell-Square Contingencies for Chi-Square Test between Males and Females with Regard to Commenting on Test Items (Permissive Group) . . 108

22. Frequency Distribution of Subjects who Made Comments According to Age and Sex 108

23. Chi-Square Test for Mean Number of Comments According to Anxiety Level 109

24. Mean Number of Comments Made by Individual Subjects According to Anxiety Level 109

25. Cell-Square Contingencies for Chi-Square Test between Age Groups with Regard to Commenting on Test Items (Affect Group). 110

26. Cell-Square Contingencies for Chi-Square Test between Age Groups with Regard to Commenting on Test Items (Reasons Group) 110

Table		Page
27.	Cell-Square Frequencies for Chi-Square Tests between Age Groups with Regard to Commenting on Test Items (Permissive Group)	111
28.	Test Scores for Groups	126
29.	Test Scores According to Sex	130
30.	Test Quartile Performance on the Basis of Anxiety Level.	135
31.	Test of Significance of Difference among Groups in Scholastic Aptitude, Analysis of Variance, Completely Randomized Design	138
32.	Test of Significance of Difference among Groups in Scholastic Aptitude, Analysis of Variance, Completely Randomized Design (Female Sample) .	139
33.	Test of Significance of Difference among Groups in Scholastic Aptitude, Analysis of Variance, Completely Randomized Design (Male Sample) . .	141
34.	Application of F Tests for Homogeneity of Variance for Groups.	144
35.	Application of F Tests for Homogeneity of Variance for Male Groups	145
36.	Application of F Tests for Homogeneity of Variance for Female Groups	146
37.	Application of F Tests for Homogeneity of Variance Among Groups on the Basis of Anxiety Level.	147
38.	Chi-Square Frequencies According to Sex on the Basis of Anxiety Level	149
39.	Chi-Square Frequencies of Subjects Commenting on the Basis of Sex	151
40.	Chi-Square Frequencies of Subjects Commenting on the Basis of Age Level	152
41.	Frequency Distribution of Comments Made by Individual Subjects According to Anxiety Level	153

LIST OF FIGURES

Figure		Page
1.	Experimental Design	64

AN EXPERIMENTAL STUDY OF DIFFERENCES IN TEST PERFORMANCE AS A FUNCTION OF DIFFERENT INTENSITIES OF CHRONIC ANXIETY

CHAPTER I

THE PROBLEM: BACKGROUND AND SCOPE

Introduction

Contemporary behavioral sciences are becoming increasingly demanding of an inductive-deductive approach to the prediction of human behavior. Accurate prediction requires the discernment of basic relationships between phenomena such as, if certain conditions exist then certain behaviors will predictably follow. In an attempt to predict behavior, theorists employ three classes of variables -- motivation, learning, and inhibitory factors as they interact with the personality characteristics of the individual.

A personality characteristic which has received a great deal of attention as a learned phenomenon and as both a motivating and an inhibitory force is that of anxiety. Introduced and popularized by psychoanalysts, anxiety has become a central concept in psychology.

While there is a substantial body of research on

the problem of anxiety, most of our knowledge concerning its effects has accrued from clinical studies, or studies in which anxiety has been experimentally induced. An important limitation in the study of experimentally induced anxiety has been the achieving of realistic threat situations. The subject's motivation has, no doubt, been one of the crucial uncontrolled variables in many of these experiments, and is probably one explanation of their equivocal and inconsistent findings.

The present research was undertaken to contribute some understanding of the extent of the problem of anxiety and its effects in a college population. Its design permitted relevance between the motive states of the subjects utilized in the study and the situation to which they were exposed.

There is abundant evidence that college students often do not achieve according to predicted success, that students of high intellectual ability are frequently on probationary and drop-out lists. Academic failure has been one of the persistent problems confronting colleges and universities. Serious shortages of professional and technical personnel have caused the problem to be of considerable national concern.

Perhaps no one would disagree with the statement that, as important as it is, the possession of intelligence is not a sufficient predictor of college success. Obviously other factors enter into scholastic achievement. Some of

these have been designated and subjectively assessed, others are being scientifically studied and objectively evaluated. The present study was designed as part of the current effort to define and measure the non-intellectual variables which affect the performance of college students.

Some studies have impressively demonstrated that high scores in emotionality are associated with lower academic achievement than would have been predicted from intelligence alone. Writing on emotional problems of college students which may interfere with academic achievement, Spielberger stated:

> . . . it is apparent that college life is characterized by conditions and expectations which may heighten anxieties already present in students or may induce new anxieties. It would seem reasonable to expect that the stresses of college life are likely to have most serious effects upon those students who have developed pronounced tendencies to respond to threatening situations with anxiety and conflict.[1]

However, research which bears on the relationship between anxiety and academic performance has yielded quite inconsistent findings.

A study by Spielberger in 1962 showing grade point averages of male students provided evidence of the detrimental effects of high anxiety on college performance.[2] Spielberger found a larger percentage of the high anxious were academic failures at all levels of intellectual ability ex-

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[1] Charles D. Spielberger, "The Effects of Manifest Anxiety on Academic Achievement of College Students," Mental Hygiene, XLVI (1962), 420-426.

[2] Ibid., p. 424.

cept the highest than students of less anxiety. His analysis of the performance of students who scored in the highest level of academic ability suggests that high anxiety may actually facilitate performance through increased motivation.

Sarason found a low positive correlation between general anxiety and grade-point averages.[3] Matarazzo et al. found a small insignificant correlation between manifest anxiety scores and grade-point average.[4] Lazarus and Eriksen have demonstrated that students with high grade-point averages tend to improve under stress while poor students show a decrement and greater variability in performance when ACE scores are held constant. They account for this relationship by the suggestion that some poor students may obtain poor grades because of the stressful nature of college examinations.[5] McKeachie et al. have shown that high anxiety about failure impaired the performance of college students in a classroom test situation.[6]

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[3]I. G. Sarason, "Test Anxiety, General Anxiety and Intelligence," Journal of Consulting Psychology. XXI(1957), 485-490.

[4]J. D. Matarazzo, G. A. Ulett, S. B. Guze, and G. Saslow, "The Relationship Between Anxiety and Several Measures of Intelligence," Journal of Consulting Psychology, XVIII (1954), 201-205.

[5]R. S. Lazarus and C. W. Eriksen, "Psychological Stress and Its Personality Correlates," Part 1: "The Effects of Failure-Stress Upon Skilled Performance," Journal of Experimental Psychology, XLIII (1959), 100-105.

[6]W. J. McKeachie, D. Pallie, and J. Spiesman, "Relieving Anxiety in Classroom Examinations," Journal of Abnormal and Social Psychology, L (1955), 93-98.

But Wesley failed to support the hypothesis that anxiety interferes with abstract thinking.[7] French, who studied the emotional states of students during a College Board Examination, found the effects of anxiety to be small.[8] Griffith reported that the probationary students in his sample were not much lower in personality adjustment than those of superior college ability.[9] Thurstone in applying his personality adjustment inventory to college students found the less well adjusted students tended toward higher grades.[10]

The results of investigations on the relationship between anxiety and intelligence have also been inconsistent and equivocal. It is suggested that some degree of the general disagreement may be attributable to differences in samples and to differences in designs of these studies.

There are times when anxiety seems to have a beneficial motivational component which may account for the increased efficiency sometimes observed in individuals under stressful conditions. At such times it apparently leads to better, more ef-

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[7]E. L. Wesley, "Perseverative Behavior in a Concept Formation Task as a Function of Manifest Anxiety and Rigidity," Journal of Abnormal and Social Psychology, XLVIII (1953), 538-542.

[8]J. W. French, "A Study of Emotional States Aroused During Examinations," Research Division, ETS, Research Bulletin R61-6 (Princeton, New Jersey: Educational Testing Service, 1961).

[9]G. R. Griffith, "Scholastic Achievement and Personality Adjustment," Journal of Applied Psychology, XXIX (1945).

[10]L. G. Thurstone and Thelma Thurstone, "A Neurotic Inventory," Journal of Abnormal and Social Psychology, VI(1930), 3-30.

fective performance; at other times it seems to produce disorganization and debilitation. Demonstration of these two opposite effects is to be found in the experimental literature. A consistent finding is that of great individual differences. Although the issue of anxiety and its correlates is still unresolved, there is some convincing evidence of its detrimental effects.

Proceeding from a postulate that there is a critical point of anxiety beyond which interference with academic performance occurs, the primary focus of this research was on the question, "What can be done about it?" In addition to its theoretical objectives, a major implication of this study was in terms of the practical applicability of its findings in mitigating the adverse effects, if any were to be found, of this personality variable.

McKeachie et al. had theorized that most students begin a test with some anxiety as a result of their uncertainty about the outcome of the test and their high degree of motivation for achieving a "good" grade in the course.[11] Each failed item, according to their theory, adds to the student's anxiety and as he attacks the succeeding items, either the anxiety or the Zeigarnik effect aroused by the items which he has failed interfers with his performance, or in Maier's terms, his behavior becomes frustration-instigated rather than motivated-problem solving.

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[11] McKeachie, Pallie, and Spiesman, Journal of Abnormal and Social Psychology, L. 93.

They conducted experiments which attempted to influence scores by setting up conditions which would permit reduction of anxiety. Although McKeachie and his colleagues did not have a direct measure of anxiety, they concluded that their findings tended to support those of Deese and Lazarus,[12] Sarason,[13] and Maier[14] who have reported decrements in various tasks as a result of anxiety.

A still unanswered question was: Which condition appeared to produce the best performance for the high anxious student? The present research, modifying test instructions suggested by McKeachie et al., while gaining some information on the generality of their findings, focused its attention upon the different effects of variable testing conditions upon performance on the basis of the intensity of anxiety as objectively measured by a clinically validated instrument. The primary objective was to determine which condition appeared to produce the most beneficial effects upon high anxiety students.

During an examination period one can observe on perhaps most campuses, groups of students in corridors, on walkways, and elsewhere discussing the course examination. That

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[12] J. Deese and R. S. Lazarus, "The Effects of Psychological Stress Upon Perceptual-Motor Performance," U.S.A.F. Human Resources Research Center, Research Bulletin, No. 53-19 (1952).

[13] S. B. Sarason and G. Mandler, "Some Correlates of Test Anxiety," Journal of Abnormal and Social Psychology, XLVII (1952), 810-817.

[14] N. R. F. Maier, Frustration (New York:McGraw-Hill, 1949).

the course examination is probably the greatest focus of student anxiety in the college setting seems a reasonable assumption. The ego is strongly involved in the college experience. The student has learned from a lesson well taught by our culture to attach tremendous significance to the possession of intelligence. He tends to regard it as a decisive characteristic for valuation of the total self, since to him it is a prequisite for almost any worthwhile achievement.[15] The experience of failure may be very intense in a situation which has been explicitly defined as a test of the student's ability.[16]

In most of our colleges, if not all, the primary, if not the only measure of success or failure is in terms of academic grades. The student realizes that the grades he earns will play a major role in the determination of his social and vocational aspirations. The course examination is a hurdle which must be overcome if these broad life goals are to be attained.

Theoretical Orientation

The theory proposed in this study is the result of extensive reading in the field, judgments derived from emperical evidence and personal observations.

Anxiety is conceptualized as having both drive properties which energize activity, and associative responses

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[15] Irwin Katz, "Emotional Expression in Failure: A New Hypothesis," Journal of Abnormal and Social Psychology, XLV (1950), 329-349.

[16] Ibid.

which may either facilitate or impair performance.

Two alternate hypotheses have been offered concerning the difference between subjects scoring high and low with respect to anxiety: (1) that such groups have different levels of chronic anxiety, or (2) that groups instead differ in their emotional reactiveness to anxiety-provoking stimuli present in the situation.[17] Available evidence does not present a clear-cut picture of these hypotheses as alternates.[18]

This theory rejects the either-or premise, and suggests that for some subjects both the level of anxiety and situational factors may simultaneously affect performance.

For the high anxious student who feels some uncertainty about his ability, the course examination is a psychological stress experience and in the test situation both the drive properties of anxiety and its associative responses are operative. Associative responses may successfully compete with cognitive processes. As an academic requirement the test is an experience from which the student cannot escape. The performance of the highly motivated student who feels some uncertainty about his ability may be impaired by the conflict produced by the threat of danger (failure) and the necessity of remaining in the test situation. It is well known that motivation has a directive aspect; in high moti-

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[17] Janet A. Taylor, "Drive Theory and Manifest Anxiety," Psychological Bulletin, LIII (1956), 303-320.

[18] Ibid., p. 304.

vational states it is possible that the individual's performance will be unadaptively directed.

A basic tenet of this theory is that excessive anxiety reduces the validity of test scores. If this is a correct postulate, the influence of this personality variable would be obscured if only the objective test score is considered.

When the student's need for achievement is frustrated, ego-defensive motives will be intensified; he will need to mobilize evidence in his favor. Disruptive anxiety drives would be reduced if there were some channel through which ego-defensive responses could be safely ventilated.

On assumption, there is a relationship between certain teacher-behaviors and the adjustment and productivity of students. The interplay of one personality upon another is a complex of many factors, important among them are the perceptions which students and teachers have of each other. The chain of student-teacher interaction is arbitrarily considered to begin with the behaviors of the teacher. If the student felt free to express attitudes toward and criticisms of test items without fear of endangering his relations with the teacher, if he had an opportunity to show some degree of understanding of test items through his comment responses, his preoccupation with the instructor's power-field would be less than if there were no outlet for these emotions. Mere verbalization would reduce tension and improve cognitive functioning. The phenomenon of catharsis has been found to

have a certain validity as an adjustive technique.

Statement of the Problem

The problem of the study was to evaluate the effects of different intensities of chronic anxiety and other selected variables on test performance.

Delineation

The primary purpose of the study was to determine which of several testing conditions, if any, appeared to have the most beneficial effect on test performance of students with a high level of chronic anxiety as measured by a scale of manifest anxiety.

The first phase of the study was to determine whether or not there were statistically significant differences in performance among groups equated in scholastic aptitude on the basis of American College Testing Scores, under variable testing conditions. Anxiety level was not a variable under consideration in this aspect of the study.

The second phase of the study concerned the effects of different intensities of anxiety and other variables on performance under different conditions of testing. The special focus of this aspect of the study was upon the performance of students with a high level of anxiety.

Suggested answers to the following questions were sought:

1. Would students perform significantly differently under different testing conditions?

2. Under which testing condition, if any, would students in general perform significantly best?
3. Is test performance a correlate of anxiety?
4. If test performance is a correlate of anxiety, under which testing condition would the performance of high anxiety students most nearly approach the performance of students with lower levels of anxiety?
5. Are certain personality variables associated with anxiety?

Assumptions underlying the study were:

1. That there is a critical point on the anxiety continuum beyond which interference with performance occurs.
2. That the course examination is a psychological stress experience for students with a high level of chronic and test anxiety who feel some doubt about their ability.
3. That tension in the examination setting would be reduced if the student perceived the instructor as non-punitive and the course examination as an instructional aid.
4. That if given an opportunity students would express ego-defensive and other reactions to test items, and this verbalization would be a channel of emotional release.
5. That there is a quantitative and qualitative relationship between anxiety level and the tendency to

express reactions to test items.

6. That there is a quantitative and qualitative relationship between sex and the tendency to express reactions to test items.
7. That there is a quantitative and qualitative relationship between age and the tendency to express reactions toward test items.
8. That the properties of anxiety would operate similarly in a test of acholastic aptitude and a course examination.

Operational Definitions

There is much diversity of opinion as to the definition of terms used in this study. Their meanings were delimited in this research to the following definitions:

1. Anxiety-- emotional reactiveness with apprehension of danger as its most prominent component, and uncertainty as its primary concomitant.
   a. Chronic Anxiety-- relatively constant personality characteristic of reactiveness
   b. Manifest Anxiety-- overt symptoms of the anxious state
   c. Neurotic Anxiety-- vigorous disproportionate reactiveness to minimal objective threat
   d. Situational Anxiety-- reactiveness to anxiety-evoking stimuli present in a specific situation -- associated with the characteristics of the task involved.

e. Test Anxiety-- reactiveness restricted to a test experience

2. Drive-- a force with energizing and directive properties

3. Need-Achievement-- concern over competition with some standard of excellence.[19]

4. Rapport-- state of harmonious relationships between student and teacher characterized by mutual feelings of sympathy, understanding, and cooperative behavior.

5. Affect Group-- experimental group restricted to expressing feelings toward test items.

6. Reasons Group-- experimental group restricted to explaining reasons for choices of alternatives.

7. Permissive Group-- experimental group unrestricted in the expression of reactions toward test items.

8. Non-Achieving Group-- experimental group not achieving toward the final course grade.

9. Control Group-- group tested under conventional conditions.

10. Abbreviations

a. MAS -- Manifest Anxiety Scale

b. TAS -- Test Anxiety Scale

c. ACT -- American College Testing

d. ACE -- American Council on Education Psychological Examination

e. HA -- high anxiety

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[19]D. C. McClelland, J. Atkinson, R. Clark, and E.Lowell, The Achievement Motive. (New York: Appleton-Century-Crofts,1953).

MA -- medium anxiety

LA -- low anxiety

MMPI -- Minnesota Multiphasic Personality Inventory

E_1 -- affect group

E_2 -- reasons group

E_3 -- permissive group

E_4-- non-achieving group

C -- control group

Limitations of the Study

1. A scale of "test" anxiety was not employed in this study. The Taylor Manifest Anxiety Scale which was used has been shown to be sensitive to situational factors as well as being a valid measure of chronic anxiety.

2. No proposal was made in this study to equate subjects on the basis of intelligence quotient. The best estimate which the study made of the uncontrolled variability arising from individual differences in intelligence was through use of American College Testing Scores. Upon the evidence of statistical analysis the groups were matched in scholastic aptitude. Experimenters have used various measures of scholastic aptitude as indices of intellectual functioning. The consistent finding of a relatively high correlation between scholastic aptitude and intelligence suggests that the stated limitation would not render the findings of this study untenable.

3. The results of the study apply to the sample which is described in Chapter 111.

Significance of the Study

1. Except as an exclusively abnormal clinical phenomenon or as a laboratory experiment, the problem of anxiety has not received the critical attention of researchers that it probably deserves. The study investigated anxiety as it existed in the course of a normal experience in the lives of the subjects utilized in this research. The subjects considered the experimental test a regular course requirement, and it is stated with confidence that they were motivated to succeed. Thus, this study overcame a crucial limitation of many experimental studies -- the questionable status of the subject's motivation.

2. Although many studies have dealt with such subjects as the socio-economic backgrounds of students, vocational aspirations, prediction of performance on the basis of high school records and intelligence, it appears that the profession of college teaching has not placed much emphasis on learning the psychological nature of the student. Even the teacher with great intuitive insights and discerning judgments needs the guidance of scientifically derived principles. Dealing with the non-intellectual problems of students should be related to the general educational philosophy of the teacher.

While it is not anticipated that the college teacher will typically employ the techniques of this research, it is suggested that college teachers need not allow their intellectual tasks to dull their sensitivity to the affective

states of students; and that students with emotional problems may often be identified. The study was concerned with a personality trait which appears to be negatively related to successful academic performance, and implied that the individual teacher is in a unique position to more adequately harness and direct student anxiety drives toward the attainment of educational objectives.

3. Much research has appeared which demonstrates the importance of the emotional climate of the elementary and high school classrooms. Writers are unequivocal in stating that the teacher more than any one else determines the emotional climate of these classrooms. Research and experience in the industrial world have convincingly shown that two-way communication between employer and employee is essential to morale and productivity. Investigators have turned away somewhat from measures of pre-service skills, intelligence, and background factors as criteria of teaching competence and toward criteria which stress the way the teacher's actions influence student performance.[20] Many clinical and intelligence tests have shown the effects certain examiner behaviors can have on the results elicited from examinees.

All of the above statements have validity for the college classroom and are explicitly implied in the practical objectives of this study. Research workers have apparently contributed relatively little toward the problem of rapport

[20] J. C. Gowan and M. S. Gowan, "A Teacher Prognosis Scale for the MMPI," Journal of Educational Research, XLIX (1955-56), 1-12.

between student and teacher on the college level. The two-way communication procedure of this study, in addition to providing the teacher with important clues to the attitudes, misconceptions, strengths, and weaknesses of students, gave students an opportunity to "present their side." A perception of the teacher which engenders freedom to express reactions without fear would contribute realistically to the personal adjustment of all students, but especially to the adjustment of those with high levels of anxiety. It is suggested that student anxiety may be either heightened or lessened by the instructor's classroom behavior, and that teaching behaviors that give the student a perception of the teacher as one who identified with him would reduce anxiety in the classroom setting and improve rapport -- the end product of which would be improved performance.

4. An objective of the study was to encourage teachers to more critically analyze and more carefully construct their course examinations. Certainly no teacher deliberately asks an ambiguous test question. It is, nevertheless, true that at times on objective-type tests, questions seem ambiguous to students.[21]

A multiple-choice test was used in this experiment. The validity of the assumption that except for the factor of chance, the subject who selects the right alternative understands, and the one who selects an incorrect alternative does not understand, was beyond the scope of this study but the

[21] McKeachie, Pallie, and Spieman, Journal of Abnormal and Social Psychology, L, 93.

accuracy of such an assumption is questionable. The design of this study gave students who revealed some difficulty with the fine points of discrimination between certain alternatives an opportunity to show some understanding of the problem even though inappropriate choices were sometimes made. A fundamental proposition offered in the study is that for such students, the chance to show the instructor that they have some degree of understanding is inherently therapeutic.

5. Grading, even at its best, is a relatively subjective procedure, dreaded by both teacher and student. Perhaps the time may come when the course grade will be eliminated, then the student need not be hampered by the pressure of working for a grade, and the motivation may be more basic. However, as long as the present competitive grading system prevails, limits for A-B-C-D-F must be set. In many courses the examination score is the primary determiner of the final grade.

This study probably has its greatest relevance for students whose grade-point averages could be significantly influenced by scores even one or two points higher on the course examination. While hardly statistically significant, one or two points would be tremendously important to the individual student for whom they would mean the difference between withdrawal or continuing until graduation. Since the teacher is powerless to change the intellectual capacity of the student, it is his responsibility to assist the student in developing and using whatever capacity he has.

CHAPTER II

REVIEW OF RELATED LITERATURE

A survey of the literature bearing on the primary variable investigated by this research revealed that a great deal of study has been devoted to the subject. The review which follows includes that literature which was deemed to be most pertinent to the problem of this study.

It is apparent from the tremendous amount of literature reported on the subject, that anxiety has become a central concept in psychology. That is has a crucial role in human behavior seems confirmed by clinicians and other observers, but there is no such unanimity as to its definition.

The Problem of Definition

One of the earliest writers on the affective state of anxiety was the noted Viennese neurologist and psychotherapist, Soren Kierkegaard whose book The Concept of Anxiety was published in 1884.[1] Since Kierkegaard, many writers

[1]Translated into English by Walter Lowrie and published under the title The Concept of Dread (Princeton, New Jersey: Princeton University Press, 1944).

have attempted to qualify the cause and nature of anxiety. It has been described as being by definition a pathological affect, or, on the contrary, as being necessary for a productive and creative life. Some writers have distinguished between defensive and signal anxiety, between healthy and neurotic, between rational and irrational anxiety. Within the last decade an existential anxiety has been described which is neither healthy nor neurotic but which is an essential attribute of the human condition. Anxiety may be of a temporary ego-involved situational nature, or a stable characteristic of the individual.[2]

For Kierkegaard, ". . . anxiety is an expression of the instinct of preservation . . . anxiety is ultimately the fear of annihilation of the ego. . . ." Kierkegaard thought of anxiety as normal not neurotic.[3] His concept was a forerunner of what Otto Rank later described as the anxiety inherent in individuation, and of Kurt Goldstine's concept of normal anxiety in the individual's meeting the inescapable shocks of growth and experience.[4]

Freud attributed instinctual, signal, repressive, defensive, normal, and neurotic characteristics to anxiety.[5]

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[2]Cited by Jack L. Rubins, "The Dynamic Significance of Psychosomatic Symptoms," in D. D. Barbara, The Psychotherapy of Stuttering (Springfield, Illinois: Charles C. Thomas Publisher, 1962).

[3]In Rollo May, "Historical Roots of Modern Anxiety Theories," in Paul H. Hock and Joseph Zubin (eds.), Anxiety (New York: Gruene and Stratton, 1950), p. 13.

[4]Ibid.

[5]Sigmund Freud, The Problem of Anxiety (New York: W. W. Norton Company, Inc., 1936).

Writing on the problem of anxiety, Freud stated, "There are certain characteristics possessed by the affect of anxiety. . . . anxiety is undeniably related to expectation. . . . It is endowed with a certain character of indefiniteness and objectlessness. . . ." Freud felt that there are cases in which the attributes of normal and neurotic anxiety are intermingled. "The real danger is known and of the real type, but the anxiety in regard to it is disproportionately great, greater than in our judgment it ought to be. It is by this excess that the neurotic element stands revealed. . . ."

One of the earliest experimentalists to assign motivational properties to anxiety was O. H. Mower (1939) who defined anxiety as "a learned response to signals or conditioned stimuli which were followed by pain." Mower seems to believe that anxiety on the whole is a constructive process, others like the late Harry Stack Sullivan, believed that anxiety is in the main a thoroughly destructive process which interfers with awareness, understanding, and effective action.[6]

Elizur defines anxiety as an "inner state of insecurity which may take one or more of the following forms: fears, phobias, lack of self-confidence, extreme shyness, ideas of reference.[7]

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[6]Cited by Patrick Mullahy, "Historical and Sociological Approach: Discussion I," in Paul H. Hock and Joseph Zubin (eds.), Anxiety (New York: Gruene and Stratton, 1950), p. 41.

[7]A. Elizur, "A Content Analysis of the Rorschach With Regard to Anxiety and Hostility," Rorschach Exchange, XIII (1949), 247-283.

The picture has also been complicated by the fact that other terms are to be found in the literature which have been used with very similar meanings to that which defines anxiety for other writers. For example, the concepts of anxiety and fear have had divergent usages, but a number of writers consider the affective states of fear and anxiety to be synonymous. Mower[8] and Bixenstein[9] use the term "tension" in the therapeutic situation which appears to be synonymous with anxiety.

Commenting on the similarity of these concepts Lotsof and Downing state:

> If anxiety is conceived of as permeating the entire personality, and tension is conceived of as a response of the total organism, results on scales which measure the same population with an anxiety scale and tension scale should show substantial correlation in view of the similarity of these two concepts.[10]

The general confusion of terms has prompted Maslow's book A Suggested Improvement in Semantic Usage.

Windle writing on the disagreement and confusion that exist in defining the concept of anxiety pointed as evidence to the variety of indices proposed for the MMPI alone.[11] (Five such MMPI scales have been proposed: (1) the

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[8]O. H. Mower (ed.), Psychotherapy: Theory and Research (New York: The Ronald Press Company, 1953).

[9]V. E. Bixenstein, "A Case Study of the Use of the Palmer Sweating as a Measure of Psychological Tension," Journal of Abnormal and Social Psychology, L (1955), 138-141.

[10]Erwin J. Lotsof and Walter Downing, "Two Measures of Anxiety," Journal of Consulting Psychology, XX (1956), 170.

[11]Charles Windle, "The Relationship Among Five MMPI "Anxiety Indices"," Journal of Consulting Psychology, XIX (1955), 61-63.

Purcell Index, (2) Welsh's Anxiety Index, (3) the Taylor Scale, (4) Modlin's Anxiety Score, and (5) Winne's Neuroticism.)

Rollo May's thesis is that the amount and forms and theories of anxiety vary with different historical epochs of the same civilization.

In spite of the difficulty in delimiting the causes, nature, and meaning of anxiety, all recent concepts found by the writer appear to have a motivational frame of reference, with uncertainty as its primary concomitant and danger as its most prominent component.

Description of Anxiety Indices

The development of questionnaire techniques for assessing anxiety has produced two main lines of research in this area. One line has considered the relationship of the general or chronic level of anxiety of the subject as measured by a test, to behavior in a variety of situations. Spence and his colleagues at Iowa exemplify investigators interested in this kind of research. The Taylor MAS (Manifest Anxiety Scale) has been extensively utilized in the investigations. The other line has been concerned with the behavior of subjects who differed in the amount of anxiety experienced in a specific situation. S. B. Sarason and his associates at Yale represent this line of research. Investigators have typically used the TAS (Test Anxiety Scale) as

the instrument of measure.

The Taylor Manifest Anxiety Scale

The items on the Taylor Manifest Anxiety Scale were drawn from the MMPI and judged by five clinical psychologists to be indicative of manifest anxiety.

Underlying the construction of the test was the theoretical assumption that variation in drive level is related to the level of internal anxiety as observed and defined by clinicians. This assumption was based upon Hull's theoretical system of habit tendencies. In this context anxiety is considered as a drive which influences behavior because of its multiplicative relation to habit strength. According to Spence-Hullian deductions,high drive should result in greater interference from competing responses and more inferior learning.

In view of the growing experimental literature devoted to testing the implications of Hullian notions concerning the relationship between performance in learning situations and level of total effective drive (D), Taylor attempted to outline a theory as it was then conceived by the Iowa Researchers and to evaluate the evidence concerning it.[12] The use of the MAS to select groups that are postulated to differ in drive level in an experimental situation has rested upon the assumption that scores on the scale are related in some manner to emotional responsiveness, which in turn con-

[12]Janet A. Taylor, "Drive Theory and Manifest Anxiety," Psychological Bulletin, LIII (1956), 303-320.

tributed to drive level. Taylor clarified a point of confusion concerning the construction of the MAS:

> The construction of the test was not aimed at developing a clinically useful test which would diagnose anxiety, but rather it was designed solely to select Ss differing in general drive level. Thus, the question of the scales "validity" (i.e., its agreement with clinical judgment) is in a sense irrelevant to the experimental purposes for which the test was developed. In the light of this, the test might better have been given a general, more noncommittal label, such as a measure of emotionality; although the fact that the items on the scale were selected by clinicians as referring to manifest anxiety as it is described psychiatrically does not make the title completely inappropriate, nor a relationship between clinical judgments and MAS scores unexpected.[13]

Many studies have used the Taylor scale with the assumption that variations in anxiety scores would reflect systematic variations of drive level. Since Taylor developed the scale, performance on the scale has been related to a wide variety of experimental measures, including such things as intelligence measures, academic aptitude measures, academic performance, and various other complex behaviors.

The Test Anxiety Scale

Sarason and his associates at Yale believed that the items composing an anxiety scale should measure the drive in a specific situation. Sarason and Mandler studying stress in academic achievement devised the TAS (Test Anxiety Scale), a questionnaire which was concerned with the subject's attitudes and experiences in a testing situation. The scale yields a score indicating the recalled intensity of experiences and behavior immediately antecedent to or concomitant

[13] Ibid., 303.

with the taking of examinations.[14]

Mandler and Sarason hypothesized that the stronger the anxiety responses to a test situation the stronger the need for intellectual achievement, and the more likely it is that a relatively challenging situation will arouse thoughts of not achieving--of failing--and then experiencing the subsequent punishment.

High anxious subjects tend to react to test situations with achievement-related, anxiety-reducing responses. Anxiety-reducing responses are largely task inappropriate. They may be self-relevant, aggressive, or in other ways competing and incompatible with the task. To this extent they impede performance.

Low-anxious subjects tend to react to test situations primarily with task appropriate responses. They do not tend to make inappropriate anxiety-reducing responses in a test situation.

Studies employing both the MAS and the TAS will be included in this review. Greater emphasis will be given to those which utilized the MAS since it was the instrument of measure in the present study.

Validation and Properties of the Taylor Manifest Anxiety Scale

Validity studies on the MAS fall into two categories. The first concerns the validity of the MAS as a measure of

[14]S. B. Sarason and G. Mandler, "Some Correlates of Test Anxiety," Journal of Abnormal and Social Psychology, XLVII (1952), 810-817.

manifest anxiety as defined and observed by clinicians. Validity of this nature consists of correlating MAS with either clinical evaluations of anxiety or scores on inventories of general neuroticism.[15] Studies by Hoyt and MaGoon,[16] Brackbill and Little,[17] Eriksen and Davids,[18] and Kausler et. al.[19] exemplify this kind of research. The second category concerns the validity of the MAS as a measure of drive level. Validity of this nature consists of comparing high scoring MAS subjects with low scoring subjects on various performance tasks. The use of the MAS as a drive measure assumes that scores on the scale reflect variations in levels of internal anxiety. Studies by Taylor and Spence,[20] and Kerrick[21] represent this category of investigation.

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[15]E. Kendall, "The Validity of Taylor Manifest Anxiety Scale," Journal of Consulting Psychology, XVIII (1954), 429-432.

[16]D. P. Hoyt and T. M. MaGoon, "A Validation Study of the Taylor Manifest Anxiety Scale," Journal of Clinical Psychology, X (1954), 357-361.

[17]G. Brackbill and K. B. Little, "MMPI Correlates of the Taylor Manifest Anxiety Scale," Journal of Consulting Psychology, XVIII (1954), 433-436.

[18]C. W. Eriksen and Anthony Davids, "The Meaning and Clinical Validity of Taylor's Manifest Anxiety Scale and the Hysteria-Psychasthenia Scales from the MMPI," Journal of Abnormal and Social Psychology, L (1955), 135-137.

[19]D. H. Kausler, E. P. Trapp, and C. L. Brewer, "Time Scores as a Measure on the Taylor Manifest Anxiety Scale," Journal of Clinical Psychology, XV (1959), 387-389.

[20]Janet A. Taylor and K. W. Spence, "The Relation of Anxiety Level to Performance in Serial Learning," Journal of Experimental Psychology, XLIV (1952), 61-66.

[21]J. S. Kerrick, "Some Correlates of the Taylor Manifest Anxiety Scale," Journal of Abnormal and Social Psychology, L (1955), 75-77.

Investigations have presented evidence both for and against the relationship between the Taylor MAS and other anxiety indices. Some have reported significantly high correlations, others have not confirmed those high correlations.

Holtzman, Calvin, and Bitterman correlated the MAS with the Winne Scale from the MMPI.[22] They chose the Winne Scale in view of the careful emperical validation of Winne's scale. Their position was that lack of relationship would cast some doubt upon the validity of the MAS, while strong support for the MAS would be provided by a high correlation between the two independently derived measures. To examine this relationship Taylor and Winne scores were obtained from 348 subjects. A third score was obtained for each subject by counting only those which were taken from the Hy D and Hs scales of the MMPI. Comparison of scores on this new scale, which the investigators designated Tn, with scores on the Winne Scale would reveal the amount of overlap resulting from markedly different procedures for selecting items from a common pool. The authors stated that the coefficient of .86 which they obtained is a conservative estimate of the "true" relationship between the Taylor and the Winne Scales. They offer their findings as additional evidence of the validity of the MAS.

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[22] W. H. Holtzman, A. D. Calvin, and M. E. Bitterman, "New Evidence for the Validity of Taylor's Manifest Anxiety Scale," Journal of Abnormal and Social Psychology, XLVII (1952), 853-854.

Deese, Lazarus, and Keenan found a correlation of .69 between the Taylor Scale and the Winne Scale, and a correlation of .81 between the Psychasthenia Scale from the MMPI.[23] Eriksen reported a correlation of .72 between these same scales.[24] Davids obtained a correlation of .92 between Psychasthenia and MAS.[25] He concluded that performance on the Taylor Scale is slightly related to (a) self-ratings on anxiety, (b) neuroticism on the psychosomatic inventory, (c) neuroticism on the Winne Scale, and (d) psychasthenia on the MMPI. The author stated that the Taylor Scale measures essentially the same variables as that measured by several other instruments, but that the Taylor Scale may be somewhat more susceptible to deception than are some other instruments.

Eriksen and Davids, cited earlier, said that the results they obtained suggest that research relating these MMPI scales to differences in response to anxiety is distinguishing between persons on the same behavioral variables that are clinically observed to be associated with differences in defense mechanisms. Thus, their data are helpful in supplying a much needed link between experimental

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[23]J. Deese, R. S. Lazarus, and J. Keenan, "Anxiety, Anxiety Reduction, and Stress in Learning," Journal of Experimental Psychology, XLVI (1953), 55-60.

[24]C. W. Eriksen, "Some Personality Correlates of Stimulus Generalization Under Stress," Journal of Abnormal and Social Psychology, XLIX (1954), 561-565.

[25]Anthony Davids, "Relations Among Several Objective Measures of Anxiety Under Different Conditions of Motivation," Journal of Consulting Psychology, XIX (1955), 275-279.

data and clinical observation.

These authors suggest that high and low groups on the anxiety scale not only have differences in performances on such tasks as conditioning and verbal learning, but they also show characteristic memory differences for anxiety arousing stimuli as well as differences in defense mechanisms and self-attitude as clinically defined. This latter finding, the authors conclude, suggests caution in ascribing performance differences between high and low anxiety groups measured by the Taylor Scale, as being solely due to the drive properties of anxiety.

The high correlations reported by the studies above were not confirmed by Windle who studied the relationship among the five MMPI "Anxiety Indices": (1) the Purcell Index, (2) Welsh's Anxiety Index, (3) the Taylor Scale, (4) Modlin's Anxiety Score, and (5) Winne's Neuroticism Score. Neither Winne's Neuroticism Score nor Modlin's A Score was sufficiently highly correlated with the other scales to assume equivalence among them. The greatest overlap among these five scales, according to Windle, is between Modlin's A Score and Purcell's Index, but intercorrelations between these scales is only of intermediate value.[26]

Kausler et. al. investigated the validity of the MAS as a measure of clinically defined manifest anxiety.[27]

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[26]Charles Windle, "The Relationship Among Five MMPI 'Anxiety Indices,'" Journal of Consulting Psychology, XIX (1955), 61-63.

[27]Kausler, Trapp, and Brewer, Journal of Clinical Psychology, XV, 387-389.

They extended the criterion measure to observable behavior rather than relying on clinical ratings or performance on some personality questionnaire. Their proposition was that if the MAS measures anxiety, then a possible way of investigating the validity of the scale is to relate scale scores to an observable performance variable in the test situation that can be regarded as indicative of anxious behavior. These authors stated that since a common characteristic of anxious individuals is difficulty in decision making, it should follow that tasks involving alternatives for responses would be relatively stressful to anxious persons. One possible indicator of this stress might,therefore, be in decision time. If the MAS does discriminate between anxious and non-anxious individuals, a relationship should be found between subjects' scores on the scale and their decision time on the items.

These authors claim that the decision time of anxious subjects may be characterized in one of two ways-- either as a relatively long decision time, or a relatively short decision time caused by subjects' defensive behavior of rushing superficially through the items to avoid the conflicts a more careful appraisal of the items would engender. In other words, the variability of the decision time of anxious subjects should be significantly greater than the variability of the decision time of non-anxious subjects.

The focus of the study was on the comparison between HA and LA with respect to time scores on the individual items of the MAS. The authors suggested that a difference in read-

ing speed between HA and LA as evaluated by the MAS may partially be involved in causing the actual observed difference, however, they did not feel that reading speed was an important variable in determining the observed time difference in item decision making on the MAS.

The discovery of acquiescence in personality tests has led to research to determine to what extent the Taylor MAS is subject to acquiescence bias. Cronbach in 1946 and 1950 wrote very influential articles on the subject, attributing to acquiescence such diverse behaviors as checking "like" on interest inventories, checking "agree" on attitudes, and checking "no" on temperament schedules. Studies have assumed that response set is a unitary source of test variance.[28] When attitude and personality scales of the agree-disagree, or true-false format contain unequal numbers of items worded in the direction of the two ends of the personality dimension, the response to the content of the items may be confounded with the general tendencies to agree or disagree.[29]

Chapman and Campbell suspected acquiescence bias in the Taylor MAS in which 39 of the items are worded so that agreement with the items contributes toward a high MA

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[28]Charles Hanley, "Responses to the Wording of Personality Tests," Journal of Consulting Psychology, XXIII (1959), 261-265.

[29]L. L. Chapman and D. T. Campbell, "Absence of Acquiescence Response Set in the Taylor Manifest Anxiety Scale," Journal of Consulting Psychology, XXIII (1959), 465-466.

score.[30] A reversed MAS was constructed by simple literal reversals of meaning, for example, "I am often sick to my stomach," the reversal was "I am seldom sick to my stomach."

If there were acquiescence variance in the MAS, it would be expected to influence the correlation of the MAS with other measures which themselves are correlated with acquiescent tendencies. To study such possible effects, each subject in the Chapman and Campbell study was given original and reversal F and E scales (The Authoritarian Personality Study-- Adorno et al.).

Two versions of the MAS were prepared, each having half the items in positive form and the other half negative. Each subject received the two forms one week apart. The Kuder-Richardson reliabilities of the positive and negative forms of the MAS were .87 and .85 respectively, and the correlation between them was almost as high as the reliabilities of the scales, a finding which is in striking contrast to the results of similar studies on the F scale. The authors concluded that the items of the Taylor MAS, unlike those of the F scale, are subject to little or no acquiescence bias. They felt that this fact may be attributed to the quite specific and personal reference of the items.

In an attempt to discover what unique advantages or disadvantages the Taylor MAS might have, Davids compared it with the Psycho-somatic Inventory and anxiety self-ratings

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[30] Ibid., p. 465.

and examined the intercorrelations among the results.[31]

Subjects in two experimental groups were matched to the extent that the experimenter felt that any differences revealed on the experimental measures could probably be attributed to different conditions of motivation under which they were examined. Two main purposes of the study were: (1) to examine the intercorrelations among results on the different measures within each of the two groups of subjects, (2) to see what effect the experimental manipulation of motivation would have on responses to the various measures of anxiety.

One group of subjects believed the results of the measures to be anonymous--they were informed that the data would be used solely for the purpose of "scientific research" and would not affect them personally in any way. The second group of subjects were informed that the results would be used to select one or two members from the group to work as highly paid assistants to staff members conducting research on small group interaction. They were led to believe the researchers were looking for mature, well adjusted individuals who would be able to observe and analyze the behavior of others with minimal interference from their own problems and abnormalities. These subjects had been interviewed prior to selection in order to insure that only individuals with high motivation to secure the position would be used in the study. The prediction was made that there would be a significant

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[31]Davids, Journal of Consulting Psychology, XIX,275.

positive association between the different measures of anxiety within each group and that there would be less anxiety evidenced by the "job seekers" than by the "helpers of science."

The results showed that within each group there were significant intercorrelations among the three measures of anxiety. The author concluded that the Taylor Scale is not unique--regardless of the particular instrument employed to assess anxiety, the relative standing of subjects is quite similar.

Comparing the anxiety scores for the two groups it was evident that subjects who were motivated to present a favorable picture of themselves revealed less anxiety in the response to each of the three assessment methods. Unexpectedly, it was the self-rating scale that showed the least difference between the two groups. Members of the group with nothing to gain by deceiving the experimenter revealed themselves as having more experience with disturbing anxiety than subjects who were motivated to appear to be well adjusted. The differences were in accord with theoretical predictions. The author felt that the Taylor Scale is especially susceptible to subjects' conscious or unconscious motivation to present a favorable picture of themselves. This conclusion received confirmation from the fact that seven subjects in the group of "job seekers" received manifest anxiety scores that were lower than the score of ten achieved by the lowest ranking subjects in the group of "research volunteers."

Theoretical studies on the Taylor MAS have mainly been concerned with the relationship of MAS to drive level. The likely possibility that MAS scores may also reflect differences in other dimensions, such as differential habit or associative tendencies, has been frequently propounded (for example, by Child-1954, Farber-1955) although little emperical evidence has actually been advanced.[32] Farber summarized the untenable status of this particular property of the MAS in stating ". . . it is not yet entirely certain what these habitual differences may be, apart from the trivial observation that they consist at least in part, in the kinds of verbal responses given on the test itself."[33]

Trapp and Kausler's study investigated the nature of some of the association tendencies presumably related to MAS scores.[34] Since the MAS was developed directly from the MMPI purporting to reflect anxiety, these authors felt that high scores on the MAS would produce associations with attributes similar to those expected in a population of clinically anxious subjects.

One commonly ascribed attribute of the associations of clinically anxious subjects is the relatively high proportions of negative tones or implications. The approach

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[32]E. P. Trapp and D. H. Kausler, "Association Tendencies on the Taylor Manifest Anxiety Scale," Journal of Consulting Psychology, XXIII (1959), 187-188.

[33]Cited in Trapp and Kausler, Journal of Consulting Psychology, XXIII, 187.

[34]Ibid.

taken by Trapp and Kausler was to compare the proportionate frequencies of negatively toned associations elicited from high and low scores on the MAS to some neutral stimulus task. The selected stimulus task was a list of nonsense syllables. Predicting that MAS scores would reflect differential associative patterns, the hypothesis was stated as follows: Subjects scoring at the upper extreme on the MAS will reflect significantly more negatively toned associations to a list of nonsense syllables than subjects scoring at the lower extreme of the MAS. The response pattern of 21 high scorers and 22 low scorers were compared in terms of the frequencies of negatively aroused associations to the list of nonsense syllables. The hypothesis was confirmed beyond the .001 level.

The group reflected, on the other hand, approximately the same proportion of positively toned associations. The sex ratio was nearly the same in both groups, thereby eliminating the possibility of the sex variable confounding the results. Hence, the most probable explanation is, according to these findings, that the MAS scores do reflect differential associative tendencies.

Related Studies

There are currently in the literature two divergent opinions regarding a measuring instrument which will predict the effect of anxiety in academic performance. One position is exemplified by Taylor with her Manifest Anxiety Scale, and the other by Mandler and Sarason with their Test Anxiety Scale.

The Taylor Scale, already described in this review, has been used in a variety of situations other than test taking. If Taylor is correct in stating that there is a relatively constant level of internal anxiety or emotionality which could be detected by this scale, it is probable that a single measure of a set of manifest anxiety responses gathered from many situations would be an adequate predictor of the presence and effect of anxiety responses in any situation.

Mandler and Sarason, who represent the alternate position, maintain that the items composing the measuring instrument should be concerned with the specific situations in which it is to be used. The Test Anxiety Scale, TAS, is a questionnaire which is specifically concerned with the subject's attitudes and experiences in a testing situation. Several studies using each of these scales in the academic situation will be reported here.

Some studies have investigated the relationship between anxiety and college grade-point average. Sarason reported a low positive correlation between general anxiety and grade-point average,[35] Matarazzo et al.[36] and Klugh and Bendix[37]

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[35] I. G. Sarason, "Test Anxiety, General Anxiety, and Intellectual Performance," Journal of Consulting Psychology, XXI (1957), 485-490.

[36] J. D. Matarazzo et al., "The Relationship Between Anxiety Level and Several Measures of Intelligence," Journal of Consulting Psychology, XVIII (1954), 201-205.

[37] Henry E. Klugh and A. W. Bendix, "The Manifest Anxiety and ACE Scales and College Achievement," Journal of Consulting Psychology, XIX (1955), 487.

found nonsignificant MAS-GPA correlations of -.08 and .01 respectively. Dreger and Aiken,[38] LaMonaca and Berkum[39] found correlations around zero.

Spielberger, who has contributed several studies to the literature on the question of anxiety among college students, reported evidence of the detrimental effects of anxiety on college grades and drop-out rates resulting from academic failure.[40] He found that HA students in the middle range of ability performed poorer than low anxious students of comparable ability. Moreover, when only the relatively able students are considered, the percentage of high anxious students who failed was nearly four times as great as the percentage of low anxious academic failures. A larger percentage of HA students were academic failures at all ability levels but the highest. For the superior students, those with ACE scores above 150, grades were high and apparently independent of anxiety level. It appeared that anxiety may have actually facilitated the performance of these students. Spielberger assumed that college work was relatively easy for such students -- their superior intellectual endowment made it possible for them to obtain good grades, irrespective of anxiety level.

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[38]R. M. Dreger and L. R. Aiken, "The Identification of Number Anxiety in a College Population," Journal of Educational Psychology, XLVIII (1957), 344-351.

[39]H. L. LaMonaca and M. M. Berkum,"Army Data on Taylor MAS, Intelligence and Ego Strength," Journal of Educational and Psychological Measurements, XIX (1959), 177-178.

[40]Charles D. Spielberger, "The Effects of Manifest Anxiety on the Academic Achievement of College Students," Mental Hygiene, XLVI, No. 3 (1962), 420-426.

The author feels that the most important implication of this study is that it appears possible to identify members in the college population who, because of emotional problems, are not likely, under general conditions, to function at levels commensurate with their intellectual potential. By identifying such students at the earliest possible time and offering them therapeutic opportunities, the academic mortality among able students who fail because of difficulties in their emotional adjustment could be reduced.

Spielberger states:

> Ideally, such students should be identified at the beginning of their freshman year. The effects of anxiety on the academic performance of college freshman might be expected tc be more detrimental than for students in the present sample who were predominantly sophomores and juniors.
>
> The college freshman must adjust to the demands of academic achievement under conditions of increased complexity of subject matter and heightened competition from his peers.
>
> In addition he is confronted with establishing a new set of social relations in a strange environment. To the extent that freshmen with heightened anxieties can be identified early and offered therapeutic assistance, it is possible that academic casualties, and in some cases emotional disorders can be prevented.

Spielberger's hypothesized main effect of anxiety--that college students with high anxiety would be more likely to perform less adequately throughout their college careers than would non-anxious students -- was supported by the obtained data.

Spielberger commented on the growing appreciation of the important role mental health and emotional factors play in the academic adjustment of college students and

cited several studies concerning these problems.

In another study Spielberger, Weitz, and Denny reported the findings of research which suggests that the full contributions of many able students are being lost to society through underachievement or academic failure stemming from emotional problems, and that measures of anxiety or adjustment may be used to identify potential underachievers early in their college career.[41]

As a part of the effort to understand the variables of which test performance is a function, Alpert designed a study to evaluate both theoretically and experimentally the paper and pencil instruments currently being used in American research to measure individual differences in anxiety as it affects academic achievement performance. In addition, the study includes a description of a new achievement-anxiety scale which has been devised to indicate not only the presence or absence of anxiety, but also whether anxiety facilitates or debilitates test performance.[42]

Three separate problems were considered:

(a) the relationship between scales which are designed to measure general anxiety and scales specifically designed to measure test anxiety,

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[41]Charles D. Spielberger, Henry Weitz, and J. P. Denny, "Group Counseling and the Academic Performance of Anxious College Freshmen," Journal of Counseling Psychology, IX (1962), 195-204.

[42]Richard Alpert and R. N. Haber, "Anxiety in Academic Achievement Situations," Journal of Abnormal and Social Psychology, LXI (1960), 207-215.

and a comparison of the relative efficacy of the general and the specific scales as predictors of academic achievement performance.

(b) the relationship between the construct of anxiety and that of aptitude and the methodological problems involved in separating these two operationally.

(c) the direction of the effect of anxiety upon academic performance.

Alpert's and Haber's research involved the administration of a variety of anxiety scales--the Taylor MAS, the Welsh Anxiety Scale, the Freeman Anxiety Scale, the Mandler-Sarason Test Anxiety Scale, and the Achievement-Anxiety-Test Scale. Analysis of the data involved intercorrelating these scales and studying the relationship to a measure of verbal aptitude, the Scholastic Aptitude Test (SAT) College Entrance Examination; and to a set of academic performance indices. These were grade point average, the final exxmination grade, mid-term examination grade, and course grade in the introductory psychology course.

The correlations among the general A-Scales ranged from .32 to .39. The correlations between the general and specific A-Scales ranged from .24 to .38. The correlations among the specific anxiety scales ranged from .40 to .64, all of which appeared to be higher than any of the correlations involving the general scales.

The summarized data indicated that the specific anx-

iety scales are more often significantly correlated with academic performance measures than are the general anxiety scales. The implication of the findings is that, according to Alpert and Haber, the variable which the specific scales measure, and which the general scales do not, is involved in academic performance to such an extent that the specific scales are better predictors of academic performance than the general A-scales.

Other conclusions from this study are that general A-scales are not significantly related to aptitude; the specific A-scales, although more highly correlated with aptitude than the general A-scales are, nevertheless, more often than the general able to account for variations in academic performance, other than that accounted for by a measure of aptitude. An explanation of the relationship between A-scales and the use of A-scales as a vehicle for rationalization or justification by students with poor past performance in academic situations was not supported by these data.

Commenting on the equivocation in the literature regarding the relationship between anxiety and aptitude, Alpert and Haber stated that one must take into consideration the type of A-scale used, the heterogeneity of the population measured, the nature of the aptitude measure--most importantly whether it was timed, and therefore under pressure.

The relationship between anxiety and intelligence has provided a provocative area for study, but the findings

have been inconsistent and equivocal. Guice[43] and Kerrick[44] found significant negative relationship; Matarazzo et al. found anxiety scores to be inversely related to ACE scores.[45] Schulz and Calvin using a procedure similar to that of Matarazzo et al. failed to replicate their findings.[46] Farber and Spence, who have done considerable work with the A-Scale over a period of years, have not been able to find a relationship between A-Scale scores and those of intelligence measures.[47]

Mayzner et al. found significant correlations between Taylor scores and Wechsler-Bellevue(individual testing) and MAS scores and ACE (group testing).[48]

Sarason and Mandler reported a low positive correlation between anxiety and the Henmon-Nelson intelligence test;[49] Alpert and Haber found "general" anxiety scales to be less related to the SAT than specific "test" anxiety scales.[50]

[43] G. R. Guice, "Discrimination Reaction Time as A Function of Anxiety," Journal of Abnormal and Social Psychology, L (1955), 71-74.

[44] J. S. Kerrick, Journal of Abnormal and Social Psychology, L, 75-77.

[45] Matarazzo et al., Journal of Consulting Psychology, XVIII, 201-205.

[46] R. Schulz and A. Calvin, "A Failure to Replicate the Findings of a Negative Correlation Between Manifest Anxiety and ACE Scores," Journal of Consulting Psychology, XIX (1955), 223-224.

[47] I. E. Farber and K. W. Spence, "Main Interactive Effects of Several Variables of Reaction Time," U. S. Naval Research Technical Report No. 3, Contract N9 onr 93802

[48] M. S. Mayzner, Jr., Eugene Sersen and M. E. Tresset, "The Taylor Manifest Anxiety Scale and Intelligence," Journal of Consulting Psychology, XIX (1955), 401-403.

[49] Sarason and Mandler, Journal of Abnormal and Social Psychology, XLVII, 810-817.

[50] Alpert and Haber, Journal of Abnormal and Social Psychology, LXI, 207-215.

Correlations around zero were found by Spielberger,[51] Dreger and Aiken,[52] LaMonaca and Berkum,[53] and Sarason.[54]

Calvin and his associates, concerned about the contradictory findings in the widespread use of the A-Scale both as a research and as a clinical instrument, investigated some of the factors leading to the equivocal results obtained in these studies.[55] They tested two groups of college students with the Taylor Scale and the Wechsler-Bellevue. The two groups were obtained from two separate sources. One group was composed of subjects of satisfactory academic achievement, the other group, of lower I. Q scores, were having concomitant scholastic difficulties.

The investigators failed to obtain a significant negative relationship between A-Scale scores and I. Q. in the "normal" group of students. An interesting finding was that when the scholastic "difficulty" group was combined with the

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[51]C. D. Spielberger and W. G. Katzenmeyer, "Manifest Anxiety, Intelligence and College Grades," Journal of Consulting Psychology, XXIII (1959), 278.

[52]R. M. Dreger and L. R. Aiken, "The Identification of Number Anxiety in A College Population," Journal of Educational Psychology, XLVIII (1957), 344-351.

[53]H. L. LaMonaca and M. M. Berkum, "Army Data on Taylor MAS, Intelligence, and Ego Strength," Educational Psychology Measurements, XIX (1959), 577-578.

[54]I. G. Sarason, "The Relationship and "Lack of Defensiveness" to Intellectual Performance," Journal of Consulting Psychology, XX (1956), 220-222.

[55]A. D. Calvin et al., "Further Investigation of the Relationship Between Manifest Anxiety and Intelligence," Journal of Consulting Psychology, XIX (1955), 280-282.

normal group, the combined groups showed a significant negative correlation with total I. Q. and a large number of sub-tests. This finding led these researchers to agree with Kerrick, who suggested that the contradictory findings reported by various investigators who used the A-Scale to select high and low anxious groups for learning experiments, conditioning experiments, etc., were because of variations in the intellectual make-up of the respective experimental populations.[56]

Noting the moderately high correlations which have consistently been reported between various measures of intelligence and college grades, Spielberger concluded that poor academic performance was primarily determined by limited intellectual endowment.[57]

Spielberger conducted a study to examine the relationship between MAS scores and GPA and to determine whether this relationship varied as a function of the intellectual level of the student.

The MAS was administered to all students in the introductory course at Duke University for six consecutive semesters, and grade-point-averages were obtained for that particular semester during which the student had taken the MAS. MAS and ACE scores and GPAs were available for 640 men. The intertest Pearson r's were MAS-GPA-.14; MAS-ACE-

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[56]Kerrick, Journal of Abnormal and Social Psychology, L. 77.

[57]Spielberger and Katzenmeyer, Journal of Consulting Psychology, XXIII, 278.

.11; ACE-GPA-.29 (all significant at the .01 level). Even when intelligence was not taken into account there was a small inverse relationship between MAS scores and GPA. In order to determine whether this relationship was influenced by the intellectual ability of the subjects, the total sample was divided into the following groups on the basis of ACE scores; lower 20%, middle 60%, and upper 20%. The MAS-GPA correlations for these groups were -.04, -.18, and -.05 respectively. Tests for linear and curvilinear regression indicated that GPAs were unrelated to MAS for the low and high intelligence groups; the test for the middle group yielded an F of 13.06. Grades varied inversely with anxiety level for the average aptitude subjects. College work appeared to be too difficult for low aptitude students whose grades were unrelated to their MAS scores. High aptitude students tended to obtain good grades regardless of the anxiety level.

The author concluded that previous studies may have failed to find significant relationship between MAS scores and grades for one or more of the following reasons: (a) failure to take intelligence into account, (b) heterogeneity with respect to intelligence, and (c) inclusion of both male and female subjects.

I. G. Sarason commented on a common deficiency in the studies of Matarazzo et al., and Schulz and Calvin (reported earlier in this review) who obtained opposite results dealing with the relationship between the Taylor Scale and

ACE scores. One deficiency common to these studies was the small number of subjects employed in certain of the anxiety groups. Sarason's study was similar to those mentioned above, but employed relatively larger numbers of subjects in all anxiety groups.[58]

A further purpose of his study was to investigate the relation to intellectual performance of a defensive test-taking attitude as measured by the MMPI - K scale. Matarazzo had hypothesized that the Taylor Scale and the K may be used as alternate forms. Sarason's study also attempted to evaluate this hypothesis.

The Biographical Inventory containing the Taylor and the K Scales was administered to the 719 subjects used in the study. Two measures were employed: ACE raw scores and semester over-all grade-point averages.

The problem of the study was to evaluate the effects of anxiety (Taylor-Scale score) and defensiveness (MMPI K-Scale) to intellectual performance (ACE scores and grade-point averages). The results failed to show significant changes in these two measures of intellectual performance as a function of anxiety.

Analysis of variance failed to reveal significant changes in grade-point average with increases in scores on either the A or the K-Scale. The results of this study are

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[58]I. G. Sarason, "The Relationship of Anxiety and Lack of Defensiveness to Intellectual Performance," Journal of Consulting Psychology, XX (1956), 220-222.

in agreement with Schulz and Calvin's demonstration of a lack of relationship between the Taylor-Scale and ACE scores.[59] The finding of Matarazzo et al.[60] that the higher the anxiety score the lower the ACE score was in no way supported. The author restated a suggestion by Schulz and Calvin -- that one explanation for contradictory outcomes of similar studies may well be related to extraneous factors associated with the various institutions in which the studies were made. For example, two of the studies indicating no relation between Taylor and ACE scores were done at large state universities, whereas the Matarazzo et al. study was done at a private and relatively smaller institution.

The author felt that low K scorers do poorly on tests like the ACE because of certain personality characteristics which are detrimental to good performance. Low K subjects in this study were self-critical in the extreme and manifested feelings of inadequacy, in a sense they are "lacking" in defensiveness. If this is so, it is plausible that when confronted with a stressful test situation in which they feel themselves being evaluated (e. g., the ACE) they tend to respond with self-depreciatory attitudes.

In search of additional evidence concerning manifest anxiety and intelligence Klugh and Bendig collected data on four variables: ACE, MAS, Gough's Hr Scale, and the Quality Point Averages of their sample. The correlations reported by

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[59] Schulz and Calvin, Journal of Consulting Psychology, XIX, 223-224.

[60] Matarazzo et al., Journal of Consulting Psychology, XVIII, 220-222.

Klugh and Bendig were: ACE and MAS, -.11, not significant; ACE and Hr, .29, significant; MAS and Hr, -.29, significant. The coefficient of each test with QPA criterion was ACE, .62, Hr, .32, both significant at the .01 level.

The conclusion of these investigators was that a combination of ACE and Hr scales is a better predictor of QPA than the ACE alone, and that by adding the MAS to the ACE-Hr did not significantly increase the multiple correlation with QPA.

Davids and Eriksen investigated relations between scores on the Taylor Scale and two measures of intellectual ability.[61] Results on the A scale were correlated with performance in a battery of college aptitude tests and with academic achievement. Scores on the Taylor Scale were also correlated with performance on a 100-word chained association test. Supporting the prediction based on the supposition that anxiety measures drive (from Hull's theoretical system of habit tendencies), significant positive relations were found between anxiety scores and productivity of word associations.

It was found that subjects scoring high on the anxiety test tended to give relatively more associations containing anxiety ideation than did low scoring subjects.

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[61]Anthony Davids and C. W. Eriksen, "The Relation of Manifest Anxiety to Association Productivity and Intellectual Attainment," Journal of Consulting Psychology, XIX (1955), 219-222.

Correlation of anxiety scores and association productivity with grade-point averages and performance of college entrance examinations indicated that both anxiety and productivity were independent of these measures of intelligence.

According to Alpert and Haber,[62] the literature involving comparable populations and test conditions indicates that general anxiety scales are not related to timed aptitude tests in homogeneous college populations whereas specific A-Scales are related to the particular kind of aptitude test. These authors offer several explanations of this difference:

(1) The specific scales are in part a measure of intellectual ability. That is, for some reason, intelligence, independent of actual anxiety level, affects the individual's response to a specific anxiety measure. General scales are free of an intellectual ability component.

(2) A specific anxiety scale is an appropriate vehicle for rationalization or justification of poor academic performance. Because people of lower intelligence are more apt to have experienced the effects of the results of poor academic performance in the past, more of them would be inclined to use such rationalizations than would people of higher intelligence.

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[62] Alpert and Haber, Journal of Abnormal and Social Psychology, LXI, 207-215.

(3)There stress clues connected with the taking of timed college aptitude tests. These clues elicit anxiety responses which affect the aptitude test performance. The specific scales are sensitive to the presence of anxiety of the type reflected in the aptitude test, but the general scales are not similarly sensitive.

(4)The more intelligent the individual, the less anxiety he manifests in test situations because he has less reason to fear the experience. The specific scales which are able to measure this interaction are, therefore, a sensitive index of anxiety in a college population, whereas the general scales are not.

S. B. Sarason who has confined his study of the problem to anxiety in the test situation, said in 1950, that in both theoretical and practical approaches to the testing situation insufficient attention has been given to the nature, role, and strength of internal or covert drive states.[63] Since this statement, Sarason has contributed prolifically to the anxiety literature.

In 1952 in collaboration with Mandler, Sarason investigated the influence of anxiety as evoked by a testing situation, on the performance of typical test items. Relevant hypotheses were postulated on the basis of S-R behavior

[63]S. B. Sarason, "The Test Situation and the Problem of Prediction," Journal of Clinical Psychology, VI (1950), 387-392.

theory.[64] The results of the study suggested that anxiety present in the testing situation is an important variable in test performance. The authors stated that it is questionable whether intelligence test scores adequately describe the underlying abilities of individuals who have high anxiety drives in the testing situation, particularly since the relation of the type of test to the test performance seems to play an important determining role. Furthermore, the authors stated, anxiety does not necessarily depress scores, but can serve to elicit improvement. They suggested further study of the nature of the various anxiety responses, particularly the two types of responses--compatible and incompatible--with test performance.

In the study, two groups of subjects, a high anxiety and a low anxiety group, all sophomore and junior college students, were selected on the basis of a questionnaire and each group was randomly divided into three sub-groups: (1) success, (2) failure, and (3) neutral. All subjects were given six trials each on the Kohs Block Design #13 and the Digit Symbol subtest of the Wechsler-Bellevue Intelligence test. The subjects were then told either that they had done very well, or very badly, or were told to go on to the second part. In the second part all subjects were given six trials each of the Kohs Block Design #16 and a comparable variation of the Digit Symbol test.

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[64] G. Mandler and S. B. Sarason, "A Study of Anxiety in Learning," Journal of Abnormal and Social Psychology, XLVII (1952), 166-173.

The following predictions based on the theoretical hypothesis were borne out:

1. The mean time scores on the Kohs Block Design of the low anxiety group were better than those of the high anxiety group for the first five trials.
2. The variability of the high anxiety group was significantly larger than that of the low anxiety group.
3. As the learning process proceeded the anxiety drive of the high anxiety group tended to improve performance scores.
4. An intervening report (success or failure) elicited improved performance for the low anxiety group but depressed scores for the high anxiety group.

It appeared that the optimal conditions for a high anxiety group were those in which no further reference was made to the testing situation, and that the optimal conditions for a low anxiety group were those in which the subjects were given a failure report.

In another study, Sarason and Mandler presented findings on the relation of test anxiety to certain psychometric and social-class data and described the relation between the anxiety questionnaire and one with habitual responses to frustration.[65] The study was concerned with such questions

[65] S. B. Sarason and George Mandler, "Some Correlates of Test Anxiety," Journal of Abnormal and Social Psychology, XLVII (1952), 810-817.

as: What are the sources of the extreme reactions of the high anxiety groups? Why should taking tests be so upsetting to them?

The following was offered by these authors as a fruitful hypothesis for understanding one of the possible sources of extreme anxiety responses to the taking of tests: The stronger the anxiety responses to a test situation, the stronger the need for intellectual achievement. The more the individual feels he should or needs to achieve in intellectual tasks, the more likely it is that a relatively challenging situation will arouse thoughts of not achieving --of failing-and then experiencing the subsequent punishments. In short, extreme anxiety responses indicate that the individual is in a danger situation, dangerous in the sense that the possibility of failing (with attendant punishments) is very likely to occur.

The authors made it clear that such an explanation does not imply that a highly anxious subject has a higher need to achieve than a non-anxious one. The latter may have an equally strong need to achieve, but when the need is evoked it does not give rise to anxiety responses. In addition, such an explanation does not imply that in highly anxious subjects the anxiety is only cued off by an achievement drive.

In trying to answer the question why should anxiety and the need for achievement be intimately related in

highly anxious subjects? the authors made the following predictions:

(1) In general, LA subjects come from those social and economic strata in which intellectual achievement is not a primary value. The conditions of learning are such so as not to make it likely that anxiety will be learned in relation to intellectual achievement. Their life goals are of such a nature that intellectual achievement is not a necessary means of fulfillment. Most of this group are probably upper-middle, lower-upper, and upper-upper social class individuals.

(2) In general, HA subjects come from those social and economic strata in our society in which conditions producing anxiety about intellectual achievement are likely to occur. To these subjects intellectual achievement is important for their post-college careers. It is a means to a very important end. As a group they are socially mobile, containing predominantly lower-middle, and upper-lower social class individuals.

The results of the study tended to confirm the predictions - a significantly higher percentage of the fathers of HA than LA subjects had middle class occupations, and significantly more of the HA than LA subjects were on a scholarship basis in college. The within-group analysis revealed that there are differences within the HA and LA groups. The within-group analysis tends to support the conclusion that the distribution of anxiety scores does not represent a so-

cial class continuum. The authors stated that it could support the conclusion that, although there is an over-all relationship between anxiety and social-class factors, the complexity of the relationship is of such nature as to preclude a simple explanation. The authors stated that these findings lend credence to the hypothesis that anxiety in the test situation is related to strong need for intellectual achievement.

Weiner, concerned with the interaction of anxiety, stress instructions, and difficulty of material conducted an experiment to determine the effects of this interaction.[66] He used a motor learning task, a Rorshach-like perceptual task, and a word association task.

Four groups of ten subjects each were used: a high and a low-test anxious group under stress instructions, HA and LA groups under non-stressful instructions. Each group was given a motor learning, a word association, and a perceptual task in the order listed. All experimental materials contained simple and difficult aspects. The difficult aspects contained a relatively greater amount of competing cues.

HA stress subjects compared to LA stress subjects were more impaired going from simple to complex items within the task. This finding was obtained for the motor learning, perception, and word association tasks. Weiner assumed

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[66]Gerald Weiner, "The Interaction Among Anxiety, Stress Instructions, and Difficulty," Journal of Consulting Psychology, XXIII (1959), 324-328.

that the HA individuals under stress instructions experience interfering anxiety-reducing responses, and these interfering responses interact with conflicting environmental cues to cause impaired performance.

Stress instructions appeared to affect LA subjects so that LA stress subjects compared to LA non-stress subjects tend not to be impaired going from simple to difficult items. LA stress subjects compared to LA non-stress subjects make fewer errors on difficult aspects of the motor learning task and tend not to perform differently to simple and difficult words of the word association task in responding with disturbed associations. The experiment's results suggest that the response competition definition of difficulty can be applied to projective materials. Projective tasks in part may be viewed as problem solving situations.

Weiner's conclusions were as follows: Test anxious subjects experience anxiety specifically in a test situation --a situation in which achievements are elicited. This anxiety probably arises in part as a response to a previously learned conflict which is induced by the elicited achievement motivation. Therefore, it is assumed that in the test situation stress instructions given to HA subjects evoke an increment in the degree of anxiety these subjects experience. HA subjects then react to achievement-related conflicts with impairing anxiety, whether the conflict is internal or external to the HA individual. Since HA stress subjects react differently to simple and difficult items, it is suggested

that there is an interaction between subjects' internal conflicts and the external conflict situation. HA stress subjects approach a conflict situation with anxiety and, therefore, cannot effectively resolve the problems presented by a conflict situation. Thus, conflict situations engender anxiety in HA subjects so as to impair performance, and performances in conflicting situations are also impaired as a function of subjects' anxiety level. Weiner stated that Child's interpretation--in complex situations where the subject is already in conflict between various response tendencies relevant to the task, the presence of irrelevant responses made to anxiety heightened the conflict and interferes with performance--was very similar to his own.

The literature of higher education has provided some answers to the question of why students go to college. Practical motives play an important role in college attendance. Students from higher income families regard attending college as a normal part of their upbringing but the vast majority of students consider college as a means of improving opportunities for the realization of economic and social goals. Undoubtedly there are some students who are genuinely motivated toward scholarly pursuits, but they probably constitute a small minority. The economic motive is clearly dominant in studies which have been concerned with this subject. Students expect college to provide a foundation upon which successful careers may be built.

A statement by Jex and Merrell who studied the characteristics of students typifies the findings of studies concerning reasons why students go to college:[67]

> The local analyses reveal that vocational considerations are clearly dominant. College is seen as the open sesame to material well-being. There is much bickering among educators as to whether the colleges should be engaged primarily in teaching their students how to live or how to make a living. But our students know what they want. They have come to prepare themselves for better paying jobs. Clearly, they do not seek so much the essence of education as its symbols: the grades, the degrees, and the certificates.

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[67] Frank B. Jex and Reed M. Merrell, "Intellectual and Personal Characteristics of University Students," Journal of Educational Research, LVI(1960), 272-279.

CHAPTER III

EXPERIMENTAL DESIGN

The study was designed to investigate the effectiveness of five testing conditions upon the performance of college students of different intensities of anxiety. The primary concern of the study was to determine which of the several conditions, if any, appeared to have the most beneficial effect on the performance of high anxious students if test performance were found to be a correlate of anxiety level. An ancillary purpose was to investigate the relationship between selected personality variables.

The design of the study was fashioned in terms of two independent variables and a dependent variable. The experimental method employed was the method of Concomitant Variation. The design consisted of two major parts.

The first part of the study was concerned with the questions:

1. Would there be a statistically significant difference in performance among groups under variable testing conditions?

2. Under which testing condition, if any, would students perform significantly best?
3. Would a significant correlation between the experimental test performance and performance on a standardized scholastic aptitude test be found?

The second part of the study was concerned with the questions:

1. Is there a significant difference in test performance of students of different levels of anxiety?
2. Under which testing condition, if any, would the performance of students of a high level of anxiety most nearly approach the performance of students of lower levels of anxiety?
3. Are certain personality variables associated with anxiety?

The design is illustrated in Figure 1.

Hypotheses

To answer the questions set forth, the following null hypotheses were formulated:

Major Hypothesis I

There is no statistically significant difference in test performance among groups under variable testing conditions.

H_{o1} There is no statistically significant difference in test performance between subjects expressing affective reactions to test items and subjects tested under conventional

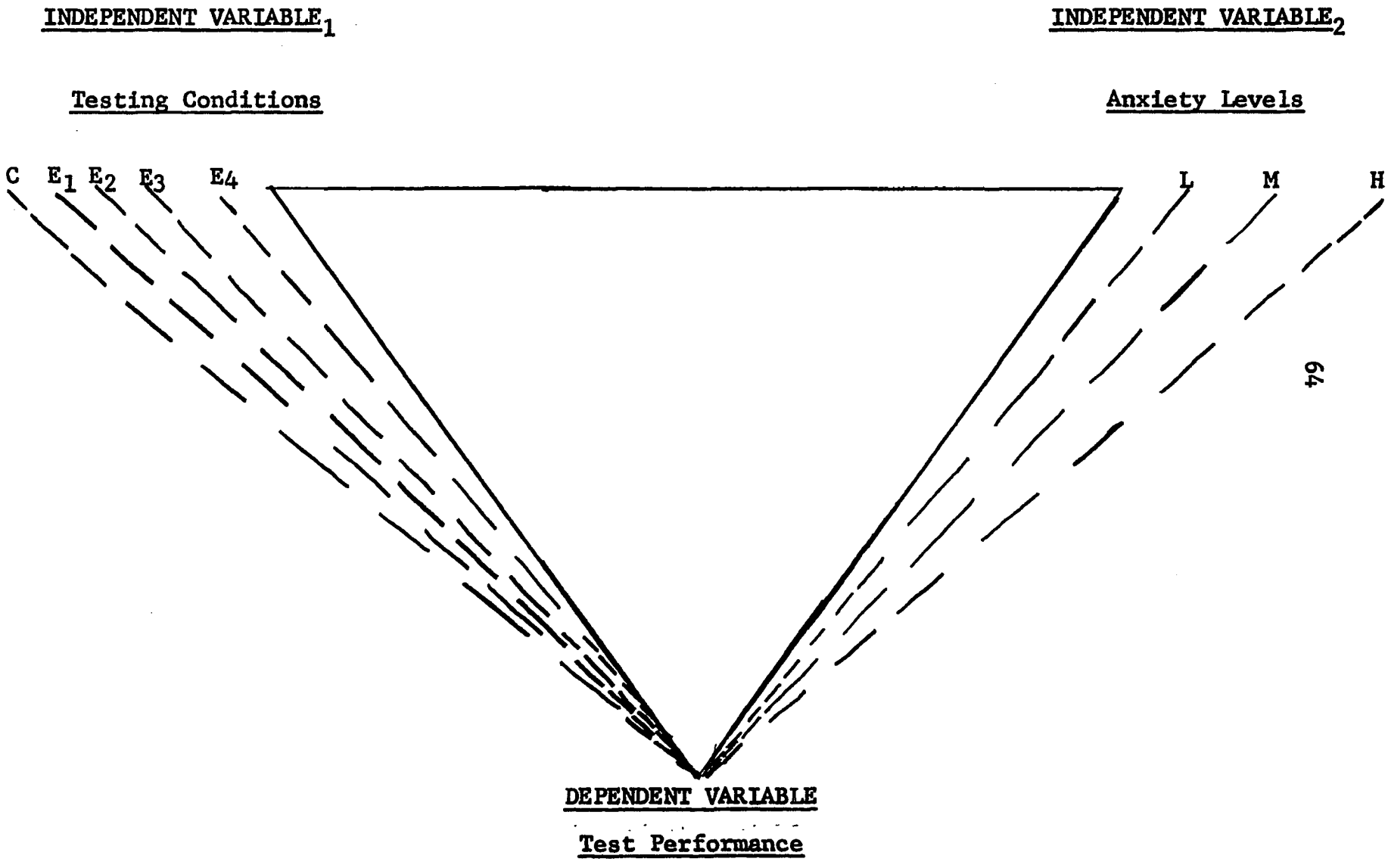


Figure 1.-- EXPERIMENTAL DESIGN

FIGURE 1--Continued

EXPERIMENTAL DESIGN

Test Performance

Variable Testing Conditions	Anxiety Levels					
	H		M		L	
C	$\bar{X}$	σ^2	$\bar{X}$	σ^2	$\bar{X}$	σ^2
E_1	$\bar{X}$	σ^2	$\bar{X}$	σ^2	$\bar{X}$	σ^2
E_2	$\bar{X}$	σ^2	$\bar{X}$	σ^2	$\bar{X}$	σ^2
E_3	$\bar{X}$	σ^2	$\bar{X}$	σ^2	$\bar{X}$	σ^2
E_4	$\bar{X}$	σ^2	$\bar{X}$	σ^2	$\bar{X}$	σ^2

conditions.

H_{o_2} There is no statistically significant difference in test performance between subjects giving reasons for choices of alternatives and subjects tested under conventional conditions.

H_{o_3} There is no statistically significant difference in test performance between subjects unrestricted in expressing reactions to test items and subjects tested under conventional conditions.

H_{o_4} There is no statistically significant difference in test performance between subjects not achieving toward final course grade and subjects tested under conventional conditions.

H_{o_5} There is no statistically significant difference in test performance between subjects expressing affective reactions toward test items and subjects giving reasons for choices of alternatives.

H_{o_6} There is no statistically significant difference in test performance between subjects expressing affective reactions toward test items and subjects unrestricted in expressing reactions.

H_{o_7} There is no statistically significant difference in test performance between subjects giving reasons for choices of alternatives and subjects unrestricted in expressing reactions.

Major Hypothesis II

There is no statistically significant correlation between the experimental test performance and scholastic aptitude test performance.

Major Hypothesis III

There is no statistically significant difference in the frequency of subjects of different intensities of anxiety with regard to above the median, and at-below the median test performance.

H_{o_1} There is no statistically significant difference in the frequency between high and low anxiety subjects with regard to above the median, and at-below the median test performance.

H_{o_2} There is no statistically significant difference in the frequency between high and medium anxiety subjects with regard to above the median, and at-below the median test performance.

H_{o_3} There is no statistically significant difference in the frequency between medium and low anxiety subjects with regard to above the median, and at-below the median test performance.

Major Hypothesis IV

There is no statistically significant difference in test performance among groups of different intensities of anxiety under variable testing conditions.

H_{o1} There is no statistically significant difference in test performance between high anxiety and medium anxiety groups expressing affective reactions to test items.

H_{o2} There is no statistically significant difference in test performance between high anxiety and medium anxiety groups giving reasons for choices of alternatives.

H_{o3} There is no statistically significant difference in test performance between high anxiety and medium anxiety groups unrestricted in expressing reactions toward test items.

H_{o4} There is no statistically significant difference in test performance between high anxiety and medium anxiety groups not achieving toward final course grade.

H_{o5} There is no statistically significant difference in test performance between high anxiety and medium anxiety groups tested under conventional conditions.

H_{o6} There is no statistically significant difference in test performance between high anxiety and low anxiety groups expressing affective reactions to test items.

H_{o7} There is no statistically significant difference in test performance between high anxiety and low anxiety groups giving reasons for choices of alternatives.

H_{o8} There is no statistically significant difference in test performance between high anxiety and low anxiety groups unrestricted in expressing reactions toward test items.

H_{o9} There is no statistically significant difference in test performance between high anxiety and low anxiety groups not achieving toward final course grade.

$H_{o_{10}}$ There is no statistically significant difference in test performance between high anxiety and low anxiety groups tested under conventional conditions.

$H_{o_{11}}$ There is no statistically significant difference in test performance between medium anxiety and low anxiety groups expressing affective reactions toward test items.

$H_{o_{12}}$ There is no statistically significant difference in test performance between medium anxiety and low anxiety groups giving reasons for choices of alternatives.

$H_{o_{13}}$ There is no statistically significant difference in test performance between medium anxiety and low anxiety groups unrestricted in expressing reactions.

$H_{o_{14}}$ There is no statistically significant difference in test performance between medium anxiety and low anxiety groups not achieving toward final course grade.

$H_{o_{15}}$ There is no statistically significant difference in test performance between medium anxiety and low anxiety groups tested under conventional conditions.

Major Hypothesis V

There is no statistically significant relationship between selected personality variables.

H_{o_1} There is no statistically significant difference in test performance between males and females under variable testing conditions.

H_{o_2} There is no statistically significant difference in the frequency of males and females with regard to anxiety level.

H_{o3} There is no statistically significant difference between males and females in the tendency to express reactions to test items.

H_{o4} There is no statistically significant relationship between age and the tendency to express reactions to test items.

H_{o5} There is no statistically significant relationship between anxiety level and the tendency to express reactions to test items.

The Sample

The subjects for this investigation were 283 undergraduates enrolled in one section of Psychology 1 at the University of Oklahoma. The sample was relatively homogeneous with respect to age. Two hundred sixty-three subjects were between ages 18 and 23, only seven were below 18 and 13 above age 23. The distribution of the sexes was about equal.

Table 1 presents a summary of the distribution of the sample on the basis of age and sex. Table 2 presents a summary of the distribution of the sample on the basis of sex and anxiety level.

Instruments of Measure

Measuring instruments were used to determine (1) performance under five different testing conditions, (2) to equate groups for achievement and to determine the correspondence between the experimental test performance and performance

TABLE 1

FREQUENCY DISTRIBUTION OF SAMPLE BY AGE AND SEX

	Group and Sex										
	Control		$Experimental_1$		$Experimental_2$		$Experimental_3$		$Experimental_4$		
Age	M	F	M	F	M	F	M	F	M	F	Total
Below 18	0	2	1	3	0	1	0	0	0	0	
18 - 20	23	21	14	16	19	29	17	26	27	22	
21 - 23	9	2	6	4	5	2	6	1	4	0	
24 - 26	1	0	1	1	0	1	1	1	3	0	
Above 26	0	0	0	2	0	0	1	1	0	0	
Total:	33	25	22	36	24	33	25	29	34	22	283

TABLE 2

FREQUENCY DISTRIBUTION OF SUBJECTS ACCORDING TO EXPERIMENTAL GROUP, SEX AND ANXIETY LEVEL

	Male			Female			
Group	Low	Medium	High	Low	Medium	High	Total
One	2	10	4	5	21	7	49
Two	4	12	7	6	16	5	50
Three	6	12	3	4	17	3	45
Four	7	17	5	1	11	2	43
Five	3	13	6	2	12	5	41
Total:	22	64	25	18	77	22	228

on a test of scholastic aptitude, and (3) to determine anxiety levels.

1. For the purpose of determining performance on the experimental test, a multiple-choice test was employed.

2. In order to determine if groups were equated for achievement, and to determine the correlation between the experimental test performance and the performance of subjects on a standardized aptitude test, American College Testing scores were employed. The ACT consists of four subtests: ACT English, ACT Math, ACT Social Studies and ACT Natural Science. The Composite score, the numerical mean of the scaled scores from the subtests, was used in this study.

3. To determine the degree of anxiety of the sub-

jects, the Taylor Manifest Anxiety Scale was the instrument of measure. The A-Scale is made up of items drawn from the MMPI clinically judged to be a detector of the presence of anxiety responses, and a valid measure of the level of chronic anxiety.

Procedure

A sample large enough to yield five sub-groups, all of whom were being taught by the same instructor in the same section of the course, was needed for this experiment. Arrangements were made with a professor of psychology at the University of Oklahoma to use his class for the conducting of the experiment. Preceding the experiment, the problem of the study and the required procedure were explained to the course instructor.

A preliminary test of 200 multiple-choice items was constructed by the investigator from which the course instructor selected the items which made up the final test. The factor of additional time needed for the experimental conditions was considered in the determination of the length of the test. The test was about two-thirds as long as those typically administered by the course instructor.

It was extremely important to the validity of the results of this research that subjects accept the experimental instructions at face value and consider the test as a bona fide course requirement. Precaution was taken to insure normalcy in the environment. The necessity to disguise the pur-

pose of the test required that it be administered under the usual prevailing conditions. Exposure of the experimental purpose of the test would have introduced an intervening variable; the subjects' motivation would have been extremely doubtful, and the results of the experiment invalidated.

About ten days before the administration of the test, its announcement was made by the course instructor in the routine fashion of test announcement. Prior to the test period, test booklets were placed in a manner which permitted subjects to retain their usual assigned seating arrangements and at the same time achieved the necessary experimental groupings. After completing the mechanical arrangements, the investigator left the testing scene. The test was administered by the course instructor and his graduate assistant.

Experimental Groups, Answer Sheets, and Test Instructions

Control Group -- Conventional answer sheet.

E_1 Affect Group -- Specially constructed answer sheet with space provided for comments.

> Instructions: In the space provided, please state your feelings concerning any test item that you may wish to. Do not explain your answers. Your comments may consist of anything you feel about a question--its fairness, clarity, ambiguity, importance, triviality, etc. Your reactions would aid in the evaluation of your performance and of the effectiveness of the test.

E_2 Reasons Group -- Specially constructed answer sheet with space provided for comments.

Instructions: In the space provided, please state your reasons for choosing an alternative whenever explanations seem necessary. Your reactions would aid in the evaluation of your performance and of the effectiveness of the test.

E_3 Permissive Group -- Specially constructed answer sheet with space provided for comments.

Instructions: Feel completely free to express any reactions to test items you may wish to. The spaces provided on the answer sheets are for your comments. Your responses would aid in the evaluation of your performance and of the effectiveness of the test.

E_4 Non-Achieving Group -- Conventional answer sheet.

Instructions: This is a practice test and will not be considered in the determination of the final course grade.

The Obtained Data

The data obtained by the research included:

1. Experimental Test Scores
2. American College Testing Scores
3. Anxiety Level Scores
4. Age of Subjects
5. Sex of Subjects
6. Verbal Reactions Toward Test Items

Statistical Treatment of Data

Three major statistical techniques were required to test the hypotheses set forth in the study. They were as follows:

1. Analysis of Variance to determine if a difference or differences beyond the consequences of chance existed among groups under variable testing conditions.
    a. The F test to determine the homogeneity of variance among groups.
    b. The t test to determine the significance of the differences among means.
2. Coefficient of Correlation to determine the correspondence of performance between the experimental test and scholastic aptitude.
3. Chi-Square to determine the relationship between personality variables.

Criterion of significance = 0.05 level of probability.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Theoretical assumptions underlying the study required the formulation and testing of five major and thirty specific null hypotheses.

It had been predicted that students would perform differently under different testing conditions. If performance occurred according to the predicted trend, then it would become necessary to determine under which testing condition or conditions the difference or differences occurred.

It was further assumed that if test performance is a correlate of anxiety level, the same concomitants of anxiety would be reflected in performance on the experimental test used in the study and performance on a standardized test of scholastic aptitude. A thesis of a debilitating relationship between high anxiety and test performance had been offered, and, moreover, that students with a high level of anxiety would perform differently under variable testing conditions. If a difference were found, then further analysis would be required to pin point the testing condition which appeared to be most beneficial to the performance of

high anxious students. This aspect of the analysis was the central interest of the study.

An assumption was made that certain personality variables are associated with anxiety level. The results of subsequent statistical treatment of the data are herewith presented.

Results

The first major hypothesis had asserted no statistically significant difference in performance among groups under variable testing conditions. A summarized account of the results of the test of significance of difference is presented in Table 3.

The statistic used to test this hypothesis was analysis of variance. To test treatments, Snedecor's F was applied. The F test furnished an over-all test of significance by showing that at least one group was significantly different from some other in performance. Table 3 shows that the mean of E_4 is less than the mean of C, indicating that the significant difference might be attributable to the difference between E_3 and E_4 . The meaningfulness of differential testing conditions would depend upon whether or not a condition which would have practical applicability in a realistic test situation were significantly different from C. The non-achieving condition under which subjects of E_4 were tested was included in the design for the purpose of indicating if achievement motivation would be lowered under such a condi-

TABLE 3

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG VARIATES, ANALYSIS OF VARIANCE, COMPLETELY RANDOMIZED DESIGN

Degrees of Freedom	Sum of Squares	Mean Square
Total 282	12913.88000	
Treatment 4	558.59000	139.64750
Error 278	12355.29000	44.44384

Summary Table

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Control	58	28.0000	53.75438	7.3317	.96270	.87536
Affect	58	28.87931	50.91501	7.1354	.93693	.87536

TABLE 3--Continued

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Reasons	57	28.71929	38.63408	6.2156	.82328	.88301
Permissive	54	31.79629	39.44803	6.2807	.85470	.90720
E_4 Non-Achieving	56	27.85714	38.81560	6.3802	.83250	.89086

To Test Treatments F = 3.142
Significant at .05 level

tion. Since it is unlikely that college teachers would employ the procedure of E_4 in a typical classroom test situation, the usefulness of the variable test instructions would be extremely doubtful unless a significant difference existed between some other group and C.

To ascertain the significance of the difference between each two sets of means, "t" tests were calculated from the data derived through the analysis of variance. Before calculating the "t" values between means, it was necessary to determine the significance of the difference between each two sets of variances. The F test was applied. No significant difference was found, indicating that variance in the groups could be explained by chance fluctuations in samples. The homogeneity of variance made possible the testing of the difference between means by the same "t" test. The results of the F test may be found in Appendix C. Table 4 presents a summarized account of the "t" values which tested the following hypotheses.

1. There is no statistically significant difference in test performance between subjects expressing affective reactions to test items and subjects tested under conventional conditions.

Between these groups, a "t" value of 0.66 was obtained; the value required for significance was 1.98 at the 0.05 level of significance with 114 degrees of freedom. The hypothesis of no difference was accepted.

TABLE 4

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AMONG GROUPS

N	Groups	Mean	Variance	Degrees of Freedom	"t" Value
58	E_1	28.87931	50.91501	114	0.66
58	vs C	28.00000	53.75438		
57	E_2	28.71929	38.63408	113	0.57
58	vs C	28.00000	53.75438		
54	E_3	31.79629	39.44830	110	2.94*
58	vs C	28.00000	53.75438		
56	E_4	27.85714	38.81560	110	0.11
58	vs C	28.00000	53.75438		
58	E_1	28.87931	50.91501	115	0.13
57	vs E_2	28.71929	38.63408		

TABLE 4--Continued

N	Groups	Mean	Variance	Degrees of Freedom	"t" Value
58	E_1	28.87931	50.91501	110	2.21*
54	vs E_3	31.79629	39.44830		
57	E_2	28.71929	38.63408	110	2.34*
54	vs E_3	31.79629	39.44830		

* Significant at the 0.05 level of probability.

2. There is no statistically significant difference in test performance of subjects giving reasons for choices of alternatives and subjects tested under conventional conditions.

Between these groups, a "t" value of 0.57 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 113 degrees of freedom. The hypothesis of no difference was accepted.

3. There is no statistically significant difference in test performance of subjects unrestricted in expressing reactions to test items and subjects tested under conventional conditions.

Between these groups, a "t" value of 2.94 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 110 degrees of freedom. The hypothesis of no difference was rejected.

4. There is no significant difference in test performance of subjects not achieving toward final course grade and subjects tested under conventional conditions.

Between these groups, a"t" value of 0.11 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 110 degrees of freedom. The hypothesis of no difference was accepted.

5. There is no statistically significant difference in test performance of subjects expressing affective reactions to test items and subjects giving reasons for choices of alternatives.

Between these groups, a "t" value of 0.13 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 115 degrees of freedom. The hypothesis of no difference was accepted.

6. There is no statistically significant difference in test performance of subjects expressing affective reactions to test items and subjects unrestricted in expressing reactions.

Between these groups, a "t" value of 2.21 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 110 degrees of freedom. The hypothesis of no difference was rejected.

7. There is no statistically significant difference in test performance of subjects giving reasons for choices of alternatives and subjects unrestricted in expressing reactions.

Between these groups, a "t" value of 2.34 was obtained; the required value for significance was 1.98 at the 0.05 level of significance with 110 degrees of freedom. The hypothesis of no difference was rejected.

Three of the specific hypotheses were rejected. The major hypothesis was, therefore, rejected.

A hypothesis of no statistically significant correlation between experimental test performance and American College Testing performance had been offered by the second major hypothesis.

To determine the correspondence between these vari-

ables, Pearson's product-moment coefficient of correlation was the statistic used. An r of +0.7218 was obtained. The size of the coefficient implies a relatively high degree of correspondence between performance on these measures. The coefficient is significantly different from zero at the 0.05 level of significance. The null hypothesis of correlation was rejected.

It is likely that the correlation between a realistic course examination and a test of scholastic aptitude may be even higher than the r reported here. This assumption is based upon the fact that the test of the study was administered under variable instructions designed to reduce enxiety and the aptitude test was administered under conventional conditions.

The third major hypothesis was concerned with the frequency with which students of high, medium, and low anxiety levels scored above the median, and at-below the median on the experimental test. The test of this hypothesis was determined on the basis of the results of the testing of the three specific hypotheses which follow. Chi-square tests were computed.

1. There is no statistically significant difference in the frequency of high and low anxiety subjects with regard to above the median, and at-below the median test performance.

Between these groups, the obtained Chi-Square value was 7.02; the value required for significance at the 0.05

level of probability with one degree of freedom was 3.841. The hypothesis of no difference was rejected. The Chi-Square frequencies are presented in Table 5.

TABLE 5

CHI-SQUARE FREQUENCIES OF ABOVE THE MEDIAN AND AT-BELOW THE MEDIAN TEST PERFORMANCE BETWEEN HIGH AND LOW ANXIETY SUBJECTS

	At-Below Median		Above Median		Total	
Group	Number	Percent	Number	Percent	Number	Percent
High A	31	65.95	16	34.05	47	100
Low A	15	37.50	25	62.50	40	100
Total	46		41		87	

$X^2 = 7.02$
d.f. = 1
Significant at 0.05 level.

2. There is no statistically significant difference in the frequency of high and medium anxiety subjects with regard to above the median and at-below the median test performance.

Between these groups, the obtained Chi-Square value was 10.89; the required value for significance was 3.841 at the 0.05 level of significance with one degree of freedom. The hypothesis of no difference was rejected. The Chi-Square frequencies are presented in Table 6.

3. There is no statistically significant difference in the frequency of medium and low anxiety subjects with re-

gard to above the median and at-below the median test performance.

TABLE 6

CHI-SQUARE FREQUENCIES OF ABOVE THE MEDIAN AND AT-BELOW THE MEDIAN TEST PERFORMANCE BETWEEN HIGH AND MEDIUM ANXIETY SUBJECTS

	At-Below Median		Above Median		Total	
Group	Number	Percent	Number	Percent	Number	Percent
High A	31	65.95	16	34.05	47	100
Medium A	54	38.30	87	61.70	141	100
Total	85		103		188	

$X^2 = 10.887$
d.f. = 1
Significant at 0.05 level

Between these groups, the obtained Chi-Square value was 0.08; the value required for significance was 3.841 at the 0.05 level of significance with one degree of freedom. The hypothesis of no difference was accepted. The Chi-Square frequencies are presented in Table 7.

The third major hypothesis had asserted no statistically significant difference in frequency among groups with different intensities of anxiety with regard to above the median, and at-below the median test performance. Since two of the obtained Chi-Square values showed differences highly exceeding chance, the hypothesis of no difference was rejected.

It was noted that the X^2 value obtained between high

TABLE 7

CHI-SQUARE FREQUENCIES OF ABOVE THE MEDIAN AND AT-BELOW THE MEDIAN TEST PERFORMANCE BETWEEN LOW AND MEDIUM ANXIETY GROUPS

	At-Below Median		Above Median		Total	
Group	Number	Percent	Number	Percent	Number	Percent
Low A	15	37.50	25	62.50	40	100
Medium A	54	38.30	87	61.70	141	100
Total	69		112		181	

X^2= .008 df = 1 Non-significant at 0.05 level

and medium anxiety groups is considerably greater than the X^2 value obtained between high and low anxiety groups. This finding suggests that a moderate degree of anxiety exerts a facilitating motivational effect on performance since medium anxiety was the level under which performance was highly statistically better than that of the high anxious group, and somewhat better than that of the low anxiety group.

The fourth major hypothesis was that there is no statistically significant difference in test performance among subjects of different intensities of anxiety under variable testing conditions. In terms of the problem of the study, this hypothesis is its focal point. The third major hypothesis had confirmed a relationship between anxiety level of subjects and test performance. Significant Chi-Square values were obtained between high anxiety and low anxiety subjects, and between high anxiety and medium anxiety subjects. The

question then became: Under which testing condition did the mean score of high anxiety subjects most nearly approach the mean score of subjects of less anxiety? The inquiry concerned a testing procedure which suggested the possibility of mitigating the detrimental effects of this personality variable.

Statistical treatment employed in the testing of Major Hypothesis III had revealed no significant frequency difference in above the median, and at-below the median test performance between medium and low anxiety groups. This finding made possible the pooling of the means and variances of these groups, and thereby necessitating the comparison of only two groups-- (1) high anxiety and (2) medium-low anxiety.

The F test confirmed the homogeneity of variance, making possible the test of the significance of difference between means by the same "t" test. The test of the fourth major hypothesis was determined by the results of the tests of the specific hypotheses which follow. The obtained "t" values are presented in Table 8.

1. There is no statistically significant difference in test performance between high anxiety and medium-low anxiety groups expressing affective reactions toward test items.

Between these groups, a "t" value of 1.99 was obtained; the value required for significance was 2.02 at the 0.05 level of significance with 47 degrees of freedom. Although the obtained valued conspicuously approached significance, the hypothesis of no difference was accepted.

TABLE 8

DIFFERENCES OF MEANS AMONG ANXIETY GROUPS
ON EXPERIMENTAL TEST

	Anxiety Level							
	High			Medium-Low				
Group	N	Mean	Variance	N	Mean	Variance	df	"t"
E_1 Affect	11	24.73	51.60	38	30.21	68.51	47	1.99
E_2 Reasons	12	26.75	65.45	38	28.87	32.27	48	1.01
E_3 Permissive	6	21.33	77.48	39	30.56	84.79	43	2.30
E_4 Non-Achieving	7	24.00	49.67	36	30.03	44.54	41	2.17
Control	11	23.00	58.60	30	28.40	73.41	39	1.84

.05 level = 2.02

2. There is no statistically significant difference in test performance between high anxiety and medium-low anxiety subjects giving reasons for choices of alternatives.

Between these groups, a "t" value of 1.01 was obtained; the required value for significance was 2.02 at the 0.05 level of significance with 48 degrees of freedom. The hypothesis of no difference was accepted.

3. There is no statistically significant difference in test performance between high anxiety and medium-low anxiety subjects unrestricted in expressing reactions toward test items.

Between these groups, a "t" value of 2.30 was obtained; the required value for significance was 2.02 at the 0.05 level of significance with 43 degrees of freedom. The hypothesis of no difference was rejected.

4. There is no statistically significant difference in test performance between high anxiety and medium- low anxiety subjects not achieving toward final course grade.

Between these groups, a "t" value of 2.17 was obtained; the value required for significance was 2.02 at the 0.05 level of significance with 41 degrees of freedom. The hypothesis of no difference was rejected.

5. There is no statistically significant difference in test performance between high anxiety and medium-low anxiety subjects tested under conventional conditions.

Between these groups, a "t" value of 1.84 was obtained; the value required for significance was 2.02 at the

0.05 level of significance with 39 degrees of freedom. The hypothesis of no difference was accepted.

The fourth major hypothesis had asserted a zero difference in test performance among subjects of different intensities of anxiety under variable testing conditions. Two of the obtained "t" values were highly significant; two of the obtained "t" values approached significance. An examination of the "t" value between the groups tested under Experimental Condition Two revealed that this was the condition under which the performance of high anxiety students most nearly approached the performance of students with lower levels of anxiety. Since two of the "t" values exceeded the required value for significance, the null hypothesis of differences was rejected.

It should be remembered that the testing of Major Hypothesis II had yielded a relatively high correlation ($r = \pm.7218$) between performance on the experimental test and the test of scholastic aptitude. A theoretical assumption had been stated that if test performance is a correlate of anxiety, then the same concomitants of anxiety would be reflected in a typical classroom test and a test of scholastic aptitude.

The finding of a significant difference in performance under variable testing conditions suggests that an even higher correlation may in fact exist between a test of scholastic aptitude which is administered under conventional conditions and a course examination which is administered under

conventional conditions. Since a scholastic aptitude test is a rough measure of intellectual functioning, it provided for this experiment some estimate of the variance among subjects attributable to individual differences in intellectual functioning. These results appear to offer definitive support of the testing condition of E_2 under which the performance of the high anxious students was conspicuously closer to that of students of less anxiety than any other testing condition. This was the condition under which students were permitted to explain choices of alternatives. The beneficial effects on the high anxious students appear to have accrued from the opportunity to show to the instructor some understanding of test problems even in the face of indecisiveness between alternatives. In terms of behavior theory, performance under condition E_2 is perhaps the most significant result of the study.

The fifth major hypothesis was concerned with the statistical significance of relationship between selected personality variables. The variables investigated in this phase of the study were:

1. sex differences in test performance under variable testing conditions.
2. sex differences in anxiety level.
3. sex differences in the tendency to express reactions toward test items.
4. anxiety level and the tendency to express reactions toward test items.

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1. sex differences in test performance under variable testing conditions.
2. sex differences in anxiety level.
3. sex differences in the tendency to express reactions toward test items.
4. anxiety level and the tendency to express reactions toward test items.

5. age differences and the tendency to express reactions toward test items.

The test of this hypothesis was made on the basis of the findings which resulted from the testing of the specific hypotheses which follow.

1. The sex variable in performance under different condtions of testing was the consideration of this hypothesis. The results of the analysis of variance which are presented in Table 9 revealed that for males, no difference exceeding chance existed among groups. The obtained F (Snedecor's) value was 1.281, non-significant at the 0.05 level of probability. By inspecting the means of the groups, it may be seen that a considerable difference exists between E_3 vs C. In order to determine how nearly this difference approached significance, "t" tests were calculated. The results of the tests of significance of difference between means are shown in Table 10. A "t" of 1.67 was obtained for E_3 vs C. The value required for significance with 56 degrees of freedom is 2.01.

Analysis of variance presented in Table 11 shows that at least one female group was statistically significantly different to some other. This difference confirms a sex variable in performance under different conditions of testing, and suggests that the differential instructions had greater beneficial effects for females than for males.

It can be seen by inspecting the means of the groups in Table 11 that the mean of E_4 is less than the mean of C

TABLE 9

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG VARIATES
ANALYSIS OF VARIANCE, COMPLETELY RANDOMIZED DESIGN
(MALE SAMPLE)

Degrees of Freedom	Sum of Squares	Mean Square
Total 137	7245.31000	
Treatment 4	268.8000	67.20000
Error 133	6976.5100	52.45496

Summary Table

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Control	33	27.90909	67.27275	8.2019	1.42778	1.26077
Affect	22	27.00000	59.71428	7.7275	1.64750	1.54412

TABLE 9--Continued

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Reasons	24	29.33333	47.88408	6.9198	1.41250	1.47838
Permissive	25	31.24000	43.44000	6.5909	1.31818	1.44851
Non-Achieving	34	28.05882	43.20857	6.5733	1.12731	1.24209

To Test Treatments F = 1.281
Non-significant at .05 level

TABLE 10

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AMONG MALE GROUPS

N	Groups	Mean	Variance	Degrees of Freedom	"t" Value
22	E_1	27.00000	59.71428	53	0.41*
	vs				
33	C	27.90909	67.27275		
24	E_2	29.33333	47.88408	55	0.69*
	vs				
33	C	27.90909	67.27275		
25	E_3	31.24000	43.44000	56	1.67*
	vs				
33	C	27.90909	67.27275		
34	E_4	28.05882	43.20857	65	00.8*
	vs				
33	C	27.90909	67.27275		

*Non-significant at the 0.05 level of probability
Two tails of the distribution of "t"

TABLE 11

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG VARIATES, ANALYSIS OF VARIANCE COMPLETELY RANDOMIZED DESIGN (FEMALE SAMPLE)

Degrees of Freedom	Sum of Squares	Mean Square
Total 144	5631.89000	
Treatment 4	412.47000	103.11750
Error 140	5219.42000	37.28157

Summary Table

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Control	25	28.12000	37.94333	6.1598	1.23196	1.22117
Affect	36	30.02777	43.51351	6.5964	1.09941	1.01764

TABLE 11--Continued

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Reasons	33	28.27272	32.70456	5.7187	.99551	1.06289
Permissive	29	32.27586	36.92121	6.0762	1.12833	1.13383
Non-Achieving	22	27.54545	33.59309	5.7959	1.23570	1.30177

To Test Treatments F = 2.765
Significant at .05 level

and, therefore, the significant difference probably occurred between E_3 vs E_4. In view of the practical purpose of the study, it became necessary to determine if the mean of a group tested under a condition more likely to be used in a realistic classroom setting than E_4 (non-achieving) were significantly different from C. For this purpose "t" tests were calculated. The results of the tests of significance of difference between means may be found in Table 12. A statistically significant difference was found between E_3 and C. Between these groups, a "t" value of 2.49 was obtained; the value required for significance at the .05 level of probability with 52 degree of freedom was 2.02.

It had been hypothesized that no statistically significant difference would be found in test performance between males and females under variable testing conditions. Since a significant difference was not found for males, but a significant difference was found for females, the hypothesis of no difference was rejected.

2. There is no statistically significant difference in the frequency of males and females with regard to anxiety level.

The Chi-Square tests yielded the following results:

E_1 . . . $X^2 = .1270$, df = $2 < 5.991 < P.05$

E_2 . . . $X^2 = .9910$, df = $2 < 5.991 < P.05$

E_3 . . . $X^2 = 1.174$, df = $2 < 5.991 < P.05$

E_4 . . . $X^2 = 2.085$, df = $2 < 5.991 < P.05$

C . . . $X^2 = .112$, df = $2 < 5.991 < P.05$

TABLE 12

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS AMONG FEMALE GROUPS

N	Groups	Mean	Variance	Degrees of Freedom	"t" Value
36	E_1	30.02777	43.51351	59	1.15
	vs				
25	C	28.12000	37.94333		
33	E_2	28.27272	32.70456	56	1.10
	vs				
25	C	28.12000	37.94333		
29	E_3	32.27586	36.92121	52	2.49*
	vs				
25	C	28.12000	37.94333		
22	E_4	27.54545	33.59309	45	.003
	vs				
25	C	28.12000	37.94333		

*Significant at the .05 level.
Two tails of the distribution of "t"

Since none of the Chi-Square values was significant, the null hypothesis of difference was accepted. The Cell-Square contingencies are presented in Tables 13, 14, 15, 16, and 17. The frequency distribution of subjects according to

TABLE 13

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO ANXIETY LEVEL (Control Group)

Sex	Low (N=7)	Medium (N=31)	High (N=11)	Total
Male	.037	.001	.047	.085
Female	.018	.001	.023	.042
Total	.055	.002	.070	X^2 = .127 (df = 2)

Non-significant at the 0.05 level.

anxiety level and sex is presented in Table 18.

3. There is no statistically significant difference between males and females in the tendency to express reactions toward test items.

TABLE 14

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST AMONG MALES AND FEMALES WITH REGARD TO ANXIETY LEVEL (Affect Group)

Sex	Low (N=10)	Medium (N=28)	High (N=12)	Total
Male	.078	.060	.397	.535
Female	.067	.051	.338	.456
Total	.145	.111	.735	X^2 = .991 (df = 2)

Non-significant at the 0.05 level

TABLE 15

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO ANXIETY LEVEL (Reasons Group)

Sex	Low (N=10)	Medium (N=29)	High (N=6)	Total
Male	.379	.173	.014	.566
Female	.332	.151	.125	.608
Total	.711	.324	.139	X^2= 1.174 (df = 2)

Non-significant at the 0.05 level

There were three commenting groups. The Chi-Square tests yielded the following results:

E_1 . . . X^2 = 3.830, df = $1 < 3.841 < P.05$

E_2 . . . X^2 = .9500, df = $1 < 3.841 < P.05$

E_3 . . . X^2 = 3.640, df = $1 < 3.841 < P.05$

TABLE 16

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO ANXIETY LEVEL (Permissive Group)

Sex	Low (N= 8)	Medium (N=28)	High (N=7)	Total
Male	.474	.187	.017	.678
Female	.985	.388	.034	1.407
Total	1.459	.575	.051	X^2 = 2.085 (df = 2)

Non-significant at the 0.05 level

Although significance was approached under experimental condition three, no X^2 value at a confidence level of .95 was obtained. The null hypothesis of difference between the sexes in the tendency to express reactions to test items was accepted. The Cell-Square contingencies are presented in Tables 19, 20, and 21. A frequency distribution of subjects according to commenting and sex is shown in Table 22.

TABLE 17

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO ANXIETY LEVEL (Non-achieving Group)

Sex	Low (N=5)	Medium (N=25)	High (N=11)	Total
Male	.038	.012	.002	.052
Female	.044	.014	.002	.060
Total	.082	.026	.004	X^2 = .112 (df = 2)

Non-significant at the 0.05 level

4. There is no statistically significant relationship between anxiety level and the tendency to express reactions to test items.

The Chi-Square test of this hypothesis yielded a Chi-Square value of 11.91; the value required for significance was 5.991 at the 0.05 level of significance with 2 degrees of freedom. The highly significant value obtained rejected the hypothesis of no relationship. Table 23 presents a summarized account of the analysis. Table 24 pre-

TABLE 18

FREQUENCY DISTRICUTION OF SUBJECTS ACCORDING TO ANXIETY LEVEL AND SEX

	Group and Sex									
	Control		Experimental$_1$		Experimental$_2$		Experimental$_3$		Experimental$_4$	
Anxiety Level	M	F	M	F	M	F	M	F	M	F
Low	3	2	2	5	4	6	6	4	7	1
Medium	13	12	10	21	12	16	12	17	17	11
High	6	5	4	7	7	5	3	3	5	2
Total	22	19	16	33	23	27	21	24	29	14

TABLE 19

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO COMMENTING ON TEST ITEMS

E_1 Affect Group

Sex	Commenting (N=28)	Not Commenting (N=30)	Total	Percent Commenting
Male	1.230	1.150	2.380	.32
Female	.750	.700	1.450	.58
Total	1.980	1.850	3.830	.48

X^2= 3.830 df = 1 3.841 P.05 Approached Significance

sents the mean number of comments according to anxiety levels.

TABLE 20

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO COMMENTING ON TEST ITEMS

E_2 Reasons Group

Sex	Commenting (N=17)	Not Commenting (N=40)	Total	Percent Commenting
Male	.390	.160	.550	.21
Female	.280	.120	.400	.36
Total	.670	.280	.950	.30

X^2 = .950 df = 1 3.841 P.05
Non-significant

TABLE 21

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN MALES AND FEMALES WITH REGARD TO COMMENTING ON TEST ITEMS

E_3 Permissive Group

Sex	Commenting (N=27)	Not Commenting (N=27)	Total	Percent Commenting
Male	.980	.980	1.960	.36
Female	.840	.840	1.680	.62
Total	1.820	1.820	3.640	.50

X^2= 3.640 df = 1 3.841 P.05
Approached Significance

TABLE 22

FREQUENCY DISTRIBUTION OF SUBJECTS WHO MADE COMMENTS ACCORDING TO AGE AND SEX

	Group and Sex					
	$Experimental_1$		$Experimental_2$		$Experimental_3$	
Age	Male	Female	Male	Female	Male	Female
18-20	5	16	3	10	7	17
21-23	1	2	2	1	4	0
Others	1	3	0	1	2	1
Total	7	21	5	12	13	18

5. There is no statistically significant relationship between age and the tendency to express reactions to test items.

Chi-Square tests yielded the following results:

E_1 . . . $X^2 = 1.885$, df = 1 < 3.841 < P.05

E_2 . . . $X^2 = 1.522$, df = 1 < 3.841 < P.05

E_3 . . . $X^2 = 1.920$, df = 1 < 3.841 < P.05

TABLE 23

CHI-SQUARE TEST FOR MEAN NUMBER OF COMMENTS ACCORDING TO ANXIETY LEVEL

Anxiety Levels			
Low	Medium	High	Total
3	6	17	26
8.67	8.67	8.67	26

$X^2 = 11.91$ df = 2 Significant P.05

TABLE 24

MEAN NUMBER OF COMMENTS MADE BY INDIVIDUAL SUBJECTS ACCORDING TO ANXIETY LEVEL

Anxiety Level	Number of Subjects	Number of Comments	Mean Comments for Individual Subjects
Low	7	22	3
Medium	18	113	6
High	25	422	17
Total	50	557	26

None of the obtained Chi-Square values achieved significance; the hypothesis of no relationship between age and the tendency to comment was accepted. The Cell-Square con-

tingencies for Chi-Square Tests for relationship between these variables are presented in Tables 25, 26, and 27.

TABLE 25

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN AGE GROUPS WITH REGARD TO COMMENTING ON TEST ITEMS

E_1 Affect Group

Age Level	Commenting (N=24)	Not Commenting (N=26)	Total	Percent Commenting
18-20	.283	.083	.366	.53
21-23	.393	1.126	1.519	.30
Total	.676	1.209	1.885	.48

X^2 = 1.885 df = 1 3.841 P.05
Non-significant

TABLE 26

CELL-SQUARE CONTINGENCIES FOR CHI-SQUARE TEST BETWEEN AGE GROUPS WITH REGARD TO COMMENTING ON TEST ITEMS

E_2 Reasons Group

Age Level	Commenting (N=16)	Not Commenting (N=39)	Total	Percent Commenting
18-20	.016	.064	.080	.27
21-23	1.394	.048	1.442	.43
Total	1.410	.112	1.522	.29

X^2 = 1.522 df = 1 3.841 P.05
Non-significant

TABLE 27

CELL-SQUARE FREQUENCIES FOR CHI-SQUARE TESTS BETWEEN AGE GROUPS WITH REGARD TO COMMENTING ON TEST ITEMS

E_3 Permissive Group

Age Level	Commenting (N=28)	Not Commenting (N=22)	Total	Percent Commenting
18-20	.008	.018	.026	.55
21-23	.098	.068	.166	.57
Total	.106	.086	.192	.56

X^2= .192 df = 1 3.841 P.05

The fifth major hypothesis had asserted no statistically significant relationship between certain personality variables. The testing of five specific hypotheses yielded the following results:

1. Sex differences in test performance under variable testing conditions significant, hypothesis rejected.

2. Sex differences in anxiety level non-significant, hypothesis accepted.

3. Sex differences in commenting on test items non-significant, hypothesis accepted.

4. Anxiety level and commenting on test items, significant, hypothesis rejected.

5. Age differences and commenting on test items non-significant, hypothesis accepted.

Since two of the sets of variables examined were found to be related, the hypothesis of no relationship was rejected.

Summary

The experimental findings of the study were presented in this chapter. Statistical analyses of the data were offered descriptively and in tabular form. On the basis of the analyses of the data, the five major null hypotheses which had been formulated were rejected. The first hypothesis concerned the question of difference in performance among groups tested under five conditions. A difference exceeding chance was found. To pin point the particular experimental condition under which the difference occurred, a comparison of means was calculated. The analysis revealed that the significantly different and best performance occurred under the testing condition which permitted unrestricted expression of reactions toward test items.

The test of the second major hypothesis was to determine the degree of correspondence between performance on the experimental test and a standardized measure of scholastic aptitude. An r of + .72 indicated a relatively high correlation between these two measures.

The third major hypothesis concerned the frequencies with which students of different intensities of anxiety scored above and at-below the median in test performance. The analysis revealed significant differences between high and low

anxiety groups, and between high and medium anxiety groups.

The fourth major hypothesis was considered the focal point of the study. The test of this hypothesis determined under which experimental condition the performance of high anxiety subjects most conspicuously approached the performance of subjects of lower levels of anxiety. It was found that the testing condition permitting giving reasons for choices of alternatives appeared to be the most beneficial to high anxious subjects.

The relationship between variables was investigated by tests of the fifth major hypothesis. A sex difference was found in performance under different testing conditions. No relationship was found between sex and anxiety level. There was a conspicuous relationship between sex and the tendency to comment on test items, however, the criterion for statistical significance was not obtained. Significant relationship was found between anxiety level and the tendency to comment. Subjects of high anxiety commented significantly more frequently. No relationship was found between age and the tendency to comment.

CHAPTER V

SUMMARY, CONCLUSIONS,AND RECOMMENDATIONS

This study was designed to investigate the effects of different intensities of chronic anxiety and other selected variables on test performance of college students. The design of the study was fashioned in terms of two independent variables and a dependent variable. The experimental method employed was the method of Concomitant Variation.

Suggested answers to several inquiries basic to the problem of the study were sought:

1. Would subjects perform differently under variable testing conditions?

2. Under which testing condition, if any, would performance be significantly different?

3. What is the correlation between performance on the experimental test of the study and a standardized test of scholastic aptitude?

4. Is anxiety level associated with test performance?

5. Is a high level of chronic anxiety debilitating to test performance?

6. If test performance is a correlate of anxiety, under which testing condition would the performance of high anxiety subjects most nearly approach the performance of subjects with lower anxiety?

7. Are certain personality variables associated with anxiety?

The sample included 283 undergraduate students enrolled in one section of Psychology 1 at the University of Oklahoma during the regular 1962-1963 school year. The sample was relatively homogeneous in age, and the distribution between the sexes was approximately equitable.

The design of the experiment required the formulation and testing of five major and thirty specific null hypotheses. The major hypotheses were formulated as follows:

1. There is no statistically significant difference in test performance among groups under variable testing conditions.

2. There is no statistically significant relationship between experimental test performance and American College Testing performance.

3. There is no statistically significant difference in the frequency of subjects of different intensities of anxiety with regard to above the median, and at-below the median test performance.

4. There is no statistically significant difference in test performance among subjects of different intensities

of anxiety.

5. There is no statistically significant relationship between selected personality variables.

To test these hypotheses, an experiment utilizing the following instruments was conducted:

1. A Psychology Course Examination - constructed by the investigator and submitted to the course instructor for approval.

2. The Taylor Manifest Anxiety Scale - an MMPI index validated as a measure of clinically defined anxiety.

3. American College Testing Scores - from the college entrance examination required by the University of Oklahoma.

The obtained data were statistically tested by means of the following techniques:

1. Analysis of Variance, to determine significance of difference in test performance among groups.

   a. The F test to determine homogeneity of variance.

   b. The "t" test to determine difference between means.

2. Coefficient of correlation to determine the degree of relationship between the experimental test and a measure of scholastic aptitude.

3. Chi-Square to determine the relationship between selected variables.

Statistical analysis of the data did not verify the asserted hypotheses; all major hypotheses were, therefore, rejected. Analysis of the data was presented descriptively and in tabular form.

Conclusions

1. Upon the evidence of statistical analysis of the data obtained in the study, academic performance is a correlate of anxiety.

2. The intensity of anxiety is more closely related to the middle range of scholastic aptitude than to either extreme. The general pattern of performance showed that those high anxiety subjects whose ACT scores were high, performed in the fourth quartile and the upper limit of the third quartile on the experimental test. The greatest variability in test performance occurred among subjects whose ACT scores were around the mean. Subjects whose ACT scores were low performed poorly on the experimental test no matter what their anxiety levels were. There were proportionately more subjects of medium anxiety in the fourth quartile than subjects of either high or low anxiety. This finding suggests that a moderate degree of anxiety is facilitating to achievement.

3. In spite of the general finding that test performance is more closely associated with scholastic aptitude than with anxiety level, the evidence of this research suggests that high anxiety may be debilitating to test perform-

ance. The correspondence that was found between ACT scores and the experimental test scores (r = +.72) may indicate that the same associative responses of anxiety were operative in each of these measures.

4. Students of high anxiety often may be identified, and certain instructional procedures may be effective in mitigating the detrimental effects of anxiety. It had been hypothetically assumed that the student's perception of the instructor is a correlate of test anxiety. This position appears to have been validated by the significant difference found in experimental test performance among groups equated in scholastic aptitude.

5. The large number of student comments suggests that, if given an opportunity to do so, students would express their reactions to test items.

6. Over-all test performance was best under the condition which permitted unrestricted expression toward test items. This finding was in accord with the anticipated trend. The surprising result was that for high anxiety subjects, test performance was best under the condition which permitted giving reasons for choices of alternatives. A possible explanation of this result is that for these students, need-achievement is particularly high in a test situation, and tension was reduced by the satisfaction of demonstrating to the teacher some understanding of test problems when discrimination among choices was difficult for them.

7. High anxiety subjects made proportionately more

comments concerning test items than subjects of less anxiety. They tended to be less critical of test items and more self-blaming on failed items. There were proportionately more self-depreciating responses among these subjects. An interesting contrast in commenting was that no high anxiety subject evaluated a test item as trivial, but this was not an infrequent comment among subjects of low anxiety. High anxious subjects tended more to evaluate test items as important and tended less to evaluate items as ambiguous as compared with subjects of lower anxiety. More variability in expressing reactions to test items occurred among subjects of medium anxiety. The conclusion drawn from these findings is that the greater the intensity of anxiety, the more fearful of and the more cautious is the student in his relationship with the instructor.

8. The procedure of the experimental test had a more beneficial effect upon the performance of female subjects than upon male subjects. A statistically significant difference was obtained for females, but no statistically significant difference was obtained for males. However, there was substantially higher mean performance for males under the same condition under which performance was best for females.

9. There is a sex variable in the tendency to verbalize reactions to test items although the criterion for significance was not reached by the Chi-Square technique used. The X^2 value required for significance was 3.84, the highest

obtained value was 3.83.

10. The findings suggested no relationship between sex and anxiety, and no relationship was found between age and the tendency to express reactions to test items. The sample used in this study was relatively homogeneous in terms of age. It may be that a more heterogeneous sample would reveal significant differences. A trend of more frequent commenting was found among younger subjects.

11. The success in achieving a realistic situation overcame an important limitation of many experimental tests involving personality dynamics, that is, the questionable status of the subjects' motivation. The students who participated in this study were unaware of the experimental purpose of the test and accepted it as a regular course requirement. Their motivation was, therefore, comparable to that in any other test situation.

The basic postulates set forth, upon the evidence of statistical tests of the data, are in the main accepted as tenable.

Recommendations

1. A review of the experimental literature bearing on the problem of this research revealed that a great deal of continuing study has not yet resolved the issue of the correlates of anxiety. It is recommended that future research employing a design similar to that of this study include the variable of intelligence. An adjustment of the

experimental test score for intelligence quotient by means of analysis of co-variance would provide a more definitive position as to the effects of the experimental testing conditions.

2. It is suggested that the anxiety index utilized in this study has a property common among questionnaire techniques, that is, susceptibility to some degree of deception. It is, therefore, recommended that a forced-choice scale be employed in future research investigating the primary personality variable of the study.

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APPENDIX A

TABLE 28

TEST SCORES FOR GROUPS

Control			
Subject	Score	Subject	Score
1	35	30	30
2	26	31	30
3	32	32	40
4	34	33	34
5	38	34	16
6	27	35	18
7	39	36	34
8	27	37	30
9	20	38	23
10	30	39	13
11	39	40	24
12	30	41	32
13	19	42	20
14	23	43	20
15	30	44	17
16	31	45	35
17	32	46	30
18	27	47	34
19	30	48	33
20	16	49	30
21	35	50	24
22	32	51	32
23	31	52	38
24	20	53	19
25	25	54	20
26	28	55	18
27	23	56	18
28	33	57	19
29	35	58	22
Affect			
1	31	30	29
2	32	31	37
3	32	32	35
4	12	33	16
5	23	34	21
6	31	35	40
7	31	36	18
8	34	37	31

TABLE 28--Continued

Subject	Score	Subject	Score
9	33	38	37
10	36	39	27
11	36	40	18
12	28	41	32
13	32	42	27
14	37	43	25
15	31	44	35
16	33	45	30
17	27	46	31
18	33	47	30
19	37	48	38
20	17	49	32
21	36	50	33
22	26	51	25
23	25	52	24
24	14	53	33
25	30	54	14
26	27	55	32
27	39	56	24
28	29	57	36
29	11	58	22
	Reasons		
1	36	29	29
2	28	30	32
3	34	31	32
4	29	32	34
5	27	33	27
6	34	34	24
7	25	35	33
8	30	36	29
9	32	37	29
10	21	38	26
11	25	39	30
12	18	40	26
13	21	41	32
14	44	42	30
15	37	43	34
16	18	44	36
17	28	45	28
18	39	46	31
19	12	47	29
20	27	48	21
21	33	49	30

TABLE 28--Continued

Subject	Score	Subject	Score
22	34	50	11
23	27	51	32
24	17	52	36
25	34	53	30
26	29	54	31
27	33	55	25
28	22	56	26
		57	26
	Permissive		
1	34	28	33
2	19	29	34
3	39	30	36
4	38	31	39
5	28	32	28
6	37	33	19
7	35	34	38
8	28	35	33
9	38	36	24
10	30	37	33
11	37	38	29
12	35	39	37
13	39	40	36
14	25	41	38
15	34	42	37
16	19	43	34
17	35	44	41
18	16	45	37
19	29	46	27
20	35	47	24
21	32	48	17
22	38	49	37
23	34	50	27
24	36	51	36
25	26	52	32
26	24	53	27
27	31	54	33
	Non-Achieving		
1	34	29	28
2	40	30	32

TABLE 28--Continued

Subject	Score	Subject	Score
3	21	31	14
4	18	32	29
5	28	33	33
6	37	34	30
7	29	35	33
8	15	36	34
9	21	37	34
10	24	38	25
11	31	39	26
12	32	40	31
13	35	41	32
14	31	42	18
15	28	43	25
16	30	44	28
17	27	45	26
18	21	46	32
19	29	47	31
20	36	48	29
21	26	49	31
22	34	50	22
23	18	51	27
24	25	52	18
25	32	53	45
26	35	54	18
27	25	55	24
28	28	56	20

TABLE 29

TEST SCORES ACCORDING TO SEX

CONTROL GROUP

Male

Subject	Score	Subject	Score
1	35	18	34
2	36	19	18
3	38	20	13
4	27	21	24
5	35	22	20
6	34	23	20
7	19	24	17
8	23	25	30
9	31	26	34
10	30	27	33
11	35	28	33
12	25	29	32
13	28	30	38
14	23	31	31
15	30	32	24
16	34	33	36
17	40		

Female

1	35	14	33
2	26	15	35
3	27	16	16
4	39	17	34
5	21	18	30
6	30	19	23
7	30	20	32
8	32	21	35
9	27	22	24
10	16	23	27
11	32	24	20
12	31	25	28
13	20		

TABLE 29--Continued

AFFECT GROUP

Male

Subject	Score	Subject	Score
1	32	12	16
2	12	13	18
3	23	14	37
4	33	15	18
5	27	16	27
6	37	17	25
7	17	18	38
8	36	19	24
9	25	20	33
10	27	21	32
11	35	22	22

Female

1	31	19	11
2	32	20	29
3	31	21	37
4	31	22	21
5	34	23	40
6	33	24	31
7	36	25	27
8	36	26	32
9	28	27	35
10	32	28	30
11	37	29	31
12	31	30	30
13	33	31	32
14	26	32	33
15	14	33	25
16	30	34	14
17	39	35	24
18	29	36	36

TABLE 29--Continued

Subject	Score	Subject	Score
REASONS GROUP			
Male			
1	36	13	34
2	28	14	34
3	34	15	32
4	25	16	24
5	21	17	33
6	25	18	29
7	21	19	29
8	44	20	26
9	37	21	28
10	39	22	29
11	12	23	21
12	33	24	30
Female			
1	34	18	30
2	29	19	26
3	27	20	32
4	30	21	30
5	32	22	34
6	18	23	36
7	18	24	31
8	27	25	11
9	27	26	32
10	17	27	36
11	29	28	32
12	33	29	30
13	22	30	31
14	29	31	25
15	32	32	26
16	34	33	26
17	27		
PERMISSIVE GROUP			
Male			
1	39	14	33

TABLE 29--Continued

Subject	Score	Subject	Score
2	38	15	29
3	35	16	38
4	28	17	37
5	37	18	37
6	25	19	27
7	34	20	24
8	16	21	17
9	35	22	36
10	38	23	32
11	26	24	27
12	24	25	33
13	36		
	Female		
1	34	16	33
2	19	17	34
3	28	18	39
4	37	19	28
5	38	20	19
6	30	21	38
7	35	22	33
8	39	23	24
9	19	24	37
10	35	25	36
11	29	26	34
12	32	27	41
13	34	28	37
14	36	29	27
15	31		
	NON-ACHIEVING GROUP		
	Male		
1	34	18	33
2	18	19	34
3	29	20	34
4	24	21	25
5	32	22	26
6	35	23	31

TABLE 29--Continued

Subject	Score	Subject	Score
7	31	24	32
8	30	25	18
9	27	26	25
10	21	27	26
11	36	28	31
12	26	29	29
13	18	30	22
14	32	31	27
15	35	32	18
16	32	33	45
17	14	34	24
		Female	
1	40	12	25
2	21	13	28
3	28	14	28
4	32	15	29
5	15	16	33
6	21	17	30
7	31	18	28
8	28	19	32
9	29	20	31
10	34	21	18
11	25	22	20

TABLE 30

TEST QUARTILE PERFORMANCE ON THE BASIS OF ANXIETY LEVEL

Anxiety Level	Q_1	Q_2	Q_3	Q_4	Totals
CONTROL GROUP					
Low	2	1	1	1	5
Medium	8	7	7	3	25
High	1	1	6	3	11
Totals	11	9	14	7	41
AFFECT GROUP					
Low	2	3	1	1	7
Medium	12	9	6	4	31
High	2	2	6	1	11
Totals	16	14	13	6	49
REASONS GROUP					
Low	3	4	2	1	10
Medium	6	8	12	2	28
High	3	4	4	1	12
Totals	12	16	18	4	50
PERMISSIVE GROUP					
Low	1	3	4	2	10
Medium	11	6	11	1	29
High	1	1	1	3	6
Totals	13	10	16	6	45

TABLE 30--Continued

NON-ACHIEVING GROUP					
Anxiety Level	Q_1	Q_2	Q_3	Q_4	Totals
Low	3	3	1	1	8
Medium	9	11	6	2	28
High	1	0	5	1	7
Totals	13	14	12	4	43

APPENDIX B

TABLE 31

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG GROUPS IN SCHOLASTIC APTITUDE
ANALYSIS OF VARIANCE COMPLETELY RANDOMIZED DESIGN

Degrees of Freedom	Sum of Squares	Mean Square
Total 258	4800.42000	
Treatment 4	43.05000	10.76250
Error 254	4757.37000	18.72980

Summary Table

Sources of Variation	N	Mean	Variance	SD	ISE Mean	PSE Mean
Control	54	20.11111	23.08177	4.8043	.65378	.58893
Affect	51	21.21568	18.73256	4.3281	.60650	.60601
Reasons	51	20.31372	20.89962	4.5716	.64015	.60601
Permissive	53	20.96226	14.42163	3.7975	.52163	.59446
Non-Achieving	50	20.70000	16.37755	4.0469	.57232	.61204

To Test Treatments F = .574 Non-significant at .05 level

TABLE 32

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG GROUPS IN SCHOLASTIC APTITUDE
ANALYSIS OF VARIANCE COMPLETELY RANDOMIZED DESIGN
(FEMALE SAMPLE)

Degrees of Freedom	Sum of Squares	Mean Square
Total 137	2750.03700	
Treatment 4	67.80100	16.95025
Error 133	2682.23600	20.16718

Summary Table

Groups	N	Mean	Variance	SD	ISE Mean	PSE Mean
One (C)	25	19.60000	21.33333	4.6188	.92376	.89815
Two (E_1)	32	21.15625	34.71674	5.8920	1.04158	.79386
Three (E_2)	30	19.83333	16.35058	4.0435	.73825	.81900

TABLE 32--Continued

Groups	N	Mean	Variance	SD	ISE Mean	PSE Mean
Four (E_3)	29	20.79310	10.09853	3.1778	.59010	.83391
Five (E_4)	22	19.36363	16.05195	4.0064	.85418	.95743

To Test Treatments F = .840
Non-significant at .05 level

TABLE 33

TEST OF SIGNIFICANCE OF DIFFERENCE AMONG GROUPS IN SCHOLASTIC APTITUDE
ANALYSIS OF VARIANCE COMPLETELY RANDOMIZED DESIGN
(MALE SAMPLE)

Degrees of Freedom	Sum of Squares	Mean Square
Total 120	2437.96700	
Treatment 4	32.52500	8.13125
Error 116	2405.44200	20.73656

Summary Table

Groups	N	Mean	Variance	SD	ISE Mean	PSE Mean
One (C)	29	20.55172	24.97046	4.9970	.92792	.84560
Two (E_1)	19	20.26315	16.20468	4.0255	.92351	1.04470
Three (E_2)	21	21.00000	27.70000	5.2630	1.14849	.99370

TABLE 33--Continued

Groups	N	Mean	Variance	SD	ISE Mean	PSE Mean
Four (E_3)	24	21.16666	20.23191	4.4979	.91814	.92952
Five (E_4)	28	21.75000	14.63888	3.8260	.72306	.86057

To Test Treatments F = .475
Non-significant at .05 level

APPENDIX C

TABLE 34

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE FOR GROUPS

Groups	Variance	F
C	53.75438	1.0558
vs		
E_1	50.91501	
C	53.75438	1.3914
vs		
E_2	38.63408	
C	53.75438	1.3626
vs		
E_3	39.44830	
C	53.75438	1.3848
vs		
E_4	38.81560	
E_1	50.91501	1.2907
vs		
E_3	39.44830	
E_3	39.44830	1.0211
vs		
E_2	38.63408	

TABLE 35

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE FOR MALE GROUPS

Groups	Variance	F
C	67.27275	1.1266
vs E_1	59.71428	
C	67.27275	1.4049
vs E_2	47.88408	
C	67.27275	1.5479
vs E_3	43.44000	
C	67.27275	1.5569
vs E_4	43.20857	
E_1	59.71428	1.3746
vs E_3	43.44000	
E_2	47.88408	1.1023
vs E_3	43.44000	

TABLE 36

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE FOR FEMALE GROUPS

Groups	Variance	F
C	37.94333	1.1468
vs		
E_1	43.51351	
C	37.94333	1.1602
vs		
E_2	32.70456	
C	37.94333	1.0277
vs		
E_3	36.92121	
C	37.94333	1.1295
vs		
E_4	33.59309	
E_1	43.51351	1.1786
vs		
E_3	36.92121	
E_3	36.92121	1.1289
vs		
E_2	32.70456	

TABLE 37

APPLICATION OF F TESTS FOR HOMOGENEITY OF VARIANCE AMONG GROUPS ON THE BASIS OF ANXIETY LEVEL

Groups	Anxiety Level	Variance	F
C	Medium-Low	73.41	1.253
	High	58.60	
E_1	Medium-Low	68.51	1.328
	High	51.60	
E_2	Medium-Low	32.27	2.028
	High	65.45	
E_3	Medium-Low	84.79	1.094
	High	77.48	
E_4	Medium-Low	44.54	1.115
	High	49.67	

APPENDIX D

TABLE 38

CHI-SQUARE FREQUENCIES ACCORDING TO SEX ON THE BASIS OF ANXIETY LEVEL

CONTROL GROUP

	Low	Medium	High	Total
Male	3	13	6	22
Female	2	12	5	19
Totals	5	25	11	41

X^2 = .112 df = 1 Non-significant 0.05 level

AFFECT GROUP

Male	2	10	4	16
Female	5	21	7	33
Totals	7	31	11	49

X^2 = 0.127 df = 1 Non-significant 0.05 level

REASONS GROUP

Male	4	12	7	23
Female	6	16	5	27
Totals	10	28	12	50

X^2 = .991 df = 1 Non-significant 0.05 level

TABLE 38--Continued

PERMISSIVE GROUP

	Low	Medium	High	Total
Male	6	12	3	21
Female	4	17	3	24
Totals	10	29	6	45

X^2 = 1.174 df = 1 Non-significant 0.05 level

NON-ACHIEVING GROUP

Male	7	17	5	29
Female	1	11	2	14
Totals	8	28	7	43

X^2 = 2.085 df = 1 Non-significent 0.05 level

TABLE 39

CHI-SQUARE FREQUENCIES OF SUBJECTS COMMENTING ON THE BASIS OF SEX

AFFECT GROUP

	Commenting	Not Commenting	Totals	Percent Commenting
Male	7	15	22	.32
Female	21	15	36	.58
Totals	28	30	58	.48

$X^2 = 3.83$ df = 1 Non-significant at 0.05 level
Note: Required X^2 for significance - 3.84 P.05

REASONS GROUP

Male	5	19	24	.21
Female	12	21	33	.36
Totals	17	40	57	.30

$X^2 = 0.95$ df = 1 Non-significant at 0.05 level

PERMISSIVE GROUP

Male	9	16	25	.36
Female	18	11	29	.62
Totals	27	27	54	.50

$X^2 = 3.64$ df = 1 Non-significant at 0.05 level
Note: Required X^2 for significance = 3.84 P.05

TABLE 40

CHI-SQUARE FREQUENCIES OF SUBJECTS COMMENTING ON THE BASIS OF AGE LEVEL

AFFECT GROUP

Age Level	Commenting	Not Commenting	Totals	Percent Commenting
18-20	21	19	40	.53
21-23	3	7	10	.30
Totals	24	26	50	.48

$X^2 = 1.88$ df = 1 Non-significant at 0.05 level

REASONS GROUP

18-20	13	35	48	.27
21-23	3	4	4	.43
Totals	16	39	39	.29

$X^2 = 1.522$ df = 1 Non-significant at 0.05 level

PERMISSIVE GROUP

19-20	24	19	43	.55
21-23	4	3	7	.57
Totals	28	22	50	.56

$X^2 = .193$ df = 1 Non-significant at 0.05 level

TABLE 41

FREQUENCY DISTRIBUTION OF COMMENTS MADE BY INDIVIDUAL SUBJECTS ACCORDING TO ANXIETY LEVEL

	AFFECT GROUP		
	Anxiety Level		
Subject	Low	Medium	High
1	4	5	16
2	3	19	8
3		8	12
4		6	19
5		8	42
6		2	16
7		9	8
8		7	9
9		6	11
10			26
11			
Total	7	60	167
	REASONS GROUP		
1	3	8	16
2		4	19
3		9	18
4		6	15
5		4	22
6			8
7			14
8			22
9			11
Total	3	31	146

TABLE 41--Continued

PERMISSIVE GROUP

	Anxiety Level		
Subject	Low	Medium	High
1	2	8	12
2	6	2	18
3	1	11	21
4	3	4	32
5			16
6			11
Total	12	25	110