1970

The Influence of Trait and State Anxiety Upon the Performance of a Novel Gross Motor Task Under Conditions of Competition and Audience.

Robert Lee Slevin
Louisiana State University and Agricultural & Mechanical College

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THE INFLUENCE OF TRAIT AND STATE ANXIETY
UPON THE PERFORMANCE OF A NOVEL GROSS
MOTOR TASK UNDER CONDITIONS OF COMPETITION
AND AUDIENCE.

The Louisiana State University and Agricultural
and Mechanical College, Ed.D., 1970
Education, physical

University Microfilms, Inc., Ann Arbor, Michigan

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THE INFLUENCE OF TRAIT AND STATE ANXIETY
UPON THE PERFORMANCE OF A NOVEL GROSS
MOTOR TASK UNDER CONDITIONS OF
COMPETITION AND AUDIENCE

A Dissertation

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

in

The Department of Health, Physical, and Recreation Education

by

Robert Lee Slevin
B. S., Ball State University, 1960
M. S., Baylor University, 1962
May, 1970
To my wife Kathy and my parents for their encouragement and inspiration.
ACKNOWLEDGMENTS

The author would like to express his sincere appreciation to his major professor, Dr. Jack K. Nelson, for his guidance and effort throughout this study. Gratitude is extended to Dr. Francis A. Drury, Dr. M. Elizabeth Moore, Dr. Helen E. Fant and Dr. Mary L. Life for their assistance as members of the advisory committee.

Special indebtedness is extended also to Dr. Charles D. Spielberger, Florida State University, for permission to use the State-Trait Anxiety Inventory.

Appreciation is extended to Dr. Barton R. Farthing and Dr. Prentiss E. Schilling and Dr. Sam Adams for their technical assistance in the statistical procedures.
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ABSTRACT

The main purpose of this study was to analyze the effects of trait and state-anxiety upon the performance of a novel gross motor task requiring both speed and accuracy under four experimental conditions involving competition and the presence of an audience. The secondary purpose was to determine the relationships among trait-anxiety scores, state-anxiety scores and performance task scores.

Eighty male high school students who were non-varsity athletes at Baton Rouge and Lee High Schools in Baton Rouge, Louisiana volunteered as subjects for this study conducted during the 1969-1970 academic year. Based on scores achieved on the STAI A-Trait Anxiety Scale two groups consisting of forty subjects per group were formed: a high-trait anxiety group and a low-trait anxiety group.

Each of the subjects in the two trait-anxiety groups executed a modified fencing lunge and recovery task requiring both speed and accuracy in a thirty second time period following a counter-balanced schedule of the experimental conditions. The experimental conditions were as follows: Experimental
Condition Number One (absence of competition and absence of audience); Experimental Condition Number Two (absence of competition and presence of audience); Experimental Condition Number Three (presence of competition and absence of audience); and Experimental Condition Number Four (presence of competition and presence of audience).

A completely randomized two-by-two split-plot factorial analysis of variance was used to compare both the state-anxiety scores and performance task scores achieved under the four experimental conditions.

Pearson Product-Moment correlation coefficients were computed to investigate the relationships among trait-anxiety scores, state-anxiety scores and performance task scores under each of the four experimental conditions.

The findings of this study were as follows:

1. The high-trait anxiety group responded with significantly higher state-anxiety scores throughout the four experimental conditions than the low-trait anxiety group.

2. The low-trait anxiety group performed significantly better under all of the different experimental conditions than did the high-trait anxiety group.

3. Performing in the absence of an audience brought about higher state-anxiety prior to performance than did the conditions with the presence of an audience.
4. Competition did not produce higher state-anxiety prior to performance than the absence of competition, however the presence of competition resulted in significantly better performance task scores.

5. A significant interaction was found between the effects of competition and the effects of audience on performance task scores in that the superiority of competition over no-competition was much greater under the conditions of no-audience than when performing in the presence of an audience.

6. A significant relationship was found between trait-anxiety and state-anxiety. Generally, a significant negative relationship was evidenced between trait-anxiety and performance.

Within the limits of this study the following conclusions were justified:

1. Apparently high-trait anxious persons perform more poorly than low-trait anxious persons on novel gross motor tasks.

2. Competition generally results in better performance than no competition.

3. Trait-anxiety is related to state-anxiety and although state-anxiety varies under different performance conditions the same general relationship between trait and state-anxiety exists.
CHAPTER I

INTRODUCTION

In the past ten years there has been an increase in both the quality and quantity of research conducted in the area of human motor performance. The related disciplines of psychology, physiology, neurology, anatomy, kinesiology, philosophy, sociology, anthropology and history have provided vital information necessary for utilization by research personnel in the study of motor performance. For example, research and investigation in the areas of motivation and perception by social psychologists, physiological psychologists and clinical psychologists has provided information relative to the following aspects of motor performance: (1) attitudes toward participation in physical activities by peers and adults; (2) relationships among motivation, stress, anxiety, tension and vigorous activity; (3) development of a healthy personality through study of self-concept and body-image; and (4) relationships among motivation, human perception, values of competition and the teaching-learning situation in physical activities and sports.

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Within the past twenty years there has been a tremendous increase in the amount of scientific research conducted in the area of human anxiety. Prior to 1950, most of the experimental work concerning fear, frustration, and conflict was primarily limited to the study of animals as evidenced by the works of Liddell, Gantt, Masserman, Miller, and Mowrer.

Anxiety has been recognized as one of the most pervasive psychological phenomena of our time, and as a result, there has been much ambiguity in both its definition and in its method of measurement.

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Freud classified anxiety into such categories as reality, neurotic and moral. Other classifications of anxiety have been given such terms as situational, characterological, bound, free floating, conscious and unconscious, harm, failure and manifest. A review of the literature indicates that the classification of anxiety depends upon the theoretical concept dictated by that investigator.

In their investigations of anxiety, Cattell and Scheier identified two distinct anxiety factors which they termed as trait-anxiety and state-anxiety. The trait-anxiety factor was considered to be a relatively permanent personality characteristic. The state-anxiety factor was considered to be a transitory state of the organism that fluctuated over time. Cattell and Scheier believed it was possible to produce a maximum distinction between these two anxiety factors through a discriminate function analysis of these two variables.

From a physiological standpoint a similarity exists between the consideration of anxiety

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11Ibid., p. 182.
as a trait factor and as a state factor. Significant relationships were found between high trait and high state anxiety factors and poor body coordination, slower reaction time, smaller total body size and smaller bulk of muscle, poor muscular performance, rapid galvanic skin response conditioning, tremor and high hippuric acid excretion.\textsuperscript{12}

Investigations in the study of trait-anxiety have utilized the Taylor Manifest Anxiety Scale (TMAS) as one of the measuring instruments for the identification of subjects with different levels of anxiety intensity. The Taylor Manifest Anxiety Scale,\textsuperscript{13} developed by Janet Taylor in 1953, consists of direct self-reports of the conscious behavior by the individual.

Taylor\textsuperscript{14} and Spence\textsuperscript{15} proposed a Drive Theory, which purported that low-anxious subjects would be superior in performance on complex tasks to the high-anxious subjects because the competing error tendencies

\textsuperscript{12}Ibid., p. 240.


were stronger than the correct response tendencies. The high-anxious subjects would be superior in performance to the low-anxious subjects on tasks involving greater correct response tendencies than error tendencies.

According to McReynolds,\textsuperscript{16} there is some doubt as to whether the Taylor Manifest Anxiety Scale measures anxiety proneness or existent anxiety, or perhaps both factors.

Spielberger, Gorsuch and Lushene\textsuperscript{17} have proposed their theoretical conception of anxiety (Trait-State Anxiety Theory) in which they distinguished the relationship between state-anxiety and trait-anxiety. They defined state-anxiety as "subjective, consciously perceived feelings of apprehension and tension accompanied by or associated with activation or arousal of the autonomic nervous system."\textsuperscript{18}

Trait-anxiety referred to the "relatively stable individual differences in anxiety proneness, that is,


\textsuperscript{17}Spielberger, op. cit., p. 16.

\textsuperscript{18}Ibid., p. 17.
to differences between people in the tendency to respond to situations perceived as threatening with elevations in A-State intensity."19

Spielberger, Gorsuch and Lushene20 have developed a self-reporting inventory scale known as the State-Trait Anxiety Inventory (STAI). The inventory consists of the measurement of the two distinct anxiety concepts: state-anxiety (A-State) and trait-anxiety (A-Trait). Norms have been developed for college freshmen, undergraduate college students, high school students, neuropsychiatric patients, general medical and surgical patients, and young prisoners.

The State-Trait Anxiety Inventory (STAI) was selected for use in this study because of the following research findings reported by Spielberger, Gorsuch and Lushene:

1. Alpha reliabilities ranging from .80 to .85 were found when the A-State and A-Trait Scales were administered under non-stress conditions.

2. The administration of the A-State Scale under conditions of psychological stress yielded alpha reliabilities ranging from .90 to .95.


20 Ibid.
3. Sufficient evidence exists as to the concurrent validity of both the A-State and A-Trait Scales. Items contained in both scales had high item remainder correlations with the total scale.

4. The A-State and A-Trait Scales may be given individually or in a group setting.

5. The STAI is feasible from an administrative viewpoint.

6. The less educated and emotionally disturbed may take either scale without too much difficulty.

7. The A-State Scale is sensitive to the conditions under which it is administered and thus can be used repeatedly.

8. Availability of norms enables scores to be compared with selected reference groups.
I. STATEMENT OF THE PROBLEM

According to Cratty,21,22,23 Singer,24 Oxendine,25 Lord,26 Lawther,27 Scott,28 and Fleishman,29 there is a tremendous need for research concerning the effects of emotion, motivation, stress, tension and anxiety upon the performance of fine, gross, and novel motor tasks related to physical education activities.

27Lawther, op. cit., pp. 103-122.
Studies that have been conducted in the area of anxiety and motor performance have primarily used college students as subjects and have focused on skills not directly related to physical education activities. Relatively little research has been done in this area with secondary school subjects. Research is needed concerning the level of anxiety before the performance of motor tasks under both competitive and non-competitive conditions. The effects of an active audience as it relates to an individual's emotional level before, during and after performance may also be worthy of investigation.

This study attempted to increase and extend the present state of knowledge concerning the influence and relationship of state-anxiety and trait-anxiety to performance on a gross motor task under motivational conditions involving competition and audience.

II. PURPOSES OF THE STUDY

The main purpose of this study was to analyze the effects of trait and state-anxiety upon the performance of a novel gross motor task requiring both speed and accuracy under four experimental conditions involving competition and the presence of an audience.

The secondary purpose of this study was to determine the relationships among trait-anxiety scores, state-anxiety scores and performance task scores.
III. DELIMITATIONS OF THE STUDY

The delimitations of this study were:

1. This study was delimited to the use of eighty subjects who were high school students enrolled in their junior year at Baton Rouge and Lee High Schools, Baton Rouge, Louisiana.

2. Only one gross motor task was used involving a modified fencing lunge and recovery task requiring both speed and accuracy.

3. The subjects performed the novel gross motor task for only thirty seconds a day for four consecutive days under four experimental conditions.

4. Only two motivational conditions were employed: competition and audience.

IV. LIMITATIONS OF THE STUDY

The limitations of the study were:

1. The subjects who participated in this study were naive to the novel gross motor task and were asked not to engage in any practice of the task outside of the experimental program. There was no way for the investigator to control this factor.

2. Complete control of the subjects motivation was not possible. However, it was assumed that the interest and motivation exhibited was genuine since the subjects were all volunteers.
V. DEFINITION OF TERMS

The terms basic to this study were defined as follows:

**State-Trait Anxiety Inventory (STAI).** This term referred to the instrument that measured the two distinct anxiety concepts, namely state-anxiety (A-State) and trait-anxiety (A-Trait). During the investigation it was referred to the subjects as the Self-Evaluation Questionnaire.

**Trait-anxiety (A-Trait).** This term defined the relatively, stable, behavioral, disposition characteristic in anxiety proneness.

**State-anxiety (A-State).** This term defined the transitory, emotional, behavioral characteristic of anxiety that fluctuates and varies in intensity over a period of time.

**High-trait anxious.** This term referred to the subjects classified as being high-trait anxious according to scores of 49 or higher on the STAI A-Trait Scale.
Low-trait anxious. This term referred to the subjects classified as being low-trait anxious according to scores of 41 or lower on the STAI A-Trait Scale.

High-state anxious. This term referred to the subjects classified as responding with a high state of anxiety intensity on the basis of scores achieved on the STAI A-State Scale.

Low-state anxious. This term referred to the subjects classified as responding with a low state of anxiety intensity on the basis of scores achieved on the STAI A-State Scale.

Performance task. The novel gross motor skill that consisted of a modified fencing lunge and recovery task requiring both speed and accuracy in a thirty second time period under four experimental conditions. The scores for this task were the number of times each subject correctly hit the target in thirty seconds.

Active audience. This term described the male peer students who attempted to verbally encourage and discourage the performers under the experimental conditions requiring spectators. The spectators that comprised the active audience did not participate as subjects in the execution of the performance task.
CHAPTER II

REVIEW OF LITERATURE

The review of literature was presented under four main headings: (1) Studies Related to Spielberger's State-Trait Anxiety Theory; (2) Studies Concerning the Relationship of Anxiety Levels and Performance of Various Motor Tasks; (3) Studies Related to the Comparative Effectiveness of Various Competitive Conditions; and (4) Studies Related to the Effects of Audience Upon the Performance of Various Motor Tasks.

I. STUDIES RELATED TO SPIELBERGER'S STATE-TRAIT ANXIETY THEORY

Johnson and Spielberger\(^1\) in their study tested the hypothesis that a muscle relaxation training procedure would reduce measures of state-anxiety and that measures of trait-anxiety would remain stable during the experimental procedures. Forty-eight male

Caucasian hospitalized psychiatric patients ranging in age from twenty-five through fifty-five served as subjects. Measures of state and trait anxiety were administered before and after each ten minute session of muscle relaxation training. There were two experimental sessions conducted separated by a six to ten day interval. During the first session, the subjects were administered the Taylor Manifest Anxiety Scale and the Affect Adjective Check List - G Scales in determining A-Trait measures. Heart rate, systolic blood pressure and a modification of the Affect Adjective Check List served as measures of state-anxiety. Subjects were then given instructions and practiced the tensing and relaxing of various muscle groups. Six to ten days later the second experimental session was conducted. The results of the study indicated that systolic blood pressure, heart rate and state-anxiety decline significantly in the procedures of muscle relaxation training. Measures of Taylor Manifest Anxiety Scale and Affect Adjective Check List - G were unaffected by the experimental procedures. Spielberger's hypothesis was accepted and it was concluded that both state and trait measures were separate and distinct constructs.

O'Neil, Spielberger and Hansen investigated the relationship between state anxiety and performance on a
computer-assisted learning task. Twenty-nine undergraduate students (sixteen males, thirteen females) who were enrolled in an introductory psychology course were administered both scales of the State-Trait Anxiety Inventory (STAI). The performance task involved the manipulation of a Computer-Assisted Instruction typewriter controlled by an IBM 1440 System.

The performance task was divided into two periods: (1) a difficult performance period whereby all the subjects attempted to solve mathematical properties of complex numbers, and (2) an easy performance period in which the subjects attempted to solve compound fraction problems. The subjects progressed from the difficult performance period to the easy performance period.

The results of the study indicated that in the difficult performance period there was increased systolic blood pressure and STAI state-anxiety scores. During the easy performance period both the STAI state-anxiety and systolic blood pressure decreased. More errors were committed by subjects with high-state anxiety scores on the difficult materials than low state-anxious students. There were no differences in the

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STAI A-State score between the male and female subjects. Male subjects had significantly higher systolic blood pressure readings than the female subjects. Both male and female subjects obtained systolic blood pressure readings that were significantly higher immediately after the difficult performance period.

Two follow-up studies on the performance of the computer-assisted learning task by high and low-trait anxious subjects were carried out by O'Neil, Hansen and Spielberger and O'Neil. In their investigation, O'Neil, Hansen and Spielberger reported that high-trait anxious subjects had significantly higher state-anxiety scores than low-trait anxious subjects during the experiment. Performance was impaired on the difficult materials by high-state anxious subjects in comparison to the low-state-anxious subjects.

O'Neil utilized female college undergraduates in his investigation. The more difficult learning materials of the task evoked higher state-anxiety levels than the easier learning materials. Subjects with high-state anxiety scores made more errors on the learning task than low-state anxious subjects.

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Hodges and Spielberger investigated the relationship between measures of state and trait anxiety and performance on a modified Digits Backwards Task.\textsuperscript{5}

Seventy-two male undergraduate students enrolled in an introductory psychology course were measured for A-Trait by the Taylor Manifest Anxiety Scale to discriminate between the high and low trait anxious subjects. The Zuckerman Affect Adjective Check List (ZAACL) was administered to all the subjects before the experiment and it served as their A-State score. Each subject was assigned either to the failure (stress) condition or the control (non-stress) condition. Subjects who performed in the failure condition were told that their performance could be better and that the other subjects were performing more effectively. In the control condition the subjects were told that their performance was effective and that the task was just as easy as that part completed. Each subject performed the Digits Backward Task six times. His performance score consisted of the number of correctly reproduced series of digits. After the task all subjects were administered the ZAACL which asked the subjects how they felt while performing the task. The findings of the study revealed that subjects in the failure condition had a significant

decrement in performance and suggested that elevations in state-anxiety were responsible. The high trait-anxious subjects under conditions of failure-stress were disposed to manifest high levels of state-anxiety which was consistent with the Trait-State Anxiety Theory by Spielberger, Gorsuch and Lushene.

Hall assessed the effects of state-anxiety upon the performance of a programmed learning task. One hundred fifty-six male high school seniors served as subjects. Stress and non-stress instructional conditions were randomly assigned to subjects with either high or low scores on the STAI-A-Trait Scale. The learning task consisted of "difficult" materials and "easy" materials. During the learning task each subject was administered the STAI A-State Scale.

The results of the study revealed that subjects recorded higher mean state-anxiety scores on the more difficult materials than the easy materials. Low state-anxious subjects performed at a more superior level than high state-anxious subjects throughout the programmed learning task. Of significance was the result that higher levels of state-anxiety were revealed during the non-stress instructional conditions than in the stress instructional conditions.

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6B. Hall, "Anxiety, Stress, Task Difficulty and Achievement Via Programmed Instruction" (Unpublished manuscript, Florida State University, Tallahassee, 1969).
Sachs and Diesenhaus\(^7\) compared the effects of stress and order of examination administration on measures of state and trait-anxiety. The STAI A-State Scale was administered twice to each of the undergraduate college students serving in the study. The first administration was given at the first class meeting of the academic term (non-stress condition). The students were administered the A-State Scale immediately prior to their actual participation in the final course examination (stress condition). Results of the study indicated that the stress condition evoked significantly higher mean state-anxiety scores than the non-stress condition. Through utilization of a counter-balanced order, the A-Trait and A-State Scales were administered twice at the beginning of the academic term. Results indicated that the mean scores of both the A-Trait and A-State Scales were approximately the same regardless of which scale was administered first.

Hodges and Felling\(^8\) investigated the relationship between trait-anxiety and various factors of experimental stress. Two hundred twenty-eight college undergraduates

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\(^7\)D. A. Sachs and H. Diesenhaus, "The Effects of Stress and Order of Administration on Measures of State and Trait Anxiety," (Unpublished manuscript, New Mexico State University, Las Cruces, New Mexico, 1969).

were administered the STAI A-Trait Scale and a "Stressful Situations Questionnaire" (SSQ). The SSQ consisted of forty stressful situations by which the subjects were to rate the degree of apprehension they would display if they were individually involved in each situation.

Significant correlations were found between the STAI A-Trait Scale and the following psychological threats: (1) apprehension about classroom participation, (2) concerns about social and academic failure, and (3) apprehension in dating situations.

Sachs\(^9\) utilized college undergraduate students in the investigation of the relationship between performance scores on a hidden figures test and an embedded figures test with measures of the STAI A-Trait and A-State Scales. It was found that low trait-anxious subjects detected more hidden figures than high trait-anxious subjects. There was no relationship between high or low trait-anxious subjects and their ability to detect embedded figures. Subjects with low state-anxiety scores detected more embedded figures and hidden figures than subjects with high state-anxiety scores.

\(^9\)D.A. Sachs, "The Relationship Between State and Trait Anxiety and the Perception of Embedded Figures and Hidden Patterns," (Unpublished manuscript, New Mexico State University, Las Cruces, 1969).
Lamb examined the effects of public speaking on self-report, physiological, and behavioral measures of anxiety. The subjects were college undergraduate students enrolled in a public speaking course. Heart rate measurements and STAI A-State and A-Trait scores were recorded at four experimental periods: (1) pre-speech rest period, (2) two-minute speech period, (3) post speech period, and a (4) period whereby subjects were instructed to blow up a balloon until it burst. The heart rate measures were very similar in changes over the four experimental periods. The STAI A-Trait scores were not affected by the induced experimental stresses.

The effects of orienting instructions and feedback upon state anxiety levels of college undergraduate students engaged in a word-completion task were investigated by Auerbach. Subjects classified as having high trait anxiety or low trait anxiety according to scores achieved on the STAI A-Trait Scale were told that they would be given an intelligence test (ego-involving instructions) or a practice task (neutral

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instructions). Both the high and low trait anxiety groups were interrupted during the task and were given either "success" or "failure" feedback about their performance.

The results of the study revealed that the state-anxiety scores of the high and low trait-anxiety subjects were not significantly affected by the two types of orienting instructions. The high-trait anxious subjects recorded the largest increases in state anxiety scores while receiving failure feedback.

Graham\(^{12}\) utilized the STAI A-Trait and A-State scales in her investigation with schizophrenic patients serving as subjects. The results of her study indicated that the STAI was very effective in recording the amount of anxiety levels evoked by these patients as they responded to personality tests. However it was further noted that several of the STAI items were not appropriate for paranoid patients.

The emotional and attitudinal changes associated with pregnancy and obstetric complications were investigated by Edwards.\(^{13}\) The STAI A-State Scale was

\(^{12}\)Sharron B. Graham, "The Effects of Two Types of Initial Interviews Upon the State Anxiety of Newly Admitted Schizophrenic Patients" (Unpublished manuscript, University of Pennsylvania, Philadelphia, 1969).

administered to a group of fifty-three women over a seven week period before the date of delivery of the baby. Evaluation of the state-anxiety scales revealed that the pattern of state-anxiety differed between the subjects classified either as abnormal or normal according to data gathered from pregnancy, delivery room, post-mortem records and observable abnormalities of new born infants.

Snake-phobic psychiatric patients served as subjects in Parrino's investigation of the effects of pre-therapy information and the resultant learning outcomes. The subjects who volunteered for this study attended nine therapeutic sessions in an effort to alleviate their emotional fears. The subjects were confronted with the snakes at three sessions. The subjects then participated in three pre-therapy information sessions and three therapy sessions. The STAI A-Trait and A-State Scales were administered to the subject before they entered the confrontation area with the snakes and immediately after the subjects left the confrontation area. It was reported that the state-anxiety scores of the pre-therapy sessions were significantly higher than the state-anxiety scores of the post-therapy sessions. The trait-anxiety scores were unchanged. Parrino interpreted his findings as supporting

the conceptual distinction between state and trait-anxiety as purported by Spielberger et al. since the situational factors in this investigation brought about changes in state-anxiety but not trait-anxiety.

In summary, fourteen studies were reviewed that concerned the State-Trait Anxiety Theory proposed by Spielberger. The findings associated with these studies were:

1. Trait-anxiety and state-anxiety were found to be two separate and distinct variables that can be measured by the State-Trait Anxiety Inventory.

2. Increased state-anxiety reactions tended to increase as the heart rate and systolic blood pressure increased.

3. Subjects classified as high trait-anxious responded with higher levels of state-anxiety intensity in stressful situations than low trait-anxious subjects.

4. High trait-anxious subjects evoked state-anxiety intensity more frequently than low trait-anxious subjects in situations involving threat of failure, interpersonal relationships and evaluation of self-esteem.

5. Low trait-anxious subjects performed more effectively in tasks of a stressful nature than high trait-anxious subjects.
6. Performance was impaired if too intense state-anxiety was displayed by both high and low trait-anxious subjects.

II. STUDIES CONCERNING THE RELATIONSHIP OF ANXIETY LEVELS AND PERFORMANCE OF VARIOUS MOTOR TASKS

For the remainder of Chapter II, subjects classified as high-trait anxious are noted as HTA; subjects classified as moderate-trait anxious are designated as MTA; and subjects classified as low-trait anxious are designated as LTA.

Matarazzo and Matarazzo\textsuperscript{15} investigated the relationship between anxiety levels and pursuit-meter performance. Eighty white male Veterans Administration in-patients ranging in age from eighteen to thirty-seven served as subjects. Based on scores on the Taylor Manifest Anxiety Scale, five anxiety groups were formed. The groups were equated on the basis of the total Wechsler-Bellevue IQ Test, age and education. Each subject performed 20 trials of 20 seconds each followed by a 40 second rest period on the double-disk pursuitmeter. The general finding of the study revealed that the MTA groups tended to be superior in learning.

There was no significant relationship between the performance measures and levels of anxiety.

Meyer and Noble\textsuperscript{16} assessed the performance of learning a verbal maze under varying conditions of muscular induction. The subjects (\(N=40\)) were volunteer male and female undergraduate students rated either high or low anxious as determined by their scores on the Taylor Manifest Anxiety Scale. Twenty of the subjects served as a control group while the other twenty subjects learned a verbal maze while gripping a hand dynamometer. It was concluded that LTA subjects tended to improve, while the performance of the HTA subjects deteriorated.

Longenecker\textsuperscript{17} conducted a study investigating the effects of anxiety and motivation upon perceptual recognition tasks in stressful and non-stressful conditions. Seventy-two male sophomore college students were divided into four equal groups. Subjects were selected as either high-anxious (HA) or low-anxious (LA) subjects based on scores on the Sarason Scale of Test Anxiety. Subjects were also classified as either highly motivated (HM) or lowly motivated (LM) based on Achievement scores on the Edwards Personal Preference Scale.


Schedule and achievement in college grades. The four groups were divided as follows: HA-HM; LA-LM; HA-LM; and LA-HM. Half of the subjects in each group performed the five perceptual recognition tests under stressful conditions and the other half of the subjects performed the same tests under non-stressful conditions. The HA and the HM groups performed significantly better than the LA and LM groups in the non-stressful conditions. In the stressful conditions the LA and LM groups performed significantly better than the HA and HM groups.

Diehl examined the effects of emotional stress upon the motor performance by HTA and LTA subjects. Two hundred high school girls were divided into HTA and LTA groups. Each subject performed a four item motor performance battery without the administration of stress. Stress was later added to the same performance of this motor battery with the subjects under the belief that motion pictures were being taken of their performance which would then be viewed by teachers and students. The results of the study indicated that there was no significant difference in the motor performance of the HTA and LTA groups when under this stress.

Carron\textsuperscript{19} tested the effect of an electric shock stressor upon the performance of HTA and LTA subjects balancing themselves on a stabilometer. Based on scores of the Taylor Manifest Anxiety Scale, 120 college male freshmen served as subjects. Sixty HTA subjects and sixty LTA subjects were assigned either to a control, stress-early, or stress-late group. Each group consisted of twenty HTA and twenty LTA subjects. All subjects were given thirty-five 20-second trials per day for a two day period. The control group performed under no-stress conditions. The stress-early group was given an electric shock stressor on the fourth, fifth and sixth trials. The stress-late group was given an electric shock stressor on the sixty-fifth, sixty-sixth and sixty-seventh trials. The results of the study indicated that stress introduced early did not affect the LTA-stress-early group but the HTA-stress-early group had significantly inferior improvement in performance than the LTA-control and stress-late groups. Both HTA and LTA subjects improved significantly in performance upon removal of the shock stressor.

Shore\textsuperscript{20} investigated the effects of induced muscular effort and manifest anxiety on perceptual

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efficiency. The subjects (N=18) were male undergraduate students enrolled in psychology courses. Based on their scores on the Taylor Manifest Anxiety Scale, three groups of subjects were formed: The HTA Group, the MTA Group, and the LTA Group. The task was to recognize and describe ten experimental targets under six conditions of varied muscular tension induced by the use of a Smedley hand dynamometer. The analysis of the data collected in this study revealed that the HTA Group significantly improved in perceptual efficiency. The LTA Group showed a decrease in perceptual efficiency as the induced muscular tension was increased. The MTA Group showed an increase in efficiency to an optimal level followed by a gradual decline. The general conclusion of this study was that an increase in induced muscular tension facilitates perceptual efficiency until an optimal level is obtained, after which increased muscular tension results in decreased perceptual efficiency.

Shephard and Abbey\(^\text{21}\) explored the relationship between manifest anxiety and performance on a complex perceptual-motor task. Four groups of subjects (N=56) performed two tasks by use of the Toronto Complex

Coordinator. All subjects received similar instructions in performing the two tasks which consisted of movement of an airplane-type control stick. The results of the study indicated that LTA subjects performed at a high level of efficiency and had a lower tendency to make errors than HTA subjects. Each male group performed at a higher level than the corresponding female group.

Grice\textsuperscript{22} utilized two groups of subjects (\(N=60\)) of high and low anxiety as determined by their scores on the Taylor Manifest Anxiety Scale in studying the relationship between discriminative reaction time and intelligence. All of the subjects performed the complex Air Force Discrimination-Reaction-Time Test. Reaction time and incorrect responses were recorded. It was found that the low-trait anxiety group was superior in performance, and that it was attributed to intellectual differences rather than differences in level of anxiety.

Kamin and Clark\textsuperscript{23} compared the relationships between the Taylor Manifest Anxiety Scale, simple reaction time (SRT), and reaction time under the motivated


condition of the avoidance of shock (ART). The subjects (N=67) were all male Canadian Air Force basic trainees ranging in age from seventeen to twenty-eight. All of the subjects were administered the Taylor Manifest Anxiety Scale. Simple reaction time was determined by an audio stimulus by the use of a standard electric chronoscope. Electric shock was administered to the subjects whenever they failed to respond after a designated time lapse when they participated in the ART treatment. Both the SRT and ART treatments consisted of three practice trials and eighteen recorded trials. Analysis of the data collected showed that the higher the score on the Taylor Manifest Anxiety Scale the slower were the SRT and ART scores. The higher the Taylor Manifest Anxiety Scale scores the greater was the increase in speed of SRT to ART treatments.

Carder assessed the relationship between manifest anxiety and performance in college football. Forty freshmen football players served as subjects. All of the subjects were administered the Taylor Manifest Anxiety Scale and three motor ability tests designed to denote potential. Three members of the coaching staff rated the subjects on two scales. One

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scale was comprised of skill ratings in agility, speed, blocking and tackling. The other scale was comprised of the rankings on the total performance which occurred during the regular season. The results of the study indicated no significant relationship between the Taylor Manifest Anxiety Scale scores and total performance, individual skill performance and actualization of football potential.

Peck studied the influence of anxiety upon the performance of volleyball skills. On the basis of the IPAT-Eight Form Parallel Anxiety Battery, thirty-two students were divided into two matched groups. The battery was administered prior to the thirteen class meetings. At the beginning, middle and termination of the meetings the French-Cooper Serve Test and repeated volleys tests were administered. Anxiety was induced through use of verbal and written suggestions by informing subjects that their inferior test performance would lower their final grade. The results indicated that there were no significant correlations between anxiety and test performance. There was a significant improvement in performance on the skill tests.

Hutson\textsuperscript{26} compared the relationship of levels of anxiety to the learning of skills in beginning horseback riding. Six female college undergraduate students served as subjects for the six weekly riding lessons. The case study method was used in gathering information. Questionnaires concerning riding experiences, judgments of riding skill, anecdotal records during riding lessons, a riding knowledge test and four forms of the IPAT-Eight Form Parallel Anxiety Battery were administered to the subjects. The results of the study indicated that a decrease in anxiety occurred for all six subjects between the first and third lessons. At the .01 level of confidence five of the six subjects increased in riding skill from the second lesson to the sixth lesson. As skill increased anxiety level tended to decrease.

Harrington\textsuperscript{27} investigated the effect of manifest anxiety on the performance of a gross motor skill. The eighty-two women who volunteered for the study were administered the Taylor Manifest Anxiety Scale. The subjects were then sub-divided into HTA, MTA and LTA groups. One group performed the balance task by


beginning first with the easy task. The other group performed the balance task by beginning first with the difficult task. The two groups were then sub-divided into HTA, LTA and MTA anxiety levels. All three anxiety levels that comprised the group taking the difficult task first performed significantly better than the group having the easy task first. The MTA and HTA levels of the group taking the difficult task second performed significantly better than those having the difficult task first. There were no significant differences between the LTA levels with regard to presentation.

In summary, two studies related to levels of anxiety upon the performance on a verbal maze and pursuitmeter were reported. One study revealed that subjects with moderate levels of trait-anxiety were superior on pursuitmeter performance to HTA or LTA subjects. The second study indicated that subjects with LTA improved their performance more effectively on a verbal maze than HTA subjects.

Performances on motor tasks under stressful conditions were studied by three investigators. One investigator reported no significant difference in performance between HTA and LTA subjects. One investigator reported that LTA subjects performed significantly better under conditions of early introduced stress than HTA subjects. The third investigator
reported that subjects classified as HTA and highly motivated performed more significantly than LTA and lowly motivated subjects under non-stressful conditions. Under stressful conditions the LTA and lowly motivated subjects performed more significantly than the HTA and highly motivated subjects.

Two studies were conducted comparing the performance of tasks involving perceptual recognition and levels of anxiety. One study reported that HTA subjects performed significantly better than LTA subjects upon the inducement of muscular effort. One study revealed that LTA subjects performed significantly better than HTA subjects on the performance of a complex motor task.

The investigation of reaction time and anxiety levels revealed that LTA subjects had faster reaction times than HTA subjects.

The relationship of trait-anxiety levels and performance on gross motor tasks was investigated in four studies. Two studies reported no significant differences between levels of trait-anxiety and performance of gross motor tasks. One study reported that levels of trait-anxiety decreased as the level of skill increased. One study reported no significant difference between levels of trait-anxiety and the performance of a gross motor skill.
The Taylor Manifest Anxiety Scale, which was the primary instrument for anxiety assessment in the studies reviewed, is considered to be a measure of trait anxiety by the majority of researchers.

III. STUDIES RELATED TO THE COMPARATIVE EFFECTIVENESS OF VARIOUS COMPETITIVE CONDITIONS

In 1962 Nelson\textsuperscript{28} tested 250 college male students for the purpose of determining the effects of various motivational situations as they exercised by use of an elbow-flexor ergograph. The ten motivational situations used in this study were: (1) normal testing instructions; (2) verbal encouragement; (3) individual competition; (4) group competition; (5) obtainable goal; (6) observer's presence; (7) instructor interest; (8) ego-involvement; (9) Air Force Space program; and (10) competition with the Russians.

Nelson reported that competition involving individuals competing against other individuals was very effective as was competition involving individuals against the group. Fictitious competition involving competition with the Russians, Air Force Space program resulted in high performance.

The comparative effects of encouraging reports of success and discouraging reports of failure on output, mechanical efficiency and cardio-respiratory functions were investigated by Ulrich and Burke in 1957. The purpose of the study was to also determine the sex difference in the above functions. Nine men and nine women were tested on a bicycle ergometer on three different occasions. On the first trial the subjects performed under non-motivating conditions. During the second and third trials the investigators introduced a bell and a buzzer to the subjects at pre-planned intervals. The subjects were unaware of this and were instructed that the ringing of the bell indicated that they were setting a new record. The sound of the buzzer indicated to the subjects that they were not performing effectively.

The results of the study indicated that motivational stressors produced greater mechanical efficiency than failure stressors. Men and women did not differ significantly in reactions to the motivational stressor.

Hesse investigated the effects of team competition and self-competition upon a testing situation of the thirty-yard dash and the standing broad jump. Seventy-five subjects involving sixth, eighth, and ninth grade girls were tested and the results indicated that there were no significant differences between the team and self-competition situations. It was indicated that limited generalizations could be drawn due to the small number of subjects and the various extraneous uncontrolled variables.

Strong investigated the effects of six motivating conditions upon the performance of the American Association for Health, Physical Education and Recreation Physical Fitness Test. Four hundred thirty-four sixth grade boys and girls were divided into seven groups. Each group participated against one another under the following motivating conditions: competition with a partner; self-competition; group-competition;

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competition against records; level of aspiration; and
competition against peers of unequal ability. One
group served as a control group. The results of the
study indicated that motivated conditions were better
than non-motivating conditions. The most effective
types of motivation were level of aspiration and team-
competition.

Hansen investigated the influence of several
motive-incentive conditions upon the development of
strength in the elbow flexor muscle group. Seventy-two
college male undergraduates ranging in age from eighteen
to twenty-four volunteered to serve as subjects for a
six week isometric training program. Based on scores
on the initial strength test the subjects were divided
into six equally matched groups. One group served as
a control group and was not assigned a motive-incentive
condition. The five groups were randomly assigned to
one of the following motive-incentive conditions:
(1) team-competition; (2) competition with someone of
near-equal ability; (3) immediate visual knowledge of
results; (4) standardized goals; and (5) subsequent
knowledge of results.

32 Gary Hansen, "Effect of Selected Motive-
Incentive Conditions Upon Development of Strength
Through an Isometric Training Program," Research
The results indicated that all five motive-incentive conditions group made significant gains in strength at the .01 level of confidence. Team-competition and competition with someone of near-equal ability had significantly improved scores over the control groups. The other three motive-incentive groups did not improve significantly over the control group. Hansen concluded that there was no superiority among the five motive-incentives in the development of strength as prescribed in this study.

Stitt33 investigated the effects of competitive type incentives upon the learning and performance of gross motor tasks. Conditions of individual, class, school, and no competitive incentives were employed by junior and senior high school girls while they performed three gross motor tasks. In two of the three tasks individual and class incentives produced better performance than no specific incentive at both the junior and senior high levels. At the junior high level the low and high ability groups maintained their initial relative performance position under individual, class and no-incentive conditions. The school-incentive

condition increased the difference between the high and low ability groups. The performances by the senior high subjects remained unaltered or decreased under the three competitive incentive conditions.

Whittemore\textsuperscript{34} investigated the effects of the influence of rivalry on the performance of a simple task resembling a factory operation and involving both mental and motor capacities. Subjects were eight college males and four college females ranging in ages from twenty-one to thirty-one. The subjects were divided into three groups regardless of sex. Experimental sessions lasted one hour each for two days. The task consisted of printing paragraphs with individual rubber types. Subjects tested under competitive conditions were told, "Try to beat your fellow-workers, remembering that both quality and quantity count in your final score. You may use any method you see fit to employ in keeping track of the progress of your competitors." Under non-competitive conditions the subjects were told, "Try to get as much work done as you can remembering that both the quality and the quantity of the work you do will count in your final score. Don't attempt to beat your fellow-workers."

\textsuperscript{34}Irving C. Whittemore, "The Influence of Competition on Performance: An Experimental Study," Journal of Abnormal and Social Psychology, XIX (October-December, 1924), pp. 236-254.
The findings of the study indicated that the quality of work was inferior under competitive conditions as compared to non-competitive conditions, but more work was produced when the subjects competed than when they performed non-competitively.

In summary, in the literature concerning the effects of competition upon performance, six studies were reviewed that indicated that motivational situations involving competition aided in performance of various tasks. One study reported that the quality of work was inferior under competitive conditions but the quantity of work was superior to the non-competitive conditions. Generally, it was found that competitive conditions in comparison to non-competitive conditions aided the performers who were engaging in gross motor tasks, fitness tests and strength tests.

IV. STUDIES RELATED TO THE EFFECTS OF AUDIENCE UPON THE PERFORMANCE OF VARIOUS MOTOR TASKS

Martens}\textsuperscript{35} investigated the effects of the presence of spectators by high- and low-anxious subjects as they learned and performed a complex motor task. The subjects

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(N=96) were male undergraduate students who were designated as being either HTA or LTA subjects according to scores achieved on the Taylor Manifest Anxiety Scale. The 48 high HTA and 48 LTA subjects participated in the coincident timing task by learning the task alone or in the presence of an audience and performing alone and in the presence of an audience. The audience consisted of ten male undergraduate students unacquainted with the subjects. According to instructions the audience did not provide social reinforcement during the task but were to be attentive but passive. The results revealed that subjects who learned and performed the task in the presence of the audience displayed more within-subject consistency than the subjects who learned before the audience and performed alone. It was found that performance was not affected by the mode of learning. Martens attributed the decrease in drive and performance impairment to the decreased arousal level caused by the removal of the audience. The HTA subjects performed significantly better than LTA subjects.

Singer\textsuperscript{36} tested sixteen college athletes and sixteen college non-athletes in comparing the effects of

spectator presence upon their performance of a novel gross motor task. Each subject was given ten 30-second practice trials at balancing on a stabilometer with only the investigator present. The following day each subject performed three practice trials of the performance task with only the investigator observing. After the completion of the three trials, six spectators consisting of both male and female members observed three more trials of the balancing task. The spectators did not speak but were attentive for each performer. The results of the study revealed that the non-athletes were superior in performance than the athletes when participating in the presence of spectators and when practicing alone.

Abel\(^\text{37}\) utilized two groups of girls of subnormal intelligence levels in her investigation of the influence of social facilitation on a paper and pencil maze task. The subjects (N=74) were all fifteen or sixteen years of age. One group of subjects consisted of thirty-eight girls with an IQ range of 50-59. The other group of subjects was comprised of thirty-six girls with IQ's ranging from 70-79. The paper and pencil maze task consisted of drawing a line around designated

pathways as quickly as possible. The subjects performed twenty trials per session for four sessions. The groups were subdivided into four equal sub-groups whereby they performed alone or in pairs with only the investigator and an assistant in the audience. It was found that performance was more consistent when both groups worked in pairs in comparison to working alone.

Gates\(^{38}\) investigated the effects of an audience upon the performance of a coordination task, color naming, analogies, and word naming. Sixty-two college women served as subjects. One group of subjects performed all the tasks in the presence of the experimenter. The second group of subjects consisted of thirty-six subjects who performed half of the tasks with only the experimenter present and the other half of the tasks in front of an audience consisting of four to six observers. The third group consisted of eleven subjects who performed half of the tasks in front of the experimenter and the last half of the tasks in the presence of an audience ranging in number from twenty-seven to thirty-seven spectators. The tasks consisted of the Three-Hole Coordination Test, the Woodworth-Wells-Color-Naming Test, a form of the Woodworth-Wells Analogies Test and a

vocabulary naming task. Gates concluded that the audience disturbed the more proficient performers while the less proficient performers were aided by the audience. There were no reliable differences in the effects of the presence of one observer and the presence of the two sizes of audience.

Travis\textsuperscript{39} investigated the effects of a small audience upon eye-hand coordination. Twenty-two male undergraduate students served as subjects who performed a pursuit-rotor task with only the experimenter present or in front of an audience. The audience was comprised of eight upperclassmen, an equal number of men and women, who were instructed to be passive but attentive. Travis concluded that the subjects performing in front of an audience made significant performance improvements.

Pessin and Husband\textsuperscript{40} investigated the effects of social stimulation on human maze learning. Ninety male and female undergraduate students served as subjects. The performance task consisted of learning a finger maze under the following experimental conditions:

1. performing the task solely in the presence of the


experimenter; (2) performing task blindfolded in the presence of one or two silent onlookers known to the performers; and (3) performing task with vision allowed but in the presence of one or two silent onlookers. The three groups of subjects consisting each of thirty members performed the task under each of three experimental conditions. Pessin and Husband concluded that the presence of silent observers had no significant effect upon the efficiency of the performance task. However, they pointed out that great variability of performance existed due to learning in the presence of spectators.

Hill and Stevenson investigated the effects of social reinforcement and non-reinforcement and the sex of the experimenter on the performance of a simple motor task by adolescent girls. The subjects were female adolescent residents of a juvenile correctional institution. Forty-eight Negro and forty-eight White girls, averaging approximately sixteen years of age, were randomly selected for this study. The task consisted of manipulating marbles into designated colored holes under two experimental conditions. One condition involved the performance of the task with the experimenter present in a neutral, silent role. The other experimental condition provided the subject with supportive reinforcing statements during the performance.

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task. The experimenters were both Negro and White (male and female) college students. Hill and Stevenson concluded that the adolescent girls performed the task more effectively when verbally reinforced by members of the male sex. Under the non-reinforcement condition, the adolescent girls performed at a higher level when the experimenters were of the same sex. There was no significant difference in the performance of the White and Negro subjects.

Stevenson\textsuperscript{42} investigated the effectiveness of social reinforcement in the performance of a single motor task by children of three different age levels. The 252 boys and 252 girls were selected on the basis of their chronological age and were either placed in the 3-5 years, 6-8 years, and 9-10 years age groups. The task involved manipulating marbles into designated colored holes. The experimenters either were attentive, non-reinforcing or were supportive and made reinforcing statements. The results of the study indicated that at the 3-5 year level that provision of social reinforcement by women experimenters was more effective than the reinforcement by male experimenters. At the 6-8 year level, there was a significant cross-effect between the sex of the experimenter and the sex of the performer. At the 9-10 year level there were no

significant differences between the sex of the experimenter and sex of subjects in the performance of their task.

Noer and Whittaker\textsuperscript{43} utilized twenty-eight undergraduate students in their investigation of the effects of masculine and feminine ego-involvements in the acquisition of a fine motor skill. The fourteen male and fourteen female subjects were divided equally into two groups as they performed the mirror-tracing task. The male and female subjects were told that their performance during the first half of the experiment was inferior to that of the opposite sex and were encouraged to perform more effectively during the last half of the experiment. The results of the study indicated that both males and females performed significantly higher when ego-involved in comparison to subjects who were not ego-involved. There was no significant difference between the ego-threats of either males or females.

In summary, the studies revealed that audience conditions had differing effects upon the performance of various motor tasks. Four studies were conducted with silent, attentive audiences present during the

performance of the tasks. Two of these studies reported that performance was significantly greater when the subjects learned and performed before an audience.

One study revealed that non-athletes were superior in motor task performance than athletes in the presence of a silent, attentive audience. One study reported that a silent, attentive audience had no significant effect upon the performance of a maze task.

Two studies demonstrated that the sex of the spectators had significant effects upon the performance of motor tasks. One study reported that verbal reinforcement by the male sex enabled adolescent girls to perform more effectively. One study revealed the following varying findings of 3-5, 6-8 and 9-10 year age level boys and girls: (1) at the 3-5 year age level boys and girls performed significantly better when socially reinforced by women than men; (2) a significant cross-effect was found between the sex of the performer and the sex of the observers at the 6-8 year age level; and (3) no significant difference was found between the sexes of the performer and the observers at the 9-10 year age level.

One study reported that the presence of an audience aided the less proficient performers and disturbed the more proficient performers. No significant difference was found between the size of the audience and resultant performance. One study revealed that consistent performance was more enhanced when working in
pairs than individually. One study reported that performance was significantly enhanced when the subjects were ego-involved in comparison to non-ego involvement. Generally it was found that a silent, attentive audience enabled performance to be significantly enhanced as well as causing variability in performance. Based on the diversified and limited number of studies dealing with audience it was indicated that the quality of performance was influenced by such factors as: (1) the age level and proficiency of the performer; and (2) the sexes of both the performers and spectators.
CHAPTER III

PROCEDURE OF THE STUDY

I. OVERVIEW

This study was designed to analyze the effects of trait and state-anxiety upon the performance of a novel gross motor task requiring both speed and accuracy under motivational conditions involving competition and audience. According to scores achieved on the STAI A-Trait Scale two trait-anxiety groups were formulated. One group consisted of forty high-trait anxious subjects and a second group consisted of forty low-trait anxious subjects. The STAI A-State Scale was given to each subject prior to his participation under each of the following counterbalanced testing conditions: Experimental Condition Number One (absence of competition and absence of audience); Experimental Condition Number Two (absence of competition and presence of audience); Experimental Condition Number Three (presence of competition and absence of audience); Experimental Condition Number Four (presence of competition and presence of audience). Inferences concerning the effects and relationships among trait-anxiety scores, state-anxiety scores and performance task scores were drawn from statistical analysis.
II. SELECTION OF SUBJECTS

This study was conducted during the fall semester, 1969-1970 at Baton Rouge and Lee High Schools, Baton Rouge, Louisiana. A total of 234 male subjects participated on a voluntary basis during their regularly scheduled physical education classes and at Saturday morning sessions planned by the investigator. The subjects, all non-varsity athletes, were male high school students in their junior year at Baton Rouge and Lee High Schools in Baton Rouge, Louisiana.

While the data from only eighty subjects were used in this study, 234 students were tested on the STAI A-Trait Scale to identify forty subjects classified as being high trait-anxious and forty subjects classified as being low trait-anxious. At Baton Rouge and Lee High Schools 153 and 81 male high school students, respectively, were tested for trait anxiety. Each subject in the high and low trait anxiety groups participated under each of the four experimental conditions.

III. DESCRIPTION OF STATE-TRAIT ANXIETY INVENTORY (STAI)

The State-Trait Anxiety Inventory, developed by Spielberger, Gorsuch and Lushene, consists of two self-reporting scales that measure trait and state-anxiety.
The A-Trait Scale and A-State Scale each contain twenty statements and require about four to five minutes to complete. The subjects rated themselves on a four-point basis for both of the scales. The minimum and maximum scores that can be obtained on either scale are 20 and 80 respectively. Both scales consist of items that are worded in such a way that a high rating indicates low anxiety and the scoring weights are reversed for these items.

The A-Trait Scale (Appendix A) instructs the subject to respond to how he generally felt. The subject then checked one of the following responses for each statement: "Almost never," "Sometimes," "Often," "Almost Always." The non-reversed items on the A-Trait Scale (2, 3, 4, 5, 8, 9, 11, 12, 14, 15, 17, 18, 20) are scored on a 1, 2, 3, 4 point basis. The reversed items (1, 6, 7, 10, 13, 16, 19) are scored on a 4, 3, 2, 1 point basis. According to Spielberger's norms on male high school juniors raw scores of 33, 38 and 44 on the A-Trait Scale were equivalent to the 25th, 50th and 75th percentiles respectively.

The A-State Scale (Appendix B) questions the subject on how he felt knowing that he was to be participating in the various experimental conditions. The subject checked one of the following responses for each statement: "Not at all," "Somewhat," "Moderately"
So, "Very much so." On the A-State Scale the non-reversed items (3, 4, 6, 7, 9, 12, 13, 14, 17, 18) are scored on a 1, 2, 3, 4 point basis. The reversed items (1, 2, 5, 8, 10, 11, 15, 16, 19, 20) are scored on a 4, 3, 2, 1 point basis. Raw scores of 30, 36 and 42 were equivalent to the 25th, 50th and 75th percentiles respectively.

Spielberger has normative data available for college freshmen, undergraduate college students, high school students, neuropsychiatric patients, general medical and surgical patients and prisoners.

IV. DESCRIPTION OF PERFORMANCE

TASK EQUIPMENT

**Target.** A small circular piece of tin, one and one-half inches in diameter served as the target for the novel gross motor task. The gold-colored tin target was attached to the wall by means of magnetic tape.

**French Foil.** A French Foil was used by the subjects in the performance of the modified fencing lunge and recovery task requiring both speed and accuracy in thirty seconds. The blade of the foil was 34-1/2" in length. The handle, exclusive of the pommel, was 5-1/2" in length.

**Stopwatch.** A Select stopwatch was used to time the subjects while they executed the performance task.
V. ADMINISTRATION PROCEDURES FOR THE STAI A-TRAIT SCALE

The same procedures were followed in the administration of the STAI A-Trait Scale to each of the various physical education classes that participated in this study. Due to the nature of this investigation the subjects were not informed of the real purpose of the study. A cover story was contrived that was designed to stimulate interest yet appear to be plausible.

The potential subjects were assembled together during their physical education class periods and the following explanation was given to them concerning the project and their participation. The subjects were told that the American Association for Health, Physical Education and Recreation was sponsoring a research project to determine the effects of emotions upon physical performance under different experimental conditions. Furthermore, that members of the football teams of the Green Bay Packers and Ohio State University, along with members of the 1968 Olympic team, participated in this same investigation thus representing the professional and amateur levels of athletics. The students were told that Baton Rouge and Lee High Schools had been selected for this project and that in this study it would be limited to
only non-varsity athletes. The students were told that the members of Green Bay, Ohio State and the Olympic Team had filled out the Self-Evaluation Questionnaire (STAI) before their participation in the modified fencing lunge and recovery task. These athletes reported that an honest assessment of their emotions before task participation resulted in a significant increase in the quality of their scores obtained on the performance task. The athletes replied truthfully when they stated that they were "anxious," "tense," "worried," "nervous," "self-confident," etc. This point was emphasized in an attempt to elicit true responses from the subjects when they filled out the Self-Evaluation Questionnaire (STAI A-Trait and A-State Scales).

The subjects were asked to participate in this investigation on a voluntary basis. They were assured that the information gathered from the Self-Evaluation Questionnaire would remain in the strictest confidence between the subject and the investigator. The subjects then completed the Self-Evaluation Questionnaire (STAI A-Trait Scale) in the physical education dressing rooms. It took approximately five minutes for each subject to fill out the questionnaire.

Based upon the scores achieved on the A-Trait Scale, the investigator formed two experimental groups. It was originally intended to use norms gathered by
Spielberger from high school juniors in the state of New York as the basis for identifying the high-trait anxious and low-trait anxious subjects. However, inspection of the scores gathered from Baton Rouge and Lee High Schools revealed that the mean trait-anxiety score was 45.23. This was higher than the mean trait-anxiety score of 39.37 reported in Spielberger's norms of male high school juniors. The investigator arbitrarily decided to select scores of 49 or higher to represent the high-trait anxious group. The score of 49 and above on the A-Trait Scale included the top 24 percent of the 234 reported scores. Forty of these subjects were selected. The score of 41 and lower on the A-Trait Scale was arbitrarily selected to represent the low-trait anxious group. The score of 41 and lower represented the bottom 21 percent of the scores reported by the subjects in this study. Forty of these subjects were utilized.

VI. PILOT STUDY

A pilot study was conducted during the fall semester, 1969-1970 at Catholic High School, Baton Rouge, Louisiana. Twenty-one male high school subjects were tested on the performance task using three different sized targets. The order of performance was counterbalanced during the four days of testing. The purpose of the pilot study was three-fold: (1) to determine and refine the administrative procedures that would be
utilized in the main study; (2) to determine the size of the target which would be appropriate for the performance of the novel gross motor task; and (3) to determine if there was a significant improvement in skill performance over the four days of testing.

Analysis of the data collected, using a three part analysis of variance revealed that there was no significant difference in skill performance from the first session through the fourth session on either the one-inch, two-inch or three-inch targets at the .05 level of probability. From the results of the pilot study it was decided by the investigator to use a target, one and one-half inches in diameter for the main study because it was found to be challenging and it resulted in a wide range of scores in each of the four experimental conditions. The investigator decided to counterbalance the experimental conditions so as to negate any possible interaction effects due to sequence of testing.

VII. FAMILIARIZATION PROCEDURES

A one-day familiarization session was conducted in order for the subjects to become accustomed to the desired techniques involved in the modified fencing lunge and recovery task. At this time, the subjects were pre-tested on the performance task which served as a basis for matching the participants for competition.
In addition, this practice enabled the student timers and scorers to familiarize themselves with their prescribed duties.

Instructions were given to each subject with regard to the execution of the performance task. The subject was instructed to grip the foil with his preferred hand so that the base of the thumb was resting against the convex side of the curved handle. The thumb was placed along the left side of the handle. The first and second joints of the index finger supported the grip. The other fingers curved around the handle. The subject then stood at a modified attention position, feet about shoulder width apart, directly facing the wall holding the foil in his preferred hand which was outstretched and at a right angle to the wall. The target was then placed on the wall by magnetic tape where the outstretched foil touched the wall. From this position the subject took one step backward with his lunging-leg a distance of approximately fifteen inches. He then took a step backward with his other leg until they both were relatively the same distance from the target. The subject then held the foil outstretched and facing the target. The non-preferred hand was held at any position desired. Upon hearing the timer's verbal command of "GET READY . . . (a pause of two seconds) . . . BEGIN, the subject attempted to hit the target with the tip of
the foil by lunging forward on the leg on the same side of the body as the preferred hand. He then quickly recovered from the lunge by stepping backward with his lunging leg until it was almost parallel to the stationary non-lunging leg. The subject attempted to hit the target as many times as possible within the thirty second time limit. The emphasis was on both speed and accuracy. At the timer's command of "STOP" the subject's performance was terminated and he was then notified by the scorer as to his score on the performance task. The subject received one point for each time the foil hit the target.

After familiarizing himself with the desired technique of executing the performance task, the subject was then pre-tested once with only the timer, scorer and investigator in the immediate testing area. The pre-test was used to match two subjects with comparable scores to compete against each other simultaneously in Experimental Conditions Numbers Three and Four. During the familiarization process the timers and scorers practiced their duties and were instructed to remain passive and unemotional but attentive to their responsibilities.
VIII. ADMINISTRATION PROCEDURE FOR THE STAI A-STATE SCALE AND PERFORMANCE TASK IN THE FOUR EXPERIMENTAL CONDITIONS

Pre-performance Period

At the beginning of each daily testing session the performing subjects met at an isolated point in the testing area dressed in their standard physical education gym-suits which consisted of tennis shoes, socks, shorts and T-shirt. The subjects were permitted to either stand or sit according to their desires but were to try and relax and perhaps engage in conversation with each other. If the experimental conditions involving an audience were scheduled, the investigator informed the active audience of their duties in another designated spot in the testing area. This was carried out so that the performing subjects could not listen to the instructions given to the audience. The investigator then informed the performing subject(s) as to the experimental condition to be performed. The investigator, timer and scorers were all present under each of the four experimental conditions which were as follows:

Experimental Condition Number One (absence of competition and absence of audience)

The subject executed the performance task by himself without the presence of an active audience.
Experimental Condition Number Two (absence of competition and presence of audience)

The subject executed the performance task by himself in the presence of an active audience consisting of six male peer spectators. Three spectators encouraged the performer during the execution of the motor task and three spectators discouraged his performance (Figure 1).

Experimental Condition Number Three (presence of competition and absence of audience)

Two subjects with comparable pre-performance task scores competed against each other simultaneously without the presence of an active audience (Figure 2).

Experimental Condition Number Four (presence of competition and presence of audience)

Two subjects with comparable pre-performance task scores competed against each other at the same time in the presence of eight male peer spectators. Two spectators encouraged each of the performers and two spectators discouraged each performer during the execution of the performance task.

Performance Period

After being informed of the experimental condition under which he was to be tested the subject was then handed the Self-Evaluation Questionnaire
Figure I. Experimental Condition Number Two (absence of competition - presence of audience)
Figure II. Experimental Condition Number Three (presence of competition - absence of audience)
(STAI A-State Scale) and was asked to fill it out truthfully and completely as to how he actually felt knowing that he was to soon participate in the designated experimental condition. The subject(s) completed the questionnaire in the testing area away from the other awaiting subjects. Upon the completion of the questionnaire the subject proceeded to the target area whereby he was handed a foil and then executed the performance task as described in the familiarization process. After receiving his performance score from the scorer, the subject left the testing area and proceeded to the gymnasium to participate in the regularly scheduled physical education program. The other subjects in the testing area who were awaiting their turns could not observe the performance of any of the subjects nor were they aware of the other subjects' performance scores. When the subject(s) finished the task another performer(s) completed the Self-Evaluation Questionnaire and proceeded to partake in the performance task. The order of sequence in which each subject awaited his turn to participate was counter-balanced. This was done to assure that each subject would have relatively the same amount of time in awaiting his turn before filling out the Self-Evaluation Questionnaire (STAI A-State Scale) over the four days of testing.
IX. ROLES OF TIMERS, SCORERS AND ACTIVE AUDIENCE

The timers, scorers and members of the active audience were comprised of male students who were not participating in the study.

Timers

Each performer was timed for the thirty second performance task daily by the same timer for each of the four experimental conditions. The timer stood to the left (right) side of the right-handed (left-handed) performer at a distance of about two feet from the target. As each performer assumed his position for the execution of the performance task, the timer gave the verbal command of "GET READY . . . (a pause of two seconds) . . . BEGIN." During the timing of the performance task the timer was unemotional, silent and attentive to his duty. At the end of the thirty seconds the timer called out "STOP" and the performance task was terminated.

Scorers

Each performer was scored by the same scorer for the performance task daily over each of the four experimental conditions. The scorer stood to the right (left) side of the right-handed (left-handed) performer
at a distance of about two feet from the target. The scorer closely observed the target as the performer attempted to hit the target with the foil in the thirty second time period. One point was awarded each time the foil touched any part of the target. The scorer kept a silent count to himself and upon the termination of the performance task informed the performer of his total score for that experimental condition.

Active Audience

Each performer was verbally encouraged and discouraged by virtually the same spectators in the two experimental conditions utilizing an audience. Experimental Condition Number Two required that there by six spectators present during the performance task. Three spectators provided discouraging remarks to the performer and three spectators verbally encouraged the performer. Experimental Condition Number Four required that eight spectators be present during the performance task. Each of the two participating performers of the performance task had two spectators assigned to provide encouraging remarks and two spectators who provided discouraging remarks. Before their actual participation as spectators in each of the two experimental conditions they were informed by the investigator as to which
spectators would provide the encouraging and discouraging remarks and the type of remarks that would be appropriate.

The spectators stood behind the performing subject so as not to physically interfere with the execution of the task. Upon hearing the command of "BEGIN" by the timer the spectators provided both encouraging and discouraging remarks. The remarks were to be made relatively loudly to enable the performing subjects to hear them clearly.

Examples of the encouraging remarks were as follows:

"Doing nicely"
"Good execution"
"Keep going"
"Good speed"
"Working just right"

The discouraging remarks were as follows:

"Pitiful"
"Terrible"
"Is that the best you can do?"
"Working too slow"
"Working too fast"

The remarks were always followed or prefaced by the subject's first or last name whenever it was possible. It was not possible to control the type and loudness of the remarks voiced by the spectators. The investigator however felt that the spectators performed
as closely to the desired intent as possible. At no time were there any swearing or any disparaging remarks of a personal nature with regard to appearance, body build, ethnic background, etc.

X. ADMINISTRATION PROCEDURES FOR THE POST-PERFORMANCE QUESTIONNAIRE

Immediately after their final participation of the performance task the subjects were given a Post-Performance Questionnaire (Appendix E) to fill out in the testing area. The Post-Performance Questionnaire was developed by the investigator for the purpose of gathering information as to the experimental conditions that caused them the "least" and "most" pressure as they performed the task. They were also asked to indicate the experimental condition which they "enjoyed" and "disliked" the most as they performed the task. The subjects were to respond to the questionnaire by placing a check mark at one of the appropriate blanks for each question for each of the four questions. Approximately three minutes were needed for each subject to complete the questionnaire. The results were tabulated and converted to percentages. The subjects were told that the information gathered from the questionnaire would be held in strict confidence.
XI. STATISTICAL ANALYSIS

The data used in the statistical analysis in this study were derived from state-anxiety scores, trait-anxiety scores, and performance task scores. The state-anxiety scores represented the level of anxiety of the subject before actual participation in the performance task under each of the four designated experimental conditions. The performance task scores represented the number of times each subject correctly executed the performance task in thirty seconds in each of the four experimental conditions.

A completely randomized two-by-two split-plot factorial analysis of variance was used to investigate the differences between the trait-anxiety groups, the difference between the presence or absence of competition, and the difference between the presence or absence of audience and the interaction effects of these three levels. The first factorial analysis of variance dealt with state-anxiety scores. The performance task scores were then analyzed.

Correlations were computed to determine the relationships among trait-anxiety scores, state-anxiety scores and performance task scores under each of the four experimental conditions. All of the computed correlations were tested against the null hypothesis for acceptance or rejection at the .05 level of probability.
CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

A completely randomized two-by-two split-plot factorial analysis of variance was employed to give an indication of the extent of the differences for the following comparisons: levels of A, high-trait and low-trait-anxiety groups; levels of B, presence or absence of competition; levels of C, presence or absence of audience; AB interaction, effects of high and low-trait anxiety in the presence and absence of competition; BC interaction, effects of presence or absence of competition in the presence or absence of audience; AC interaction, effects of high and low-trait anxiety in the presence or absence of audience; ABC interaction, the effects of high and low-trait anxiety in the presence or absence of competition and in the presence and absence of audience.

The design was a split-plot arrangement whereby the two trait anxiety groups (high and low) constituted the whole plot with forty subjects per whole plot. The split-plot was made up of a two-by-two factorial analysis of variance with two levels of competition and two levels of audience.
The first analysis of data utilized the state-anxiety scores. The second analysis of data utilized performance task scores.

Pearson Product-Moment coefficient correlations were employed to assess the following relationships under each of the four experimental conditions: (1) the relationship of trait-anxiety scores to performance task scores; (2) the relationship of state-anxiety scores to trait-anxiety scores; (3) the relationship of state-anxiety scores to performance task scores; (4) the relationship of the state-anxiety scores of the high trait anxiety group to their performance task scores; and (5) the relationship between the state-anxiety scores of the low-trait anxiety group to their performance task scores. All of the correlations were tested against the null hypothesis for acceptance or rejection at the .05 level of confidence.

I. ANALYSIS OF THE EFFECTS OF THE FOUR EXPERIMENTAL CONDITIONS UPON STATE-ANXIVITY SCORES

The analysis of variance of the state-anxiety scores of the eighty male high school students classified as being high or low-trait anxious who executed the performance task under the four experimental conditions
are presented in Table I. Table II presents the mean differences in the state-anxiety scores for the comparisons made by the analysis of variance design in Table I.

**Comparison of State-Anxiety Scores of the Group of Subjects Classified as High-Trait Anxious with the Group Classified as Low-Trait Anxious**

Analysis of the data revealed that there was a significant difference in the state-anxiety scores between the high-trait and low-trait anxiety groups. As shown in Table I, the F-ratio for Level A of 28.76 with 1 and 319 degrees of freedom surpassed the F-ratio of 6.71 needed for significance at the .01 level of probability. The high-trait anxiety group averaged 45.57 in state-anxiety scores in comparison to the mean of 40.58 of the low-trait anxiety subjects throughout the four experimental conditions.

**Comparison of the Effects of the Presence and Absence of Competition Upon State-Anxiety Scores**

The comparison of the effects of the presence or absence of competition on state-anxiety scores revealed that there was no significant difference.
TABLE I

ANALYSIS OF VARIANCE OF STATE ANXIETY SCORES OF EIGHTY HIGH SCHOOL MALE JUNIORS CLASSIFIED AS BEING HIGH OR LOW TRAIT ANXIOUS PRIOR TO PERFORMING UNDER FOUR EXPERIMENTAL CONDITIONS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A High-trait anxiety group compared to low-trait anxiety group</td>
<td>1990</td>
<td>1</td>
<td>1990</td>
<td>28.76</td>
<td>.01</td>
</tr>
<tr>
<td>* subjects/anxiety groups</td>
<td>5397.48</td>
<td>78</td>
<td>69.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Competition versus no-competition</td>
<td>2.45</td>
<td>1</td>
<td>2.45</td>
<td>.11</td>
<td>NS</td>
</tr>
<tr>
<td>C Audience versus no-audience</td>
<td>66.61</td>
<td>1</td>
<td>66.61</td>
<td>4.24</td>
<td>.05</td>
</tr>
<tr>
<td>AB Interaction</td>
<td>18.05</td>
<td>1</td>
<td>18.05</td>
<td>1.35</td>
<td>NS</td>
</tr>
<tr>
<td>AC Interaction</td>
<td>1.01</td>
<td>1</td>
<td>1.01</td>
<td>.08</td>
<td>NS</td>
</tr>
<tr>
<td>BC Interaction</td>
<td>8.45</td>
<td>1</td>
<td>8.45</td>
<td>.63</td>
<td>NS</td>
</tr>
<tr>
<td>ABC Interaction</td>
<td>.80</td>
<td>1</td>
<td>.80</td>
<td>.06</td>
<td>NS</td>
</tr>
<tr>
<td>**Error</td>
<td>3121.63</td>
<td>234</td>
<td>13.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10606.48</td>
<td>319</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* F needed at .05 level, 3.97; F needed at .01 level, 6.98.

** F needed at .05 level, 3.88; F needed at .01 level, 6.71.
TABLE II

MEAN STATE-ANXIETY SCORES FOR THE VARIOUS COMPARISONS MADE IN THE TWO-BY-TWO RANDOMIZED SPLIT-ПLOT ANALYSIS OF VARIANCE SHOWN IN TABLE I

<table>
<thead>
<tr>
<th>ANOVA Comparison</th>
<th>Experimental Condition</th>
<th>Mean State-Anxiety Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>average state-anxiety score for high-trait anxiety group under all four experimental conditions</td>
<td>45.57</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group under all four experimental conditions</td>
<td>40.58</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>4.99</td>
</tr>
<tr>
<td>B</td>
<td>average state-anxiety score for competitive conditions</td>
<td>42.98</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for non-competitive conditions</td>
<td>43.16</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>- .18</td>
</tr>
<tr>
<td>C</td>
<td>average state-anxiety score for audience conditions</td>
<td>42.61</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for non-audience conditions</td>
<td>43.52</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>- .91</td>
</tr>
</tbody>
</table>
TABLE II (continued)

<table>
<thead>
<tr>
<th>ANOVA Comparison</th>
<th>Experimental Condition</th>
<th>Mean State-Anxiety Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>average state-anxiety score for high-trait anxiety group with competition</td>
<td>45.71</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group with competition</td>
<td>40.25</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>5.46</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for high-trait anxiety group with no-competition</td>
<td>45.41</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group with no-competition</td>
<td>40.90</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>4.50</td>
</tr>
<tr>
<td>AC</td>
<td>average state-anxiety score for high-trait anxiety group with audience</td>
<td>45.16</td>
</tr>
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<td></td>
<td>average state-anxiety score for low-trait anxiety group with audience</td>
<td>40.06</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>5.10</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for high-trait anxiety group with no-audience</td>
<td>45.96</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group with no-audience</td>
<td>41.09</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>4.87</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Experimental Condition</td>
<td>Mean State-Anxiety Score</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>BC</td>
<td>average state-anxiety score for competition with audience</td>
<td>42.36</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for no-competition with audience</td>
<td>42.86</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-.50</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for competition with no-audience</td>
<td>43.60</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for no-competition with no-audience</td>
<td>43.45</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>.15</td>
</tr>
<tr>
<td>ABC</td>
<td>average state-anxiety score for high-trait anxiety group for no-competition and no-audience</td>
<td>45.60</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group for no-competition and no-audience</td>
<td>41.30</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>4.30</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for high-trait anxiety group for no-competition with audience</td>
<td>45.22</td>
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<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group for no-competition with audience</td>
<td>40.50</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>4.72</td>
</tr>
<tr>
<td>ANOVA Comparison</td>
<td>Experimental Condition</td>
<td>Mean State-Anxiety Score</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for high-trait anxiety group for competition and no-audience</td>
<td>46.32</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group for competition and no-audience</td>
<td>40.88</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>5.44</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for high-trait anxiety group for competition with audience</td>
<td>45.10</td>
</tr>
<tr>
<td></td>
<td>average state-anxiety score for low-trait anxiety group for competition with audience</td>
<td>39.63</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>5.47</td>
</tr>
</tbody>
</table>
In Table I, it is seen that this comparison (Level B) resulted in an F-ratio of .11. The mean state-anxiety score obtained prior to the two experimental conditions involving competition was 42.98 in comparison to a mean state-anxiety score of 43.16 reported in the two conditions without competition.

Comparison of the Effects of the Presence and Absence of Audience Upon State-Anxiety Score

A significant F-ratio of 4.24 at the .05 level of probability was obtained in the comparison of the presence and absence of audience (Level C, Table I) upon state-anxiety scores. The F-ratio needed for significance at the .05 level of probability was 3.86. Inspection of the data in Table II reveals that the mean state-anxiety score obtained prior to performing in the two experimental conditions having an audience was 42.61. The two experimental conditions without an audience had a mean state-anxiety score of 43.52. The state-anxiety scores were significantly higher in the absence of an audience than in the presence of an audience.
Interaction Effects of Trait-Anxiety Levels and the Presence or Absence of Competition on State-Anxiety Scores

The F-ratio shown in Table I for the interaction of trait-anxiety scores and the presence or absence of competition (A x B) upon the attainment of state-anxiety scores was 1.35 which was not significant at the .05 level of probability. This indicated that the difference in state-anxiety scores between the high and low trait-anxiety groups was uniform under the conditions of competition and no-competition.

Interaction Effects of Trait-Anxiety Levels and the Presence or Absence of Audience Upon State-Anxiety Scores

The F-ratio shown in Table I for the interaction of trait-anxiety scores and the presence or absence of audience (A x C) upon the attainment of state-anxiety scores was .08 which was not significant at the .05 level of probability. This indicated that the difference in state-anxiety scores between the high and low trait-anxiety groups was uniform under the conditions of audience and no-audience.
Interaction Effects of the Presence or Absence of Competition and the Presence or Absence of Audience Upon State-Anxiety Scores

The F-ratio shown in Table I for the interaction of the presence or absence of competition and the presence or absence of audience (B x C) upon the attainment of state-anxiety scores was .63 which was not significant at the .05 level of probability. This indicated that the difference in state-anxiety scores obtained in the conditions of competition and no-competition was uniform under the conditions of audience and no-audience.

Interaction Effects of Trait-Anxiety, Presence or Absence of Competition and Presence or Absence of Audience Upon State-Anxiety Scores

The F-ratio for the interaction effects of high and low trait-anxiety, presence or absence of competition and presence or absence of audience (A, B, C, Table I) upon the attainment of state-anxiety scores was .06. This failed to meet the test of significance required at the .05 level of 3.86. Thus the differences in state-anxiety scores were uniform under the three conditions.
II. ANALYSIS OF THE EFFECTS OF THE FOUR EXPERIMENTAL CONDITIONS UPON PERFORMANCE TASK SCORES

The performance task scores of the eighty male high school subjects classified as being high or low trait anxious who executed the performance task under the four experimental conditions are presented in Table III.

Table IV presents the mean differences in the performance task scores for the comparisons made in the analysis of variance design in Table III.

**Comparison of the Two Trait Anxiety Groups on Performance Task Scores**

Analysis of the data revealed that there was a significant difference in performance task scores between the high and low-trait anxiety groups. The F-ratio for Level A of 7.24 with 1 and 319 degrees of freedom, surpassed the F-ratio of 6.71 needed for significance at the .01 level of confidence. This indicated that throughout the four experimental conditions there was a difference between the two groups. It can be seen in Table IV that the low-trait anxiety group had an over-all mean performance task score of 16.88 as compared to the mean performance task score of 14.68 for the high-trait anxiety group. Therefore, the low trait-anxious subjects performed significantly better than the high trait-anxious subjects.
<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-trait anxiety group compared to low-trait anxiety group</td>
<td>387.20</td>
<td>1</td>
<td>387.20</td>
<td>7.24</td>
<td>.01</td>
</tr>
<tr>
<td>* subjects/anxiety groups</td>
<td>4169.99</td>
<td>78</td>
<td>53.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competition versus no-competition</td>
<td>76.05</td>
<td>1</td>
<td>76.05</td>
<td>11.35</td>
<td>.01</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audience versus no-audience</td>
<td>.11</td>
<td>1</td>
<td>.11</td>
<td>.02</td>
<td>NS</td>
</tr>
<tr>
<td>AB Interaction</td>
<td>3.61</td>
<td>1</td>
<td>3.61</td>
<td>.54</td>
<td>NS</td>
</tr>
<tr>
<td>AC Interaction</td>
<td>8.45</td>
<td>1</td>
<td>8.45</td>
<td>1.26</td>
<td>NS</td>
</tr>
<tr>
<td>BC Interaction</td>
<td>33.80</td>
<td>1</td>
<td>33.80</td>
<td>5.05</td>
<td>.05</td>
</tr>
<tr>
<td>ABC Interaction</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.001</td>
<td>NS</td>
</tr>
<tr>
<td>** Error B</td>
<td>1567.47</td>
<td>234</td>
<td>6.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6246.69</td>
<td>319</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* F needed at .05 level, 3.97; F needed at .01 level, 6.98.
** F needed at .05 level, 3.88; F needed at .01 level, 6.71.
TABLE IV

MEAN PERFORMANCE TASK SCORES FOR THE VARIOUS COMPARISONS MADE IN THE TWO-BY-TWO RANDOMIZED SPLIT-PILOT ANALYSIS OF VARIANCE SHOWN IN TABLE III

<table>
<thead>
<tr>
<th>ANOVA Comparison</th>
<th>Experimental Condition</th>
<th>Mean Performance Task Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>average performance task scores for high-trait anxiety group under all four experimental conditions</td>
<td>14.68</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group under all four experimental conditions</td>
<td>16.88</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.20</td>
</tr>
<tr>
<td>B</td>
<td>average performance task scores for competitive conditions</td>
<td>16.27</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for non-competitive conditions</td>
<td>15.29</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>.98</td>
</tr>
<tr>
<td>C</td>
<td>average performance task scores for audience conditions</td>
<td>15.76</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for non-audience conditions</td>
<td>15.80</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-.04</td>
</tr>
<tr>
<td>ANOVA Comparison</td>
<td>Experimental Condition</td>
<td>Mean Performance Task Scores</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>AB</td>
<td>average performance task scores for high-trait anxiety group with competition</td>
<td>15.06</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group with competition</td>
<td>17.47</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.41</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for high-trait anxiety group with no-competition</td>
<td>14.30</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group with no-competition</td>
<td>16.29</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-1.99</td>
</tr>
<tr>
<td>AC</td>
<td>average performance task scores for high-trait anxiety group with audience</td>
<td>14.50</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group with audience</td>
<td>17.02</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.52</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for high-trait anxiety group with no-audience</td>
<td>14.86</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group with no-audience</td>
<td>16.74</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-1.88</td>
</tr>
<tr>
<td>ANOVA Comparison</td>
<td>Experimental Condition</td>
<td>Mean Performance Task Scores</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>BC</td>
<td>average performance task scores for competition with audience</td>
<td>15.92</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for no-competition with audience</td>
<td>15.60</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for competition with no-audience</td>
<td>16.60</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for no-competition with no-audience</td>
<td>14.98</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>1.62</td>
</tr>
<tr>
<td>ABC</td>
<td>average performance task scores for high-trait anxiety group for no-competition and no-audience</td>
<td>14.15</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group for no-competition and no-audience</td>
<td>15.83</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-1.68</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for high-trait anxiety group for no-competition with audience</td>
<td>14.45</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group for no-competition with audience</td>
<td>16.75</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.30</td>
</tr>
<tr>
<td>ANOVA Comparison</td>
<td>Experimental Condition</td>
<td>Mean Performance Task Scores</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for high-trait anxiety group for competition and no-audience</td>
<td>15.58</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group for competition and no-audience</td>
<td>17.65</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.07</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for high-trait anxiety group for competition with audience</td>
<td>14.55</td>
</tr>
<tr>
<td></td>
<td>average performance task scores for low-trait anxiety group for competition with audience</td>
<td>17.30</td>
</tr>
<tr>
<td></td>
<td>mean difference</td>
<td>-2.75</td>
</tr>
</tbody>
</table>
Comparison of the Effects of the Presence or Absence of Competition Upon Performance Task Scores

An F-ration of 11.35 was obtained for Level B in Table III which was the comparison of the effects of the presence or absence of competition upon performance task scores. This was significant at the .01 level of probability. Analysis of the data in Table IV reveals that the mean performance task score in the two conditions involving competition was 16.27. A mean performance task score of 15.29 was obtained in the two conditions without competition. The performance task scores were significantly higher in the conditions with competition than in the conditions without competition.

Comparison of the Effects of the Presence or Absence of Audience Upon Performance Task Scores

The comparison of the effects of the presence or absence of audience (Level C, Table III) reveals that there was no significant difference in the performance task scores. The F-ratio of .02 was much less than the F-ratio of 3.86 needed for significance at the .05 level of probability. The mean performance task scores with and without audience were 15.76 and 15.80, respectively.
Interaction Effects of Trait-Anxiety Levels and the Presence or Absence of Competition Upon Performance Task Scores

The F-ratio shown in Table III for the interaction of trait-anxiety scores and the presence or absence of competition (A x B) upon performance task scores was .54 which was not significant at the .05 level of probability. This indicated that the difference in performance task scores between the high and low trait-anxiety groups was uniform under the conditions of competition and no-competition.

Interaction Effects of Trait-Anxiety Levels and the Presence or Absence of Audience Upon Performance Task Scores

The F-ratio shown in Table I for the interaction of trait-anxiety scores and the presence or absence of audience (A x C) upon the attainment of performance task scores was 1.26 which was not significant at the .05 level of probability. This indicated that the difference in performance task scores was uniform under the conditions of audience and no-audience.

Interaction Effects of the Presence or Absence of Competition and the Presence or Absence of Audience Upon Performance Task Scores

In Table III, the P x C interaction effects of the difference between performance task scores in the presence
of competition and the absence of competition under the conditions of audience and no-audience was found to be significant at the .05 level of probability. The difference between the performance task scores in the presence of competition and in the absence of competition under the testing conditions having an audience was .32 in favor of the competitive conditions. However, the difference between competition and no-competition under the testing conditions without an audience was 1.62 in favor of the competitive conditions. This difference in the differences was significant as evidenced by the F-ratio of 5.05 for the BC interaction in Table III. Thus competition was more effective when the subjects were performing without an audience than with an audience. It should be noted that it was shown in Table I that performing without an audience produced higher state-anxiety scores than performing with an audience.

The results of the Post-Performance Questionnaire developed by the investigator (see Appendix E) revealed that sixty-five percent of the participating subjects indicated that Experimental Condition Number One (absence of competition and absence of audience) caused the least amount of "pressure" in comparison to the other experimental conditions. The performance task scores were poorer under this condition. The presence of an audience apparently neutralized the motivating effects of competition.
Interaction Effects of Trait-Anxiety, Presence or Absence of Competition and Presence or Absence of Audience Upon Performance Task Scores

The F-ratio for the interaction effects of high and low trait-anxiety, presence or absence of competition and presence or absence of audience (A, B, C, Table III) upon the attainment of performance task scores was .001. This failed to meet the test of significance required at the .05 level of 3.86. Thus the differences in performance task scores were uniform under the three conditions.

III. ANALYSIS OF THE RELATIONSHIPS AMONG TRAIT-ANXIETY SCORES, STATE-ANXIETY SCORES, AND PERFORMANCE TASK SCORES UNDER EACH OF THE FOUR EXPERIMENTAL CONDITIONS

Pearson Product Moment correlation coefficients were employed in the investigation of the relationships among trait-anxiety, state-anxiety and performance task scores by eighty high school male subjects under each of the four experimental conditions. Five correlations were drawn for each of the four experimental conditions. Table V reveals the results of the twenty correlations.
Relationship Between Trait-Anxiety Scores and Performance Task Scores Under the Four Experimental Conditions

Utilizing all eighty subjects, significant negative correlations between trait-anxiety scores and performance task scores were found under the following testing conditions: the absence of competition and presence of audience; the presence of competition and the absence of audience; and the presence of competition and the presence of audience. These correlations were significant at the .01 level and were interpreted to indicate that subjects with higher trait-anxiety performed more poorly on the above tasks than did the low trait-anxious subjects (Table V). These correlations supported the findings from the comparisons by analysis of variance which revealed that the low-trait anxiety group outperformed the high-trait anxiety group throughout the four experimental conditions (Table IV).

Relationship Between State-Anxiety Scores and Trait-Anxiety Scores Under the Four Experimental Conditions

As noted in Table V the correlations of .44, .47, .35, and .48 between the eighty state-anxiety scores and each of the experimental conditions were significant at the .01 level of probability. These positive correlations indicated that the higher the trait-anxiety score the higher the state-anxiety score of each subject as he
### TABLE V

**Correlations Among Trait-Anxiety Scores, State-Anxiety Scores, and Performance Task Scores Under Each of the Four Experimental Conditions by Eighty High School Male Subjects Classified as Being High or Low-Trait Anxious**

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Experimental Condition #1 (absence of competition-absence of audience)</th>
<th>Experimental Condition #2 (absence of competition-presence of audience)</th>
<th>Experimental Condition #3 (presence of competition-absence of audience)</th>
<th>Experimental Condition #4 (presence of competition-presence of audience)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*trait-anxiety scores with performance task scores (N=80)</td>
<td>r: -.19 p: NS</td>
<td>r: -.24 p: .05</td>
<td>r: -.26 p: .05</td>
<td>r: -.31 p: .01</td>
</tr>
<tr>
<td>*state-anxiety scores with trait-anxiety scores (N=80)</td>
<td>r: .44 p: .01</td>
<td>r: .35 p: .01</td>
<td>r: .47 p: .01</td>
<td>r: .48 p: .01</td>
</tr>
<tr>
<td>*state-anxiety scores with performance task scores (N=80)</td>
<td>r: -.15 p: NS</td>
<td>r: -.20 p: NS</td>
<td>r: .07 p: NS</td>
<td>r: -.09 p: NS</td>
</tr>
<tr>
<td>**state-anxiety scores of high-trait anxiety group with performance task scores (N=40)</td>
<td>r: -.17 p: NS</td>
<td>r: -.18 p: NS</td>
<td>r: .24 p: NS</td>
<td>r: -.03 p: NS</td>
</tr>
<tr>
<td>**state-anxiety scores of low-trait anxiety group with performance task score (N=40)</td>
<td>r: .02 p: NS</td>
<td>r: -.06 p: NS</td>
<td>r: .19 p: NS</td>
<td>r: .16 p: NS</td>
</tr>
</tbody>
</table>

*With (N-2 df) r needed for significance at .05 level, .22; at the .01 level, .29.

**With (N-2 df) r needed for significance at .05 level, .30; at the .01 level, .40.
performed under each of the four experimental conditions. These results generally support the purported relationship between trait and state-anxiety.

**Relationships Between State-Anxiety Scores with Performance Task Scores Under the Four Experimental Conditions for all Eighty Subjects and for the High and Low Trait-Anxious Groups Separately**

In Table V, it can be noted that the correlations between the state-anxiety scores and the performance task scores for all eighty subjects and for the high and low-trait anxiety groups measured separately under the four experimental conditions were all non-significant at the .05 level of probability. These coefficients were essentially the same and indicated that there was no significant relationship between state-anxiety scores and performance task scores under each of the four experimental conditions.
CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

The main purpose of this study was to analyze the effects of trait and state-anxiety upon the performance of a novel gross motor task requiring both speed and accuracy under four experimental conditions involving competition and the presence of an audience. The secondary purpose of this study was to determine the relationships among trait-anxiety scores, state-anxiety scores and performance task scores.

Subjects for this study were eighty high school male non-varsity athletes who were enrolled in their junior year at Baton Rouge and Lee High Schools, Baton Rouge, Louisiana. The subjects were classified into two treatment groups according to scores on the STAI A-Trait Anxiety Scale. Forty subjects classified as being high-trait anxious formed one group; the second group consisted of forty subjects classified as being low-trait anxious. Each of the eighty subjects performed a novel gross motor task consisting of attempts to touch a small target with a fencing foil as many
times as possible in thirty seconds. The movement involved a modified fencing lunge and recovery. Both speed and accuracy were emphasized. The subjects were tested under the following experimental conditions using a counter-balanced schedule: Experimental Condition Number One (absence of competition and absence of audience); Experimental Condition Number Two (absence of competition and presence of audience); Experimental Condition Number Three (presence of competition and absence of audience); and Experimental Condition Number Four (presence of competition and presence of audience).

A completely randomized two-by-two split-plot factorial analysis of variance was used to compare the state-anxiety scores and the performance task scores achieved under each of the four experimental conditions and analyzed as to the effects of trait-anxiety levels, competition, audience and the interaction of these variables. Correlations were computed to investigate the relationships among trait-anxiety scores, state-anxiety scores and performance task scores under each of the four experimental conditions.

II. FINDINGS

The findings in this study were as follows:

1. The high-trait anxiety group responded with
significantly higher state-anxiety scores throughout the four experimental conditions than the low-trait anxiety group.

2. The low-trait anxiety group performed significantly better under the different experimental conditions than did the high-trait anxiety group.

3. Performing in the absence of an audience brought about higher state-anxiety prior to performance than did the conditions with the presence of an audience.

4. Competition did not produce higher state-anxiety prior to performance than the absence of competition, however the presence of competition resulted in significantly better performance task scores.

5. A significant interaction was found between the effects of competition and the effects of audience on performance task scores in that the superiority of competition over no competition was much greater under the conditions of no audience than when performing in the presence of an audience.

6. A significant relationship was found between trait-anxiety and state-anxiety. Generally, a significant negative relationship was evidenced between trait-anxiety and performance.

III. DISCUSSION OF THE FINDINGS

The findings of this study were shown to be consistent with the Trait-State Anxiety Theory\(^1\) proposed by the State-Trait Anxiety Inventory, \textit{op. cit.}, p. 2.
by Spielberger, Gorsuch, and Lushene which postulated that subjects classified as being high-trait anxious would exhibit greater intensity in state-anxiety than subjects classified as being low-trait anxious. Throughout each of the four experimental conditions conducted in this study the forty high-trait anxious subjects had significantly higher state-anxiety scores than the forty low-trait anxious subjects.

The finding that the low-trait anxious subjects significantly outperformed the high-trait anxious subjects in each of the four experimental conditions supported a Drive Theory proposed by Taylor and Spence. The Drive Theory postulated that the performance of low-trait anxious subjects would be superior to that of the high-trait anxious subjects on complex tasks whereby the competing error tendencies were stronger than the correct response tendencies.

This finding is also in compliance with the Yerkes-Dodson Principle which postulated that performance in complex tasks is facilitated by a relatively low drive-level, whereas performance in simple tasks a high drive-level is advantageous. Significant negative correlations were also found in the relationship between


the trait scores and the performance task scores of all eighty subjects under each experimental condition. This further indicated that the lower the trait-anxiety score the higher the performance task score.

In general, the findings of this study with regard to anxiety and performance supported the consensus of the literature that high-anxious subjects tend to become disturbed in stressful conditions and have more difficulty in adapting to novel situations than low-anxious subjects.

The finding that the presence of competition elicited higher performance task scores than the absence of competition was supportive of the concept of competition reported by Cratty.\(^4\) He stated that two conditions must be present if competition is to occur and be successful: (1) two individuals must desire the same goal; and (2) both individuals must perceive themselves as being capable of achieving this goal. This study which dealt with levels of competition was structured to meet the standards necessary for a successful occurrence of competition.

The finding that the absence of audience evoked higher state-anxiety scores than did the presence of audience was not expected. It was hypothesized that state-anxiety intensity would be greater under the audience conditions since the literature had generally

\(^4\)Bryant J. Cratty, op. cit., p. 185.
concluded that the presence of an audience was stressful. However, it has been shown that the presence of an audience has on occasion both facilitated and impeded performance in complex perceptual-motor tasks. The role of the "unseen audience," composed of peers and friends to which each subject compared his performance, may have exerted its influence upon each subject as they performed alone. Perhaps competition in the presence of only the investigator may have been more threatening than in the group facilitative effects of an audience of peers.

IV. CONCLUSIONS

Within the limitations of this study the following conclusions appeared justified:

1. Apparently high-trait anxious persons perform more poorly than low-trait anxious persons on novel gross motor tasks.

2. Competition generally results in better performance than no competition.

3. Trait-anxiety is related to state-anxiety and although state-anxiety varies under different performance conditions the same general relationship between trait and state-anxiety exists.

5Ibid., p. 159.
V. RECOMMENDATIONS

As a result of this study the following areas were deemed to be in need of further investigation:

1. The State-Trait Anxiety Inventory is recommended for usage by research personnel in physical education to investigate the effects of state-anxiety before, during, and after performance of motor skills related to physical education activities.

2. It is recommended that more studies should be conducted comparing the effects of different kinds of competition in the presence of different kinds of audiences.
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SELECTED BIBLIOGRAPHY

A. BOOKS


B. PERIODICALS


C. UNPUBLISHED MATERIALS


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APPENDIX A

STAI A-TRAIT SCALE

SELF-EVALUATION QUESTIONNAIRE

STAI FORM X-2

Name ________________________________ Date ____________________

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

1. I feel pleasant .................................. 1 2 3 4
2. I tire quickly ................................... 1 2 3 4
3. I feel like crying ................................ 1 2 3 4
4. I wish I could be as happy as others seem to be ............... 1 2 3 4
5. I am losing out on things because I can't make up my mind soon enough .................. 1 2 3 4
6. I feel rested ....................................
7. I am "calm, cool, and collected" .............. 1 2 3 4
8. I feel that difficulties are piling up so that I cannot overcome them ............ 1 2 3 4
9. I worry too much over something that really doesn't matter ...................... 1 2 3 4
10. I am happy ..................................... 1 2 3 4
11. I am inclined to take things hard .......... 1 2 3 4
12. I lack self-confidence ......................... 1 2 3 4
13. I feel secure ...................................
14. I try to avoid facing a crisis or difficulty .................................. 1 2 3 4
15. I feel blue ..................................... 1 2 3 4
16. I am content ...................................
17. Some unimportant thought runs through my mind and bothers me .................. 1 2 3 4
18. I take disappointments so keenly that I can't put them out of my mind ............. 1 2 3 4
19. I am a steady person ........................... 1 2 3 4
20. I become tense and upset when I think about my present concerns .................. 1 2 3 4

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APPENDIX B

STAI A-STATE SCALE

SELF-EVALUATION QUESTIONNAIRE

Developed by C.D. Spielberger, R.L. Gorsuch and R. Lushene

Name ___________________________ Date ________________

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

21. I feel calm.............................. 1 2 3 4
22. I feel secure........................... 1 2 3 4
23. I am tense............................. 1 2 3 4
24. I am regretful......................... 1 2 3 4
25. I feel at ease.......................... 1 2 3 4
26. I feel upset........................... 1 2 3 4
27. I am presently worrying over possible misfortunes.......................... 1 2 3 4
28. I feel rested........................... 1 2 3 4
29. I feel anxious......................... 1 2 3 4
30. I feel comfortable...................... 1 2 3 4
31. I feel self-confident................... 1 2 3 4
32. I feel nervous........................... 1 2 3 4
33. I am jittery............................ 1 2 3 4
34. I feel "high strung"...................... 1 2 3 4
35. I am relaxed............................ 1 2 3 4
36. I feel content.......................... 1 2 3 4
37. I am worried............................ 1 2 3 4
38. I feel over-excited and rattled........ 1 2 3 4
39. I feel joyful........................... 1 2 3 4
40. I feel pleasant.......................... 1 2 3 4

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## APPENDIX C

**Daily Recordings of State-Anxiety Scores and Performance Task Scores by the Forty High-Trait Anxious Subjects Who Executed the Performance Task under the Four Experimental Conditions**

| A-Trait Name | A-Trait Score | Pre-Performance Task Score | Pre-Performance Anxiety Score | Performance Task Score | Performance Anxiety Score | Per-Performance Task Score | Per-Performance Anxiety Score | State-Performance Task Score | State-Performance Anxiety Score | Per-Performance Task Score | Per-Performance Anxiety Score | Per-Performance Task Score | Per-Performance Anxiety Score | Per-Performance Task Score | Per-Performance Anxiety Score | Per-Performance Task Score | Per-Performance Anxiety Score |
|--------------|---------------|----------------------------|-------------------------------|------------------------|----------------------------|----------------------------|-------------------------------|-------------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| H1           | 54            | 14                         | 45                            | 12                     | 39                         | 17                         | 43                            | 14                            | 37                            | 16                         | 16                         | 13                         | 49                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H2           | 52            | 7                          | 47                            | 7                       | 47                         | 10                         | 48                            | 13                            | 49                            | 16                         | 19                         | 12                         | 58                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H3           | 49            | 13                         | 48                            | 12                     | 49                         | 14                         | 49                            | 17                            | 58                            | 19                         | 12                         | 53                         | 12                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H4           | 51            | 7                          | 45                            | 13                     | 40                         | 10                         | 36                            | 10                            | 34                            | 9                          | 46                         | 10                         | 40                         | 18                         | 11                         | 44                         | 11                         | 11                         |
| H5           | 49            | 16                         | 40                            | 17                     | 44                         | 12                         | 37                            | 10                            | 40                            | 18                         | 10                         | 46                         | 7                          | 44                         | 11                         | 44                         | 11                         | 11                         |
| H6           | 49            | 13                         | 46                            | 13                     | 49                         | 5                          | 46                            | 10                            | 44                            | 11                         | 12                         | 53                         | 12                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H7           | 49            | 11                         | 46                            | 13                     | 49                         | 4                          | 46                            | 10                            | 44                            | 11                         | 11                         | 44                         | 11                         | 11                         | 44                         | 11                         | 11                         | 11                         |
| H8           | 52            | 13                         | 55                            | 13                     | 48                         | 11                         | 50                            | 14                            | 53                            | 12                         | 12                         | 47                         | 13                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H9           | 54            | 10                         | 49                            | 11                     | 47                         | 10                         | 48                            | 20                            | 47                            | 13                         | 13                         | 47                         | 13                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H10          | 54            | 12                         | 48                            | 13                     | 55                         | 13                         | 49                            | 14                            | 47                            | 10                         | 10                         | 47                         | 13                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H11          | 50            | 12                         | 48                            | 12                     | 49                         | 12                         | 54                            | 15                            | 47                            | 14                         | 10                         | 44                         | 10                         | 12                         | 14                         | 14                         | 16                         | 13                         |
| H12          | 53            | 11                         | 47                            | 19                     | 45                         | 19                         | 47                            | 19                            | 44                            | 10                         | 10                         | 46                         | 12                         | 11                         | 47                         | 11                         | 11                         | 44                         |
| H13          | 51            | 10                         | 47                            | 10                     | 50                         | 10                         | 52                            | 10                            | 46                            | 12                         | 10                         | 46                         | 12                         | 11                         | 47                         | 11                         | 11                         | 44                         |
| H14          | 53            | 7                          | 49                            | 12                     | 50                         | 12                         | 55                            | 15                            | 47                            | 11                         | 11                         | 47                         | 11                         | 11                         | 47                         | 11                         | 11                         | 44                         |
| H15          | 54            | 7                          | 51                            | 13                     | 56                         | 13                         | 57                            | 13                            | 51                            | 13                         | 13                         | 47                         | 13                         | 19                         | 12                         | 14                         | 16                         | 13                         |
| H16          | 52            | 4                          | 40                            | 8                      | 35                         | 12                         | 30                            | 8                              | 47                            | 7                          | 7                          | 47                         | 7                          | 7                          | 47                         | 7                          | 7                          | 47                         |
| H17          | 52            | 14                         | 37                            | 19                     | 40                         | 14                         | 49                            | 20                            | 38                            | 19                         | 19                         | 41                         | 19                         | 19                         | 44                         | 20                         | 20                         | 41                         |
| H18          | 49            | 19                         | 43                            | 20                     | 38                         | 19                         | 45                            | 20                            | 41                            | 19                         | 19                         | 41                         | 19                         | 19                         | 44                         | 20                         | 20                         | 41                         |
| H19          | 49            | 18                         | 46                            | 21                     | 47                         | 20                         | 47                            | 19                            | 44                            | 20                         | 20                         | 41                         | 19                         | 19                         | 44                         | 20                         | 20                         | 41                         |
| H20          | 49            | 15                         | 43                            | 16                     | 36                         | 18                         | 41                            | 16                            | 43                            | 22                         | 16                         | 43                         | 22                         | 15                         | 44                         | 15                         | 15                         | 44                         |
| H21          | 52            | 15                         | 45                            | 15                     | 44                         | 13                         | 49                            | 17                            | 44                            | 15                         | 15                         | 44                         | 15                         | 15                         | 44                         | 15                         | 15                         | 44                         |
| H22          | 49            | 12                         | 41                            | 19                     | 41                         | 12                         | 37                            | 18                            | 44                            | 19                         | 19                         | 41                         | 19                         | 19                         | 44                         | 19                         | 19                         | 41                         |
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Range 49-58 4-20 37-55 7-21 28-66 5-24 30-57 8-21 31-62 7-22
APPENDIX D

DAILY RECORDINGS OF STATE-ANXIETY SCORES AND PERFORMANCE TASK SCORES BY THE FORTY LOW-TRAIT ANXIOUS SUBJECTS WHO EXECUTED THE PERFORMANCE TASK UNDER THE FOUR EXPERIMENTAL CONDITIONS

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**Mean** 38.98 14.75 41.30 15.83 40.50 16.75 40.88 17.65 39.63 17.30

**Standard Deviation** 1.38 3.95 4.30 4.37 4.86 4.83 5.01 3.97 4.17 5.02

**Range** 35-41 6-24 34-51 6-26 29-53 7-27 33-50 8-26 32-48 6-27
APPENDIX E

POST-PERFORMANCE QUESTIONNAIRE

Results of questionnaire filled out by the high and low-trait anxiety subjects after their participation in the performance task in all four experimental conditions.

Please read each question carefully and then place a check mark in the appropriate blank. Only one check mark to each question.

1. Which one of the four conditions caused you the "most" pressure as you performed your task?
   12% (a) Competing against yourself without the active audience
   23% (b) Competing against yourself with an active audience
   12% (c) Competing against another performer without the active audience
   45% (d) Competing against another performer with an active audience
   8% (e) None of the conditions

2. Which one of the four conditions caused you the "least" pressure as you performed the task?
   65% (a) Competing against yourself without the active audience
   17% (b) Competing against yourself with an active audience
   10% (c) Competing against another performer without the active audience
   8% (d) Competing against another performer with an active audience
   8% (e) None of the conditions

3. Which one of the four conditions did you "enjoy" the best as you performed the task?
   20% (a) Competing against yourself without the active audience
   20% (b) Competing against yourself with an active audience
   17% (c) Competing against another performer without the active audience
   43% (d) Competing against another performer with an active audience
   8% (e) None of the conditions

4. Which one of the four conditions did you "dislike" the most as you performed the task?
   18% (a) Competing against yourself without the active audience
   27% (b) Competing against yourself with an active audience
   18% (c) Competing against another performer without the active audience
   22% (d) Competing against another performer with an active audience
   15% (e) None of the conditions
VITA

The author was born in Youngstown, Ohio on March 27, 1937. He attended public school in Youngstown and graduated from Boardman High School in 1955. He earned the Bachelor of Science Degree with a major in physical education in 1960 from Ball State University, Muncie, Indiana.

The author taught and coached on the secondary school level serving as physical education instructor, assistant football coach and as a guidance director in and around the Youngstown, Ohio area. He also served as a recreational supervisor during the summer months for ten years.

The author served as an instructor in the Men's Physical Education Department and as assistant varsity football coach at Baylor University, Waco, Texas. In August, 1962 the Master of Science Degree was earned at Baylor University with a major in physical education and a minor in guidance and counseling.

In September, 1967 the author entered Louisiana State University to work toward the Doctor of Education Degree with a major in physical education and a minor in guidance and counseling. During the period of graduate
study, the author served one year as a graduate assistant in the Men's Physical Education Department. The following two years the author served as Academic Counselor for the University (Evening) College.

The author is married to the former Kathleen N. Baughman of Poland, Ohio. They have one daughter, Kelly Lee.
Candidate: Robert Lee Slevin

Major Field: Physical Education

Title of Thesis: The Influence of Trait and State Anxiety Upon the Performance of a Novel Gross Motor Task Under Conditions of Competition and Audience

Approved:

[Signatures]

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: May 5, 1970