

THE EFFECTS OF TEST FORMAT AND LOCUS OF
CONTROL ON TEST ANXIETY

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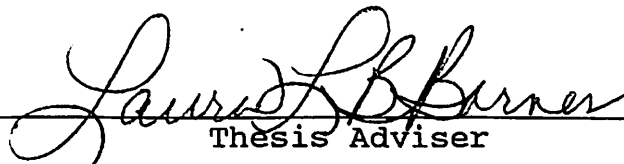
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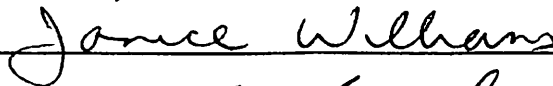
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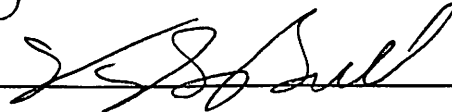
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CHAPTER I

INTRODUCTION

Test Anxiety

Testing is almost universal in academia and it is the most popular form of evaluation. Testing also plays a major role in the process of evaluation in employment contexts: personnel selection and placement, certification and licensure, etc. Since testing is so widespread, as a measure of achievement and ability, factors that affect the accuracy of test scores are important.

One factor that has effect on test scores is test anxiety, since test anxiety and test scores are often negatively correlated. Hunsley (1985) reported correlation coefficient of $-.29$ between test anxiety and the first exam scores in an undergraduate statistics course. Tryon (1980) also summarized studies on the relationship between test anxiety and academic performance and reported that the correlation coefficients between the two variables ranged from $-.47$ to $-.14$. When students experience high levels of test anxiety, they generally exhibit lower levels of performance than students who experience low levels of test anxiety.

Other effects of test anxiety should also be considered. Test anxiety may be related to low, or invalid, test scores which results in inaccurate evaluation. High test anxiety could affect a person's overall attitudes about school and education. Also it could cause avoidance of situations where testing is the primary form of evaluation in schools.

Test anxiety develops during the early school years (Hill, 1972), and increases as students grow older (Kirkland, 1971). It begins to stabilize during the later elementary school years (Dusek, 1980). It has been suggested that students develop test anxiety from evaluative experiences (Dusek, 1980).

It is generally believed that there are two types of test anxiety (Spielberger, 1966): trait anxiety and state anxiety. Trait anxiety is a relatively stable reaction to situations perceived to be threatening. State anxiety is considered to be a transitory emotional state, or human organismic condition, aroused by a subjective consciousness of tension, nervousness, and worry (Spielberger, 1966). Higher trait anxiety tends to elicit higher state anxiety in a testing situation (Herman, 1990). Thus the relationship between trait anxiety and state anxiety tends to show a positive correlation. For example, Head and Knight (1988), as well as Herman (1990), found that students having higher

trait anxiety experience higher levels of state anxiety than do students exhibiting lower levels of trait anxiety.

Test anxiety is manifested in both the cognitive and affective domains. These components of state anxiety have been termed "worry" and "emotionality" (Deffenbacher, 1980; Liebert & Morris, 1967). Worry refers to any cognitive concern or expression of concern related to one's academic performance. It can be a concern, in terms of consequences, which includes failure, negative self-evaluation, or evaluation of one's ability relative to others. While the worry component is cognitive, the emotionality component is autonomic or behavioral. According to Deffenbacher (1980), emotionality is an affective-physiological response that is generated through increased autonomic arousal. He has also suggested that worry is more stable and persistent than is emotionality, during the evaluative situation. Emotionality is usually aroused before testing and decreases following completion of the test. Worry and emotionality have been determined to be positively correlated (Deffenbacher, 1980).

Although the literature has provided evidence for the relationship between academic performance and components of anxiety, several empirical studies have found negative correlations between the worry component and test performance (Doctor & Altman, 1969; Liebert & Morris, 1967). Emotionality, on the other hand, has not been found to be significantly related to academic performance (Doctor &

Altman, 1969; Liebert & Morris, 1967). Deffenbacher's (1980) research has confirmed the negative relationship between worry and academic performance.

Three theories have been set forth to explain how anxiety influences student academic performance. The cognitive-attentional theory explains test anxiety in terms of a temporary blockage of retrieval of prior learning (Sarason, 1980; Wine, 1971). The second theory, dual-deficit theory, explains the poor academic performance of highly anxious students in terms of poor study habits and/or poor test-taking skills (Smith, Arnkoff, & Wright, 1990). The third theory, called social learning model, has been developed from Bandura's social learning theory (Smith et al., 1990). This theory tries to explain test anxiety in terms of self-efficacy and expectation for academic achievement.

So far, most test anxiety studies have used test anxiety as an independent variable (e.g., Culler & Holahan, 1980), rather than as a dependent variable. When test anxiety is considered to be the dependent variable, numerous factors contribute to variance in test anxiety: evaluative stress, time pressure, test format, poor study habits, lack of knowledge, locus of control, etc. For the purpose of this study, test format and locus of control have been selected as the independent variables.

The most common test formats, essay and multiple-choice, have been investigated to determine what effect test format has on test anxiety. These investigations have, primarily, been non-experimental studies. Essay test format has been shown to create more test anxiety than has multiple-choice test format (Anderson, 1987). Few studies have specifically investigated the relationship between test anxiety and test format (e.g., Weare, 1984; Zoller & Ben-Chaim, 1988). Most studies have looked at student test format preference (Anderson, 1987; Weare, 1984). The relationship between test anxiety and test format has not been clearly established.

Locus of control has been extensively studied as a variable to explain academic behavior in education. According to Rotter (1966), a person with internal locus of control perceives events to be the consequences of his/her own actions; therefore, internals tend to attribute success or failure to factors within themselves, such as effort or ability. A person with external locus of control perceives events to be independent of his/her own actions. Consequently, externals tend to attribute success or failure to external factors such as luck, task difficulty, fate, or powerful others. Research indicates that students with external locus of control experience higher levels of test anxiety (Bar-Tal & Bar-Zohar, 1977; Hountras & Scharf, 1970). Therefore, when used as an independent variable, the

locus of control variable appears to account for variability in test anxiety.

Statement of the Problem

Numerous studies have reported the debilitating effects of test anxiety on academic performance (Culler & Holahan, 1980; Hunsley, 1985). There is, however, a real need to identify factors contributing to test anxiety so that the debilitating effects of test anxiety can be ameliorated, to improve learning assessment.

As indicated, test anxiety has been studied as the independent variable rather than the dependent variable in most studies. By treating test anxiety as the dependent variable, sources of test anxiety will be identified, which will help practitioners with diagnosis and/or alleviating test anxiety in classroom settings. Although test anxiety has been studied in terms of test format and locus of control constructs, no studies have looked at the combined effects of test format and locus of control on test anxiety.

No studies to date have simultaneously examined the effects of both locus of control and test format on test anxiety. It is reasonable to believe that the test anxiety of students with external locus of control would be more influenced by test format than would the test anxiety of students with internal locus of control. It is also expected that students who are externally oriented on the

locus of control scale will exhibit higher levels of test anxiety than would those who are internally oriented. It is further hypothesized that students who take essay tests will exhibit higher levels of test anxiety than those who take multiple-choice tests. This is because externals are more sensitive to factors beyond their control.

This study was designed to investigate the effects of both locus of control and test format on test anxiety in an actual classroom setting using an experimental design. The findings of this study will be limited to some extent since effects of manipulated variable (test format in this study) on test anxiety may be different in nonexperimental classroom settings.

Definition of Terms

In this study, the terms will be defined as follows:

Test Format

- essay: a test format that requires a few sentences as response
- multiple-choice: a test format that requires selection of the correct or best alternative from 4 or 5 options

Locus of Control

external: a person who attributes success or failure to external factors, such as luck, task difficulty, or fate - a student who scored above the median on Rotter I-E scale in this study

internal: a person who attributes success or failure to internal factors, such as ability or effort - a student who scored below the median on Rotter I-E scale in this study

Summary

In the test anxiety area, it is believed that anxiety is not a unitary construct, but is a function of personality factors and situational factors (Morris, Davis, & Hutchings, 1981). Locus of control is a personality factor (trait) affecting test anxiety, whereas test format is a situational factor (state) affecting test anxiety. This study is an investigation of the combined effects of test format and locus of control on test anxiety in a college sample. The primary focus, in this study, was to explore the effect of test format on test anxiety, across subjects exhibiting the two types of locus of control. In addition, the effects of preference for each test format on test anxiety were

examined. The test formats under investigation were essay format and multiple-choice format. The relationship between test anxiety and academic performance was also explored.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Numerous studies have investigated the effects of test anxiety on academic performance. As indicated, in the previous chapter, the negative effect of test anxiety on academic performance has been well established. However, the factors that contribute to creating test anxiety have not been specifically identified. In this chapter, literature was selected on the basis of relevance to the factors that are believed to be related to test anxiety. The issues that are relevant to test format will be discussed first. These include the effects of test format on test performance, students' preference for a test format, and the effects of test format on test anxiety. Next, locus of control theory and relevant issues will be reviewed. These include the relationship between locus of control and academic performance, and the relationship between locus of control and test anxiety.

Test Format

The type of test format a student expects in a given testing situation appears to affect an individual's mode of restoring and/or retrieving information. In a review of the effects of tests on several different variables, Kirkland (1971) summarized the effects of objective tests versus essay tests on study behavior. According to him, students tend to memorize material in preparation for objective tests. On the other hand, when students prepare for essay tests, they tend to organize material and try to find relationships rather than trying to memorize the material.

The study of McDaniel, Challis, and Sadowski (1991) also showed the differential effects of expected test format. In their study students who expected multiple-choice, true-false, or essay test formats were compared to students who did not expect any specific test format. They were evaluated on their ability to organize content while reading. The results indicate that students who expect essay tests organize material better than those who expect other test formats.

Studies on the effects of test format have focused on learning process rather than test performance. The trend of focusing on learning process may be due to the fact that constructing equivalent tests in two or more forms is extremely difficult. Therefore, most studies on test

format, have been conducted to determine students' preference for test formats.

Of the formats typically utilized in classrooms, student preference for either essay format or multiple-choice format has not been clearly determined. It appears, however, that undergraduate students tend to show more positive attitudes toward multiple-choice test format than they do toward essay test format. One study found that undergraduate students preferred multiple-choice test format to essay test format (Anderson, 1987). Another study reported that students preferred an essay test to multiple-choice only when the exam was a take-home test (Zoller & Ben-Chaim, 1988). In Weare's (1984) study, students were found to prefer both essay test format and multiple-choice test format over true-false and/or matching. Other formats, such as true-false and matching are typically ranked somewhere in the middle.

Interestingly, students have indicated that they believe essay tests evaluate student performance better than any other format, regardless of their preference (Weare, 1984; Anderson, 1987). Zoller & Ben-Chaim (1988) have found that students prefer a test format which measures understanding rather than one that requires memorization and recognition; however, in most studies, it appears that students' preference for test format and their beliefs

concerning how well a particular format measures performance are not consistent.

Students' preference for test format appears to be dependent upon test restrictions. Students prefer formats that exert less time-pressure, fewer restrictions and are more open (Zoller & Ben-Chaim, 1988). Zoller and Ben-chaim (1988) have found that undergraduate students prefer projects, followed by take-home tests, oral tests, and written tests.

Few studies have examined the relationship between test format and test anxiety. However, the relationship between test format and test anxiety can be inferred on the basis of student preference, because preferred formats tend to reduce students' test anxiety (Zoller & Ben-Chaim, 1988). The fact that college students ranked written tests, compared to oral tests, as the least preferred implies that written tests elicit more anxiety. The most common written test formats are true-false, matching, multiple-choice, and essay (Osterlind, 1989).

College students consider true-false tests to be less threatening than other formats (McDaniel et al., 1991). However, these students indicate that they have low confidence in the ability of true-false tests to accurately evaluate ability (Anderson, 1987). Adult students enrolled in adult education program, however, have indicated that

true-false items can create anxiety when test items require rote memorization (Weare, 1984)

Essay tests appear to be related to increased test anxiety in most students regardless of age. Benjamin et al., (1981) found that highly test anxious students perform poorly on short essay tests. These researchers argue that poor performance on the part of highly anxious students may be due to a lack of ability in terms of encoding and organizing information. Their argument supports the dual-deficit theory of test anxiety, which considers test anxiety to be the outcome of poor preparation and/or poor study skills. In Weare's study (1984), many students reported that they experienced test anxiety when taking essay tests. Students in Weare's study gave several reasons why they experienced test anxiety: lack of writing ability, lack of time, and unclear questions. Whether test anxiety is due to low writing ability or poor test construction, it appears that the essay test format makes a greater contribution to overall test anxiety than any other format.

Because of the versatility in measuring course objectives and objectivity in scoring, multiple-choice tests are the most widely used. On the basis of several studies concerning test format preference (Anderson, 1987; McDaniel et al., 1991; Weare, 1984), it may be assumed that the multiple-choice format creates less test anxiety than does the essay format in college samples. It may also be

concluded that students having high test anxiety tend to do better on multiple-choice tests than on essay tests. The results of Benjamin et al., (1981) support this inference.

Since students are required to choose one correct answer from several options, the matching test format is considered to be similar to multiple-choice tests. One study (students, age 8 through 26) indicated that a matching test format provokes less test anxiety than does a multiple-choice test format (Shaha, 1982). The matching test format was also found to elicit less anxiety than multiple-choice tests in an adult population (Weare, 1984).

Among the four common test formats, true-false and matching tests appear to create less anxiety. The essay format appears to create more anxiety than multiple-choice format. Since few experimental studies have investigated the effect of test format on test anxiety, the relationship between the two variables has not been clearly established. However, it appears that test format affects the level of test anxiety and that providing a preferred test format tends to reduce test anxiety (Zoller & Ben-Chaim, 1988). In comparisons of the two most widely used formats, multiple-choice seems to be preferred to essay by college students. Therefore, it can be surmised that the essay test format creates more state test anxiety than the multiple-choice format. One possible explanation for this phenomenon might

be that college students have had more experience in taking multiple-choice tests.

Locus of Control

Locus of control is a construct that has contributed to the causal explanation of human actions. It is generally believed that there are two types of locus of control: internal and external. According to Weiner (1985), a person with internal locus of control (referred to as an internal) perceives events to be the consequences of his/her own actions. Internals tend to contribute success or failure to factors within themselves. Such a person believes that reinforcement is contingent upon effort or ability. Since a person with internal locus of control perceives events to be the consequences of their own actions and attributes success or failure to factors within self, they are more alert to aspects of the environment that provide useful information (Bar-Tal & Bar-Zohar, 1977). A person having an external locus of control (referred to as an external), on the other hand, perceives events to be independent of his/her own actions. They perceive outcomes to be attributable to external factors such as luck, task difficulty, fate, or powerful others.

In education locus of control has often been used to explain students' academic achievement behaviors. The relationship between locus of control and academic

performance has been explained in terms of motivation and cognitive reactions. According to Bar-Tal and Bar-Zohar (1977), students with internal locus of control believe that they have control over their academic behaviors. That belief leads internals to higher motivation in academic pursuits. Therefore, they exhibit increased initiative and sustain cognitive alertness in academic endeavors. This results in higher achievement. On the other hand, students with external locus of control believe that the outcomes of their actions are beyond their control. Attributing outcomes to factors outside the self has a detrimental effect on motivation and leads to engagement in task-irrelevant activities (Baker, 1971), resulting in poor academic performance. Since academic performance is typically measured through tests, internals show higher levels of test performance. According to Seeman (1963), internals show better cognitive ability to recall information that is useful for personal goals than externals.

Because of high motivation and being cognitively alert in academic endeavors, internals show higher levels of academic performance. Research provides evidence that there is a significant relationship between locus of control and academic performance. A correlational study by Warehime (1972) supports the relationship between locus of control and GPA of college freshmen. Using the Rotter Internal-

External Scale (I-E) as the measure of locus of control type, a statistically significant negative correlation coefficient of - .16 was obtained for male students. The lower score on Rotter I-E scale indicates more internal direction. Thus, the results of Warehime's study suggest that students who are more internally oriented on the Rotter I-E scale tend to exhibit higher GPAs than externally oriented students although the association between them is not very strong.

Gilmor and Reid (1978) found similar results in their study of the effect of locus of control on the accuracy of estimating final grades using 20 male and 32 female college students. As expected, internals obtained higher final grades than externals. The mean final grade of internals was B, whereas the mean of externals was C. In addition, Gilmor et al., (1978) also found that internals estimated their final grades more accurately.

In their review of locus of control studies Bar-Tal and Bar-Zohar (1977) showed evidence of a strong relationship between academic achievement and locus of control in the literature. Thirty-one out of thirty-six studies indicated that there is a significant relationship between academic performance and locus of control construct. Students with an internal locus of control tend to exhibit higher academic achievement than those with an external locus of control.

While the relationship between internality and academic performance is positive, the relationship between internality and test anxiety appears to be negative (Phares, 1976; Watson, 1967). Watson investigated the relationship between locus of control and anxiety with 648 undergraduate students. The Achievement Anxiety Test (Alpert & Harber, 1960) was used to measure facilitating (AAT+) and debilitating (AAT-) achievement anxiety, along with Taylor's (year) Manifest Anxiety Scale (MAS). A significant correlation coefficient of .38 was observed between the locus of control scale (higher scores indicate more external orientation) and the Manifest Anxiety Scale. Debilitating anxiety score (AAT-) and locus of control showed a significant positive correlation ($r=.25$), whereas facilitating anxiety (AAT+) and locus of control showed a significant negative correlation ($r=-.15$). Therefore, students who are more externally oriented show the tendency of exhibiting more debilitating test anxiety.

Using low-achieving male college students as subjects, Hountras and Scharf (1970) also observed that internally oriented students experienced less anxiety. In their study the mean score on the Taylor MAS for internals was 45.15, whereas the mean for externals was 56.30. The mean difference was significant at .01 level.

In conclusion, it appears that internals tend to perceive increased control over, and maintain responsibility

for, their actions; therefore, they may tend to experience less test anxiety. Externals, on the other hand, may fail to maintain control over their actions; therefore, they might tend to experience more test anxiety.

Summary

The relationship between test anxiety and test format in college samples has not been well established. However, it appears that essay test format elicits more test anxiety than any other test format. Since those findings are based on non-experimental studies, the relationship between the two variables needs to be further investigated.

The relationship between test anxiety and locus of control in college sample has been well established. Externals tend to experience higher levels of test anxiety compared to internals due to their attributional characteristics. The strength of the relationship between the two variables is moderate, but consistent from study to study (Phares, 1976; Ray & Katahn, 1968; Watson, 1967).

The relationship between test format and locus of control is not clear because few studies have examined test format and locus of control at the same time. However, it appears that to a certain degree locus of control is related to the effect of test format on test anxiety. Based on the literature, it is logical to expect that externals will be more affected by test format than internals. In this study

the relationship between test format and locus of control on test anxiety will be explored by looking at the effects of both variables on test anxiety.

CHAPTER III

METHODS

Subjects

Participants in this study were drawn from four undergraduate Measurement and Evaluation classes at Oklahoma State University. Each class was taught by a different instructor. Of the initial 108 participants, (25 male and 83 female), 11% were not included in the analyses because they failed to complete the test anxiety instrument that was used as the dependent measure. After descriptive statistics was calculated, 10 subjects who scored at the median on the I-E scale were excluded from further analyses. Therefore, the final number of subjects was reduced to 86. The racial distribution was 95.3% White, 1.9% Hispanic, and 2.8% Native American. The class is a required course for a Bachelor's degree in teacher education at Oklahoma State University.

Instruments

Worry-Emotionality Questionnaire

The revised version of the Worry-Emotionality Questionnaire (WEQ; Liebert & Morris, 1967) was used to measure test anxiety. WEQ is a 10 item forced-choice

instrument consisting of two categories, Worry and Emotionality. The five items for Worry measure the cognitive component of test anxiety, such as self-evaluation, relevant thoughts for the test, and concerns about the test. The five items for Emotionality measure physiological reactions to the test, such as upset stomach, nervousness, and panic. Item scores range from 1 to 5, yielding a total score that may range from 10 to 50. High scores on WEQ indicate high levels of test anxiety.

Morris, Davis, and Hutchings (1981) reported an internal consistency of .81 for worry, and .86 for emotionality. Morris et al., (1981) have reported correlation coefficients of .41 and .43 between Worry and Emotionality components in a sample of 223 college students.

Internal-External Locus of Control Scale

The Internal-External Locus of Control Scale (I-E; Rotter, 1966), used to measure locus of control is composed of 29 forced-choice items including 6 filler items. Filler items are included to disguise the purpose of the test. Each item has two options, an internal belief option and an external belief option. The scale is additive with the total number of external choices yielding a maximum score of 23. In other words, higher scores indicate more externality. The items on the I-E scale are intended to reflect an individual's beliefs across different situations,

such as interpersonal situations, school, government, work, and politics (Phares, 1976). As a consequence, the I-E scale is intended to measure a generalized expectancy; therefore, it is considered to sample an individual's attitudes across various situations.

Rotter (1966) has reported estimates of internal consistency ranging from .65 to .79 and test-retest reliability coefficients ranging from .49 to .83, depending on the interval and the sample. Reliability coefficients of .75 for a 3-month period, .39 for a 6-month, and .26 for a 9-month have also been reported by Kiehlbauch (1967).

To measure discriminant validity of the I-E scale, correlation coefficients between I-E scale and other measures were obtained. Rotter (1966) reported correlation coefficients, ranging from -.07 to -.35, between I-E scale and Marlowe-Crowne Social Desirability Scale using college samples. Correlation coefficients between I-E scale and intelligence measures were also reported (Rotter, 1966). The correlation coefficients range from -.22 to .03 with college students. The correlation coefficients between I-E scale and other measures (i.e., intelligence or social desirability measures) are relatively low or negligible.

Procedure

Prior to the beginning of the semester, four sections of the Measurement and Evaluation class were randomly

assigned to either the essay test format or multiple-choice test format. Two sections were assigned to each test format. The four instructors for each class were then informed which type of test format would be used for the first test. Only the first test of the semester was used in this study.

During the second class period, students were provided with information concerning the purpose of the study and the procedure to be followed. They were also assured that although they were required to take the tests as part of their course requirements, participation in the study was optional. All students elected to participate in the study.

Following administration of the consent form, the Rotter I-E scale was administered to all participants during the second class. In addition, a Student Information Questionnaire (SIQ) was administered in combination with the I-E scale during the second class period. The items on SIQ included overall GPA at the university level, the amount of experience with each of the two test formats (multiple-choice, essay), self-rated test taking ability in the two formats, how well the two formats evaluate learning, preference for the two formats, expected grade in the class, self-rated writing ability and the importance of tests. Each item utilized a 5-point scale, and the score for each item may range from 1 to 5.

Students in all sections were then informed by their instructors what format to expect for their first exam. Five experts in the area of measurement developed two content equivalent tests; one an essay format test and the second a multiple-choice format. A test blueprint was used to develop two quasi-equivalent forms of the test: an essay and a multiple-choice test. However, because some taxonomy levels are best measured by specific item types (e.g., synthesis is difficult to measure with multiple-choice items), and because some content objectives specifically required recall, whereas others required recognition, the two test forms cannot be considered truly equivalent. This does not threaten the validity of this study, however, since test score was used only to examine the relationship between test anxiety and academic performance within each test format condition.

The first test was given to all participants during the fifth week of the semester. The essay test was administered to the two randomly assigned classes and the multiple-choice test was administered to the other two classes. Immediately before the test, participants completed the WEQ, the measure of test anxiety. Test anxiety scores were used as the dependent variable. After a week, test scores were obtained.

Although participants were encouraged to fill out the test anxiety instrument according to how they felt right

before the test, 11 participants in the essay test condition failed to fill out the instrument.

A two-factor (2 x 2) between group analysis of variance (ANOVA) was used to analyze the data. Test format (essay or multiple-choice) and locus of control type (internal or external) served as the two between factors; test anxiety was used as the dependent variable. This analysis of variance was used to test the following three hypotheses:

1) Interaction

The test anxiety of students with external locus of control would be more influenced by test format than would the test anxiety of students with internal locus of control (Ho: There will be no significant interaction between test format and locus of control on test anxiety)

2) Main effect for locus of control

Students who were externally oriented would exhibit higher levels of test anxiety than those who were internally oriented (Ho: There will be no significant difference between the mean test anxiety score of internals and the mean test anxiety score of externals)

3) Main effect for test format

Students taking an essay test format would show higher levels of test anxiety than students taking a multiple-choice test format (Ho: There will be no significant difference between the mean test anxiety score of students

under essay test condition and the mean test anxiety score of students under multiple-choice test condition)

Two Mann-Whitney U tests were conducted to test the effect of students' attitude on test anxiety. Analyses were conducted separately for each test format. Students were categorized into positive and negative attitude groups based on their responses to questions asking them to indicate their attitude toward multiple-choice and essay tests. One analysis was conducted using only students in the multiple-choice condition; these students were grouped into positive and negative attitude toward multiple-choice tests. A second analysis was conducted using only students in the essay condition; these students were grouped into positive and negative attitude toward essay tests. Test anxiety was the dependent variable for both analyses. Due to a large disparity in cell size and lack of homogeneity of variance, the Mann-Whitney U test was preferable to an independent groups t-test. The hypotheses were:

4) Among students in the multiple-choice condition, those who have positive attitudes toward multiple-choice tests will have lower test anxiety than will students with negative attitudes (Ho: There will be no significant difference between the mean test anxiety score of students who reported positive attitudes toward multiple-choice tests and the mean test anxiety score of students who reported negative attitudes toward multiple-choice tests)

5) Among students in the essay condition, those who have positive attitudes toward essay tests will have lower test anxiety than will students with negative attitudes (Ho: There will be no significant difference between the mean test anxiety score of students who reported positive attitudes toward essay tests and the mean test anxiety score of students who reported negative attitudes toward essay tests)

To explore the relationship between academic performance and test anxiety within each test format condition, two correlational analyses were conducted. The first test score was used as the measure of academic performance. The hypotheses were:

6) There will be significant negative relationship between academic performance and test anxiety under essay test format condition (Ho: There will be no significant linear relationship between academic performance and test anxiety under essay test format condition)

7) There will be significant negative relationship between academic performance and test anxiety under multiple-choice format condition (Ho: There will be no significant linear relationship between academic performance and test anxiety under multiple-choice test format condition)

In addition, reliability analyses of internal consistency were conducted on the I-E scale and on the WEO.

CHAPTER IV

RESULTS

Reliability Analysis

Before the analysis, reliability analyses were conducted for I-E scale and WEQ. Coefficient Alpha was obtained to estimate internal consistency reliability of each instrument. The reliability coefficient for I-E scale in this study was .73 which is within the range reported by Rotter (1966). For the WEQ, the overall reliability coefficient for 10 items was .89. The reliability coefficients for each subscale, Worry and Emotionality, were .77 and .91, respectively. The coefficient for Worry was lower than .81 reported by Morris et al., (1981). However, the coefficient for Emotionality was higher than .86 reported by Morris et al., (1981).

Descriptive Statistics

Descriptive statistics were obtained to determine the number of subjects in each cell. The observed locus of control median score was 11. The subjects were then divided into two groups based on their scores relative to the median from the locus of control scale. Subjects who scored 10 or

less on locus of control were assigned to the internal category. Subjects who scored 12 or higher on the locus of control were assigned to the external category. There were 10 subjects who received the median score of 11. They were eliminated from further analyses because they did not reflect any clear distinction between the two categories. This left 26 in the internal/multiple-choice condition, 16 in the internal/essay condition, 25 in the external/multiple-choice, and 19 in the external/essay condition for analysis.

The means, medians, and standard deviations for locus of control and test anxiety are shown in Table 1. The mean score for I-E scale in this study is a little higher than the mean scores reported by Rotter (1966). According to him, the mean levels of the I-E scale ranged from 5.48 to 10.00. Phares (1976) in a college sample, reported that the mean ranged from 7.50 to 8.50.

Table 1 reveals that there was no apparent difference between the two experimental conditions on the locus of control variable. As expected, externals had higher mean test anxiety scores than internals and students in the essay conditions had higher mean test anxiety scores than those in the multiple-choice conditions.

TABLE 1
 DESCRIPTIVE STATISTICS OF TEST ANXIETY
 AND LOCUS OF CONTROL

Variable	Essay	MC	In	Ex	Total
<u>Locus of Control</u>					
N	41	55	42	44	96*
Mean	11.6	10.9	7.5	14.8	11.2
Median	11.0	11.0	8.0	14.0	11.0
SD	4.1	4.0	1.8	2.6	4.0
<u>Test Anxiety</u>					
Mean	32.3	28.0	26.8	32.6	29.8
Median	33.0	29.0	27.0	34.0	30.0
SD	8.5	9.1	9.1	7.9	9.1

* The total includes the 10 students who were eliminated from further analyses because they received the median score.

Note: maximum score, Locus of Control = 23
 maximum score, Test Anxiety = 50
 In = Internals
 Ex = Externals

The cell means and marginal means for test anxiety by test format and locus of control are shown in Table 2. Table 2 reveals that students in multiple-choice/internal condition exhibited the lowest mean test anxiety scores, whereas students in essay/internal condition exhibited the highest mean test anxiety scores.

TABLE 2
CELL MEANS AND MARGINAL MEANS FOR TEST ANXIETY
BY TEST FORMAT AND LOCUS OF CONTROL

		Format		
		MC	Essay	
Locus	In	24.54 (n=26)	28.81 (n=16)	26.17 (n=42)
	Ex	30.48 (n=25)	35.47 (N=19)	32.64 (n=44)
		27.45 (n=51)	32.43 (n=35)	

Due to the unequal n in each cell, homogeneity of variance assumption was tested. The variances in each cell were 84.09, 82.81, 67.08, and 44.22. Hartley test was utilized to obtain F_{\max} statistic. Since the obtained F_{\max} (1.90) was smaller than the critical value (3.29 at .05, 20df), the equal variance assumption had been met.

Analysis of Variance

The results of the two-factor between ANOVA for test format and locus of control are presented in Table 3. The ANOVA summary table shows that there was no significant interaction between test format and locus of control.

TABLE 3
ANALYSIS OF VARIANCE OF THE EFFECT OF TEST FORMAT AND
LOCUS OF CONTROL ON TEST ANXIETY

Source	SS	df	MS	F	P
Main Effects	1346.902	2	673.451	9.604	.000
Locus	832.648	1	832.648	11.875	.001
Format	447.464	1	447.464	6.381	.013
2-Way					
Interaction	2.675	1	2.675	.038	.846
Format x Locus	2.675	1	2.675	.038	.846
Explained	1349.578	3	449.859	6.416	.001
Residual	5749.876	82	70.120		
Total	7099.453	85	83.523		

The main effects for test format and locus of control were statistically significant at $\alpha = .05$ and $\alpha = .01$ levels, respectively. Students who took the essay test showed a significantly higher mean score in test anxiety than students who took the multiple-choice test. With regard to locus of control, students who were externally

oriented showed a significantly higher mean score in test anxiety than their internal counterparts.

For the analysis of test format attitude on test anxiety in the multiple-choice condition, only 9 students reported negative attitudes (i.e., scores of 1 or 2 on the survey question), whereas 23 students reported positive attitudes (i.e., scores of 4 or 5 on the survey question) toward multiple-choice tests. The mean test anxiety score of students with negative attitudes was 30.89. The mean test anxiety score of students with positive attitudes was 25.04. The results of the Mann-Whitney U test for the multiple-choice test condition showed a non significant difference in test anxiety between students with positive and students with negative attitudes toward multiple-choice tests ($U = 65, p > .05$).

For the analysis of test attitude on test anxiety in the essay condition, only 5 students reported negative attitudes, whereas 24 students reported positive attitudes toward essay tests. The mean test anxiety score of students with negative attitudes was 42.00. The mean test anxiety score of students with positive attitudes was 28.96. The results of the Mann-Whitney U test for the essay test condition showed a significant difference in test anxiety between students with positive and students with negative attitudes toward essay tests ($U = 2, p < .001$).

The correlational analyses revealed that there was a significant negative relationship between academic performance and test anxiety under multiple-choice test format condition, but not under essay test format condition. The obtained Pearson product-moment correlation coefficients were $r(43) = -.3931$, $p < .01$, and $r(33) = .0019$, respectively. The plotted scores in the scattergram indicated that there was a linear relationship between test anxiety scores and test scores under multiple-choice condition. The results show that students who experienced high levels of test anxiety scored low, whereas students who experienced low levels of test anxiety scored high on their first test taking multiple-choice test. On the other hand, there was no significant relationship between anxiety and test score under essay test condition.

CHAPTER V

DISCUSSION

The first hypothesis, that the effect of test format on test anxiety would differ across internals and externals was not supported in this study. Students in the internal/multiple-choice test condition exhibited the lowest amount of test anxiety, whereas students in external/essay test condition exhibited the highest amount of test anxiety.

It seems that there could be three possible explanations for nonsignificant interaction. The first explanation is that it could be due to an insufficient power. However, descriptive statistics does not support the existence of interaction in this study. Thus, the second explanation is that there may be no interaction between test format and locus of control in the population. The third explanation is that it could be due to the experimental context of this study. Although every effort was made to provide normal classroom environments, students were aware that this was an experimental study. Informing students the nature of the study was unavoidable because the Institutional Review Board (IRB) requires researchers to provide sufficient information about studies. Being part of

an experimental study may have affected students' anxiety levels. Normally multiple-choice tests were given in these classes and reports from instructors indicated that students in the essay sections were upset that they had to take essay tests. Therefore, it was impossible for students to perceive it as a normal academic experience. The negative reactions to the essay tests by the students may have been strong enough to inflate the overall anxiety level in the two essay test classes regardless of each student's locus of control type. As a consequence, internals who are generally believed to experience less test anxiety could have been influenced by that strong anxiety invoking situation. Assuming this third explanation is true, it affects the issue of external validity since that explanation implies that the effect of manipulated variable (test format) has been confounded.

The second and third hypotheses, concerning the main effects for test format and locus of control, were supported. As expected, students who took the essay test format showed significantly higher levels of test anxiety than did students who took the multiple-choice test format. This finding is consistent with the findings of Anderson (1987), and Zoller and Ben-Chaim (1988).

The reason students are more anxious when they are taking the essay tests may be that they do not like essay tests. In the essay condition, students with negative

attitudes toward essay tests reported significantly higher levels of test anxiety. Whether negative attitude causes increased anxiety or whether prior anxiety experience produces negative attitude, however, cannot be determined from this study. However, these results are consistent with prior research (e.g., Benjamin et al., 1991). In the multiple-choice condition, attitude toward multiple-choice tests had no apparent effect on test anxiety. It is interesting to note that the five students in the essay condition with negative attitude toward essay tests had an extremely high mean test anxiety score. Their mean test anxiety score was 42.

The other finding is that students who were externally oriented on the locus of control scale experienced higher levels of test anxiety than students who were internally oriented. These findings are consistent with the literature (Hountras & Scharf, 1970; Watson, 1967). In both studies externals showed significantly higher levels of test anxiety than did internals.

The characteristics of internals and externals seem to explain why internals exhibited less test anxiety in this study. As Rotter (1966) explained, internals maintain the belief that they can control their performance in a given environment to a certain extent. Although the internals in this study could not exert control over the test format that was given, they may have been more motivated and cognitively

alert during the process of test preparation. By employing the dual-deficit test anxiety theory, internally oriented students' high motivation might have led them to be more prepared for the test, which in effect alleviated their test anxiety. By employing the cognitive attentional test anxiety theory, internals might have been cognitively alert enough to pay close attention to the relevant tasks during testing.

The fourth hypothesis, that students who have positive attitudes toward multiple-choice tests will have lower test anxiety than will students with negative attitudes under multiple-choice condition, was not supported. The fifth hypothesis, that students who have positive attitudes toward essay tests will have lower test anxiety than will students with negative attitudes under essay condition was supported.

These findings of the effects of attitudes toward test format on test anxiety indicate that multiple-choice test format does not have a significant effect on test anxiety regardless of students' attitudes toward multiple-choice tests. On the other hand, essay test format has a significant effect on test anxiety when students have negative attitudes toward essay tests.

The null hypothesis number six, that there will be no significant linear relationship between academic performance and test anxiety under essay test condition, was accepted. The finding suggests that students' test anxiety does not

appear to be related to their achievement levels when they take essay tests. This finding is inconsistent with literature where the relationship between academic achievement and test anxiety has been well established (e.g., Tryon, 1980).

The null hypothesis number seven, that there will be no significant linear relationship between academic performance and test anxiety under multiple-choice condition, was rejected. The finding indicates that there is moderate negative correlation between academic performance and test anxiety ($r = -.39$) when students take multiple-choice tests. The higher a student's anxiety level is, the lower the student's performance is. The size of the correlation coefficients is within the range of correlation coefficients Tryon (1980) summarized studies on the relationship between academic performance and test anxiety.

The same speculation (i.e., experimental context of this study) may be applied to the reason of nonsignificant correlation between test anxiety and academic performance under essay test condition. Another speculation is that it may be due to the unreliability of grading the essay tests.

One of the implications of the findings in this study is that test format may be an important factor that contributes to test anxiety. The results of this study suggest that essay test format is related to higher levels of test anxiety in college students than is multiple-choice

format, especially when students' attitudes toward essay tests are negative. The implication may be that teachers need to be aware of the effect of test format on test anxiety, since teachers have more control over factors that are related to test anxiety.

Concerning the limitations of this study, it has been speculated that the effect of test format on test anxiety may have been confounded with the experimental context to some extent in this study. That effect, as well as having used intact groups, may limit the generalizability of the study results. Further study is needed to clarify or to confirm the effects of test format.

In this study the composite score of WEQ was used as the dependent measure to study the combined effects of test format and locus of control on test anxiety. Since the WEQ is composed of two subscales (worry and emotionality), further research needs to be done using the two subscales as multiple dependent measures. Employing multivariate analysis of variance (MANOVA) may allow us to explore the effects of test format and locus of control on worry and emotionality. No significant interaction between test format and locus of control was found in this study; using MANOVA may give insight into the nature of interaction. This will further determine which component of test anxiety, worry or emotionality, is more associated with test format and /or locus of control.

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APPENDIX A

IRB APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Proposal Title: THE EFFECTS OF TEST FORMAT AND LOCUS CONTROL ON TEST ANXIETY

Principal Investigator: LAURA BARNES/ NAMOK CHOI BRVANT

Date: JUNE 24, 1992 IRB # ED-92-069

This application has been reviewed by the IRB and

Processed as: Exempt [] Expedite [XX] Full Board Review []

Renewal or Continuation []

Approval Status Recommended by Reviewer(s):

Approved [XX] Deferred for Revision []

Approved with Provision [] Disapproved []

Approval status subject to review by full Institutional Review Board at next meeting, 2nd and 4th Thursday of each month.

Comments, Modifications/Conditions for Approval or Reason for Deferral or Disapproval:

PROVISIONS RECEIVED

Signature: Marina S. Tilley
Chair of Institutional Review Board

Date: 7-20-92

APPENDIX B

VOLUNTEER SOLICITATION FORM

VOLUNTEER SOLICITATION FORM FOR
THE EFFECTS OF TEST FORMAT AND LOCUS OF CONTROL ON TEST
ANXIETY

There is ABSOLUTELY no penalty for non-participation. Your participation is completely voluntary.

We are interested in understanding various things that affect how students feel about taking tests, and to gain insight into the best ways to test students. Therefore, we are inviting you to participate in an in-class study.

If you choose to participate, you will first be asked to complete a Student Information Questionnaire and an attitude survey. You will be asked to complete these forms at the beginning of the second class meeting. You will be asked to write the last six digits of your social security number on all instruments instead of your name. The instructor will pass around an envelope in which to place all forms.

It will take approximately 10 minutes to fill out a Student Information Questionnaire and 10 minutes for the attitude survey.

Before you take your first course exam, your instructor will notify you of the test format (either essay or multiple-choice) that will be given.

Right before you take your first test, you will be asked to complete another attitude survey. You will also be asked to write the last six digits of your social security number on that form. It will take approximately 5 minutes for you to fill out that survey. For confidentiality, your class instructor will pass around an envelope in which to place all forms.

When you get your test result back after the first course exam, you will be asked to write down your test grade. That will take less than one minute.

All materials that you completed will be sent to the researcher who is not related to this class in any way. Your instructor will not have access to any of these materials other than your course grade.

Students willing to participate in the study will be required to complete the subject consent form on the next page.

APPENDIX C

CONSENT FORM

CONSENT FORM

The effects of Test Format and Locus of Control on Test Anxiety

I, _____, voluntarily agree to participate in the above titled research.

I understand that:

1) the purpose of the study is to investigate factors believed to affect students' test performance;

2) I will be requested to complete a Student Information Questionnaire, two attitude surveys, and to report my first test grade using the last six digits of my social security number known only to me;

3) It will take approximately:

10 minutes for me to complete the Student Information Questionnaire

10 minutes for me to complete the 1st attitude survey

5 minutes for me to complete the 2nd attitude survey

1 minute for me to report my test grade;

4) I may benefit from participating in this study by becoming more aware of my beliefs and feelings about taking tests. Additionally, the results of this study will increase educators' knowledge about factors that affect students' test-taking and may contribute to improved testing practices;

5) Prior to taking my first course exam, I will be asked to spend 5 minutes filling out an attitude survey, so if I have crammed for that exam, I may potentially lose some of the crammed information. However, I will be given the opportunity to retest on the material covered on the first exam if I choose;

6) I will be asked to write the last six digits of my social security number on all materials that I complete for this research project. This is needed in order to match the results from the various materials. No attempt will be made to match my name to my partial social security number and my course instructor will not have access to any of the materials I complete for this research project except for my classroom test. My research materials will not be released to anybody other than the investigators. Upon completion of data analysis, the completed materials and data storage

devices will be locked in a filing cabinet or other secure storage area. The information that I provide will be combined with that of other student participants. Only group results will be reported in the write-up of this project and no individual students will be identified;

7) my participation is voluntary and I have the right to withdraw from this study at any time, although I am required to take the course exam as part of the course requirements;

8) I may contact Dr. Laura Barnes at (405) 744-6036 should I wish further information. I may also contact Beth McTernan, University Research Services, 005 Life Sciences East, Oklahoma State University, telephone (405) 744-5700.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date _____

Signed _____

APPENDIX D

STUDENT INFORMATION QUESTIONNAIRE

XXX - _____ - _____
 Last 6 digits social security number

STUDENT INFORMATION QUESTIONNAIRE

Demographics: Check one response for each question.

1. What is your gender?

- male
- female.

2. What is your ethnicity?

- Black
- White
- Hispanic
- Native-American
- Asian-American
- other

3. What is your overall GPA at OSU?

- less than 2.00
- 2.01 to 2.50
- 2.51 to 3.00
- 3.01 to 3.50
- 3.51 to 4.00

Test Format: Essay(E) vs Multiple-Choice(MC); Short essay (E-short) requires a few sentence response. Long essay (E-long) requires more than a paragraph response. For each format, circle the number that best describes your experience or attitude.

* In your high school education, how much experience did you have with each of these test formats?

	None				Very much
4. MC	1	2	3	4	5
5. E-short	1	2	3	4	5
6. E-long	1	2	3	4	5

* In your university education, how much experience have you had with each of these test formats?

	None				Very Much
7. MC	1	2	3	4	5
8. E-short	1	2	3	4	5
9. E-long	1	2	3	4	5

* Rate your ability as a test taker in each of these test formats.

	Very Poor				Very Good
10. MC	1	2	3	4	5
11. E-short	1	2	3	4	5
12. E-long	1	2	3	4	5

* Based upon your test experience, rate these test methods according to how well they can evaluate student learning.

	Very Poorly				Very Well
13. MC	1	2	3	4	5
14. E-short	1	2	3	4	5
15. E-long	1	2	3	4	5

* In general, what is your attitude about each test format?

	Strongly Dislike				Strongly Like
15. MC	1	2	3	4	5
16. E-short	1	2	3	4	5
17. E-long	1	2	3	4	5

Measurement & Evaluation in The School class: Circle the number that best describes your attitude.

18. How closely does this class relate to your major and intended future employment?

	Very Little				Very Much
	1	2	3	4	5

19. What is your perception of this class in terms of difficulty level?

	Very Difficult				Very Easy
	1	2	3	4	5

20. How much "prior knowledge" of the subject matter do you think you have for this class?

	None				Very Much
	1	2	3	4	5

20. What grade do you expect to receive in this class?

	F;	D;	C;	B;	A;
	1	2	3	4	5

21. How do you judge your writing ability?

Very Poor

Very Good

1 2 3 4 5

22. How much math ability do you think is required for this class?

None

A Great Deal

1 2 3 4 5

23. How would you rate your math ability?

Very Poor

Very Good

1 2 3 4 5

24. Classify yourself as a student in terms of effort.

Very Low

Very High

1 2 3 4 5

25. How important is it for you to do well on tests?

Not At All

Extremely

1 2 3 4 5

APPENDIX E

INTERNAL-EXTERNAL CONTROL SCALE

XXX - _____ - _____
Last 6 digits social security number

ATTITUDE SURVEY; Internal-External Control Scale

Directions: For each number, circle the letter of the statement that you believe to be most true.

1. a. Children get into trouble because their parents punish them too much.
b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
b. There will always be wars, no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world.
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
5. a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. a. Without the right breaks one cannot be an effective leader.
b. Capable people who fail to become leaders have not taken advantage of their opportunities.
7. a. No matter how hard you try some people just don't like you.
b. People who can't get others to like them don't understand how to get along with others.
8. a. Heredity plays the major role in determining one's personality.
b. It is one's experiences in life which determine what they're like.
9. a. I have often found that what is going to happen will happen.
b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.
12. a. The average citizen can have an influence in government decisions.
b. This world is run by the few people in power, and there is not much the little guy can do about it.
13. a. When I make plans, I am almost certain that I can make them work.
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyway.
14. a. There are certain people who are just no good.
b. There is some good in everybody.
15. a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might just as well decide what to do by flipping a coin.
16. a. Who gets to be the boss often depends on who was luck enough to be in the right place first.
b. Getting people to do the right thing depends upon ability; luck has little to do with it.
17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
b. By taking an active part in politics and social affairs the people can control world events.
18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck."
19. a. One should always be willing to admit mistakes.
b. It is usually best to cover up one's mistakes.
20. a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.
21. a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
22. a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.
24. a. A good leader expects people to decide for themselves what they should do.
b. A good leader makes it clear to everybody what their jobs are.
25. a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.
26. a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.
27. a. There is too much emphasis on athletics in high school.
b. Team sports are an excellent way to build character.
28. a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.
29. a. Most of the time I can't understand why political behave the way they do.
b. In the long run the people are responsible for bad government on a national as well as on a local level.

APPENDIX F

WORRY-EMOTIONALITY QUESTIONNAIRE

XXX - _____ - _____
Last 6 digits social security number

ATTITUDE SURVEY; Anxiety Instrument

Directions: To the left of each of the following statements, indicate your feelings, attitudes, or thoughts as they are right now in relation to this course examination.

Use the following numerical scale:

1. The statement does not describe my present condition.
2. The condition is barely noticeable.
3. The condition is moderate.
4. The condition is strong.
5. The condition is very strong; the statement describes my present condition very well.

_____ I feel my heart beating fast.

_____ I feel regretful.

_____ I am so tense that my stomach is upset.

_____ I am afraid that I will have to study very hard for the test.

_____ I have an uneasy, upset feeling.

_____ I feel that others will be disappointed in me.

_____ I am nervous.

_____ I feel I may not do as well on the tests as I could.

_____ I feel panicky.

_____ I do not feel very confident about my performance on the tests.

APPENDIX G

FOLLOW-UP INFORMATION

XXX - _____ - _____
Last 6 digits social security number

FOLLOW-UP INFORMATION

The following information is needed to investigate the effect of test format on student academic achievement. Your participation is absolutely voluntary.

* Please circle the number that corresponds to the grade you received on your first exam in this course.

- 9. A
- 8. A-
- 7. B
- 6. B-
- 5. C
- 4. C-
- 3. D
- 2. D-
- 1. F

Thank you for your participation.

VITA \

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Master of Science

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