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AN ASSESSMENT OF COGNITIVE STRATEGIES UTILIZED BY TEST-ANXIOUS SUBJECTS

Indiana State University   PH.D.   1980

AN ASSESSMENT OF COGNITIVE STRATEGIES UTILIZED
BY TEST-ANXIOUS SUBJECTS

A Dissertation

Presented to

The School of Graduate Studies

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

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by

Laura Ruth Meers

December 1979

APPROVAL SHEET

The dissertation of Laura Ruth Meers, Contribution
to the School of Graduate Studies, Indiana State University,
Series III, Number 210, under the title <u>An Assessment of</u>
<u>Cognitive Strategies Utilized by Test-Anxious Subjects</u> is
approved as partial fulfillment of the requirements for the
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ABSTRACT

This study was designed to investigate the cognitive strategies utilized by high and low test-anxious subjects when faced with an evaluative situation. The sample consisted of 43 high test-anxious subjects and 43 low test-anxious subjects at a midwestern university who were enrolled in an introductory psychology course. Subjects were classified as high or low test-anxious on the basis of their scores on the Test Attitude Inventory. All subjects recorded ten thoughts they entertained in reference to taking tests two weeks prior to the final examination in the psychology course, one week before the final, and on the day of the final examination immediately preceding the test. Subjects also recorded a positive, negative, or neutral evaluation (valence) of each thought.

Each self-reported thought of each of the 86 subjects over three time periods was assigned to one of the following three categories by three independent raters: (a) self-referent cognitive strategy, (b) test-specific cognitive strategy, or (c) nonspecific cognitive strategy.

Various Chi Square tests of goodness of fit were performed to compare the expected frequencies of self-reported statements and valences with the observed frequencies

for high and low test-anxious subjects immediately prior to the final examination.

Two-way analyses of variance with repeated measures on the time factor were employed to compare the mean frequencies of cognitive strategies and valences utilized across the three time periods by high and low test-anxious subjects.

Results related to the Chi Square goodness of fit tests revealed that high test-anxious subjects most frequently utilized the self-referent cognitive strategy in the face of an evaluative situation. Low test-anxious subjects utilized both the self-referent and test-specific cognitive strategies when confronted with taking a test. High test-anxious subjects most frequently recorded the negative valence while low test-anxious subjects utilized the positive valence most frequently in the face of a test situation.

The results of the Analyses of Variance indicated that high test-anxious subjects utilized the self-referent cognitive strategy across time. Low test-anxious subjects recorded the self-referent and test-specific cognitive strategies most frequently across the three time periods. While high test-anxious subjects continued to record the negative valence most frequently across time, the frequency of neutral valences decreased significantly as the test became more immediate. In a similar fashion, low test-anxious subjects continued to utilize the positive valence most frequently across time, and the frequency of neutral

valences recorded by low test-anxious subjects also decreased significantly as the test grew nearer.

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INTRODUCTION

STATEMENT OF PURPOSE

The purpose of this study was to examine the
self-reported thoughts of high and low test-anxious students.
This study sought to classify these thoughts into three
separate cognitive strategies, i.e. self-referent, test-
specific, or nonspecific. Once these thoughts were classi-
fied into specific cognitive strategies, the study attempted
to differentiate the cognitive strategies utilized by high
test-anxious subjects from the cognitive strategies employed
by low test-anxious subjects. The study also attempted to
differentiate adaptive from maladaptive cognitive strategies.
Finally, this study sought to identify the cognitive
strategies utilized over time by high and low test-anxious
subjects.

BACKGROUND OF THE PROBLEM

Anxiety in a testing situation is an emotional
experience shared by many persons. Liebert and Morris (1967)
conceptualized test anxiety as consisting of two major
components, worry and emotionality, and they developed
scales for measuring each of these. Emotionality was defined
as the autonomic arousal aspect of anxiety, while worry was

described as "primarily the <u>cognitive concern</u> about the consequences of failure" (p. 975). Wine (1971) further described the worry component in a detailed review of test anxiety literature. According to Wine (1971),

> The highly test-anxious person responds to evaluative
> testing conditions with ruminative, self-evaluative
> worry, and thus does not direct adequate attention to
> the task-relevant variables. (p. 99)

On the basis of extensive research evidence, Sarason (1955, 1960, 1972) concluded that high test-anxious persons are likely to emit self-centered and self-critical derogatory statements which interfere with task performance. There appears to be a consensus among recent researchers (Liebert & Morris, 1967; Sarason, 1972; Smith, Andrews, & Morris, 1975; Spielberger, Gonzalez, Taylor, Algaze, & Anton, 1977; Taylor, 1977; Wine, 1971) that high test-anxious individuals experience worry cognitions in situations in which they are being evaluated.

Currently, the procedures used to assess cognitions may be classified into three types (Meichenbaum, 1977). One type of assessment examines subjects' cognitions <u>prior</u> to the evaluative situation (Liebert & Morris, 1975; Spielberger, Gonzalez, Taylor, Anton, & Algaze, 1978). A second assessment approach involves having the subject recall his thoughts, during the performance, immediately <u>following</u> the performance (Sarason, 1975). The third type of assessment requires subjects to monitor and report thoughts <u>during</u> the performance (Bruch, 1976). Each of these assessment procedures

aids in a clearer description of cognitive processes. Via these procedures, cognitions may be grouped into categories or patterns and the quality of the cognition may be examined. The quality refers to the adaptiveness or maladaptiveness of cognitions as determined by the desirability or undesirability of the subsequent emotional responses.

The differing nature of cognitions and their resultant emotive responses has been recognized in the cognitive psychotherapy literature (Beck, 1976; Ellis, 1962; Meichenbaum, 1974). In a recent review of cognitive and self-control therapies, Mahoney and Arnkhoff (1978) classified three therapy approaches under the rubric of cognitive restructuring therapies. Rational emotive therapy (RET) by Ellis (1962), self-instructional training (Meichenbaum, 1974), and cognitive therapy (Beck, 1970, 1976) were included. Generally, each of these therapies attempts to identify the specific nature of the cognition or cognitive pattern. If the cognition is maladaptive, i.e., irrational or emotionally disruptive, it is disputed and replaced with a more adaptive cognition or cognitive pattern. Such therapeutic interventions are based upon the premise that maladaptive cognitions lead to undesirable emotional responses and, most likely, to maladaptive behaviors.

While the cognitive restructuring therapies have focused upon the nature or quality of the cognition, researchers in cognitive therapy have attempted to modify

and manipulate the frequency of maladaptive covert thoughts
utilizing the same principles which govern the conditioning
of overt behavior (Heppner, 1978). It appears that both
cognitive therapy and research are interested in manipu-
lating and reducing the frequency of maladaptive cognitions.
Presently, however, no evidence exists to suggest that mood
states, e.g., anxiety, differ depending upon the frequency
or quantity of certain types or categories of cognitions.
Before attempting to reduce the frequency of maladaptive
cognitions and increase the frequency of adaptive ones, it
seems desirable to determine if the quantity of particular
categories of cognitions does significantly affect the
resultant mood state. Specifically, considering test
anxiety, does the individual who experiences high test
anxiety emit more cognitions of a particular type than the
individual who is low test anxious?

STATEMENT OF THE PROBLEM

Lazarus (1973, 1977) has suggested that individuals
are constantly reappraising their relationship to the
environment in an effort to cope with a situation or regulate
emotional responses. This constant reappraisal, or altering
of internal dialogue or cognitions, appears to be shaped and
influences by four factors:

1. the individual's focus within the environment;

2. the person's evaluation of various stimuli
within the environment;

3. the person's locus of control or cause for behavior; and

4. the individual's assessment of a coping ability with the environment (Meichenbaum, 1977).

Constant reappraisal shaped by the above four factors may be defined as the cognitive strategies employed by persons to cope with their environments. Gagne and Briggs (1974) explained that cognitive strategies are internally organized control processes which guide the cognitions. It appears that high test-anxious persons guide their cognitions by utilizing cognitive strategies which have been shaped by the following factors: (a) focusing upon themselves and their own discomforts (Sarason, 1975; Sarason & Stoops, 1978; Wine, 1971); (b) evaluating the testing situation as threatening to them and evaluating themselves as inadequate to perform (Wheelis, 1969); (c) attributing the cause for their anxiety to the testing situation (Liebert & Morris, 1967; Sarason & Mandler, 1952; Spielberger, et al., 1977); and (d) subsequently assessing their ability to cope with their negative emotions as poor (Sarason, 1973).

An assessment of the frequency of various types of cognitive strategies employed by high and low test-anxious individuals in evaluative situations has not yet been attempted. Such an assessment would provide information as to the types of cognitive strategies utilized by high and

low test-anxious persons. It is quite possible that low
test-anxious individuals engage in types of cognitive
strategies similar to those of high test-anxious persons,
but that the frequency with which they emit cognitions of a
particular strategy varies between high and low test-anxious
subjects. While cognitive researchers have treated various
undesirable mood states by increasing the frequency of
positive self-statements and decreasing the frequency of
negative self-statements (Heppner, 1978), sufficient evidence
does not exist to suggest that the frequency of cognitions
of a particular category is a significant determinant of
mood state. Therefore, it is necessary that an assessment
of the cognitive strategies being employed by high and low
test-anxious persons be undertaken before treatment paradigms
are developed utilizing cognitive restructuring techniques.

RATIONALE

There are three considerations pertinent to the
assessment of cognitive strategies. The first consideration
is that cognitions do play a role in anxiety level. The
second consideration is that cognitions may be grouped into
categories or cognitive strategies. Third, cognitive
strategies may be evaluated as to their adaptiveness
(adaptive or maladaptive). Each of these considerations
will be addressed.

1. Cognitions play a role in anxiety level.

In a review of research in cognitive behavior therapy, Ellis (1977) cited evidence to support the notion that cognitions, i.e., thoughts, beliefs, attitudes, and images, play a significant role in human emotions. Several researchers have provided evidence to support the specific premise that an individual's cognitive interpretations of the environment influence the person's mood state (Lazarus & Alfert, 1964; Rimm & Litvak, 1969; Schacter & Singer, 1966; Velten, 1968; Weissberg, 1975). For example, Lazarus and Alfert (1964) successfully demonstrated that subjects' stress reactions could be enhanced or reduced by providing information which influenced subjects to alter their interpretations of a common situation. These researchers found that very different degrees of emotional reactions were associated with the same stimulus depending on how it was interpreted.

In a study reported by Meichenbaum (1975a) college students were video-taped while taking an examination. They were asked to view their tape and reconstruct their thoughts during the examination. It was noted that those students who were previously identified as high test anxious entertained different thoughts from those reported as low test-anxious. High test-anxious subjects focused upon themselves and their inadequacies in the testing situation, while low test-anxious subjects focused upon the examination itself and upon their ability to perform adequately in this

situation. Similar to the Lazarus and Alfert (1964) study this study illustrated that different cognitive interpretations of the same stimulus produced different emotional reactions.

2. Cognitions may be grouped into specific cognitive strategies.

This consideration is supported and explained primarily by the research which examines stress and coping. In a review of studies which focus on coping as the central feature of cognitive processes, Lazarus (1977) contended that an individual is constantly reappraising or employing various cognitions in an effort to cope with the environment. Lazarus noted that most emotions shift in intensity and quality over time and that the person's constant effort to master relationships with the environment influences this shift in emotional quality. Thus, an individual copes with the environment by active reappraisal, i.e., developing cognitive strategies with the goal of overcoming damage, postponing and preventing danger, or tolerating the situation.

An experimental research design illustrated the use of various cognitive strategies to manipulate emotional states. Koriat, Melkman, Averill, and Lazarus (1972) exposed subjects to four presentations of a film showing wood-shop accidents. During the first two presentations there were no instructions. Prior to the third presentation half the subjects were instructed to detach themselves from a negative

emotional response, and before the fourth presentation they were asked to _involve_ themselves and fully experience their emotional reactions.

There were two findings of particular relevance. First, it was found that subjects could manipulate their emotional reactions to the films as noted by self-report of their emotional state and changes in heart rate. Second, certain cognitive strategies were reported being used most commonly in involvement and certain others were most often used in detachment.

3. Cognitive strategies may be evaluated as to their adaptiveness.

Beck (1976) and Ellis (1970) have identified various cognitions which may be categorized as "irrational beliefs" (Ellis, 1962) or "maladaptive ideations" (Beck, 1976). The cognitions have been assessed as to their adaptiveness based upon the accompanying emotional response. For example, Beck noted that the person whose cognitions tend to focus on danger will most likely experience anxiety, while Ellis described the emotionally distressful person as one whose cognitions stem from an irrational belief about himself or others. Both Beck and Ellis have attempted to classify cognitions into descriptive categories, and to assess the adaptiveness of these categories based upon the accompanying mood state.

In summary, it has been demonstrated that cognitions do play a role in anxiety level, that cognitions may be grouped into cognitive strategies, and that these strategies may be evaluated as to their adaptiveness. Given these considerations, this investigation sought to categorize students' cognitions into three general categories, and to monitor these categories of cognitions, or cognitive strategies, over a specified time period.

RESEARCH QUESTIONS

The following research questions were addressed in this study:

1. Are there significant differences among the frequencies of cognitive strategies of a self-referent, test-specific, or nonspecific nature emitted by high test-anxious subjects?

2. Are there significant differences among the frequencies of cognitive strategies of a self-referent, test-specific, or nonspecific nature emitted by low test-anxious subjects?

3. Are there significant differences among the frequencies of positive, negative, and neutral valences within the self-referent category emitted by high test-anxious subjects?

4. Are there significant differences among the frequencies of positive, negative, and neutral valences

within the test-specific category emitted by high test-anxious subjects?

5. Are there significant differences among the frequencies of positive, negative, and neutral valences within the nonspecific category emitted by high test-anxious subjects?

6. Are there significant differences among the frequencies of positive, negative, and neutral valences within the self-referent category emitted by low test-anxious subjects?

7. Are there significant differences among the frequencies of positive, negative, and neutral valences within the test-specific category emitted by low test-anxious subjects?

8. Are there significant differences among the frequencies of positive, negative, and neutral valences within the nonspecific category emitted by low test-anxious subjects?

9. Are there significant differences among the means of positive, negative, and neutral valences for high test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam?

10. Are there significant differences among the means of positive, negative, and neutral valences for low

test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam?

11.   Are there significant differences among the means of self-referent cognitive strategies, test-specific cognitive strategies, and nonspecific cognitive strategies for high test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam?

12.   Are there significant differences among the means of self-referent cognitive strategies, test-specific cognitive strategies, and nonspecific cognitive strategies for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam?

DEFINITION OF TERMS

For purposes of this study the following terms were used, as follows:

1.   <u>Test Anxiety</u>. Test anxiety was defined in the manner of Spielberger and his colleagues (1977). They concluded that most test anxiety theorists would agree that ". . . the concept of test anxiety may be defined in terms of individual differences in anxiety proneness in examination situations" (p. 11). Spielberger and his colleagues (1977) believed that most persons high in test anxiety are more likely to perceive examination situations as fearful or

threatening than persons low in test anxiety, and that high test-anxious individuals would experience worry cognitions and elevations in state anxiety in evaluative situations. For the purpose of this study high test-anxious subjects scored within the top 20% of all subjects completing the Test Attitude Inventory. Low test-anxious subjects scored within the bottom 20% of all subjects completing the Test Attitude Inventory (Spielberger, et al., 1977).

2. <u>Self-Referent Cognitive Strategies</u>. The category of self-referent cognitive strategies included individual statements in which the action of each statement was directed toward the <u>self</u> in reference to taking tests. Such statements as "Did I study enough?" "I would like to get an 'A.'" "I'm afraid I won't be able to concentrate." are all statements which belong in the category of self-referent cognitive strategies. For the purpose of this study self-referent cognitive strategies were defined as subjects' written statements which were classified by raters as belonging in the self-referent category.

3. <u>Test-Specific Cognitive Strategies</u>. The category of test-specific cognitive strategies included individual statements in which the action of each statement was directed toward the <u>test</u> per se. Such statements as "Will it be hard?" "It's probably all essay, and that will be easy." "Tests give me headaches." are all statements which belong in the category of test-specific cognitive strategies. For the

purpose of this study, test-specific cognitive strategies were defined as subjects' written statements which were classified by raters as belonging in the test-specific category.

4. <u>Nonspecific Cognitive Strategies</u>. The category of non-specific cognitive strategies included individual statements in which the action of the statement was directed towards individuals or activities not specifically related to the self in the testing situation or to the test per se. Such statements as "I don't want my parents to be disappointed in me." "This prof is lousy." "I wish school was over." are all examples of statements which belong in the category of nonspecific cognitive strategies. For the purpose of this study nonspecific cognitive strategies were defined as subjects' written statements which were classified by raters as belonging in the nonspecific category.

5. <u>Positive, Negative, and Neutral Valences</u>. In order to ascertain the subjects' own experience of the cognitions that were reported, subjects were instructed to indicate whether the statements which they recorded would be viewed by most people as positive, negative, or neutral statements to think to themselves. For purposes of this study positive, negative, and neutral valences were defined as + (positive), - (negative), and 0 (neutral) markings made by subjects when instructed to evaluate their statements as most people would rate them.

ASSUMPTIONS

The following assumptions were made in designing and implementing this study:

1. Subjects' self-reported statements were, in reality, the cognitions they entertained in reference to taking tests (See Chapter 3, Procedures section).

2. Raters could be trained to differentiate statements into three categories of cognitive strategies (See Chapter 3, Procedures section).

3. The Test Attitude Inventory (Spielberger, et al., 1977) is a valid measure of test anxiety.

LIMITATIONS

The following factors were considered limitations of this study:

1. The results of this study are generalizable only to college students who volunteered and who scored high or low on the Test Attitude Scale.

2. Results of this study are limited to those individuals specifically experiencing "test anxiety."

Chapter 2

REVIEW OF RELATED LITERATURE AND RESEARCH

The purpose of this chapter is to review the literature and research pertaining to test anxiety theory, the nature of cognitive strategies, cognitive restructuring therapies, and cognitive-behavior modification. This chapter treats each area separately, and then shows how the present study is related to this literature and research.

TEST ANXIETY

Test anxiety is a widespread problem on college campuses (Reister, Stockton, & Maultsby, 1977; Speilberger, Anton, & Bedell, 1976). In 1959, Seymour Sarason, a major contributor to test anxiety theory, observed, "We live in a test-conscious, test-giving culture in which the lives of people are in part determined by their test performances" (p. 26). Many students are so disturbed by test anxiety that they often need assistance to cope with their undesirable emotional and behavioral responses. As long ago as 1938, Charles H. Brown noted the seriousness of the problem of test anxiety for college students. Commenting on two student suicides at the University of Chicago, Brown attributed one of these to worry over an approaching examination. He stated:

> These incidences show that students are taking their examinations more and more seriously, and that the emotional reactions of students before examinations is an important problem. (1938, p. 12)

In response to this widespread problem there has evolved an increasing concern with understanding the nature of test anxiety in an effort to develop more effective methods of treatment. Clinical and experimental research studies have demonstrated that test-anxious individuals perceive evaluative situations as personally threatening (Mandler & Sarason, 1952; Sarason, 1975). These individuals are likely to engage in task-irrelevant, and self-centered worry responses that increase undesirable emotional arousal and interfere with effective performance.

Seymour Sarason and George Mandler (1952) are most often credited with pioneering the research in the field of test anxiety. They developed the Test Anxiety Questionnaire (TAQ) used to assess individual differences in test anxiety. Sarason, Mandler, and their colleagues (Doris & Sarason, 1955; Mandler & Sarason, 1952; Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960; Sarason & Mandler, 1952; Sarason, Mandler, & Craighill, 1952) demonstrated that high test-anxious subjects performed more poorly on tests administered under stressful "ego-involving" conditions than students who were low in test anxiety. Mandler and Sarason (1952) explained these performance decrements via a theory of "learned drives." They noted that two kinds of learned drives are evoked in a testing situation. One set of drives, called "learned task drives," stimulates task-relevant responses which lead to the reduction of the drive through

task completion. The second drive, called "learned anxiety drive," stimulates both task-relevant responses and task-irrelevant responses. The task-relevant responses are functionally equivalent to those evoked by learned task drives. However, the task-irrelevant responses interfere with performance and are characterized by

> feelings of inadequacy, helplessness, heightened somatic reactions, anticipation of punishment or loss of status and esteem, and implicit attempts at leaving the test situation. (p. 166)

Task-irrelevant responses are self-centered rather than task-oriented. Thus, according to Mandler and Sarason (1952) one of two incompatible drives may be evoked in an evaluative situation. Learned task drives stimulate task-relevant responses that facilitate performance. Learned anxiety drives evoke self-centered responses that interfere with performance. These two drives are incompatible because they lead to different intervening responses and different behaviors.

Alpert and Haber (1960) labeled these incompatible drives as facilitating and debilitating anxiety. They contended that facilitating anxiety serves as a task-relevant drive to increase the probability of successful task completion in evaluative situations. Debilitating anxiety responses are characterized by non-task related coping strategies which distract from the demand characteristics of the task and interfere with successful performance. Alpert and Haber

(1960) suggested that high test-anxious persons are experiencing debilitating anxiety.

Consistent with these descriptions of high test-anxious subjects, and on the basis of factor analytic studies of the Test Anxiety Questionnaire (Sarason & Mandler, 1952), Liebert and Morris (1967; Morris & Liebert, 1969, 1970; Spiegler, Morris, & Liebert, 1968) have proposed that test anxiety consists of two major components: worry and emotionality. Emotionality is the autonomic arousal aspect of anxiety. The worry component is described as "primarily cognitive concern about the consequences of failure" (Liebert & Morris, 1967, p. 975). Morris and Liebert (1969) suggested that worry, i.e., the cognitive component of test anxiety, interferes with performance and leads to decrements in cognitive tasks. They further suggested that emotionality, i.e., the physiological component of test anxiety, is typically unrelated to the task performance of the high test-anxious person in an evaluative situation.

In a review of test anxiety literature, Wine (1971) employed Liebert and Morris' conceptualization of worry and emotionality in suggesting an "attentional" interpretation of the debilitating effects of test anxiety. She noted that task-irrelevant activities such as worry and self-criticism distract the subject from task performance. Although Wine (1971) agreed with Mandler and Sarason's (1952) view that high test-anxious persons react to evaluative threat with self-oriented interfering responses, she emphasized the

attention given to these distractive cognitive processes by high test-anxious individuals.

On the basis of research on the performance of high and low test-anxious subjects in evaluative situations, Irwin Sarason (1958, 1960, 1965, 1972, 1975) concluded that high test-anxious persons are more self-centered and self-critical than low test-anxious subjects. He agreed with Wine (1971) that high test-anxious subjects are likely to emit personalized, self-centered, derogatory responses that interfere with task performance. Irwin Sarason (1972) described the high test-anxious person as likely to experience emotional blocks and misinterpret readily available informational cues when being evaluated. Sarason (1975) concluded that test anxiety was a type of trait anxiety. This implied that individuals who are high test anxious have a predisposition to respond with increased levels of anxiety in evaluative situations as compared with individuals who are low test anxious.

Similarly, empirical research led Spielberger (1966, 1972a, 1972b, 1975) to conceptualize test anxiety as a situation-specific form of trait anxiety. Spielberger (1966) defined state anxiety as a transitory emotion which fluctuates over time and in intensity. He conceptualized trait anxiety as a relatively stable personality trait. According to Spielberger, Anton, and Bedell (1976), situations or circumstances in which adequacy is evaluated, i.e., test

situations, will most likely be perceived as more threatening to the ego by individuals who are high in trait anxiety than by individuals who are low in trait anxiety. Therefore, threats to self-esteem evoke higher levels of state anxiety and arousal in individuals who are high trait anxious than in persons low in trait anxiety. High levels of state anxiety which are evoked in trait test-anxious persons activate: (1) task-related error tendencies which compete with correct responses, and (2) task-irrelevant worry responses that distract the test-anxious person from effective task performance.

In summary, test anxiety may be viewed in terms of individual differences in anxiety proneness in evaluative situations. Although research findings from several diverse views have contributed to test anxiety theory, most investigators have agreed that persons high in test anxiety tend to perceive examination situations as more threatening to their self-esteem than low test-anxious persons. Subsequently, high test anxious persons often (a) fail to attend to relevant parts of the task, (b) focus on themselves, and (c) entertain self-centered, interfering thoughts as reactions to evaluative situations. They also appear to experience increased emotional arousal.

COGNITIVE STRATEGIES

Gagne and Briggs (1974) have defined cognitive strategies as internally organized control processes which serve to guide and manage cognitions or thinking processes. It appears that individuals who develop emotionally effective cognitive strategies are most successful in managing their thinking (Lazarus, 1977). An individual's thinking becomes an important factor in his or her emotional stability in so far as cognitions may be demonstrated to mediate between environmental stimuli and subsequent emotional reactions.

Clinical and experimental research supports the premise that cognitions do mediate between the environmental stimuli and the person's emotive responses (Ellis, 1957, 1958, 1962, 1975, 1977; Lazarus, 1971, 1974, 1976; Lazarus, 1966, 1977; Lazarus & Averill, 1975; Lazarus, Averill, & Opton, 1970; Meichenbaum, 1974, 1975a, 1975b, 1977; Schacter, 1965, 1966, 1971; Schacter & Singer, 1962). Additional research has demonstrated that particular types, or qualities, of cognitions significantly influence resultant mood states. Velten (1967) demonstrated that moods, i.e., elation and depression, could be altered in female college students by manipulating the quality of the women's self-statements. Studies replicating this investigation (Aderman, 1972; Blue, 1975; Coleman, 1975; Hale & Strickland, 1976) have confirmed Velten's original findings. It appears that the quality of

the mediating cognitions or self-statements <u>does</u> significantly affect the resultant mood state.

Lazarus (1977) noted that individuals are constantly appraising and reappraising their relationships with their environments in efforts to cope with their surroundings. Consequently, emotional reactions are continually in flux as individuals seek to maintain a balance with their environments via constant appraisal and reappraisal. Meichenbaum (1977) observed that four factors seem to shape this cognitive process of appraisal and reappraisal. These factors included: (a) to what the individuals attend, (b) how persons evaluate various stimuli within the environment, (c) where individuals attribute their loci of control or causes for behavior, and (d) persons' assessments of available coping mechanisms.

As noted previously in this chapter, test anxiety theorists (Liebert & Morris, 1967; Sarason, 1975; Sarason & Mandler, 1952; Spielberger, et al., 1977; Wine, 1971) generally agreed that high test-anxious persons are likely to entertain self-oriented, critical, interfering thoughts. These thoughts are shaped by cognitive strategies which are built on reappraisal involving: (a) attending to their own discomforts, (b) attributing control to the testing situation, (c) blaming themselves or their environments for their anxiety, and (d) assessing their ability to cope as poor. The high test-anxious individual who strives to cope with the

testing situation appears to be utilizing cognitive strategies which serve to maintain high levels of anxiety.

COGNITIVE RESTRUCTURING THERAPIES

Cognitive strategies or thoughts which lead to undesirable emotional responses, e.g., high test anxiety, have been viewed as maladaptive by cognitive therapists. Therapies designed to aid in restructuring maladaptive cognitions have evolved. In a recent review of cognitive and self-control therapies, Mahoney and Arnkhoff (1978) identified three major therapies as representative of those therapies which focus on the restructuring of cognitions. These therapies included Rational Emotive Therapy (Ellis, 1962), Cognitive Therapy (Beck, 1970, 1976), and Self-Instructional Therapy (Meichenbaum, 1974).

Rational Emotive Therapy (Ellis, 1962) is based upon the premise that "certain core irrational ideas . . . are at the root of most emotional disturbances" (Ellis, 1970). RET therapists aid the client in recognizing their maladaptive, self-defeating thoughts and beliefs, and in directly challenging and replacing them with more adaptive, self-enhancing thoughts and beliefs.

Similar to RET, Cognitive Therapy (Beck, 1970, 1976) also seeks to aid clients in discovering maladaptive cognitions and in becoming aware of their deleterious effect, and subsequently in replacing these with more adaptive cognitions (Beck, 1976). While Ellis (1962) has identified certain

"core irrational ideas" which underlie emotional disturbances, Beck (1976) has observed that specific types of thoughts appear to be associated with specific affective disorders.

Self-instructional training (Meichenbaum, 1975b, 1975c, 1977) also is interested in thought patterns and self-state-ments. However, Meichenbaum and his colleagues (Meichenbaum, 1975b, 1975c; Meichenbaum & Cameron, 1973; Meichenbaum, Gilmore, & Fedoravicius, 1971) are more concerned with the individual's idiosyncratic thought patterns. Self-instructional training (Meichenbaum, 1977) focuses on helping the client to identify available coping mechanisms and develop these, rather than identifying and destroying maladaptive beliefs (Mahoney & Arnkhoff, 1978).

Although there are differences in the cognitive restructuring approaches of Ellis, Beck, and Meichenbaum, they appear to support the notion that certain types or qualities of cognitive thoughts may be identified as adaptive or maladaptive depending upon the accompanying emotive responses. As Mahoney and Arnkhoff (1978) have pointed out, preliminary studies in this area show promise in documenting the potential efficacy of cognitive restruc-turing therapies (Bender, 1976; Cabush & Edwards, 1976; Denney, 1975; Keller, Croake, & Broaking, 1975; Novaco, 1975, 1976; Rush, Khatami, & Beck, 1975; Sanchez-Craig, 1976; Wein, Nelson, & Odom, 1975).

In summary, although the techniques and emphases may differ among approaches, the cognitive restructuring approaches are interested in replacing maladaptive cognitions, i.e., those thoughts, beliefs, or ideas which lead to undesirable emotive responses, with more adaptive cognitions.

COGNITIVE-BEHAVIOR MODIFICATION

While cognitive theorists and therapists have focused on the qualitative aspects of cognitions, therapists utilizing a more behavioral orientation have attempted to manipulate thoughts in much the same way as overt behavior can be conditioned (Heppner, 1978). Two techniques which specifically address the modification of covert thoughts (as opposed to images, urges, feelings, and sensations) are thought stopping (Wolpe, 1961) and covert thought modification (Homme, 1965).

Thought stopping (Wolpe, 1961) is a widely used procedure which has been reported as being successful in a number of studies (e.g., Beck, 1970; Cautela & Bacon, 1973; Daniels, 1976; Hays & Waddell, 1976; Rimm, 1973; Stern, 1970; Wolpe, 1958, 1969, 1971; Wolpe & Lazarus, 1966). However, in a recent critical review on the modification of covert thoughts, Heppner (1978) noted that the thought-stopping procedure had not been systematically isolated from other techniques and that most of the investigations utilized case studies, resulting in a lack of experimental evidence to support the effectiveness of this technique.

Another procedure which has been utilized to alter the frequency of covert thoughts is covert conditioning (Homme, 1965). This technique assumes that cognitions may be manipulated in a manner similar to that needed to change overt behaviors. Studies by Krop, Calhoon, and Kerrier (1971), Krop, Perez, and Beaudoin (1973), and Kanfer and Marston (1963a, 1963b) seem to support the assumption that cognitions can be modified utilizing the laws which apply to overt behavior modification, in particular reduction in the frequency of negative thoughts. However, Heppner (1978) pointed out that research in this area is still sparse, and as yet, only tentatively confirms the feasibility of thought modification. Heppner also noted that no one has attempted a functional analysis of this procedure in an effort to identify more clearly why and in what situations it would be effective.

SUMMARY

A review of the research addressing test-anxiety theory has shown that investigators generally agree that there is a cognitive component to test anxiety. It has been observed that high test-anxious individuals are likely to entertain self-centered, interfering responses as reactions to evaluative situations. These responses appear to be influenced by the individual's attention to his or her own discomfort, negative evaluation of self and the environment, perceived inability to control the environment, and

assessment of his or her coping ability as poor. While cognitive therapists and researchers have focused upon the qualitative aspects of these cognitions, and have attempted to replace maladaptive thoughts with more adaptive ones, behavioral researchers and therapists have focused on the frequency or quantitative aspects of cognitions. They have attempted to alter the frequencies of negative thoughts in much the same way as the frequencies of overt behaviors have been manipulated.

Research has been cited in this chapter to demonstrate that certain types of thoughts, or qualities of thoughts, produce varying emotional states. Presently, however, no research exists which supports the notion that the frequencies, or quantities of these types of thoughts lead to differing moods. Consequently, there is no research or evidence which would suggest that reducing or increasing the frequencies of certain types of thoughts would have any effect on the resultant mood states. Specifically, to date there is no evidence to support the theoretical position that high test-anxious individuals have a higher frequency of certain types of thoughts than do low test-anxious individuals.

The purpose of the present study was to determine the relationship between the quality and quantity of cognitions and test anxiety. Specifically, the study sought to determine if the frequency of thoughts, types of thoughts, or both differed between high and low test-anxious subjects.

Chapter 3

SAMPLE, INSTRUMENTS, PROCEDURES

This chapter includes a description of the sample, instruments, and procedures of the study. Also included in this chapter are the null hypotheses and an explanation of the analysis of the data.

SAMPLE

The subjects for this study were selected from undergraduate students enrolled in Psychology 101, General Psychology, during the Spring Semester, 1979, at Indiana State University. All students who were present in class three weeks prior to the final examination, and who agreed to participate, were administered the Test Attitude Inventory (Spielberger, et al., 1977) for the purpose of identifying high and low test-anxious subjects. The students whose scores were within the top 20% of all test scores were identified as high test-anxious. Students whose scores were within the bottom 20% of all test scores were identified as low test-anxious.

From a total of 215 students who participated in all three data collections, 86 students (43 identified as high test-anxious and 43 identified as low test-anxious) served as subjects for this study.

INSTRUMENTS

Test Attitude Inventory

The Test Attitude Inventory (TAI), developed by Spielberger, Gonzalez, Taylor, Algaze, and Anton (1977) was used to differentiate high and low test-anxious subjects. (For information on how to order this test see Appendix A, p. 116.) The TAI is a twenty item inventory which requires the student to respond to each question on a scale of 1 to 4 (1 = almost never, 4 = almost always). The TAI yields a total score, and has also been factored into two subscales: (1) worry and (2) emotionality.

Normative data for this instrument were obtained from samples of 654 college men and 795 college women. Test-retest reliability with subsamples at two weeks and one month intervals was .80 and .81, respectively (Spielberger, et al., 1977).

The TAI total test score correlated .82 for males and .83 for females with the Test Anxiety Scale (Sarason, 1972). The TAI total test score correlated .86 and .87 with Exam A-State (Spielberger, Gorsuch, & Lushene, 1970) for males and females, respectively. Both the Test Anxiety Scale and the Exam A-State have been reported to be valid measures of test anxiety. The TAI appears to be an equivalent measure of test anxiety to these two instruments (Spielberger, et al., 1977). The alpha coefficients for the TAI total scores were .94 or higher for both men and women. The internal consistency for

the Worry and Emotionality scales was somewhat lower, but all coefficients were .86 or higher with a median alpha of .90. The authors concluded that the TAI may be used as an assessment of test anxiety as a situation specific personality trait (Spielberger, et al., 1977).

Notecards

Thought-listing is a procedure which has been used recently by Cacioppo and Petty (1978) to examine the self-statements of individuals experiencing social anxiety. The subjects recorded their thoughts on a page and rated each thought as positive, negative, or neutral. Subjects' ratings correlated with independent rater's evaluations. Thus, Cacioppo and Petty (1978) concluded that the thought-listing procedure showed promise as a means of learning more about persons' thoughts.

Notecards to assess subjects' thoughts were employed as a variation of the Cacioppo and Petty (1978) thought-listing procedure. The notecards were determined to be a more efficient way to collect and store the data.

There were three separate data collections. The same information was collected on notecards in the same manner during each of the three collections. Only the colors of the notecards differed for each collection. White note-cards were used for the first data collection, two weeks prior to the final examination in Psychology 101. Blue notecards were used for the second data collection, one week

prior to the final examination. Pink notecards were used for the third data collection, the day of the final examination.

On each notecard students recorded the last four digits of their social security numbers and their sex in the upper right hand corner. They numbered the cards from 1 through 10. The following information was recorded by the students on each card: (a) one thought about taking tests, (b) either positive (+), neutral (0), or negative (-). (For the specific instructions given to the students to elicit these responses, see Procedures section of Chapter 3, p. 34.)

High and low test-anxious subjects were selected from the students participating in all three data collections. Thirty notecards, i.e., 10 pink, 10 white, and 10 blue were filed in units for each of the 86 subjects selected. This accounted for a total of 2,580 notecards. The first piece of information recorded on the notecards, i.e., a thought about taking tests, was independently rated by each of the 3 raters and then recorded on the IBM scoring sheet. The second piece of information was recorded "verbatim" onto the IBM scoring form by the investigator.

In summary, the notecards proved to be an efficient and concise format for the purpose of data collection and rating. The use of three colors allowed for easily identifying the three collection periods. The size of the cards

was ideal for recording the necessary information, and proved
to be easy to manipulate when rating, and to file in an
orderly fashion when finished with the rating process.

PROCEDURES

This section will discuss the following: (1) data
collection and (2) rating the data.

Data Collection

Data were collected at three different time periods.
The first data collection took place two weeks prior to the
final examination in Psychology 101. The second data
collection occurred one week prior to the examination. The
third data collection took place on the day of the examina-
tion, immediately preceding the test.

During the first data collection, students enrolled
in Psychology 101 were told that a study was being conducted
to determine what types of thoughts students have about
taking tests. Students were told that if they chose to
participate in the study, they would be required initially
to complete a test attitude form and to list 10 thoughts
they think about taking tests. Students also were informed
that since this study was being conducted during class time,
they would not receive extra credit, but their participation
would be recorded as class participation credit.

Following this introduction, consent forms (See
Appendix B, p. 117) were circulated. Students who signed
the forms were given the Test Attitude Inventory (TAI)

to complete. Students were instructed to identify themselves
on the TAI by listing the last four digits of their social
security numbers and their sex. After each student had
completed the inventory, the investigator collected the
inventories and gave each student ten 3 x 5 notecards.
Students were instructed to put the last four digits of their
social security numbers and their sex in the upper right hand
corner of each card. They were then told that they would be
doing two tasks with each card:

1. The students were told, "I want you to list ten
(10) statements, one on each card, that you think in reference
to taking tests."

2. After each student had completed ten statements,
they were given the following instructions: "Now I would
like you to evaluate each statement as you think most people
would rate it as a relatively positive, negative, or neutral
statement to say to yourself about taking tests. You may do
this by placing a '+' for positive, '0' for neutral, or '-'
for negative beside each statement you have written."

The first data collection took approximately 25
minutes. The second data collection took place one week
prior to the course examination. Students were given the
same instructions as during the first data collection, only
this time they did not complete the Test Attitude Inventory.
This data collection lasted for about 12 minutes. The final
data collection occurred on the day of the examination. The

instructions replicated those of the second data collection. This collection also lasted approximately 12 minutes. All data were collected by the investigator of this study.

Rating the Data

Three raters were selected from doctoral students in the Counseling and Psychological Services program at Indiana State University. The raters had some orientation to cognitive therapy prior to their participation in this study. The raters were trained by the investigator using statements which were collected in pilot studies until inter-rater reliability exceeded 75% agreement, which exceeds chance expectation (Cartwright, 1956). During the training session, the raters were given the definitions for the three categories of cognitive strategies, and practiced rating each statement using these definitions. (These definitions are listed in Chapter 1, p. 12.) Statements which were not clearly accounted for by the definitions were examined by the raters and the investigator, and a set of rules for rating these exceptional statements was generated. These rules were recorded and a copy was given to each rater to aid in his independent evaluation of the statements (See Appendix C, p. 118).

Following this training procedure, the raters independently evaluated the statements collected from the Introductory Psychology students. Only those statements of 43 high and 43 low test-anxious subjects were rated. This

accounted for a total of 2,580 statements. The raters did not know which statements belonged to high or low test-anxious subjects. Individual Chi-Square tests of goodness of fit were performed on each of the 10 statements given by the 86 subjects prior to the final examination. The inter-rater reliability was satisfactory. Results of the chi-square analysis are presented in Appendix D, p. 120.

One IBM answer sheet per subject was used to record the ratings. On the IBM answer sheet form, the Social Security number, sex, and TAI score were recorded. The TAI score was not recorded on the form until after the three raters had completed marking it. Each rater was assigned a certain space in which to record his ratings for the three different time periods. Rater 1 was assigned the numbers from 1 through 10 in Columns 1, 2, and 3. Rater 2 was assigned numbers 11 through 20 in Columns 1, 2, and 3. Rater 3 was assigned numbers 21 through 30 in Columns 1, 2, and 3. Ten spaces could be used after each number to record data. Only the first 3 spaces were used to record the statements collected. Space 'a' was used to record state-ments which raters determined belonged in the self-referent category. Space 'b' was used to record statements in the test-specific category. Space 'c' was used to record statements which raters assigned to the nonspecific category.

Using numbers 31 through 40 on the IBM answer sheet, the investigator recorded the valences as reported by the

participating subjects. Again, the first three spaces after each number were used to record either _positive_ (+), _neutral_ (0), or _negative_ (-) valences, respectively.

Null Hypotheses

The hypotheses investigated are:

1. There are no significant differences among the frequencies of cognitive strategies of a self-referent, test-specific, or nonspecific nature, emitted by high test-anxious subjects.

2. There are no significant differences among the frequencies of cognitive strategies of a self-referent, test-specific, or nonspecific nature, emitted by low test-anxious subjects.

3. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the self-referent category, emitted by high test-anxious subjects.

4. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the test-specific category, emitted by high test-anxious subjects.

5. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the nonspecific category, emitted by high test-anxious subjects.

6. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the self-referent category, emitted by low test-anxious subjects.

7. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the test-specific category, emitted by low test-anxious subjects.

8. There are no significant differences among the frequencies of positive, negative, and neutral cognitions, within the nonspecific category, emitted by low test-anxious subjects.

9. There are no significant differences between the means of positive and neutral cognitions for high test-anxious subjects across time, i.e., two weeks prior to exam, one week prior to exam and on the day of the exam.

10. There are no significant differences between the means of positive and negative cognitions for high test-anxious subjects across time, i.e., two weeks prior to exam, one week prior to exam and on the day of the exam.

11. There are no significant differences between the means of neutral and negative cognitions for high test-anxious subjects across time, i.e., two weeks prior to exam, one week prior to exam and on the day of the exam.

12. There are no significant differences between the means of positive and neutral cognitions for low test-

anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

13.   There are no significant differences between the means of positive and negative cognitions for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

14.   There are no significant differences between the means of neutral and negative cognitions for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

15.   There are no significant differences between the means of self-referent cognitive strategies and test-specific cognitive strategies, for high test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

16.   There are no significant differences between the means of self-referent cognitive strategies and nonspecific cognitive strategies, for high test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

17.   There are no significant differences between the means of test-specific cognitive strategies and nonspecific cognitive strategies, for high test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

18. There are no significant differences between the means of self-referent cognitive strategies and test-specific cognitive strategies, for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

19. There are no significant differences between the means of self-referent cognitive strategies and nonspecific cognitive strategies, for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

20. There are no significant differences between the means of test-specific cognitive strategies and nonspecific cognitive strategies, for low test-anxious subjects across time, i.e., two weeks prior to the exam, one week prior to the exam, and on the day of the exam.

ANALYSIS OF DATA

The statistical methodology used to analyze each hypothesis will be discussed in this section.

The first and second null hypotheses which dealt with differences in frequencies among the three cognitive strategies, were analyzed via individual Chi-Square tests to determine the goodness of fit among the frequencies of statements within each category versus the expected frequencies within each category. Expected frequencies are based upon chance. Given that there were three categories of cognitive strategies, chance alone would have predicted that

the probability of listing a statement which belonged in the self-referent, test-specific, or nonspecific category was one out of three (Downie & Heath, 1970).

Null hypotheses 4, 5, 6, 7, 8, and 9 were tested using individual Chi-Squares to determine the goodness of fit between the observed frequencies or positive, negative, and neutral statements versus the expected frequencies of these statements within each category (Downie & Heath, 1970). The expected frequencies based upon chance alone would have been one out of three that a statement would have been positively, negatively, or neutrally valenced.

The last eleven hypotheses were examined via the use of two-way Analyses of Variance with repeated measures on the time factor. The mean frequencies were used for each of these analyses (Ferguson, 1976). Because the categories and valences were not independent from one another, i.e., once the frequencies of two categories or two valences were known, the third was automatically determined, it was necessary to compare only two categories or valences at a time. This accounts for the employment of eleven hypotheses to examine the last four research questions.

Results of these analyses are presented in Chapter 4.

Chapter 4

RESULTS

The purpose of this study was to examine the
cognitive strategies utilized by high and low test-anxious
subjects when faced with an evaluative situation. An over-
view of the problem and the rationale for the present study
were discussed in Chapter 1. Chapter 2 presented a review
of the literature pertaining to the present study. Proce-
dures which were appropriate for gathering and analyzing the
data necessary to answer the specific research questions were
detailed in Chapter 3. This chapter presents the results of
the statistical analyses of the data, as they pertain to the
twenty null hypotheses addressed by this study, and discus-
sions of the findings. The level of significance required
to reject the null hypotheses was set at .05.

TESTING OF THE NULL HYPOTHESES

Null Hypotheses 1 and 2

These hypotheses dealt with differences among the
frequencies of the three cognitive strategies, i.e., self-
referent, test-specific, and nonspecific, for high and low
test-anxious subjects Chi Square goodness of fit tests were
performed to determine if the frequencies of statements
observed in each of the three categories of cognitive

strategies differed significantly from the expected frequency
distributions.

Null Hypothesis 1

It was hypothesized that there would be no significant
differences among the frequencies of cognitive strategies of
a self-referent, test-specific, or nonspecific nature, emitted
by high test-anxious subjects.

Table 1 shows that .600 of the statements were self-
referent, .287 were test-specific, and .113 were nonspecific.
A Chi Square coefficient of 471.14 was significant (p < .05)
which indicated that the observed distribution of frequencies
of statements differed significantly from the expected
distribution.

Thus, high test-anxious subjects listed 20% more
self-referent statements than the combined total of test-
specific and nonspecific statements.

Based upon the significant Chi Square, this hypothesis
was rejected.

Null Hypothesis 2

This hypothesis stated that there would be no signif-
icant differences among the frequencies of cognitive strategies
of a self-referent, test-specific, or nonspecific nature,
emitted by low test-anxious subjects.

Presented in Table 1 are the percentages of state-
ments within each category. It may be observed that .496

of the statements were self-referent, .350 were test-specific, and .146 were nonspecific.

A significant Chi Square of 239.3 ($p < .05$) indicated that the recorded frequencies of the three cognitive strategies differed significantly from the expected frequencies. Low test-anxious subjects also entertained more self-referent thoughts than test-specific or nonspecific thoughts. However, while high test-anxious subjects had a majority of self-referent statements, low test-anxious subjects had a relatively equal distribution of self-referent and test-specific statements.

Based upon the significant Chi Square, this hypothesis was rejected.

Null Hypotheses 3 Through 8

These hypotheses dealt with differences among the frequencies of positive, negative, and neutral valences, within each of the three cognitive strategies emitted by high and low test-anxious subjects. Chi Square goodness of fit tests were employed to determine the differences between the observed and expected frequencies among the positive, negative, and neutral valences within each cognitive strategy.

Null Hypothesis 3

This hypothesis stated that there would be no significant differences among the frequencies of positive, negative, and neutral valences within the self-referent category for

Table 1

Percentages of Self-referent, Test-specific, and

Nonspecific Statements Recorded by High and

Low Test-Anxious Subjects

Subject Categories	Percentages	
	High*	Low**
Self-referent	.600	.496
Test-specific	.287	.350
Nonspecific	.113	.146

*χ^2= 471.14 with 9 degrees of freedom; significance = .00001

**χ^2= 239.3 with 9 degrees of freedom; significance = .00001

high test-anxious subjects. Findings related to this
hypothesis are summarized in Table 2, which shows that .593
of the self-referent cognitions entertained by high test-
anxious subjects were negatively valenced; .298, positively;
and .109, neutrally. A Chi Square coefficient of 92.26 was
significant (p < .05) which indicated that the observed
frequencies of the positive, negative, and neutral valences
differed significantly from the expected frequencies. High
test-anxious subjects valenced the majority of their self-
referent thoughts as negative.

Null Hypothesis 3 was rejected owing to the
significant Chi Square.

Null Hypothesis 4

This hypothesis stated that there would be no signif-
icant differences among the frequencies of positive, negative,
and neutral valences, within the test-specific cognitive
strategy emitted by high test-anxious subjects. Displayed
in Table 2 are the findings which show that .557 of the test-
specific cognitive strategies emitted by high test-anxious
subjects were valenced as negative, while .287 of the
cognitions emitted were valenced as positive, and .156,
neutral. A Chi Square coefficient of 30.70 was significant
(p < .05) which indicated that there was a significant
difference among the observed and expected frequencies of
positive, negative, and neutral valences within the test-
specific cognitive strategy, emitted by high test-anxious

Table 2

Percentages of Positive, Negative, and Neutral Valences

within the Self-Referent, Test-Specific, and

Nonspecific Cognitive Strategies, Recorded

by High Test-Anxious Subjects

Valence	Self-referent*	Test-specific**	Nonspecific***
Positive	.298	.287	.286
Negative	.593	.557	.571
Neutral	.109	.156	.143

$*\chi^2 = 92.26$ with 2 degrees of freedom $p = .0001$

$**\chi^2 = 30.70$ with 2 degrees of freedom $p = .0001$

$***\chi^2 = 16.33$ with 2 degrees of freedom $p = .001$

subjects. High test-anxious subjects recorded more negative test-specific statements than either positive or neutral statements. In fact, the majority of test-specific statements recorded by high test-anxious subjects were negative.

On the basis of the significant Chi Square, this null hypothesis was rejected.

Null Hypothesis 5

This hypothesis stated that there would be no significant differences among the frequencies of positive, negative, and neutral valences with the non-specific cognitive strategy emitted by high test-anxious subjects.

In Table 2 are presented percentages which show that .571 of the nonspecific cognitive strategies were valenced as negative by high test-anxious subjects; .286, positive; and .143, neutral. A Chi Square of 16.33 was significant ($p < .05$) indicating that there was a significant difference among the frequencies of positive, negative, and neutral valences recorded by high test-anxious subjects from the expected frequencies of the three valences, that the majority of nonspecific statements were valenced as negative by high test-anxious subjects.

This hypothesis was rejected on the basis of the significant Chi Square.

Null Hypothesis 6

This hypothesis stated that there would be no significant differences among the frequencies of positive, negative, and neutral valences, within the self-referent category emitted by low test-anxious subjects.

Table 3 presents the data for this hypothesis. Within the self-referent category, low test-anxious subjects valenced this strategy as follows: .477 positive, .332 negative, and .192 neutral. The obtained Chi Square coefficient of 26.08 was significant (p < .05) indicating that the frequencies of positive, negative, and neutral valences which were recorded by low test-anxious subjects significantly differed from the expected frequencies. The results show that low test-anxious subjects recorded a higher frequency of positive valences than either negative or neutral valences.

On the basis of the significant Chi Square, this hypothesis was rejected.

Null Hypothesis 7

This hypothesis stated that there would be no significant differences among the frequencies of positive, negative, and neutral valences, within the test-specific cognitive strategy emitted by low test-anxious subjects.

Listed in Table 3 are the percentages which show that .422 of the test-specific strategies were positive; .370, negative; and .208, neutral. A Chi Square of 51.33 was significant (p < .05) indicated that low test-anxious

Table 3

Percentages of Positive, Negative, and Neutral Valences

Within the Self-Referent, Test-Specific, and

Nonspecific Cognitive Strategies, Recorded

by Low Test-Anxious Subjects

Valence	Self-referent*	Test-specific**	Nonspecific***
Positive	.447	.422	.290
Negative	.332	.370	.468
Neutral	.192	.208	.242

*x^2= 26.08 with 2 degrees of freedom; significance = .0001

**x^2= 51.33 with 2 degrees of freedom; significance = .00001

***x^2= 5.25 with 2 degrees of freedom; significance = .07

subjects recorded more positive valences than negative or neutral. The observed frequencies of positive, negative, and neutral valences significantly differed from the expected frequencies.

On the basis of the significant Chi Square coefficient, Null Hypothesis 7 was rejected.

Null Hypothesis 8

This hypothesis stated that there would be no significant differences among the frequencies of positive, negative, and neutral valences within the nonspecific category emitted by low test-anxious subjects.

Table 3 presents the data which show that .290 of the nonspecific statements were positive; .242, neutral; and .468, negative. A Chi Square of 5.25 was not significant indicating that there were no significant differences in the observed valence frequencies within the nonspecific category and the expected valence frequencies. Low test-anxious subjects had a fairly even distribution of valences within the nonspecific category.

On the basis of the nonsignificant Chi Square, Null Hypothesis 8 was maintained.

Discussion of Results Related to Null Hypotheses 1 Through 8

The first eight null hypotheses examined the frequencies of cognitive strategies and valences reported

by high and low test-anxious subjects immediately prior to their final examination in Psychology 101.

The results of the analyses indicated that high test-anxious subjects listed a majority of negative self-referent statements when instructed to record ten thoughts in reference to taking tests. Low test-anxious subjects also listed a high frequency of self-referent statements. However, they did not list a majority of self-referent statements but recorded a fairly equivalent percentage of self-referent and test-specific statements. Low test-anxious subjects recorded a majority of positive and neutral statements within the self-referent and test-specific categories.

The results related to these eight null hypotheses are consistent with the observations of Mandler and S. Sarason (1952) and I. Sarason (1975) who suggested that high test-anxious individuals entertain self-centered, self-defeating responses to evaluative situations. In the study reported by Meichenbaum (1975a) in which high and low test-anxious subjects were asked to reconstruct their thoughts while viewing films of themselves during an examination, it was observed that high test-anxious subjects entertained different thoughts about taking tests than did low test-anxious subjects. In particular, high test-anxious subjects focused upon themselves more than did low test-anxious subjects.

Mandler and Sarason (1952) and Wine (1971) suggested that high test-anxious subjects entertain task-irrelevant thoughts when faced with taking a test. The findings related to the present study indicated that high test-anxious subjects recorded less test-specific thoughts than did low test-anxious subjects, and that the majority of their test-specific thoughts were valenced as negative by them. Although these findings did not directly support the observations of Mandler and Sarason (1952) and Wine (1971), the results suggested that high test-anxious subjects were engaging in a higher frequency of task-irrelevant, self-critical, and blaming-type thinking than task-relevant thinking. Given the specific instructions, to list ten thoughts in reference to taking tests, it seems even more apparent that high test-anxious subjects departed from the specific task, and recorded thoughts which were focused upon themselves and their own discomforts in the testing situation.

The selection of positive, negative, or neutral valences by high and low test-anxious subjects is interesting to note in view of the research by Velten (1968) which examined the effects of positive, negative, and neutral statements upon the mood states of college women. Velten found that positive self-statements could produce elation, while negative self-statements could induce depression. He noted that neutral statements did not appear to induce elation or depression and described these neutral statements as producing

neutral affect. It may be inferred from Velten's (1968) results that negative valencing of statements resulted in undesirable emotional responses, i.e., depression, while positive and neutral valencing of statements led to more desirable emotional responses, i.e., elation or calmness.

In examining the findings related to the present study, the differences in choice of valences become even more clear when positive and neutral valence frequencies are added together and compared with the negative valence frequencies. The majority of statements utilized by low test-anxious subjects were valenced as positive or neutral, while high test-anxious subjects displayed a majority of negative valences. It appears there is a relationship between the experience of high test anxiety and subjects' evaluations of their thinking as negative, and between low test anxiety and subjects' evaluation of their thinking as positive or neutral.

In reference to the current "merging" of cognitive and behavior therapies, the present results appear to support both the cognitivists' contentions that the quality of thinking is related to resultant moods, and the behaviorists' views that the frequency or quantity of certain types of thoughts is related to the resultant emotional states.

Cognitive theorists, such as Beck (1970), Ellis (1977), Lazarus (1977) and Meichenbaum (1977) have emphasized the idiosyncratic manner in which each individual interprets

the environment, or the <u>quality</u> of an individual's thinking,
as being responsible for the resultant mood state. The
Meichenbaum study (1975a), which found that high test-
anxious students entertained different thoughts in reference
to taking tests than did low test-anxious students, suggested
that qualitative differences do exist in the thinking of
high versus low test-anxious subjects.

Ellis (1977) has noted further that humans have the
ability to "think about their thinking" (p. 39). Ellis has
explained that an individual who feels anxious tends to
think about the thinking which led to the anxiety, and by
doing so can increase or reduce the anxiety, depending upon
how the initial thinking is evaluated. Thus, it is quite
likely that high test-anxious individuals tend to increase
their anxiety by negatively evaluating their thinking in
reference to taking tests.

Lazarus (1977) has referred to this tendency to think
about thinking as reappraisal. Lazarus (1977) has noted that
individuals attempt to manipulate their emotional reactions
by constant reappraisal of their environments. The findings
in the present study suggested that there was a high
frequency of negative valences recorded by high test-anxious
subjects, and that those negative evaluations may have served
to maintain undesirable emotional responses.

Thus, it appears that the results of this study do
indeed support the cognitivists' assertions that <u>quality</u> of

thinking is primarily related to the resultant emotional reaction. However, these results also suggested that there were _quantitative_ differences in thinking between high and low test-anxious subjects. Not only did high test-anxious subjects report negative self-referent thoughts in reference to taking tests, but they reported _more_ negative self-referent thoughts than did low test-anxious subjects. Low test-anxious subjects, on the other hand, reported _more_ positive and neutral self-referent and test-specific thoughts than did high test-anxious subjects.

Wolpe (1969) and Homme (1965) have promoted the view that thoughts may be reduced or increased by the same procedures used to modify overt behavior. Implicit in the view of these behavior theorists is the assumption that the _quantity_ or frequency of certain types of thoughts influences various mood states.

Although there has been no research, as yet, which has sought to reduce the negative self-referent statements reported by high test-anxious subjects, research has successfully altered subjects' self-concepts. Krop and his colleagues (Krop, Calhoon, & Kerrier, 1971; Krop, Perez, & Beaudoin, 1973) were able to alter subjects' self-concepts (as measured by positive self-evaluative statements) by using contingent covert reinforcement. Krop, et al., (1971, 1973) successfully reduced the number of negative self-evaluative statements, and increased the positive

positive self-evaluative statements in over 100 subjects. Two-week follow-up studies showed that subjects continued to utilize more positive self-evaluative thoughts. Thus, it appears as if the number or quantity of certain types of thoughts is related to the resultant mood states.

In summary, the results related to the first eight hypotheses indicated that both the quality, i.e., the specific cognitive strategy utilized, and the quantity, i.e., the frequency of thoughts of a particular cognitive strategy, were related to the emotional state of the subject.

Null Hypotheses 9 Through 14

These hypotheses dealt with differences among the means of the frequencies of positive, negative, and neutral valences recorded by subjects across time, i.e., two weeks prior to the final examination, one week prior to the exam, and on the day of the final examination in Introductory Psychology, for high and low test-anxious subjects.

A two-way analysis of variance with repeated measures on the time factor was performed to test each hypothesis.

Null Hypothesis 9

This hypothesis stated that there would be no significant difference between the means of positive and neutral valences across time for high test-anxious subjects.

Table 4 shows the means of the valences at each time period, and the mean of the means for each valence across

Table 4

Mean Comparison of Positive and Neutral Valences

Recorded by High Test-Anxious Subjects

Across Three Time Periods

	N	Positive	SD	Neutral	SD
T_1	43	2.62	2.26	2.76	2.06
T_2	43	2.34	2.14	2.27	2.34
T_3	43	3.55	2.64	1.51	1.46
Mean of the Means		2.84	2.40	2.18	2.04

time. The mean of the means for the positive valence was 2.84; neutral, 2.18.

The results of the Analysis of Variance are presented in Table 5. Nonsignificant F ratios for main effects A and B indicate that there was no significant difference between the means of the positive and neutral valences, and that there were no significant differences among the three time periods.

A significant F ratio of 11.17 ($p < .05$) on the A x B interaction indicates that the positive and neutral valences differed from one another across time. Figure 1 shows that the valences seem to differ significantly from one another at time 3. This indicates that high test-anxious subjects tended to reduce their utilization of neutral valences and increase their recording of positive valences immediately prior to the test.

This hypothesis was rejected based upon the significant F ratio on the A x B interaction.

Null Hypothesis 10

This hypothesis stated that there would be no significant difference between positive and negative valences for high test-anxious subjects across time.

The means for the valences at each time period and averaged across time are presented in Table 6. The mean of the means for the positive valence was 2.84; negative, 5.29.

Table 5

Results of Analysis of Variance Comparing the Means of

Positive and Neutral Valences Recorded by High

Test-Anxious Subjects Across Three

Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	28.004	1	28.004	3.20	0.077
Error Between	735.101	84	8.751		
B (Within Time)	6.380	2	3.190	1.139	0.322
A x B (Valences Across Time)	62.566	2	31.283	11.173	0.000*
Error Within	470.388	168	2.800		

* $p < .05$

Figure 1

Illustration of the Means of Positive and Neutral Valences

Recorded by High Test-Anxious Subjects

Across Three Time Periods

Table 6

Mean Comparison of Positive and Negative Valences

Recorded by High Test-Anxious Subjects

Across Three Time Periods

	N	Positive	SD	Negative	SD
T_1	43	2.62	2.26	4.60	2.81
T_2	43	2.34	2.14	5.37	2.86
T_3	43	3.55	2.64	5.90	2.78
Mean of the Means		2.84	2.40	5.29	2.84

The results of the Analysis of Variance shown in Table 7 indicate that the F ratio of 27.52 for main effect A was significant (p < .05). This indicates that there was a significant difference between the mean of the means of the positive and neutral valences. An F ratio of 29.61 was significant (p < .05) for main effect B indicating that there was a significant difference among the three time periods.

Nonsignificance for the A x B interaction suggests that the valences did not differ across time. This indicates that the time factor did not influence the frequencies of valences recorded by high test-anxious subjects.

A nonsignificant F ration on the A x B interaction indicated that Null Hypothesis 10 was maintained.

Null Hypothesis 11

This hypothesis stated that there would be no significant difference between the means of neutral and negative valences across time for high test-anxious subjects.

Table 8 presents the means of the valences at each time period and averaged across time. The mean of the neutral means was 2.18; negative, 5.29.

The results of the Analysis of Variance, shown in Table 9, indicate that the F ratio of 53.07 for main effect A was significant (p < .05). This suggests that there was a significant difference between the means of neutral and negative valences.

Table 7

Results of Analysis of Variance Comparing the Means of

Positive and Negative Valences Recorded by High

Test-Anxious Subjects Across Three

Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	387.039	1	387.039	27.528	0.000*
Error Between	1181.039	84	14.060		
B (Within Time)	59.233	2	29.616	9.471	0.000*
A x B (Valences Across Time)	12.101	2	6.050	1.935	0.147
Error Within	525.333	168	3.127		

* p < .05

Table 8

Mean Comparison of Neutral and Negative Valences

Recorded by High Test-Anxious Subjects

Across Three Time Periods

	N	Neutral	SD	Negative	SD
T_1	43	2.76	2.06	4.60	2.81
T_2	43	2.27	2.34	5.37	2.86
T_3	43	1.51	1.46	5.90	2.78
Mean of the Means		2.18	2.04	5.29	2.84

Table 9

Results of Analysis of Variance Comparing the Means of

Neutral and Negative Valences Recorded by High

Test-Anxious Subjects Across Three

Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	623.260	1	623.260	53.079	0.000*
Error Between	986.341	84	11.742		
B (Within Time)	0.961	2	0.481	0.156	0.855
A x B (Valences Across Time)	70.357	2	35.178	11.438	0.000*
Error Within	516.682	168	3.075		

* $p < .05$

A nonsignificant F ratio for main effect B indicates that there was no significant difference between the time periods. A significant F ratio of 11.43 on the A x B interaction indicates that the means of the valences differed significantly across time. Figure 2 illustrates how these means differed across time. The means of the neutral valences decreased while the means of the negative valences increased over time. This indicates that high test-anxious subjects significantly decreased their recording of neutral valences and increased their utilization of negative valences immediately prior to the final examination.

This hypothesis was rejected based upon the significant F ratio on A x B interaction.

Null Hypothesis 12

This hypothesis stated that there would be no significant differences between the means of positive and neutral valences for low test-anxious subjects across time.

Displayed in Table 10 are the means of the positive and neutral valences for each of the time periods and the mean of the means across time. The mean of the means for the positive valences was 4.26, while the mean of the means of the neutral valences was 2.65.

Table 11 presents the results of the Analysis of Variance which indicates that an F ratio of 17.06 for main effect A was significant ($p < .05$). This suggests that the means of the positive and neutral valences differed
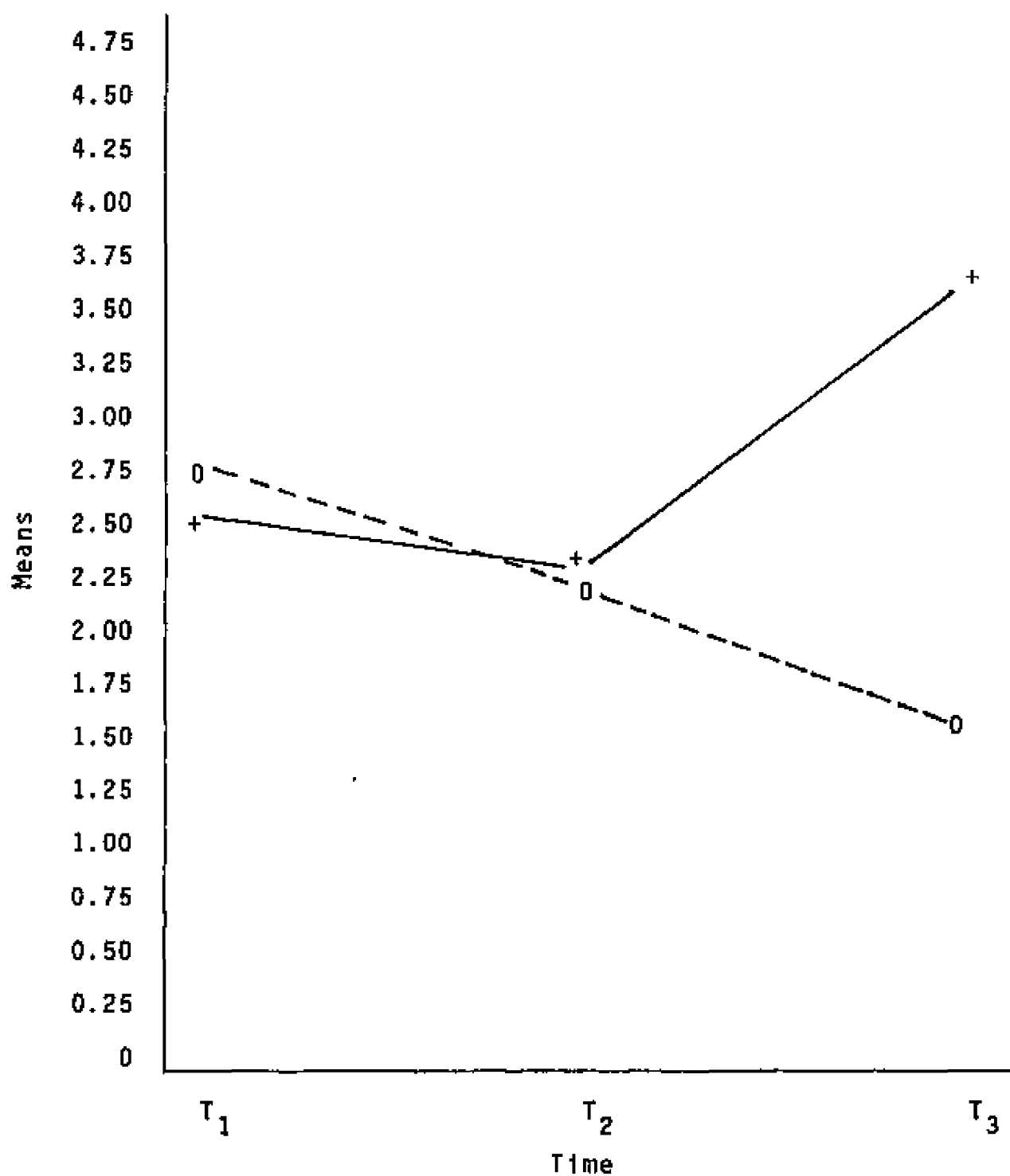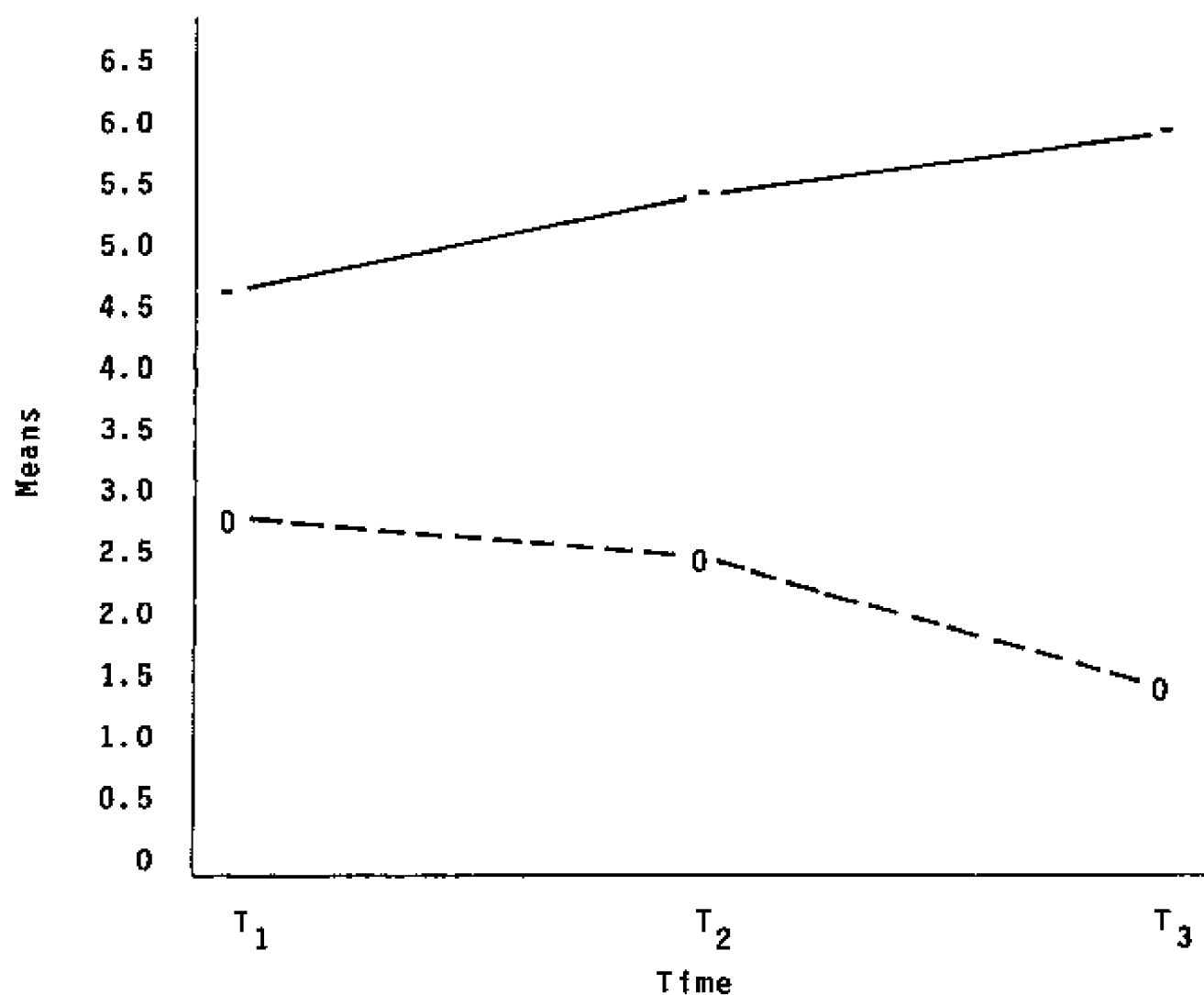
Figure 2

Illustration of the Means of Neutral and Negative Valences

Recorded by High Test-Anxious Subjects

Across Three Time Periods

Table 10

Mean Comparison of Positive and Neutral Valences

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

	N	Positive	SD	Neutral	SD
T_1	43	3.79	1.89	3.16	2.17
T_2	43	4.25	2.15	2.46	2.02
T_3	43	4.74	2.79	2.37	2.26
Mean of the Means		4.26	2.32	2.65	2.16

Table 11

Results of Analysis of Variance Comparing Means of Positive

and Neutral Valences Recorded by Low Test-Anxious

Subjects Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	167.690	1	167.690	17.060	0.000*
Error Between	825.674	84	9.829		
B (Within Time)	1.682	2	0.841	0.325	0.723
A x B (Valences Across Time)	32.008	2	16.004	6.181	0.002*
Error Within	434.977	168	2.589		

* $p < .05$

significantly from one another. Nonsignificance for the F ratio on main effect B showed that the time periods did not differ significantly from one another.

A significant F ratio on the A x B interaction indicates that the means of the valences differed significantly from one another across time. This difference is shown in Figure 3. It may be observed that as the means of positive valences increased over time, the neutral valences decreased, indicating that low test-anxious subjects tended to increase their recording of positive valences and decrease their use of neutral valences as the examination grew nearer.

Based upon the significant F ratio on the A x B interaction, Null Hypothesis 12 was rejected.

Null Hypothesis 13

This hypothesis stated that there would be no significant difference between the means of positive and negative valences for low test-anxious subjects across time.

Table 12 shows the means of the positive and negative valences for each time period and the average means for all three time periods. The mean of the means of the positive valences was 4.26, while the mean of the means of the negative valences was 3.41.

Displayed in Table 13 are the results of the Analysis of Variance. An F ratio of 4.32 for main effect A was significant (p < .05) indicating that there was a significant difference between the positive and negative valences of low

Figure 3

Illustration of the Means of Positive and Neutral Valences

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

Table 12

Mean Comparison of Positive and Negative Valences

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

	N	Positive	SD	Negative	SD
T_1	43	3.79	1.89	3.09	2.20
T_2	43	4.25	2.15	3.27	2.13
T_3	43	4.74	2.79	3.88	2.45
Mean of the Means		4.26	2.32	3.41	2.70

Table 13

Results of Analysis of Variance Comparing Means of Positive

and Negative Valences Recorded by Low Test-Anxious

Subjects Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	46.050	1	46.050	4.328	0.040*
Error Between	893.767	84	10.640		
B (Within Time)	33.403	2	16.702	6.580	0.001*
A x B (Valences Across Time)	0.845	2	0.422	0.166	0.846
Error Within	426.419	168	2.538		

* $p < .05$

test-anxious subjects. Significance for main effect B
(p < .05) suggested that there was a difference among the
three time periods. However, a nonsignificant F ratio on
the A x B interaction indicated that the means of the
positive and negative valences did not significantly differ
across time. Thus, it appears as if the time factor did not
effect subjects' valencing of statements.

Based upon the nonsignificant F ratio on the A x B
interaction, this hypothesis was maintained.

Null Hypothesis 14

This hypothesis stated that there would be no signif-
icant difference between the means of neutral and negative
valencies for low test-anxious subjects across time.

Displayed in Table 14 are the means of the neutral
and negative valences at each time period and the mean of the
means for each valence. Low test-anxious subjects had a mean
of 2.65 for neutral valences and 3.41 for negative valences.

The Analysis of Variance results displayed in Table 15
indicate that the F ratio for main effect A, which was the
difference between the means of neutral and negative valences,
was not significant. The F ratio for main effect B, differ-
ences between time periods, was not significant.

A significant F ratio of 6.21 (p < .05) for the A x B
interaction indicates that the means of the valences differed

Table 14

Mean Comparison of Neutral and Negative Valences

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

	N	Neutral	SD	Negative	SD
T_1	43	3.11	2.17	3.09	2.20
T_2	43	2.46	2.02	3.27	2.13
T_3	43	2.37	2.26	3.88	2.45
Mean of the Means		2.65	2.16	3.41	2.27

Table 15

Results of Analysis of Variance Comparing Means of Neutral

and Negative Valences Recorded by Low Test-Anxious

Subjects Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Valences)	37.988	1	37.988	3.583	0.061
Error Between	890.698	84	10.604		
B (Within Time)	3.442	2	1.721	0.843	0.432
A x B (Valences Across Time)	25.395	2	12.698	6.216	0.002*
Error Within	343.163	168	2.043		

* $p < .05$

significantly across time. As is illustrated in Figure 4, the neutral valences decreased over time, while the negative valences increased over time. Thus, low test-anxious subjects recorded less neutral valences as the test situation became more immediate.

Summary of Results Related to Null Hypotheses 9 Through 14

The results of these analyses suggested that the means of positive valences were significantly greater than the means of either the neutral or negative valences recorded by low test-anxious subjects. The means of the neutral valences tended to interact with time, and decreased significantly across time.

The means of the negative valences were significantly higher than the means of the positive or neutral valences for high test-anxious subjects. Once again, the means of the neutral valences significantly interacted with the time factor and decreased across time. Thus, both positive and negative valences increased.

It appears that as the test situation became imminent, both high and low test-anxious subjects utilized positive or negative valences, in preference to the neutral evaluation of their thoughts.
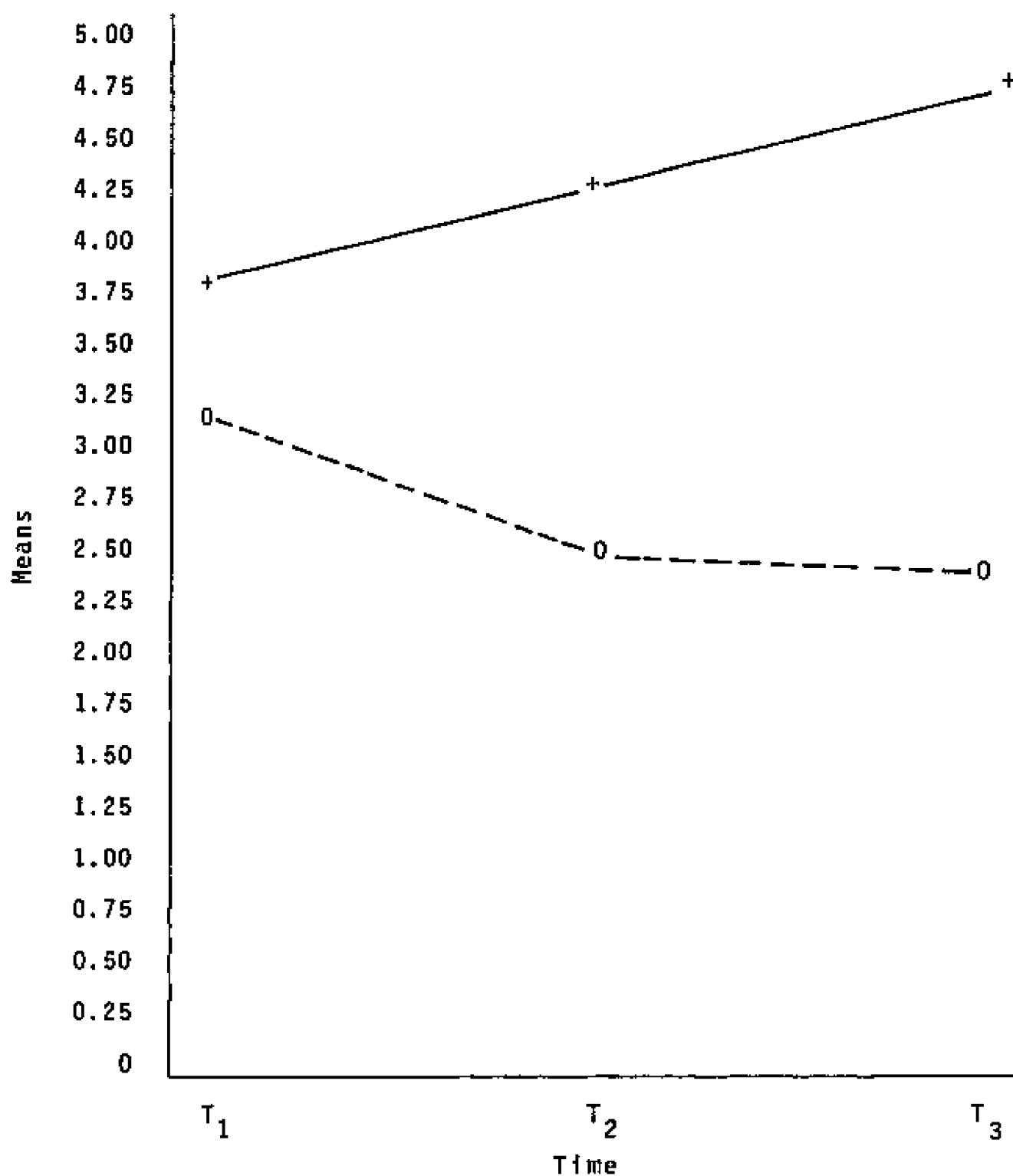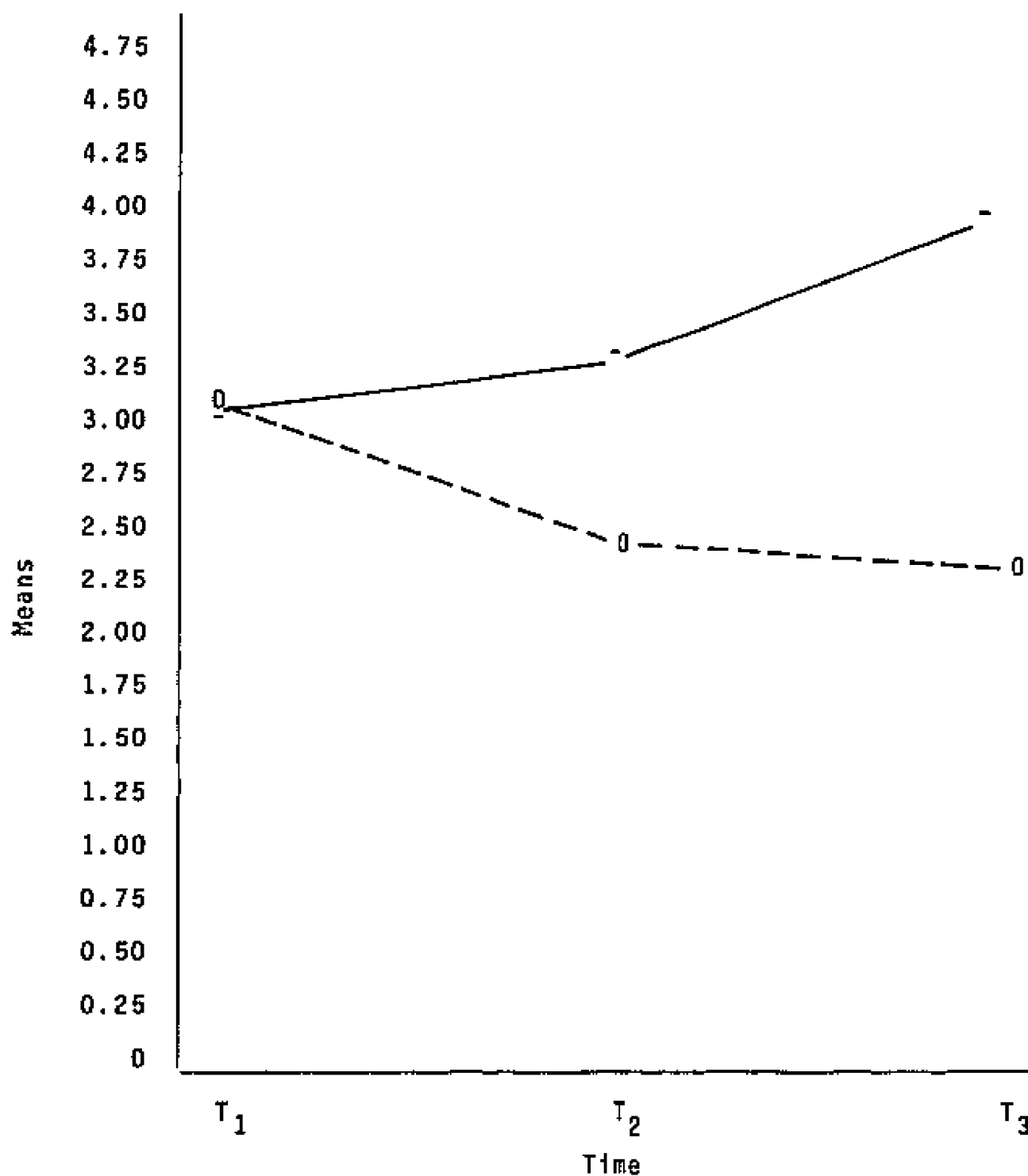
Figure 4

Illustration of the Means of Neutral and Negative Valences

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

Null Hypotheses 15 Through 20

These hypotheses dealt with differences among the means of the frequencies of self-referent, test-specific, and nonspecific cognitive strategies across time, i.e., two weeks prior to the final examination, one week prior to the final exam, and on the day of the final examination in Introductory Psychology, for high and low test-anxious subjects.

A two-way analysis of variance with repeated measures on the time factor was performed to test each hypothesis.

Null Hypothesis 15

This hypothesis stated that there would be no significant difference between the means of the self-referent and test-specific cognitive strategies across time for high test-anxious subjects.

Table 16 presents the means of the two cognitive strategies at each time period and the mean of the means across time. The mean of the means for the self-referent cognitive strategy recorded by high test-anxious subjects was 6.05; for the test-specific cognitive strategy, 2.77.

The results of the analysis of variance are displayed in Table 17. A significant F ratio of 35.28 ($p < .05$) for main effect A indicates that the means of the self-referent and test-specific cognitive strategies significantly differed from one another. A nonsignificant F ratio for main effect B indicates that there was no significant differences among time periods.

Table 16

Mean Comparison of Self-Referent and Test-Specific Cognitive
Strategies Recorded by High Test-Anxious Subjects
Across Three Time Periods

	N	Self-Referent	SD	Test-Specific	SD
T_1	43	6.23	2.95	2.49	2.68
T_2	43	5.94	2.83	2.94	2.70
T_3	43	6.00	2.98	2.86	2.74
Mean of the Means		6.05	2.90	2.77	2.69

Table 17

Results of Analysis of Variance Comparing Means of the
Self-Referent and Test-Specific Cognitive Strategies
Recorded by High Test-Anxious Subjects
Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	697.902	1	697.902	35.284	0.000*
Error Between	1661.462	84	19.779		
B (Within Time)	0.333	2	0.167	0.081	0.921
A x B (Strategies Across Time)	6.631	2	3.316	1.619	0.201
Error Within	344.073	168	2.048		

* $p < .05$

A nonsignificant F ratio on the A x B interaction suggests that the cognitive strategies did not significantly differ across time. Thus, it appears that the time factor did not significantly interact with the choice of cognitive strategy utilized by high test-anxious subjects.

Nonsignificance on the A x B interaction indicated that Null Hypothesis 15 was maintained.

Null Hypothesis 16

This hypothesis stated that there would be no significant difference between the means of the self-referent and nonspecific cognitive strategies across time for high test-anxious subjects.

The means of the strategies are presented in Table 18. It may be noted that the mean of the means for the self-referent cognitive strategy was 6.05; for the nonspecific cognitive strategy, 1.17.

The results of the Analysis of Variance, presented in Table 19, indicate that the F ratio of 123.36 was significant (p <.05) for main effect A. This shows that there was a significant difference between the means of the self-referent and nonspecific cognitive strategies. The F ratio for main effect B, which compared the means of the three time periods, was not significant.

Table 18

Mean Comparison of Self-Referent and Nonspecific Cognitive

Strategies Recorded by High Test-Anxious Subjects

Across Three Time Periods

	N	Self-Referent	SD	Nonspecific	SD
T_1	43	6.23	2.95	1.27	1.46
T_2	43	5.94	2.83	1.10	1.21
T_3	43	6.00	2.98	1.13	1.32
Mean of the Means		6.05	2.90	1.17	1.33

Table 19

Results of Analysis of Variance Comparing Means of the

Self-Referent and Nonspecific Cognitive Strategies

Recorded by High Test-Anxious Subjects

Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	1540.000	1	1540.000	123.360	0.000*
Error Between	1048.567	84	12.483		
B (Within Time)	2.452	2	1.276	0.800	0.450
A x B (Strategies Across Time)	0.187	2	0.093	0.061	0.940
Error Within	257.361	168	1.532		

* $p < .05$

A nonsignificant F ratio on the A x B interaction indicates that the means of the cognitive strategies did not differ significantly as a result of interacting with the time factor.

Based upon the nonsignificant F ratio on the A x B interaction, this hypothesis was maintained.

Null Hypothesis 17

This hypothesis stated that there would be no significant difference between the means of the test-specific and nonspecific cognitive strategies across time for high test-anxious subjects.

The means of these strategies are presented in Table 20. The mean of the means of the test-specific cognitive strategy was 2.77; the nonspecific strategy, 1.17.

Table 21 shows the results of the Analysis of Variance. An F ratio of 15.20 was significant (p < .05) for main effect A indicating that the means of the cognitive strategies differed significantly from one another. A nonsignificant F ratio on main effect B suggests that there was no significant difference among the means of the three time periods.

A nonsignificant F ratio on the A x B interaction indicates that the means of the two cognitive strategies did not differ significantly as the result of the time factor.

Table 20

Mean Comparison of Test-Specific and Nonspecific Cognitive

Strategies Recorded by High Test-Anxious Subjects

Across Three Time Periods

	N	Test-Specific	SD	Nonspecific	SD
T_1	43	2.49	2.68	1.27	1.46
T_2	43	2.94	2.70	1.10	1.21
T_3	43	2.86	2.74	1.13	1.32
Mean of the Means		2.77	2.69	1.17	1.33

Table 21

Results of Analysis of Variance Comparing Means of the

Test-Specific and Nonspecific Cognitive Strategies

Recorded by High Test-Anxious Subjects

Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	164.481	1	164.481	15.205	0.000*
Error Between	908.644	84	10.817		
B (Within Time)	1.019	2	0.509	0.350	0.705
A x B (Strategies Across Time)	4.592	2	2.296	1.575	0.209
Error Within	244.834	168	1.457		

* $p < .05$

Based upon the nonsignificant F ratio on the A x B interaction Null Hypothesis 17 was maintained.

Null Hypothesis 18

This hypothesis stated that there would be no significant difference between the means of the self-referent and test-specific cognitive strategies for low test-anxious subjects.

Table 22 displays the means for both cognitive strategies. The mean of the means for the self-referent cognitive strategy was 4.75; for the test-specific cognitive strategy, 3.57.

In Table 23 are presented the results of the Analysis of Variance. Nonsignificant F ratios for main effects A, B, and the A x B interaction indicate that there were no significant differences between the means of the cognitive strategies, among the means of the three time periods, or between the means of the strategies across time.

This hypothesis was maintained based upon the nonsignificant F ratio on the A x B interaction.

Null Hypothesis 19

This hypothesis stated that there would be no significant difference between the means of the self-referent and

Table 22

Mean Comparison of Self-Referent and Test-Specific Cognitive
Strategies Recorded by Low Test-Anxious Subjects
Across Three Time Periods

	N	Self-Referent	SD	Test-Specific	SD
T_1	43	4.66	3.20	3.96	3.16
T_2	43	4.62	3.10	4.17	3.02
T_3	43	4.96	2.86	3.57	2.82
Mean of the Means		4.75	3.04	3.90	2.99

Table 23

Results of Analysis of Variance Comparing Means of the
Self-Referent and Test-Specific Cognitive Strategies
Recorded by Low Test-Anxious Subjects
Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	46.333	1	46.333	2.411	0.124
Error Between	1614.328	84	19.218		
B (Within Time)	0.817	2	0.409	0.097	0.907
A x B (Strategies Across Time)	10.109	2	5.055	1.204	0.302
Error Within	705.073	168	4.197		

nonspecific cognitive strategies across time for low test-anxious subjects.

Table 24 shows the means for both cognitive strategies. The mean of the means of the self-referent cognitive strategy was 3.90, while the mean of the means of the nonspecific cognitive strategy was 1.34.

The results of the Analysis of Variance are shown in Table 25. A significant F ratio ($p < .05$) of 33.09 on main effect A indicates that there was a significant difference between the self-referent and nonspecific cognitive strategies for low test-anxious subjects.

Nonsignificant on main effect B and the A x B interaction indicates that the means of the times did not differ significantly from one another, nor did the means of the strategies differ significantly across time.

Based upon the nonsignificant F ratio on the A x B interaction, Null Hypothesis 19 was maintained.

Null Hypothesis 20

This hypothesis stated that there would be no significant difference between the means of the test-specific and nonspecific cognitive strategies across time for low test-anxious subjects.

Table 24

Mean Comparison of Self-Referent and Nonspecific Cognitive

Strategies Recorded by Low Test-Anxious Subjects

Across Three Time Periods

	N	Self-Referent	SD	Nonspecific	SD
T_1	43	3.96	3.16	1.37	1.78
T_2	43	4.17	3.02	1.19	1.25
T_3	43	3.57	2.82	1.46	1.60
Mean of the Means		3.90	2.99	1.34	1.55

Table 25

Results of Analysis of Variance Comparing Means of the

Self-Referent and Nonspecific Cognitive Strategies

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	422.945	1	422.945	33.092	0.000*
Error Between	1073.586	84	12.781		
B (Within Time)	1.429	2	0.714	0.321	0.725
A x B (Strategies Across Time	8.275	2	4.137	1.859	0.158
Error Within	373.852	168	2.225		

* $p < .05$

Means for both strategies are presented in Table 26. The mean of the means of the test-specific cognitive strategy was 4.75; nonspecific, 1.34.

Table 27 displays the results of the Analysis of Variance. A significant F ratio ($p < .05$) of 70.37 on main effect A indicates that the strategies differed significantly from one another. Nonsignificant F ratio on main effect B indicates that the means of the time periods did not differ from one another. A nonsignificant F ratio on the A x B interaction indicates that the means of the strategies did not interact with the time factor.

Null Hypothesis 20 was maintained based upon the nonsignificant F ratio for the A x B interaction.

Summary of Results Related to Null Hypotheses 15 Through 20

The results of the Analyses related to these hypotheses suggested that the mean of the means of the frequencies of the self-referent cognitive strategy was significantly higher than the mean of the frequencies of the test-specific or nonspecific cognitive strategies for high test-anxious subjects. It also appeared as if the time factor did not influence significantly the choice of cognitive strategy utilized by high test-anxious subjects.

The mean of the means of frequencies of the self-referent and test-specific cognitive strategies did not differ

Table 26

Mean Comparison of Test-Specific and Nonspecific Cognitive

Strategies Recorded by Low Test-Anxious Subjects

Across Three Time Periods

	N	Test-Specific	SD	Nonspecific	SD
T_1	43	4.66	3.20	1.37	1.78
T_2	43	4.62	3.10	1.19	1.25
T_3	43	4.96	2.86	1.46	1.60
Mean of the Means		4.75	3.04	1.34	1.56

Table 27

Results of Analysis of Variance Comparing Means of the

Test-Specific and Nonspecific Cognitive Strategies

Recorded by Low Test-Anxious Subjects

Across Three Time Periods

Main Effects	SS	DF	MS	F	Sig.
A (Between Strategies)	749.251	1	749.251	70.372	0.000*
Error Between	894.345	84	10.647		
B (Within Time)	4.034	2	2.017	0.570	0.566
A x B (Strategies Across Time)	0.458	2	0.229	0.065	0.937
Error Within	594.766	168	3.540		

* $p < .05$

significantly for low test-anxious subjects. Both of these
means were significantly greater than the mean of the means
of the frequencies of the nonspecific cognitive strategy.

The time factor did not significantly influence the
choice of cognitive strategy for low test-anxious subjects.
Thus, the choice of cognitive strategy remained consistent
over time for both high and low test-anxious subjects.

Discussion of the results
Related to Null Hypotheses
9 Through 20

These twelve null hypotheses examined the means of
the frequencies of cognitive strategies and valences, across
three time periods, recorded by high and low test-anxious
subjects. The time periods were as follows: two weeks
prior to the final examination in Introductory Psychology,
one week prior to the final exam, and on the day of the
final examination immediately preceding the exam.

The results of the analyses related to these null
hypotheses indicated that the means of the frequencies of
the negative valences were significantly higher than the
means of the frequencies of the positive or neutral valences
for high test-anxious subjects. It appeared as if the
neutral valences significantly interacted with time, i.e.,
the means of the frequencies of the neutral valences decreased
across time, while negative and positive valences increased.

The means of the frequencies of the positive valences were significantly higher than the means of the frequencies of the negative or neutral valences for low test-anxious subjects. Once again, the neutral valences category interacted significantly with the time factor by decreasing in frequency of occurrence over time, as the positive and negative valences increased.

The means of the frequencies of the self-referent cognitive strategy were significantly higher than the means of the frequencies of the test-specific or nonspecific cognitive strategy for high test-anxious subjects. The means of the frequencies of the self-referent and test-specific cognitive strategies were consistently higher than the means of the frequencies of the nonspecific cognitive strategy in low test-anxious subjects. There was no significant inter-action between the means and the time factor for high or low test-anxious subjects, suggesting that the use of cognitive strategies did not differ across time for high or low test-anxious subjects.

Thus, it appears as if high test-anxious subjects consistently employed the negative self-referent cognitive strategy when confronted with taking a test. Low test-anxious subjects consistently utilized positive self-referent and positive test-specific statements when facing an evalua-tive situation.

These results appear to be consistent with
Spielberger's (1966) notion that test anxiety is a situation-
specific personality trait. Speilberger (1966) contended
that certain individuals have a predisposition to view
certain types of situations as dangerous or threatening, and
to react with acute anxiety in the face of these situations.
He speculated that individuals form personality traits as a
result of their childhood experiences, and maintain these
traits throughout their adult lives.

Similar to this conceptualization, Ellis (1962)
described "personality trait" from a cognitively-oriented
point of view. Ellis (1962) explained that an individual's
thinking is a product of underlying attitudes and beliefs
which develop, in part, as a result of childhood experiences
and their subsequent evaluations of these experiences. Thus,
it may be inferred that individuals who are highly test
anxious have adopted certain irrational attitudes and beliefs
about themselves in evaluative situations. When confronted
with a test, it is speculated that they will entertain
thoughts which are consistent with their underlying irrational
attitudes and beliefs.

Thus, consistent with the views of Ellis (1962) and
Spielberger (1966) subjects in the present study indicated
their choice of a particular cognitive strategy two weeks
prior to the test and continued to utilize this strategy
until the actual examination. However, their evaluations of

their thinking, i.e., positive, negative, or neutral valencing of statements, did change as the test became imminent. A reconsideration of the four tenets suggested in Chapter 3 by Meichenbaum (1977) seems cogent in view of these particular findings in this study.

Meichenbaum (1977) suggested that the cognitive strategies utilized by individuals are influenced and shaped by the following four factors: (1) the individual's focus within the environment, (2) the person's evaluation of stimuli within the environment, (3) the person's locus of control, and (4) the individual's assessment of coping ability within the situation.

The negative self-referent cognitive strategy appeared to be the most frequently utilized strategy of high test-anxious subjects in this study. The use of this strategy suggests that (a) high test-anxious subjects were negatively attending to themselves and their environment, (b) that they evaluated the test situation as personally threatening to them, and (c) that they viewed themselves as not having control in this situation. Subsequently, they determined that their ability to cope in the situation was poor. This observation is consistent with the research of test anxiety theorists such as Sarason (1975), Sarason and Mandler (1952), and Wine (1971).

The implicit assumption held by test-anxiety theorists, that low test-anxious subjects positively attend

to themselves in test situations, evaluate their performance and the entire test situation as positive, view themselves as in control, and subsequently assess their ability to cope as good, was supported by the results of this study. These results showed that low test-anxious subjects utilized positive self-referent and positive test-specific cognitive strategies when faced with an examination. Thus, there was a qualitative difference in the thinking of high and low test-anxious subjects in reference to the test situation. This difference may be the result of the different attitudes and beliefs of high versus low test-anxious subjects, and of their own perceptions of their ability to cope with the situation.

As was mentioned previously, although high test-anxious subjects consistently recorded the negative self-referent cognitive strategy and low test-anxious subjects consistently utilized the positive self-referent and test-specific cognitive strategies most frequently over time, both high and low test-anxious subjects recorded significantly less neutral valences as the test became more immediate. Lazarus (1977) has suggested that individuals attempt to postpone or prevent danger, overcome damage, or simply tolerate a situation by constant reappraisal. It seems as if high and low test-anxious subjects attempted to cope with the approaching examination by reappraising the situation in a manner which was most consistent with their own attitudes

and beliefs. Whereas high test-anxious subjects increased their negative evaluations, low test-anxious subjects increased their positive evaluations of their thoughts as the test grew nearer. Thus, it appears as if neither group viewed the test situation as relatively neutral, but attached either a positive or negative evaluation to this event.

In summary, high test-anxious subjects utilized the negative self-referent cognitive strategy over time and low test-anxious subjects utilized the positive self-referent and test-specific cognitive strategies over time. This finding appears to be consistent with the view that test anxiety is a situation-specific personality trait, and that individuals have a predisposition to evaluate test situations in a certain manner. The reduction of neutral valencing by both high and low test-anxious subjects was attributed to their idiosyncratic attitudes and perceived abilities to cope in test situations.

Chapter 5

SUMMARY, CONCLUSIONS, IMPLICATIONS,
AND RECOMMENDATIONS

This chapter contains a summary of the study, conclusions based on the findings of the study, implications for practice, and recommendations for future research.

SUMMARY

Purpose

This study sought to accomplish the following: (1) to classify the self-reported thoughts of high and low test-anxious subjects into three distinct categories, i.e., the self-referent cognitive strategy, the test-specific cognitive strategy, and the nonspecific cognitive strategy; (2) to differentiate the cognitive strategies utilized by high test-anxious subjects from the cognitive strategies employed by low test-anxious subjects; (3) to differentiate adaptive from maladaptive cognitive strategies; and (4) to identify the cognitive strategies utilized over time by high and low test-anxious subjects.

Sample

The 86 subjects in this study were undergraduate college students enrolled in Introductory Psychology at Indiana State University during the Spring semester, 1979.

Based upon the scores of 215 students who were administered the Test Attitude Inventory (Speilberger, et al., 1977), 43 students were identified as high test-anxious subjects and 43 students were identified as low test-anxious subjects.

Review of Literature

A review of test-anxiety theory indicated that test anxiety has a cognitive component, and that individuals who experience high test anxiety seem prone to evaluate examination situations as threatening to their self-esteem.

Studies examining the role of cognitions as mediators between environmental stimuli and emotional responses, suggested that high test-anxious individuals may be utilizing cognitive strategies which serve to maintain high levels of anxiety.

From the literature discussing the cognitive restructuring approaches of Ellis, Beck, and Meichenbaum, it was noted that emphasis was placed upon maladaptive conditions, i.e., ideations, thought patterns, beliefs, and attitudes as determinants of undesirable emotional responses. Thus, it was concluded that cognitive approaches emphasize the qualitative aspects of thinking as these relate to mood states.

Literature reporting the research on thought modification procedures suggested that the frequency or quantity of certain types of thoughts is directly related to the subsequent mood state. Research was cited which illustrated various thought modification procedures.

Data Collection

Two weeks, one week, and immediately preceding the final examination in Introductory Psychology, subjects completed ten 3 x 5 notecards with the following information: (1) one thought in reference to taking tests, and (2) an evaluation (valence) of the thought as positive, negative, or neutral for them to think about taking tests.

Treatment and Analysis of Data

A total of 2,580 statements and an equal number of valences were analyzed.

Individual Chi Square tests of goodness of fit were employed to examine the frequencies of statements and valences recorded immediately prior to the test by high and low test-anxious subjects.

Individual 2 x 3 Analysis of Variance designs were employed to analyze the means of the frequencies of cognitive strategies and valences of high and low test-anxious subjects over time.

Results

Results of the Chi Square goodness of fit tests, performed to analyze the data related to Hypotheses 1 through 8, showed that, immediately preceding the test, high test-anxious subjects recorded a higher frequency of self-referent statements than test-specific or nonspecific statements. High test-anxious subjects also listed more negative valences than

positive or neutral valences. Low test-anxious subjects recorded a high frequency of self-referent and test-specific statements. They also utilized positive and neutral valences more frequently than negative valences.

Hypotheses 9 through 20 were analyzed via two-way analyses of variance with repeated measures on the time factor. The results of these analyses indicated that over time, i.e., from two weeks prior to the final, one week before the final, and on the day of the final exam, the mean frequencies of negative valences were significantly higher than positive or neutral valences for high test-anxious subjects. The mean frequencies of the positive and neutral valences were significantly higher for low test-anxious subjects than the mean frequencies of the negative valence. It appeared that the neutral valence category was the only one to interact significantly with the time factor by decreasing in frequency of occurrence over time for both high and low test-anxious subjects.

The results also showed that high test-anxious subjects responded consistently over time, as did low test-anxious subjects, i.e., high test-anxious subjects recorded the highest frequency of negative self-referent statements over time, and low test-anxious subjects recorded high frequencies of positive test-specific and positive self-referent statements over time.

CONCLUSIONS

The following conclusions are based on the data collected and analyzed in this study.

1. High test-anxious subjects negatively attend to themselves and their own discomforts in evaluative situations. This finding is consistent with the research of Sarason (1975) and Wine (1971). Althought test-anxiety theorists have speculated that low test-anxious subjects view themselves more positively and focus on the task at hand, there has not been research to support this speculation in the past. The current findings indicated that low test-anxious subjects do view themselves positively, and that they entertain positive thoughts about the test, per se.

2. The negative self-referent cognitive strategy appears to be an ineffective means of coping with the environment in terms of the related emotional response experienced by the individual. This conclusion is consistent with the research of Sarason (1975), Wine (1971), and Spielberger, et al., (1977). The results of the present study indicated that positive self-referent and positive test-specific cognitive strategies are adaptive means of coping with a test situation, i.e., these strategies were related to a more desirable emotional response.

3. The quality and the quantity of thinking appear to be related to the level of test anxiety experienced by the subjects in the study. This finding is consistent with a

cognitive-behavioral approach to the conceptualization and treatment of test anxiety as suggested by Meichenbaum (1974). The desirability and frequency of particular thoughts entertained by the subjects in this study were proportional to the level of anxiety experienced by the subjects. This finding which related quality and quantity of thinking to specific levels of anxiety experienced by the subjects is consistent with the research of Schacter and Singer (1966). This research demonstrated that differing cognitive interpretations of a situation resulted in differing emotional responses to the situation.

4. Test anxiety appears to be a situation-specific form of trait anxiety. The present results indicated that subjects reported similar types of thoughts in reference to taking tests two weeks prior to the test, one week prior to the test and on the day of the test. Thus, they appeared to be utilizing consistent cognitive strategies in response to being evaluated. However, as the test grew nearer they increased significantly the frequencies of the particular strategies they were utilizing. This increase corresponded in the direction of their assessed tendency to be high or low test-anxious, i.e., high test-anxious subjects increased negative thoughts, low test-anxious subjects increased positive thoughts. Thus, the present findings are consistent with Spielberger's (1966) contention that individuals have

a predisposition to be test-anxious and that they most
actively express this tendency in the actual situation.

IMPLICATIONS

The following implications for the conceptualization
and treatment of test anxiety are presented on the basis of
the findings of this study.

1. The present findings, i.e., that both the _quality_
and _quantity_ of thoughts influence the resultant mood state,
provide a theoretical basis for implementing a cognitive-
behavioral approach in the conceptualization and treatment of
test anxiety. The research conducted by Meichenbaum (1972)
which treated high test-anxious subjects via a combined
introspective and behavioral approach was reported as
successful in reducing the negative affective responses
associated with evaluative situations in high test-anxious
subjects. Meichenbaum (1972) also noted that subsequent to
the affective change, successful performance on tests also
increased.

It appears as if thoughts may be manipulated
similarly to overt behaviors, and thus thought modification
is consistent with a behavioral approach to the treatment of
test anxiety. However, as Meichenbaum (1972) demonstrated,
the subjects must first become aware of the _content_ and
meaning (the _quality_) of their thoughts before attempting to
utilize a thought modification procedure. This process of
gaining awareness of the content and meaning of thinking is

consistent with a cognitive approach. Thus, a combined cognitive-behavioral approach appears to be theoretically and practically sound in reference to the conceptualization and treatment of test anxiety.

2. The findings related to the present study do not support an insight-oriented approach as the sole approach to the treatment of test anxiety. The present study illustrated that awareness of one's thoughts in reference to taking tests was not sufficient to influence high test-anxious subjects to alter their negative thoughts in reference to taking tests. As Lazarus (1967) suggested, individuals seek to cope with their environments by constant reappraisal. As the test became imminent, high test-anxious subjects increased the frequency of negative thoughts. It was speculated that their efforts to cope required them to utilize thoughts that were immediately accessible to them. These thoughts were consistent with their firmly-held attitudes and beliefs, and subsequently were most familiar to them. Thus, being aware that they were reporting negative thoughts did not, in itself, aid the subjects in reducing these maladaptive thoughts.

In a treatment study comparing an insight-oriented approach to treating test anxiety with an insight-behavioral approach, Wine (1970) noted that the insight-oriented approach which focused only on aiding subjects to gain

awareness of their self-statements, without practicing
alternatives, was insufficient in reducing test anxiety.

3. The present findings suggested that the cognitive
strategies utilized by high and low test-anxious subjects
appear to have been influenced by the subjects' attitudes
and beliefs about themselves in reference to being evaluated,
and by their own perceptions of their abilities to cope in
evaluative situations.

It appears as if the present findings support the
approaches utilized by Ellis (1962), Meichenbaum (1974), and
Lazarus (1977). These approaches focus upon helping clients
to identify their attitudes and beliefs and replace the
emotionally self-defeating ones with emotionally enhancing
beliefs and attitudes.

RECOMMENDATIONS

Various recommendations are made for future research
on thoughts related to test anxiety.

1. The present study required subjects to record
new thoughts at each collection and to valence these thoughts
as positive, negative, or neutral. In this way, both the
content and meaning of thoughts were explored. It is
recommended that future research explore further the meaning
attached to the thoughts by having subjects valence the same
thoughts over a specified time period. Thus, all that would
be varied across time would be the particular meaning that
subjects attach to the thoughts. This method would allow

researchers to examine the importance of meaning in the thought modification process.

2. It is recommended that additional research be conducted to teach high test-anxious subjects to utilize the positive self-referent and test-specific strategies to overcome their anxiety related to taking tests. Kirschenbaum and Karoly (1977) and Masters and Santrock (1976) have reported successfully employing similar strategies to treat performance anxiety in college students and to teach children to attend to tasks.

3. The results related to the present study suggested that high test-anxious subjects were <u>not</u> entirely deficient in the cognitive strategies which were employed by low test-anxious subjects, but that high test-anxious subjects did not employ these strategies as frequently as low test-anxious subjects. Thus, research directed at the utilization of strategies within students' repertoirs is recommended. This type of research would require an assessment of subjects' available coping mechanisms, and the utilization of these mechanisms, rather than a deficit-building approach. Meichenbaum (1977) has suggested that normal and clinical populations may be separated in terms of <u>how they cope</u> with similar attitudes and behaviors, and <u>not</u> in how they differ in attitudes and behaviors.

4. It is recommended that research be continued which examines and compares "normal" and clinical populations.

Often studies research clinical populations, and assume that "normals" think or behave "just the opposite." Lazarus (1977) has discussed "palliative coping," i.e., the use of denial, avoidance, etc. by so-called healthy populations, as compared to a direct problem solving approach which is most often utilized to treat clinical populations. As was noted in Chapter 3, Ellis (1962) contended that undesirable emotions result from irrational thinking. Rational Emotive Therapy (Ellis, 1962) seeks to aid clients in disputing their irrational thinking. It also would be of interest to determine whether the thoughts recorded by "normal" populations are indeed rational, or whether they also utilize irrational thoughts in the face of stress. There appears to be much fruitful information to be gathered by observing how normal populations cope with high stress situations.

5. In order to assess the consistency of subjects' cognitions and affect, it is recommended that subjects record their thoughts after the examination, and that they re-take the Test Attitude Inventory (Spielberger, et al., 1977). Such information would provide additional evidence concerning the notion that test anxiety is a situation specific personality trait.

6. In order to broaden the scope of the present findings and to provide additional evidence regarding differences in high and low test-anxious subjects' responses to evaluative situations, it is recommended that physiological

measures be collected in addition to self-reported thoughts.
Recently, Rogers and Craighead (1977) reported on the physio-
logical responses to the valencing of self-statements related
to academic, social, and family-parental problems. They
noted that skin conductance appeared to be the most sensitive
measure of arousal. It is recommended that this measure be
adopted for use in a replication of the present study.

      7. It is recommended that high test-anxious subjects
be taught to relable their evaluations of their thoughts
(Schacter & Singer, 1966). In the present study, high and
low test-anxious subjects often recorded the same thoughts
in reference to taking tests, but evaluated the thoughts
differently. High test-anxious subjects valenced the
thoughts as negative while low test-anxious subjects valenced
the thoughts as positive. Teaching high test-anxious
subjects to relable their thinking as positive may aid them
in altering their emotional responses to taking tests.

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APPENDICES

APPENDIX A

Request for Test Attitude Inventory (TAI)

Copies of the TAI test form, norms for high school and college students, and information on the reliability and validity of the TAI may be obtained by writing to:

Charles D. Spielberger
Department of Psychology
College of Social and Behavioral Sciences
University of South Florida
Tampa, FL   33620

APPENDIX B

Consent Form

This study is being conducted to determine what types of thoughts students have about taking tests. Your participation in this study will require you to complete a test attitude form two weeks prior to your final examination. You will then be requested to list ten thoughts you think about tests, two weeks prior to your exam, one week prior to your exam, and on the day of the final examination.

All information that you give will be completely confidential, and you will not be asked to use your name. For purposes of categorizing all the information given by many students, you will be asked to use the last four digits of your social security number on the form and on the list of statements you record.

Although information on you as an individual will not be processed for purposes of this study, you may obtain the results of the group's attitudes by contacting the investigator at ext. 7397 on campus. The investigator in this study is Laura Meers. She is working under the direction of Arthur Horne, Professor of Graduate Education, Guidance and Counseling.

I have read the above information. I am aware that my participation in the study is voluntary, and that I may choose to stop participation at any time. Understanding this information, I agree to participate in this study.

Signature _____

Date _____

APPENDIX C

Raters' Instructions

Following are the three categories of statements and rules for each. First is a list of general instructions to you.

General Instructions
1. The instructions which were given to the students before they filled out the cards were as follows: "Write 10 statements, one on each card, that you think about taking tests."

2. When one statement contains two phrases, rate the first phrase only.

3. Restate questions as statements before you rate them.

4. Before rating statements beginning with "I wish," "I prefer," "I think," "I believe," "I want," etc.--Remove these first, and then pay attention to the subject or object of the statement.

5. Ask yourself who or what is the statement referring to before you rate it.

Self-Referent Statements
1. These refer to the person in the testing situation--"Me about tests" Ex: I hate tests, Tests make me sick, I want an A, I can't flunk

2. Look for the implied subject of one word
   Ex: Bored, Sick, Anxious, Pressure, Fear, etc. All of these refer to the self in the testing situation.

3. Affective statements will be self-referent
   Ex: Hard tests scare me to death, I hate to take tests, I can't remember

Test-Specific Statements
1. Too long, too short, easy, hard, unfair, sucks, boring, etc.--refer to test

2. What does the statement tell you about tests--is the test or tests the subject or object of the statement.
   Ex: It's poorly written, too many questions, true-false are best, etc.

Nonspecific Statements

1. Truly ambiguous statements will be placed in this category.

2. Statements referring to the research or researcher go here.

3. Any statement not directly referring to the self in testing situations or the test in testing situations goes here.
   Ex: My parents will be disappointed if I flunk this test, This prof was lousy, She spends time on stupid surveys, etc., I'm hungry.

APPENDIX D

Results of Chi Square Analyses on Rater Agreement
of the Averaged Frequencies of Ten Thoughts
Recorded by 86 High & Low Test-Anxious
Subjects Prior to Final Examination

High Test-Anxious

	Chi Square	DF	Significance
1	0.000	4	1.000
2	0.183	4	0.996
3	0.000	4	1.000
4	0.166	4	0.996
5	0.000	4	1.000
6	0.000	4	1.000
7	0.422	4	0.980
8	0.000	4	1.000
9	0.151	4	0.997
10	0.150	4	0.997

Low Test-Anxious

	Chi Square	DF	Significance
1	0.228	4	0.993
2	0.233	4	0.993
3	0.270	4	0.991
4	0.504	4	0.973
5	0.071	4	0.999
6	0.187	4	0.995
7	0.105	4	0.998
8	0.115	4	0.998
9	0.350	4	0.986
10	0.100	4	0.998