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A comparative analysis of the efficacy of endemic imagery and systematic desensitization on the affective, cognitive, and physiological parameters of test-phobic students

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A Comparative Analysis of the Efficacy of Endemic Imagery and Systematic Desensitization on the Affective, Cognitive, and Physiological Parameters of Test-Phobic Students

by

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Abstract

A Comparative Analysis of the Efficacy of Endemic Imagery and Systematic Desensitization on the Affective, Cognitive, and Physiological Parameters of Test-Phobic Students

by

Eric R. Linden

Advisor: Professor Phillip A. Saigh

The purpose of this investigation was to compare the effects of two therapeutic procedures in the treatment of test phobic undergraduate students. The sample was composed of thirty-nine second and third semester community college students whose scores were at or above the eightieth percentile in a self-report test anxiety inventory and who were clinically diagnosed as test phobic as indicated by a DSM-III-R structured clinical interview. The subjects were then randomly assigned to one of three treatment groups whose subjects received either individual therapy in systematic desensitization or endemic imagery or were wait-listed. Test anxiety, worry, emotionality, general anxiety and depression

were assessed by self-report inventories before and immediately after treatment and at a one-year follow-up following a pretest-posttest control group design. Physiological response (i.e. heart rate) was measured before and during an actual final examination (in vivo) and academic achievement was assessed by grades on the final examination.

The results of MANCOVA analyses for data immediately following the treatments indicated that subjects in both treatment groups were significantly less test anxious and their academic achievement on the exam was significantly higher than control group subjects. The results also indicated that immediately following the treatments, subjects who received endemic imagery demonstrated significantly less worry while subjects who received systematic desensitization showed significantly less emotionality than control subjects. A non-significant trend towards reduced in vivo heart rate in the treatment groups to control group comparison was also evidenced. A MANCOVA performed on the one-year follow-up data revealed no statistical significance between groups on any outcome measure.

A luminous thing giving out light must have something within itself that perseveres.... Thus sun and moon cling to heaven and grain, grass and trees cling to the earth. So the twofold clarity of the dedicated man clings to what is right and thereby can shape the world.

Hexagram 30, Book 1, I Ching

Dedicated.....

To Ruth, my wife. whose support has been a constant throughout my marriage.

To my daughter Sarabeth whose impending birth was the impetus I needed to complete my proposal.

To Rita, my mother-in-law whose gentle but firm nudging kept me on track.

To my parents, Seena and Murray whose love and encouragment led to my pursuit of a higher education.

Finally, I wish to thank Phil Saigh whose criticism, suggestions and ultimatums enabled me to complete this project.

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Chapter I

Selected Review of the Literature

Test Anxiety and Its Correlates

Although test anxiety has been chronicled in the literature for at least forty years, the first definitive investigation that dealt with test anxiety was published by Mandler and Sarason in 1952. The study involved 42 college students who were divided into low and high anxiety groups using a self-report questionnaire. They were presented with the WAIS Block Design and Digit-Symbol subtests and given false feedback (i.e., success, failure, or neutral reports) on their performance. The results indicated that high anxiety students had greater variability and significantly lower response times, except on the first and last trials, than low anxiety students. Negative feedback was related to significant performance improvement among the low anxiety students. It was concluded that optimal conditions for high anxiety groups are unrelated to the testing situation.

Taylor and Spence (1952) used serial learning to investigate the relationship between anxiety and performance. Their sample included 40 college students

selected from the upper and lower 15th percentile of the distribution of the Manifest Anxiety Scale (Taylor, 1953). The results demonstrate that the test anxious students required more trials and committed more errors in reaching a learning criterion than the low anxiety students.

Quantification of the anxiety-performance relationship with specific reference to correlations between anxiety, aptitude, general anxiety and test anxiety instruments was studied by Alpert and Haber (1960). The subjects were 323 male college students who were administered the Taylor Manifest Anxiety Scale (Taylor,1953), the Welsh Anxiety Index (Welsh, 1952), the Freeman Anxiety Scale (Freeman,1953),the Test Anxiety Scale (TAS) (Mandler & Sarason,1952), and the Achievement Anxiety Test (AAT) (Albert & Haber,1960). These scores were intercorrelated with SAT verbal scores, college GPAs, as well as midterm and final exam grades in introductory psychology courses. The findings indicated that: 1. general and test anxiety scales measured different variables; 2. Test anxiety measures were more highly correlated with academic performance than general anxiety scales; 3. Test anxiety scales accounted for more variance in

academic performance not attributable to aptitude; and 4. test anxiety scales were more sensitive to verbal aptitude than general anxiety scales.

Sarason and Minard (1962) administered four subtests of the WAIS and TAS to 96 introductory psychology students in an attempt to investigate interactions among test anxiety, intelligence and achievement-oriented or neutral instructions. Subjects were selected by scoring in the upper and lower 15th percentile of a larger sample distribution of the TAS. Low anxious students performed significantly better with achievement-oriented instructions, but no differences were reported on the other subtests. No significant differences between the groups on the Digit Symbol were reported. Finally, high anxiety males with achievement-oriented instructions achieved significantly higher scores while high anxiety females performed better with neutral instructions.

Observer effects were studied by Ganzer (1968). Taken in this context, 72 female undergraduates marked the TAS and were subsequently administered a nonsense syllable learning task. The subjects were randomly assigned to two groups. One group

was informed about the presence of a observer who was situated behind a one-way mirror and the other was not. The groups were again subdivided with half switching to the opposite condition and half not. The results on a relearning task showed that high anxious and moderately anxious subjects performed poorly in the observer present condition as compared to low anxious individuals.

After administering the Test Anxiety Scale for Children (TASC; Sarason, Davidson, Lighthall, Waite & Ruebush,1960) and the author's own achievement test which included questions with both relevant and irrelevant information to 58 sixth and eighth grade students, West, Lee, and Anderson (1969) found that the combination of test anxiety and relevant information produced a significant drop in performance.

Sarason and Stoops (1978) investigated the relationship between test anxiety, achievement-oriented instructions and the perception of time in a series of three experiments. Subjects for all experiments were administered the TAS and classed to high anxious, low anxious and moderately anxious groups comprising the top 15 percent, bottom 15

percent and middle 70 percent of the distribution consecutively. They then randomly assigned subjects. In Experiment 1, 48 male and 48 female undergraduate subjects in achievement-oriented groups or neutral instruction groups were administered the Digit Symbol Test (Brown,1972). Before administration, the experimenter left the test area for 2 minutes to "get test materials" and subjects were subsequently asked to estimate how long they thought the experimenter was gone and the duration of the test period. The results indicated that the waiting time was estimated as significantly longer by high anxious subjects in the achievement-oriented condition as compared to the neutral condition while estimates were significantly shorter in all of the neutral conditions as compared to achievement-oriented conditions.

Experiment 2 used 60 male and 60 female undergraduate college subjects. The procedure in this case was essentially the same as in Experiment 1 with two changes: the waiting period was increased to four minutes and anagrams were added as part of the test. The achievement-oriented group received a difficult anagram solution task while the neutral group received an easy anagram solution task. Again,

waiting period estimates were significantly higher for high anxiety versus low anxious and moderately anxious students. Achievement-oriented instruction groups estimated the highest waiting period. Performance and task time estimates were the same as waiting period estimates for both groups.

Experiment 3 used 60 female undergraduate students as subjects. The procedure was the same as in the two former experiments. However, in this case, subjects also answered a cognitive activity questionnaire following completion of the performance tasks. The results replicated the earlier experiments. The replication held true for performance time estimates and waiting time estimates as well. In view of the consistancy across the three experiments, the authors concluded that highly anxious individuals who are "stressed", experience cognitive interference, self-preoccupation and perceive time to be lengthened. The authors also held that these effects induced performance defecits.

The relationship between test anxiety, performance, cognition, and physiological responding was studied by Holroyd, Westbrook, Wolf, and Badhorn in 1978 who used 72 female introductory psychology students as subjects.

The subjects were selected by TAS scores in the upper and lower 25th percentile and then randomly assigned to three conditions of varied evaluation apprehension. In the first condition, the subjects were informed that the tasks (an anagram and a color-word task) were easily solvable and were measures of intelligence and academic ability. In the second condition, subjects were informed that the anagrams were difficult to solve. The experimenter also indicated that he was unconcerned with the examinee's task performance. Subjects in the third condition received the same instructions as in Condition two and were further informed that their facial expressions would be videotaped through a one-way mirror. Condition one was designed to maximize evaluation apprehension and Condition two was designed to minimize evaluation apprehension. Condition three was designed to induce evaluative self-awareness. Subjects' responses to a state-anxiety questionnaire, estimates on percent spent in time worrying while working on solving tasks, and causal attributions for the difficulty they encountered were the dependent measures. Physiological measures included heart rate, heart rate variability, skin conductance level, and spontaneous skin resistance changes. The results

indicated that low test anxious subjects performed significantly better on the anagrams than the high anxiety subjects. High anxiety subjects had more negative self-evaluations of their performance that were unrelated to actual test performance. Subjects in the evaluative (Condition three) group attributed significantly more of their difficulty to lack of effort than the other groups. Physiological results indicated that low test anxious subjects had significantly lower levels of heart rate variability compared to high test anxious individuals with no other physiological differences reported.

Galassi, Frierson, and Sharer (1981) studied the behavior of 231 test anxious undergraduate history students during actual testing conditions. The subjects were classified according to the following TAQ score criteria: 0 to 13, low test anxious; 14 to 18, moderate test anxious; 19 to 37, high test anxious. Subjects were randomly assigned to one of three groups to be assessed at the beginning, middle, or ten minutes before the end of the test. The assessment instruments consisted of the Subjective Units of Disturbance Scale (SUDS; Wolpe & Lazarus,1966), the Checklist of Bodily Sensations (Lacey & Lacey,1958) and the author's own

Checklist of Positive and Negative Thoughts administered respectively. The results indicated the following: 1. the high anxious students had significantly fewer positive thoughts as compared to moderate anxiety or low anxiety subjects; 2. throughout the exam, test anxiety increased linearly, approaching the end of the exam, there were more negative thoughts than at other times; 3. there was an inverse relationship between evaluation of the test and level of test anxiety; 4. grade performance was significantly higher in low test anxious subjects as compared to high test anxious subjects; 5. as level of test anxiety increased, there was a significant linear increase in number of reported bodily sensations; 6. Significantly more bodily sensations were reported by students who had high GPAs as compared to students with low GPAs; 7. subjectively experienced anxiety had positive linear relationship to reported test anxiety on a significant level; 8. subjects who had high GPAs performed significantly better in their test grades than subjects with low GPAs; 9. escape from the test situation was the most frequent thought reported by high test anxious subjects.

Under actual test conditions, the cognitions of

306 fifth and sixth grade test anxious children were studied by Zatz and Chassin (1985). Subjects were divided into test anxious groups consisting of low anxiety, moderate anxiety and high anxiety children following the administration of the Test Anxiety Scale for Children (TASC; Sarason et al, 1960). The subjects subsequently sat for the Lie Scale for Children (Sarason et al,1960) to check TASC score validity, the Competition and Teacher Control subscales of the Classroom Environment Scale (Trickett & Moos,1973) to reflect evaluative threat in the classroom situation and the Children's Cognitive Assessment Questionnaire (Zatz & Chassin, 1983) to assess on-task thoughts and coping self-statements. The results indicated that the high anxious subjects reported significantly more on and off-task thoughts, negative evaluations, coping statements and fewer positive self-evaluations in contrast to the low anxiety group. The more threatening the classroom situation, the poorer the high anxiety students performed on math tests as compared to moderate anxiety and low anxiety groups. There was a significant positive correlation between self-evaluation and math test performance,

particularly significant in the highly threatening classroom environment. In addition, test anxiety, off-task thoughts and negative self-evaluations were negatively correlated with math performance.

An investigation of the relationship between physiological arousal and task-irrelevant thinking in an actual testing situation was conducted by Glazeski, Hollandsworth and Jones (1986). The subjects were 15 high anxiety and 15 low anxiety students who were randomly selected from the lower and upper 10th percentile as based on their AAT scores. The subjects were subsequently presented with nine items from the author's Mental Abilities Test during which heart rate, heart rate variability, skin conductance and skin resistance measures were recorded. After the administration of each item, reports of cognitive and problem solving strategies and self-statements were obtained. Although, there was no significant difference between groups, both high anxiety and low anxiety subjects became more aroused on the combined physiological measures during the test situation. When items were ranked according to physiological arousal, there was no relationship between reports of task-irrelevant thinking and physiological

responding. Low anxiety subjects answered more items correctly and reported fewer task-irrelevant thoughts than high anxiety subjects.

Beidel (1988) studied the psychopathology of childhood test anxiety and it's physiological and cognitive correlates. The subjects were 25 test anxious and 25 non-test anxious elementary school children with an age range of eight to eleven years. These cases were selected on the basis of TASC scores above the 25th percentile and a semi-structured clinical interview. The subjects participated in a vocabulary test and a story reading session. Dependent measures were physiological response (heart rate and blood pressure) and type of cognition. The physiological results indicated that test anxious subjects had significantly higher pulse rates and less heart rate variability than non-test anxious children as measured by a heart rate monitor instrument. The findings indicated that test anxious subjects had more fears and worries, significantly less confidence in their cognitive abilities, lower general feelings of self-worth, fewer satisfying peer relationships and a significantly negative cognitive style in social performance situations vis-a-vis the responses of the

non-anxious subjects. Test anxious subjects also scored significantly higher on anxiety-proneness compared to non-test anxious subjects. Sixty percent of the test anxious sample met the DSM-III (American Psychiatric Association, 1980) criteria for an anxiety disorder.

A number of general conclusions can be drawn from the reviewed research of test anxiety and its correlates. When performance measures were assessed, virtually every report indicated that high anxiety subjects evidenced poorer performance than low test anxious subjects. Poor high anxious group performance can be exacerbated by the following test-taking conditions: reports of previous success or failure (Mandler & Sarason,1952); linking intelligence to performance (Sarason & Minard,1962); observer effects (Ganzer,1968); relevant and irrelevant information (West et al,1969); negative self-evaluation (Holroyd et al,1978; Zatz & Chassin,1985); distorted perception of time during testing by high anxiety individuals (Sarason & Stoops,1978) and threatening classroom situations (Zatz & Chassin,1985). The highly test anxious subjects presented with lower evaluations of tests, have fewer positive thoughts and more bodily sensations (i.e., checklist scores) during testing,

and they experience more thoughts regarding escape from the testing situation than low or moderate anxious subjects (Galassi et al,1981).

The studies utilizing physiological measures under actual test conditions have had varied findings. In one study (Holroyd et al,1978), the authors reported that lower heart rate variability was apparent among low test anxious subjects, while another, Glazeski et al (1986) reported that arousal measures, including heart rate variability increased in both high and low test anxious individuals. Another recent study (Beidel, 1988), supported earlier evidence that suggested that test anxious subjects manifest higher heart rates and less heart rate variability.

Evidence reported in this literature review suggests that performance of test anxious students depended on time, attention and other self-oriented responses. Further, heightened autonomic arousal accompanies evaluation. Wolpe (1973) postulates on this basis that this arousal may interfere either directly, or indirectly with psychomotor processes necessary for complex problem solving. Wolpe (1973) further suggested that arousal may motivate escape and avoidance behaviors that disrupt exam preparation

(i.e., study). With this in mind, two distinct processes that may account for performance deficits (i.e., worry, the cognitive aspect of subject's responses and emotionality, the autonomic aspect of subject's responses) have been extensively considered in the literature. These will be treated in the next section along with relevant physiological correlates.

Worry and Emotionality

Individuals working under evaluative stress have consistantly reported more negative thoughts and self-statements (Galassi et al, 1981) and attend to task-irrelevant cues more frequently than test anxious individuals (Sarason & Stoops,1978). With these points in mind, worry refers to cognitive preoccupation with one's performance, performance consequences, comparison to others and the like. Worry tends to be elicited by external or internal cues that focus on evaluation and possible failure (Deffenbacher,1986).

Autonomic arousal, including changes in heart rate, skin conductance, resistance and blood pressure that occur in test anxious individuals (Beidel,1988; Glazeski & Jones,1986; Holroyd et al,1978 and Sarason & Stoops,1978) has been associated with test anxiety and has embodied the construct of emotionality.

Emotionality, then refers to self-perceived affective, physiological arousal (e.g., nervous stomach and generally upset feelings) and appears to be elicited by external cues (Deffenbacher,1986).

Liebert and Morris (1967) were among the first to research these modalities under in vivo conditions. The subjects, 50 undergraduates who had previously reported their success expectancies, were administered a questionnaire of items from the TAQ designed to factor out the constructs of worry and emotionality before an examination. The results indicated that worry was significantly inversely related to success expectancy and no relation was observed between emotionality and expectancy.

Speigler, Morris and Liebert (1968) studied 71 undergraduates and 21 graduate students in two studies utilizing the same kind of questionnaire with one pre-exam administration in the first study and two pre-exam administrations in the second study. The administrations were five days prior and immediately prior to the exam. Again, the earlier results were replicated. Although emotionality appeared to vary with external cues in the test situation, no significant relationship between

expectancy and external cues was reported.

The same questionnaires were administered to 152 undergraduate college sophmores before and after a final exam by Doctor and Altman (1969). The results essentially replicated the inverse worry and success expectancy relationship as reported in Liebert and Morris (1967). Worry was found to be related to final exam performance with high worry students performing significantly worse than low worry students.

Morris and Liebert (1970) studied physiological variables related to worry and emotionality. The subjects were 95 introductory psychology undergraduate students who served in the first experiment. Pulse rates were recorded early in the semester and preceding an actual examination. A TAQ-based questionnaire with success expectancy items was also administered pre-examination. A second experiment using 91 high school seniors as subjects was essentially identical in procedure. Results of both experiments demonstrated that worry was negatively related to performance (i.e., grades) and success expectancy as compared with emotionality. No additional significant relationships were found.

Deffenbacher and Hazaleus (1985) investigated the

sources of interference in 66 high anxious and 63 low test anxious subjects. Subject selection was based on scores in the upper or lower 25th percentile of the distribution on TAS administration and were randomly assigned to one of two testing conditions. In the normal testing condition, subjects were told that the test was designed to assess intelligence (i.e., ego-involving instructions). In the reassurance condition, the subjects were told that the test was experimental (i.e., non-ego-involving instructions). The experimenter then administered the Wonderlic Personnel Test (Wonderlic,1973) and a questionairre. It was subsequently observed that worry and task-generated interference accounted for a significantly greater amount of difference between the means of high anxiety subjects as compared to emotionality. Worry was found to be significantly inversely related to test performance. In addition, when high anxiety and low test anxious groups were compared, the high anxiety group presented with significantly: 1. poorer performance; 2. more negative feelings about themselves, their abilities and the task; 3. evidenced more anxiety and felt that it interfered more with performance; 4. made lower time estimates

of time spent on task; 5. thought they engaged in more worry, emotionality, and task-generated interference.

Minor and Gold (1985) administered various self-report measures to 103 male introductory psychology students to assess the relationship between worry, emotionality and test anxiety. Subjects were administered the Test Anxiety Inventory (TAI; Spielberger et al,1980) and examinees who scored above the 25th percentile were selected as subjects. The following dependent measures were administered to each subject: The Checklist of Positive and Negative Thoughts (Galassi et al,1981), The Checklist of Bodily Sensations (Lacey & Lacey,1958), and the SUDS scale (Wolpe & Lazarus,1966). A significant inverse relationship was observed between worry and GPA. A significant positive relationship was also observed between worry and the number of negative thoughts, and between emotionality and self-reported evaluation of physiological arousal.

More recently, the cognitive and physiological components of test anxiety under actual examination conditions were investigated by Deffenbacher (1986).

The subjects in this case were abnormal psychology students; 49 male and 107 females in Experiment 1 and 57 males and 114 females in Experiment 2. In the third week of class, subjects completed the TAS at home. Five weeks later, the subjects completed the State Anxiety Test Report (STAR; Deffenbacher & Hazeleus, 1985) immediately upon completion of their second 50-item multiple choice exam (i.e., STAR appended to the last page of the exam). This procedure was repeated in Experiment 2 with two exceptions: students were pre-trained to take their own wrist pulse and went on to practice for three 15 second periods before the exam and on the day of the exam. The subjects were trained using a digital scorer's clock that was placed in front of the room. The subjects were then instructed to write the value of the reported pulse rate in a provided space on the test sheet. The results indicated that worry, emotionality, and task-generated interference all positively correlated with each other and negatively with performance. Significant positive correlations were observed between heart rate, worry and emotionality, with no significant performance relationships. On the other hand,

the highly anxious subjects were reported to have significantly poorer performance, significantly higher pulse rates and subjects reported significantly more worry, emotionality and task-generated interference than low anxious subjects.

In summary, studies on the components of worry and emotionality have suggested that worry (the cognitive component) is generally inversely related to the expectancy of success while emotionality (the autonomic component) is not (Doctor & Altman,1969; Liebert & Morris,1967; Morris & Liebert,1970; Minor & Gold,1985). These studies also indicated that worry is negatively correlated with performance vis-a-vis emotionality.

The studies of the physiological correlates of worry and emotionality have yielded mixed results. Generally, high test anxious subjects have higher pulse rates, even though this does not appear to be a significant source of interfering state anxiety. Physiological arousal is not highly correlated with emotionality and worry is a greater source of interference than physiological arousal (Deffenbacher, 1986;Deffenbacher & Hazaleus,1985; Holroyd et al,1978). Thus, emotionality appears to reflect a subject's self-

report of arousal more than physiological arousal per se. In addition, physiological arousal does not appear to influence test performance under ordinary conditions (Deffenbacher,1986). The investigator suggests that future research should concentrate on how worry distracts highly test anxious subjects and the development of effective strategies to alter the debilitating effects that worry and emotionality have on performance in both test and non-test conditions.

Assessment of Test Anxiety

There are a variety of methods and instruments used to asess test anxiety which include self-report measures, clinical interviewing, behavioral avoidance tests and psychophysiologial assessment techniques. These methods will be treated individually in this section.

Self-report measures. Perhaps the most popular way of assessing test anxiety is through the utilization of questionnaires, inventories, and surveys. Since there are a great number of self-report instruments, this review is limited to psychometrically valid measures that have been adapted for the behavioral assessment of test anxiety.

One of the first self-report instruments for the assessment of test anxiety was developed by Sarason and Mandler (1952). The Test Anxiety Questionnaire (TAQ) consists of 37 questions in a rating scale format and was originally administered to 492 undergraduate sophmores and juniors. The TAQ is divided into three sections: group intelligence tests; individual intelligence tests; and course examinations. Over a six-week duration, split-half reliability was .91 and test-retest reliability was .82.

The TAQ served as a framework for the development of many other self-report instruments. The Test Anxiety Scale (TAS) is also well used and was first developed by Sarason (1958). This rewritten form of TAQ originally had 21 true-false questions and was revised later to a 37-item scale (Sarason,1972,1978). Although scores on the scale are time-dependent (Suinn,1969a), the revised TAQ has a .93 correlation with the original scale.

The Test Anxiety Scale for Children (TASC; Sarason, Davidson, Lighthall, Waite & Ruebush,1960) reflects a revision of the TAS. This scale possesses a split-half reliability of .88 and the test-retest reliability is .67. The TASC is considered multi-dimensional as it

presents factors involving test anxiety, school concern, poor self-evaluation and somatic signs of anxiety (Feld & Lewis,1967). The TASC was administered to 7500 grade school children in this study. Intelligence and achievement tests correlate well with TASC while the correlation of scores with teacher ratings is low (r=.20).

The Achievement Anxiety Test (AAT) was developed using 379 undergraduate subjects by Alpert and Haber (1960) in response to the belief that the TAQ measured debilitating anxiety. The 28-item AAT contains two scales, a 10-item Debilitating (D) Scale which measures how anxiety interferes with test performance and a 9-item Facilitating (F) Scale which was designed to measure how anxiety facilitates performance. These scales correlate significantly (r=-.37) with test-retest reliabilities of .87 at ten weeks and .76 at eight months for the D Scale and .83 at ten weeks and .75 at eight months for the F Scale. Further, the D Scale has a high (r=.64) TAQ correlation and the F Scale has a -.40 correlation with the TAQ, even though the AAT is not derived from TAQ items.

Liebert and Morris (1967) demonstrated through factor analytic studies on that the TAQ worry and

emotionality factors are inversely related to performance expectancy. They also demonstrated that the emotionality factor has no relationship with performance expectancy. The authors developed a 10-item Worry & Emotionality Questionnaire (WEQ) composed of modified TAQ items, 5 items forming the Worry Scale and 5 items forming the Emotionality Scale. Test-retest reliabilities were .69 for worry and .83 for emotionality over an unspecified time period. Later, Morris and Liebert (1970) reported test-retest reliabilities of .68 for worry and .76 for emotionality over one month in high school seniors.

Suinn (1969b) developed the 50-item Suinn Test Anxiety Behavior Scale (STABS) to assess the effectiveness of behavior therapy in the treatment of test anxiety. The items on the 5-point scale describe situations that arouse test anxiety so accurately that they can be used in the construction of systematic desensitization hierarchies. The STABS, one of the few instruments not derived from the TAQ has a .60 correlation with the TAQ and has test-retest reliabilities of .78 over four weeks and .74 over six weeks.

Osterhouse (1972) developed a 16-item scale from the WEQ and other inventories. Osterhouse's scale uses a 5-point Likert-type scale and items refer to classroom examination-situations. The Inventory of Test Anxiety (ITA) has a split-half reliability over seven weeks of .92 and test-retest reliabilities are .72 for worry and .68 for emotionality.

The Test Anxiety Inventory (TAI; Spielberger, 1980) a 20-item scale that was designed to be a brief objective self-report scale is highly correlated with other popular self-report measures and also measures the factors of worry and emotionality. This 4-point scale yields a Total Test Anxiety score as well as the respective factor scores for worry and emotionality. The TAI norms were based on the performance of 1449 undergraduates in introductory psychology courses, 320 community college students and 1118 ninth through twelveth grade students. The total test-retest reliability coefficients ranged from .80 at two weeks to .81 at one month to .62 at six months. The authors point out that test-retest time lapses of greater than six months may influence personality traits and may result in lower correlations. Additionally, TAI Total Scale item-remainder

correlations ranged from .61 to .69; for TAI-W and TAI-E scales ranged from .58 to .72 and .57 to .74 respectively. The TAI has a .82 validity correlation with the TAS, .73 with WEQ-Worry and .77 with WEQ-Emotionality.

The value of self-monitoring instruments to target specific behaviors or events in a subject's daily life has been well established. In particular, self-report instruments allow the investigator to examine items that may be used to establish desensitization hierarchies (Bellack & Hersen, 1988). The authors state that these factors are assessments of individual characteristics that are highly generalizable to therapeutic interventions with those individuals. Despite criticisms that have been raised regarding multiple instruments used (Spielberger,Anton & Bedell,1976) and fakability (Allen,1970), and low correlations with behavioral and physiological measures (Paul & Erikson, 1964; Spielberger,1980), questionnaires, inventories and surveys are one of the limited ways in which we may learn about subjective fear components.

Clinical and diagnostic interviews. The DSM-III-R's (APA,1987) approach to diagnosis has made the

interview an important element of the assessment process. With respect to anxiety and fear, the interview focuses in on what a subject does and when, where, and under what conditions and or circumstances the behaviors occur (Bellack & Hersen,1988; Morris & Kratochwill,1983) describe the value of the interview as an assessment tool. The authors suggest that variable structure and format make the interview more flexible than other assessments. Further, interview assessments promote formal personal contact that may be valuable for a subject who is experiencing fear or other emotional reactions. In the diagnosis of Anxiety Disorders, interviews have been structured according to the DSM-III guidelines for diagnosis. DiNardo, O'Brien, Barlow, Weddell and Blanchard (1983) developed the Anxiety Disorder Interview Schedule (ADIS) with DSM-III Anxiety Disorder operational categories in mind which eliminates the misdiagnosis of other associated disorders such as affective disorders, substance abuse, and psychosis. The interview, which takes about ninety minutes to administer, includes historical, situational, cognitive and other clinical characteristics associated with each of the DSM-III Anxiety Disorders. The subjects in the original study were 60 self-referred patients

to a Phobia and Anxiety Clinic at the State University of New York at Albany. The reliability of the ADIS as based on two separate interviews per patient classifications yielded a kappa coefficient of .68 for anxiety disorders in general and also high for DSM-III Axis I categories: $\underline{k}$=.86 for Agoraphobia with Panic Attacks; $\underline{k}$=.69 for Panic Disorder; $\underline{k}$=.47 for Generalized Anxiety Disorder; $\underline{k}$=.77 for Social Phobia and $\underline{k}$=.66 for Obsessive-Compulsive Disorder.

There is a paucity of data resulting from empirical work with behavioral interviews, the assessment of anxiety disorders in general and test anxiety in particular. In one such study Beidel (1988) demonstrated that 60% of the subjects who scored above the high-cutoff point for test anxiety on the TASC and confirmed as being as test anxious, through structured clinical interviews, met the criteria for DSM-III Anxiety Disorder including Overanxious Disorder, Social Phobia, Seperation Anxiety and Simple Phobia. The correlation for diagnostic agreement was high ($\underline{k}$=.84) in twelve out of thirteen cases.

Morris and Kratochwill (1983) summarized interview succinctly as follows:

In general, an interview is useful with other

assessment approaches. Information gained during the interview may prompt other forms of assessment, since statements made by the client or care provider may form a basis for pursuing other techniques that further elucidate the fear. (p.87)

Behavioral avoidance tests. The Behavioral Avoidance Test (BAT) is the most commonly used direct behavioral measure in the assessment of anxiety and fear (Bellack & Hersen,1988). This type of test rests on the premise that an individual's anxiety increases with exposure to the anxiety-eliciting stimulus (also see DSM-III-R operational criteria for Simple Phobia). In a prototypical study, Lang and Lazovik (1963) used a BAT to establish a typical procedure wherein the subjects are instructed to make approach responses toward a phobic stimulus while observers objectively record those responses. In the initial study, snake-phobic subjects were instructed to enter a room containing a caged harmless snake. Then, as the subject remained at the entrance of the experimental room, the investigator opened the cage and instructed the subject to approach and hold the snake. In this context, the subject's behavior was rated as to discreet look, touch, and hold criteria on a 3-point scale.

It must be noted that BATs do not generalize well, because each test is specifically designed for a particular fear or problem. Murphey and Bootzin (1973) pointed out that BATs provide avoidance measures of response latency, number of tasks completed, and distance from feared objects. The lack of standardization has been considered a major drawback in the efficacy of this technique (Barrios et al,1981) because comparison across studies is difficult.

Despite its lack of standardization, many researchers (Haynes,1978; McFall,1977; Nay,1977) argued that BATs allow for more control and yield analogue data, both of which are difficult to obtain in natural settings. Further, they suggest that BATs allow the researcher to assess motoric responses including facial expressions and trembling (Barrios et al,1981). The authors pointed out that BATs also allow for time and latency variables associated with completion of steps and tasks. This bears particular relevance to the establishment of treatment strategies since BATs incorporate treatment variables into the assessment process (Morris & Kratochwill,1983). BATs then, can be used to identify the specific behaviors that are indicative of a particular avoidance situation

(Bernstein & Nietzel,1977). It is suggested, however, that BATs should be used in conjunction with other techniques so that both programmed and unprogrammed factors of behavioral assessment may be examined in the attempt to develop effective treatment strategies (Morris & Kratochwill,1983).

Psychophysiological Measures. The physiological and behavioral activity that accompanies emotion can provide information on reactivity that is important in understanding anxiety. Since anxiety has been shown to produce a "storm" of sympathetic nervous activity, concomitant symptoms (e.g., accelerated heart rate, sweating, hyperventilation and increased muscle tension) may provide some insight in the identification of the etiological factors of test anxiety (Gilbert,1986). It has been suggested that this could lead to the development of effective treatment strategies for anxiety in general and test anxiety in particular (Lehrer et al,1983). The most commonly used psychophysiological measures are heart rate (cardiovascular) and electrodermal measures primarily because these measures have more empirical data to support their relationship with anxiety (Bellack & Hersen,1988). The authors also note that

other measures such as electromyographic techniques have been used for assessment, but with mixed results. Therefore, this review will treat the most viable psychophysiological measures and their potential for use in the assessment of test anxiety.

Heart rate is the most widely used of all psychophysiological measures because it has relatively few artifacts and is easy to measure technically as compared to other measures (Nietzel & Bernstein,1981). The authors stated that the ease of measurement associated with heart rate, makes heart rate the measure of choice among researchers and clinicians. Further, the relative ease of measurement, makes heart rate recording adaptable to actual natural testing environments.

Lacey (1967) and Paul (1966) originally correlated accelerated heart rate with anxiety-producing stimuli. This was replicated by Tal and Miklich (1976) where children were asked to imagine angry or fearful stimuli. Heart rate was observed to increase during the imaginal sequences and decrease thereafter at a significant level.

More recently, Beidel (1988) compared 25 test-anxious elementary school children selected on the

basis of the TAS and found that all of the subjects had significantly increased heart rates and less heart rate variability than controls when participating in anxiety producing tasks (see detailed report in Test Anxiety & Its Correlates section).

Heart rate change does not always increase upon exposure to arousing stimuli. Some subjects show heart rate slowing (e.g., in the case of orienting responses) while others show diphasic (i.e., an increase followed by decrease in heart rate) responses. Ost, Sterner and Lindahl (1984) recorded the heart rate and blood pressure of 18 blood phobics before, during, and after viewing a particularly bloody movie on thoracic surgery. Thirteen of the subjects evidenced elevated heart rate increases during the viewing and decreases after the film was concluded. Unexpectedly, five subjects demonstrated the diphasic response of heart deceleration during the film and evidenced a subsequent increase when the film was over. Other mixed results were demonstrated where Kutina and Fischer (1977) examined the relationship between anxiety produced by dental examination and public speaking. Out of ten subjects, only one subject had a heart rate that correlated with public speaking and this was a negative correlation.

Some studies reported no correlations between anxiety and physiology. Steinbach (1962) compared eye-blink rate, finger pulse volume, gastric motility, respiration rate, skin resistance to self reports of "scary" segments of Walt Disney's "Bambi" as children watched the film. There were no correlations between the self-report and physiological ratings of the 10 subjects.

Other cardiovascular measures such as blood pressure and peripheral blood flow have been suggested as possible avenues for assessment. The research is sparse with Beidel (1988) reporting no blood pressure correlations in the subjects described above and the Kaloupek and Levis (1983) attempt to use skin temperature (measured in fingertips to indicate peripheral blood flow) as a fear index. More empirical work with these measures is needed.

In the main, heart rate is a sensitive indicator of motoric and perceptual activities which makes it a logical choice of the available psychophysiological methods of assessment; or on the other hand, it may be confounded by the stress itself and other assessment tasks (Michaelson, Mavissakalian & Marchione,1985). Further, idiosyncratic heart rate responses make this

index less reliable than what one might expect (Nietzel & Bernstein, 1981). As such, investigations should utilize heart rate among multiple physiological measures when attempting to establish a relationship with anxiety producing situations.

Because of their sensitivity to emotional arousal, electrodermal measures can be quite useful in the assessment process. Since human sweat glands are innervated heavily with sympathetic nervous fibers, the sweat response to arousing stimuli is well known. Electrodermal measures are accomplished by placing two electrodes on adjacent fingertips or the palm and applying a minute electrical current across them. In this way, one can qualitatively measure the activation of the sweat glands as a response to arousing stimuli by the amount of electricity the skin conducts. This technique, similar to that used in lie detector tests is quantified by measuring baseline, and posttreatment skin conductance and computing the change.

Kenyon and Muller (1963) used electrodermal response indicator called Palmar Sweat Prints (PSP) which consisted of tape bands that were attached to a subject's palm and changed color when the subject perspired. These were rated by independent observers

very reliably with an interobserver agreement level of .93. Even with the high reliability, the validity of the technique was found to be low because temperature was reported to account for a high proportion of the variance in PSP's (Shapiro,1975).

More recently, Katkin and Hastrup (1982) demonstrated that skin conductance changes can be used to differentiate phobics from non-phobics. Moreover, Katkin and Dietz (1973) reported that skin conductance increases significantly as the desensitization procedure proceeds although there is disagreement as to whether these results are replicable (Haynes,1978; Lehrer et al,1980).

Electrodermal measures have artifactual problems associated with their use; more specifically, they are responsive to procedural variations, changes in measurement strategy and environmental intrusions (e.g., novel and interesting stimuli other than the stimulus itself), but are still useful as assessment measures because of technical and assessment simplicity (Lick & Katkin,1978). Bellack and Hersen (1988) add that "for the clinician seeking a middle ground between the burdens of psychophysiological techniques and the disadvantages of omitting such measures altogether,

electrodermal assessment may provide an acceptable compromise" (p.292).

In general, psychophysiological measures are included as anxiety assessment measures, but they are unreliable, and sensitive to instrumental artifacts and contamination from other sources of experimentation. Moreover, Arena, Blanchard, Andrasik, Cotch and Myers (1983) report that autonomic responsiveness is not even reliable over time. In a 28-day study of normal subjects, heart rate, skin resistance, hand temperature and vasomotor responses significantly differed from one another when measured twice over a several day interval. Interestingly, the only measure that was reliable in this study was EMG, which has had great variability in previous studies (Nietzel & Bernstein,1981). It has been suggested that we need to assess the psychometric properties more accurately (Belack & Hersen,1988). The authors also suggested that psychophysiological indices should be used in conjunction with other assessment measures and collect data on the various relationships established, rather than to omit them and risk losing valuable data.

Treatments of Test Anxiety

Systematic desensitization. Over the years, a number of treatments have been developed and utilized in the treatment of test anxiety (Hudesman,Loveday & Woods, 1984; Saigh,1980; Snyder & Deffenbacher,1977). Systematic desensitization (SD; Wolpe, 1958) has been widely used in the treatment of phobias. The procedure, based partly on the Jacobson (1938) deep muscle relaxation technique makes use of what Wolpe (1973) calls reciprocal inhibition. The basic principle is that a fear response can be inhibited by counterposing relaxed physiological responses with fear stimuli. From a physiological perspective, sympathetic (anxiety) and para-sympathetic (relaxation) nervous responses represent two antagonistic systems that function to maintain the homeostasis of nervous system responses (Bandura,1968; O'Leary & Wilson,1975).

The desensitization process is accomplished by exposing the individual in small, graduated steps to the feared situation or event (i.e., real or imaginal) as he or she performs an activity that is antagonistic to the anxiety (Morris & Kratochwill,1983). After the subject has learned to relax, using a deep muscle relaxation technique, he or she moves slowly and

progressively through a hierarchy of anxiety-related scenes. The reviews of the literature on systematic desensitization have consistently indicated that the technique decreased phobic symptomology across a wide range of settings and fear-evoking stimuli (Morris & Kratochwill,1983; Rachman,1978; Rimm & Masters,1979; Tryon, 1980). The following section will focus on the use of systematic desensitization in the treatment of test anxiety.

Katahn, Strenger and Cherry (1966) studied 14 test anxious college students who scored in the upper quartile of the TAS as compared to 24 control subjects who completed an eight session program of group counseling and systematic desensitization. Even though the effects of systematic desensitization may have been confounded by counseling, the test anxious group still evidenced significantly increased GPAs and concomitant TAS decrements as compared to the controls.

Kondas (1967) studied 11 test anxious 15 year old students who were selected via the administration of an oral examination. The subjects were subsequently randomly assigned to a relaxation, group systematic desensitization or hierarchy-only treatment group. The systematic desensitization group showed significantly

decreased scores on self-report measures of fears and significant reduction of palmar perspiration measures as compared to the other groups. There were no other significant effects.

In another early study comparing systematic desensitization and relaxation training (Johnson & Sechrest,1968), 33 undergraduate students whose scores were 19 or above on the D Scale or 10 or above on the D minus F Scale of the AAT were selected and randomly assigned to systematic desensitization, relaxation training or control groups in blocks based on sex. The outcome measures were: 1. pre-posttreatment AAT scores; 2. final exam grades; and 3. nonessential information given on the final exams (i.e., two judges' messiness ratings of actual test papers). The results revealed that subjects who received systematic desensitization performed significantly better on final exams than any of the other groups. No other significant differences were reported.

An elaborate study investigating the effects of group systematic desensitization compared to group relaxation training with non-directive psychotherapy used 17 college students as subjects (Crighton & Jehu, 1969). Subjects were randomly assigned to one of two

treatment groups after being paired for clinically judged severity of examination anxiety. Results indicated significant pre-posttreatment improvement for the systematic desensitization group as based on the Affect Adjective Checklist (AACL; Zuckerman, 1960) and on a sleep distubance questionnaire. Although the experimental groups had significant pre-posttreatment improvement on these measures, significant improvement was not apparent on their examination grades. No significant pre-posttreatment changes were reported for any group difference on any other reported measure.

Cohen (1969) investigated the influence of group interaction and a progressive hierarchy presentation of anxiety-provoking situations on systematic desensitization of test anxiety. The subjects were 19 college students who scored in the upper quartile of the TAS. The subjects were randomly assigned to group interaction, non-interaction (subjects were allowed to interact or not with others during systematic desensitization, progressive and non-progressive hierarchy treatment groups (where the desensitization hierarchy was ordered or not). All treatment groups demonstrated significant decreases

in TAS pre-posttreatment scores as compared to the scores of 8 controls. There was no significant trend in pre-posttreatment GPAs.

Mitchell and Ng (1972) examined the effects of counseling and systematic desensitization efficacy on students by administration of a test battery including a general anxiety scale, two test anxiety scales (the AAT and STABS), a study habits survey, the fear thermometer and verbal and quantitative aptitude tests. The subjects were randomly assigned to one of the following treatment conditions: 1. systematic desensitization; 2. individual counseling; 3. serial desensitization (relaxation and desensitization followed by individual counseling); 4. combined desensitization (combined relaxation, desensitization and individual counseling given for three sessions each); combined sensitization (combined relaxation, desensitization and individual counseling in each session) and 5. no-treatment control. Only the systematic desensitization group evidenced a significant pre-posttreatment decrease in gain scores reflecting test anxiety.

A comparison of group cognitive behavior modification, group systematic desensitization,

and a waiting-list control group was conducted by Meichenbaum (1972). The subjects were 21 undergraduate subjects who were randomly assigned to one of three treatment groups. Outcome measures were the pre-post TAQ, the AACL, analog test performance, and GPA. Although results indicated that the cognitive behavior modification group had significant gains on all measures as compared to all other treatment groups, the group systematic desensitization subjects showed significant analog test improvement and significant reduction in pre-post TAQ scores.

Bedell (1976) investigated whether demand characteristics played a role in the efficacy of systematic desensitization training (i.e., the fact that systematic desensitization is often preceded by suggestions as to nature and outcome of treatment) and relaxation training (i.e., often not preceded by suggestions). Fifty subjects were randomly assigned to one of five conditions and administered the TAS, the State Trait Anxiety Inventory (STAI; Spielberger, Gorsuch & Lushene,1968) and the Wonderlic Personnel Test. Each treatment group received high and low suggestions. The results demonstrate that both systematic desensitization and relaxation training

significantly reduced pre-posttreatment TAS scores as compared to controls. STAI scores were significantly decreased only in the systematic desensitization-low suggestion condition when groups were compared. Performance on the Wonderlic was not affected by any treatment.

Snyder and Deffenbacher (1977) used 43 undergraduate students as subjects who were selected by scores in the upper 25th percentile on the AAT. They were then randomly assigned to one of three treatment groups: relaxation as self-control, systematic desensitization or waiting list controls. The dependent measures were pre-posttreatment performance on the AAT and a fear inventory. High stress instructions were given and all subjects were administered the WES followed by difficult anagrams. Self-reports of anxiety, task pleasantness and feeling about self were then collected. The results indicated that debilitating test anxiety as compared to controls was significantly reduced by both procedures. In addition, the subjects in the systematic desensitization group performed significantly better on the anagrams and reported significantly higher scores on the F Scale of the AAT as compared with controls. Reductions in test

anxiety appeared to generalize to non-targeted anxiety compared to controls and both experimental groups were significantly less worried and anxious, reported their abilities significantly more positive and found the experience significantly less aversive than controls did.

Hudesman and Wiesner (1979) investigated the relationship between systematic desensitization and performance in 34 self-referred community college students who were randomly assigned to systematic desensitization or non-treatment control groups. The results show significant increases in GPAs during two semesters following the treatment as compared to control groups during the same period.

In a similar vein, Hudesman, Loveday and Woods (1984) examined 97 self-referred community college students, whose free time coincided with the workshops, were assigned to systematic desensitization and control groups. The experimental paradigm was the same as in the previously reported study, except that an extra outcome measure was added: the pre-posttreatment AAT scores. Again, GPA was significantly improved at the end of semester when systematic desensitization groups were compared

to control groups. Pre-posttreatment AAT-D Scale scores were significantly reduced in the treatment group compared to controls.

Eleven studies relating to systematic desensitization were reviewed. Of these, nine reported that the procedure was associated with significant reduction in self-reported anxiety. Of the reported studies, five studies demonstrated that systematic desensitization was associated with significant performance improvement.

Endemic imagery. The standard systematic desensitization procedure that requires subjects to experience deep muscle relaxation (Jacobson,1938) is ineffective in in some cases, despite their efforts to relax (Wolpe,1973). This inability to relax makes it impossible to proceed with the counterposing of imaginal items of a feared situation or event with relaxation in the classic (Wolpe, 1962) reciprocal inhibition framework.

Wolpe's (1973) observation of the phobic's inability to respond to deep muscle relaxation, prompted the recommendation of the utilization of three "vicarious imaginal devices" that were postulated to be efficacious in assisting in

relaxation of these individuals (e.g.,"imagine that near a river's bank, you see a leaf moving erratically on little waves", p.122).

Based on Wolpe's (1973) recommended use of three relaxing images, Saigh (1980) developed a series of relaxing endemic images in a case study with a test-phobic subject who experienced great difficulty with relaxation. The subject was a 19 year-old female from the desert nation of Qatar who had been diagnosed as test phobic by a staff physician and therapist at the American University of Beirut in Beirut, Lebanon. She had failed a University English Entrance Examination a total of nine times. After the subject expressed a general inability to relax, Saigh (1980) proceeded with the first of five 45-minute systematic desensitization sessions using the imagery techniques. At this point, the therapist presented five positively valanced scenes in an attempt to augment the relaxation process (e.g.,"Imagine that you are seated on a balcony overlooking the sea and that you can see a small sailboat in the distance. Concentrate on the white sails against the blue background as they gently move toward the horizon", p. 13).

Using Jacobson's (1938) progressive relaxation

technique, the therapist systematically relaxed the subject. Then, as the subject was asked to imagine the scene, the first item of a previously composed anxiety hierarchy (e.g.,"imagine studying at home the night before the test", p. 13) was simultaneously presented. The counterposing of positive endemic images and relaxation instructions was continued so that the subject was able to relax after imagining each item on the hierarchy. The sessions were held on four consecutive days with a double session on the last day. Shortly thereafter, the subject passed the examination with a signifcant gain score that reflected a 38% improvement over her previous average.

In order to examine the external validity of this technique, Saigh and Antoun (1984) assessed 48 test anxious subjects (28 females and 20 males) whose STABS scores exceeded the group mean by a standard deviation and whose STAI Trait anxiety estimates were below the 70th percentile. These cases were selected and randomly assigned to endemic imagery and study skills training, group systematic desensitization and study skills training or a control group. Each group received three 50-minute study skills training sessions and seven 50-minute treatment sessions. The results revealed that

the STABS scores of the endemic imagery cases as well as the systematic desensitization cases were significantly greater than the controls. No significant differences were noted between the STABS scores of the endemic imagery and the systematic desensitization cases. Analogously, the GPAs of the endemic imagery and systematic desensitization cases significantly exceeded the controls. No significant differences were apparent between the GPAs of the endemic imagery and the systematic desensitization cases.

Statement of the Problem

One of the most common sources of emotional distress in school settings, test anxiety affects a great number of individuals. Most people are evaluated many times during their lives (e.g., parents, teachers, and peers) and the individual being evaluated may become threatened. This not only applies to test situations, but to any test-like evaluative situation where judgments are being made on behavior and performance.

Individuals may fear negative evaluation to such an extent that worrying interferes with study and exam preparation. In its extreme, phobic or phobic-like symptoms may develop with debilitative consequences (Beidel, 1988). The present study focused on the use

of two experimentally derived treatment stategies (i.e., systematic desensitization and endemic imagery) to ameliorate test anxiety. In this context, systematic desensitization has enjoyed considerable utility in the treatment of phobias (Wolpe,1982). Systematic desensitization calls for the contraction and relaxation of different muscle groups. Wolpe (1982) and Saigh (1980) have documented situations wherein physiologically normal individuals are unable to contract and relax their muscles according to the standard desensitization paradigm. Further, persons with cerebral palsy, polio and related conditions may also not be able to follow the standard relaxation regimen either. In view of this, Saigh (1980) developed an alternative treatment (endemic imagery) that involves asking phobic individuals to experience relaxing scenes (in vitro) in lieu of inducing deep muscle relaxation. It should be noted, however, that Saigh's endemic imagery research was limited to Lebanese nationals and that the efficacy of different treatment modalities may vary cross-culturally (Rachman & Wilson,1984). It should also be noted that Saigh's endemic imagery did not deal with psychophysiological ratings (an

important component of the current conceptualization of anxiety). With these points in mind, this investigation compared the efficacy of systematic desensitization and endemic imagery as based on the affective, cognitive and psychophysiological reactivity of test-phobic American undergraduates.

Chapter II

Method

Measures

Test anxiety inventory (TAI; Spielberger,1980).

This chapter describes the measures that were used, diagnostic procedures, subject characteristics, the method of assigning subjects to groups, research design, experimental procedures and research hypotheses. The TAI is a self-report 20-item scale that was developed to measure individual differences in test anxiety as a situation specific trait. Respondents are asked to report how frequently they experience specific symptoms before, during and after examinations. Each item is scored according to a 4-point Likert-type scale. As such, TAI total scores range from 85 to 0. The TAI includes a worry and an emotionality subscale. Worry (i.e., cognitive concerns about the consequences of failure) and emotionality (i.e., reactions of the autonomic nervous system that are evoked by evaluative stress) have been identified as two major components of test anxiety (Liebert & Morris,1967). TAI-worry and TAI-emotionality subscale scores are each based on an 8-item scale and range

from 32 to 0.

Spielberger (1980) observed total TAI test-retest reliability estimates of .80 and .81 as based on assessments at two weeks and four weeks. Item-remainder correlations of total TAI ranges from .61 to .69 (Spielberger,1980). By way of construct validity, a coefficient of .82 between total TAI and TAS (Sarason, 1978) scores has been observed. The median alpha coefficients for the TAI-worry and TAI-emotionality subscales, .88 and .90 indicate satisfactory internal consistancy for each 8-item subscale.

Structured clinical interview for test phobia. The Structured Clinical Interview for Test Phobia (see Appendix B) was designed by the author so that each subject was evaluated as to whether he or she met the diagnostic criteria of a DSM-III-R Axis 1 Simple Phobia (i.e., test phobia diagnosis; Appendix A). The interview consists of 7 questions, and examined for the presence of a chronic and irrational fear of examinations (e.g.,"Do you feel that you have a persistant fear of taking tests?") and a compelling desire to avoid test situations (e.g.,"Do go out of your way to avoid taking tests ?") as well as the self-awareness of inordinate distress during academic

testing situations (e.g.,"Are you more afraid of tests than you should be ?"). The interview questions were of a format that required the interviewee to provide simple declarative answers (i.e., yes or no). Yes responses were scored as 1 and no responses were scored as 0. A minimum of 5 yes responses (i.e., positive symptoms) are required for DSM-III-R Axis 1 phobia diagnosis.

Beck anxiety index (BAI; Beck,Brown,Epstein & Steer,1988). The BAI is a 21-item self-report inventory designed to measure the anxiety-related symptomology. Each of the items describes a common symptom of anxiety (e.g.,"fear of losing control"). Respondents were asked to rate how much they had been bothered by each symptom during the previous week. Items were rated on a 0 ("Not at all") to 3 ("Severely-I could barely stand it") point scale. As such, BAI scores ranged from 0 to 63.

Beck et al (1988) observed that the BAI has a high level internal consistancy with an alpha coefficient of .92. The test-retest reliability at one-week administration was .75. Correlations with measures of related constructs, the Hamilton Rating Scales for Anxiety (HARS-R; Hamilton,1959) and the Cognition Checklist Anxiety Subscale (CCL-A;Beck,Brown, Steer & Riskind, 1987) were .51 and .51 respectively.

Beck depression inventory (BDI; Beck,Rush,Shaw, & Emery,1979). The BDI is a widely used measure of the severity of depression. The scale consists of 21 items, each describing a common symptom of depression. Each respondent was asked to rate how much he or she has been affected by each symptom in the past week according to a 4-point scale ranging from 0 ("Not at all") to 3 ("Severely-I could barely stand it") The items were summed to obtain a total score that ranged from 0 to 63. The scale has an internal consistancy coefficient of .86 and an item-total correlation of .93 (Beck,Steer & Garbin,1988). The BDI demonstrates strong positive relationships with the Zung self-rating depression scale (Zung,1965) and the Hamilton rating scale for depression (HRSD) with correlation coefficients of .76 and .73 respectively (Beck,Steer & Garbin,1988).

Final examination grades. Subjects were requested to submit the semester's copy of their final examination test grade in the same introductory community health course. The final examination was a 50-item test that was developed to measure achievement in community health. Respondents were asked specific information from units in lifestyle and health promotion, pollution, housing, food protection, and health resources. The

final examination items consisted of 28 true-false items and 22 multiple choice items obtained from the Community Health Instructor's manual accompanying the course textbook (Community Health, Green & Anderson,1986). All test-items are standardized, although statistics are not reported in the manual. Each item is scored by an optical scanner, with raw scores being converted to scaled scores that range from 100 to 0.

Heart rate. Heart rate was measured by an CIC Uniq Heartwatch Model 9799 multiple program heart rate monitor. This monitor has a range of 40 to 200 BPM and featured selectable sampling intervals and a 960 sample memory. Heart rate was recorded from a wireless ECG sensor and sampled at an interval of every 15 seconds for the duration of the time sampling period. A receiver stored heart rate data from the sampling period for later analysis. During the final examination, heart rate was recorded by a remote receiver. Before entering the test room, the male and female assistants attached a sensor band and transmitter to the subject. After a 5-minute baseline (i.e., for the purpose of habituation), heart rate was recorded for a total of 20 minutes and sampled at 15-second intervals. The average heart rate in beats per minute during this 20 minute period

constituted the physiological outcome measure. Male and female assistants detatched the sensor band when each subject completed the exam.

Social validity score. In an effort to address Wolf's (1978) concern regarding the social validity of behavioral treatment (i.e.,"Were the participants satisfied with the results ?"), a brief questionnaire was constructed along the dimensions that Wolf established (see Appendix I).

Subjects

The initial subject pool consisted of 204 second and third semester students at an urban community college in New York City. The TAI was administered to the initial subject pool and sixty-one students whose TAI total scores were at or above the 80th percentile sat for the Structured Clinical Interview. Of these, thirty-nine cases who received a phobia diagnosis as based on the structured interview constituted the final subject pool. All of the cases had developed their phobias shortly after they enrolled in college (i.e., from 1 to 12 months before the treatment was initiated). This total pool consisted of 28 females and 11 males with a mean age of 21.4 years (SD=3.63). The total racial-ethnic distribution was as follows: 26 black,

7 Hispanic, and 6 Caucasion. These cases were randomly assigned to one of three treatment groups (i.e., systematic desensitization, endemic imagery and wait-list controls). The demographic makeup of the selected subjects by experimental group (n=13/group) with mean age, standard deviation, racial-ethnic and gender distribution is presented respectively as follows: The mean age of the Systematic desensitization group was 23.64 years (SD=5.28) and consisted of 9 black, 3 Hispanic, 1 Caucasion, 11 females, and 2 males. The mean age of the Endemic Imagery group was 21.38 years (SD=2.02) and consisted of 8 black, 2 Hispanic, 3 Caucasion, 8 females, and 5 males. The mean age of the Wait-list Control group was 20.54 years (SD=2.07) and consisted of 9 black, 3 Hispanic, 1 Caucasion, 9 females, and 4 males.

Procedure

The subjects were invited to an orientation session. The purposes and procedures of the program were then explained to the students. The students were told that the study was intended to provide information on test anxiety and it's treatment. It was also indicated that the treatments offered in this study were designed to help students accurately reflect their knowledge on

tests. Students were then asked to participate in 6 to 8 bi-weekly 50-minute treatment sessions. At this point, informed consent (see Appendix F) were signed.

Treatments

Following the pretest administration of the TAI and the Structured Clinical Interview, subjects were randomly assigned to one of three treatment conditions (i.e., systematic desensitization, endemic imagery and a wait-list control). Each treatment condition consisted of 13 subjects and each treatment session was conducted individually. Complete treatment manuals (see Appendices G and H) were followed. Individual treatment sessions began the week after the pretest assessment of TAI, BAI and BDI and continued for 6 to 8 weeks until completed. Each treatment group received 6 to 8 bi-weekly 50-minute treatment sessions. Treatments were conducted at the urban community college during school study hours in all cases.

Systematic desensitization. A individualized 5-item test anxiety hierarchy was compiled on the basis of subjects responses. The desensitization procedure as described by Wolpe (1982) was used. The procedure consisted of five operations which included a basic interview of the subject, construction of an anxiety

hierarchy, explanation of the procedure, training in deep muscle relaxation, and counterposing relaxation and anxiety-evoking stimuli from the hierarchies.

Individual interviews were used to establish a 5-item test anxiety hierarchy for each subject. At this point, the subjects were trained to denote their level of anxiety vis-a-vis fear hierarchy items according to a subjective units of disturbance (SUDS) scale. Viewed along these lines, the subjects were taught to recognize and enumerate subjective anxiety on a 0 to 100 continuium with 0 denoting no anxiety and 100 denoting maximum anxiety.

The muscle relaxation procedure involved dimming the lights, asking the subject to close his or her eyes, and sitting in a comfortable position in an armchair. The subjects were then asked to tense and maintain muscle tension in various muscle groups until the therapist said "relax." Subjects were then asked to "Let go and concentrate on reducing the muscle tension." This procedure was essentially the same as Jacobson's (1938) progressive relaxation training which involved the relaxation of 15 primary muscle groups. Each subject completed the muscle relaxation training procedure in a single session.

After inducing deep muscle relaxation, the therapist described the least aversive scene from the hierarchy and the subject was then advised to imagine the scene. Subjects were also advised that they could stop the scene presentation by raising an index finger if they became anxious. At this point, the subjects SUDS level was established. Following this, relaxation was introduced and this was followed by the presentation of the aversive scene. This regimen was maintained until 0 SUDs were evident. The subsequent desensitization sessions were identical in procedure, except that the hierarchy items continued from the item following the last desensitized item. Appendix D presents the treatment manual for this modality.

Endemic images. The endemic imagery procedure as described by Saigh (1980) was used. The procedure (Saigh & Antoun, 1984) consisted of five operations which included a basic interview of the subject, construction of an anxiety hierarchy, identification of the Endemic Imagery preferences, explanation of the procedure, and counterposing endemic images and anxiety-evoking stimuli from the hierarchies.

Individual interviews were used to establish a 5-item test anxiety hierarchy for each subject. At this

point, the subjects were trained to denote their level of anxiety vis-a-vis fear hierarchy items according to a subjective units of disturbance (SUDS) scale. Viewed along these lines, the subjects were taught to recognize and enumerate subjective anxiety on a 0 to 100 continium with 0 denoting no anxiety and 100 denoting maximum anxiety.

The subjects in this group were then asked to fill out an endemic imagery questionnaire (Saigh & Antoun, 1984; (see Appendix C). On the basis of this questionnaire, endemic image preference was determined by scoring the images according to a Likert-type score (e.g.,Not at all=1 through Very much=5).

The endemic imagery procedure involved dimming the lights, asking the subject to close his or her eyes, and sitting in a comfortable position in an armchair. The therapist then described the 5th item from the endemic imagery list. The subject was then instructed to raise the right index finger when he or she was able to mentally picture the scene. The trainer did not proceed until the subject was able to do so. After 60 seconds of imagining the scene, the subject was advised to stop thinking about the endemic image and the 5th item from the fear hierarchy was presented. In the

event that anxiety was noted, the subject raised his or her right index finger. At this point, the subjects SUD level was established.

This procedure was repeated until each subject reported 0 SUDs for the item. The 4th item from the endemic imagery questionnaire was then counterposed with the 4th hierarchy item. The endemic images were repeated when the list was complete and counterposed with the appropriate hierarchy item until 0 SUDs were reported for the entire test anxiety hierarchy. Subsequent sessions had a procedure identical to the first endemic image session. Appendix E presents the treatment manual for this modality.

Wait-list control. After the wait-list controls were selected and administered the pretest measures, they were told that due to a scheduling problem, their treatments must be temporarily delayed. They would, however, be asked to sit for the dependent variables "in order to ascertain if they still need help."

Seven to ten days after the last treatment session, all of the subjects sat for the final examination. One day before the examination, the subjects sat for the posttreatment TAI, BAI and BDI. Heart rate was measured throughout the examination. Treatments were audiotaped

and independent raters rated the transcripts for compliance with the experimental protocols. One year after the last treatment session, all of the subjects marked the posttreatment TAI, BAI and BDI. After the one-year follow-up was completed, four subjects from the wait-list group who requested therapy were provided with a combined course of endemic imagery and systematic desensitization.

Therapist. The author, a doctoral level educational psychology student, acted as the therapist and utilized a manual (see Appendices G and H) specifying the procedures that were to be used in each treatment group. It should be noted in this regard that the therapist has had extensive training and experience (i.e., more than 10,000 hours in biofeedback, imagery, desensitization and relaxation techniques). He also received extensive training at the Graduate Center of the City University of New York on the implementation of endemic imagery.

Research Design and Hypotheses

The design for this study was a basic pretest-posttest control group design. The independent variables (i.e.,treatment modality) were: systematic desensitization versus endemic images versus no-

treatment (wait-list control). The outcome measures were scores of total TAI, TAI-worry, TAI-emotionality, BAI, BDI, final exam grades, and heart rate measured immediately following treatment (posttest 1) and one year following treatment (posttest 2). Figure 1 presents a schematic representation of the data collection design.

Figure 1

Schematic representation of the data collection design

	Treatment Group-Posttest 1			Treatment Group-Posttest 2		
Outcome Measure	Systematic Desensitization	Endemic Imagery	Wait-list Controls	Systematic Desensitization	Endemic Imagery	Wait-list Controls
TAI Total						
TAI/W						
TAI/E						
BAI						
BDI						
Final Grade				*** Final Grade and Heart Rate not***		
Heart Rate				*** recorded on posttest 2 ***		

As the literature suggests, systematic desensitization is a highly effective treatment, therefore, the following hypotheses are predicted:

Ho 1. The total TAI scores of the systematic desensitization group will be significantly lower than the total TAI scores of the control group on posttest 1.

Ho 2. The TAI-worry scores of the systematic desensitization group will be significantly lower than the TAI-worry scores of the control group on posttest 1.

Ho 3. The TAI-emotionality scores of the systematic desensitization group will be significantly lower than the TAI-emotionality scores of the control group on posttest 1.

Ho 4. The BAI scores of the systematic desensitization group will be significantly lower than the BAI scores of the control group on posttest 1.

Ho 5. The BDI scores of the systematic desensitization group will be significantly lower than the BDI scores of the control group on posttest 1.

Ho 6. The final grades of the systematic desensitization group will significantly exceed the final grades of the control group on posttest 1.

Ho 7. The heart rate scores of the systematic desensitization group will be significantly lower than

the heart rate scores of the control group on posttest 1.

Ho 8. The total TAI scores of the systematic desensitization group will be significantly lower than the total TAI scores of the control group on posttest 2.

Ho 9. The TAI-worry scores of the systematic desensitization group will be significantly lower than the TAI-worry scores of the control group on posttest 2.

Ho 10. The TAI-emotionality scores of the systematic desensitization group will be significantly lower than the TAI-emotionality scores of the control group on posttest 2.

Ho 11. The BAI scores of the systematic desensitization group will be significantly lower than the BAI scores of the control group on posttest 2.

Ho 12. The BDI scores of the systematic desensitization group will be significantly lower than the BDI scores of the control group on posttest 2.

As the literature suggests, endemic imagery is quite an effective treatment, therefore, the following hypotheses are predicted:

Ho 13. The total TAI scores of the endemic imagery group will be significantly lower than the total TAI scores of the control group on posttest 1.

Ho 14. The TAI-worry scores of the endemic imagery

group will be significantly lower than the TAI-worry scores of the control group on posttest 1.

Ho 15. The TAI-emotionality scores of the endemic imagery group will be significantly lower than the TAI-emotionality scores of the control group on posttest 1.

Ho 16. The BAI scores of the endemic imagery group will be significantly lower than the BAI scores of the control group on posttest 1.

Ho 17. The BDI scores of the endemic imagery group will be significantly lower than the BDI scores of the control group on posttest 1.

Ho 18. The final grades of the endemic imagery group will significantly exceed the final grades of the control group on posttest 1.

Ho 19. The heart rate scores of the endemic imagery group will be significantly lower than the heart rate scores of the control group on posttest 1.

Ho 20. The total TAI scores of the endemic imagery group will be significantly lower than the total TAI scores of the control group on posttest 2.

Ho 21. The TAI-worry scores of the endemic imagery group will be significantly lower than the TAI-worry scores of the control group on posttest 2.

Ho 22. The TAI-emotionality scores of the endemic

imagery group will be significantly lower than the TAI-emotionality scores of the control group on posttest 2.

Ho 23.The BAI scores of the endemic imagery group will be significantly lower than the BAI scores of the control group on posttest 2.

Ho 24.The BDI scores of the endemic imagery group will be significantly lower than the BDI scores of the control group on posttest 2.

Insomuch as the literature suggests that systematic desensitization and endemic imagery are equally effective procedures, therefore the following hypotheses are predicted:

Ho 25.The total TAI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 26.The TAI-worry scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 27.The TAI-emotionality scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 28.The BAI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 29.The BDI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 30. The final grades of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 31. The heart rate scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 1.

Ho 32. The total TAI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 2.

Ho 33. The TAI-worry scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 2.

Ho 34. The TAI-emotionality scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 2.

Ho 35. The BAI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 2.

Ho 36. The BDI scores of the systematic desensitization and endemic imagery groups will not be significantly different on posttest 2.

Chapter III

Results

This chapter provides a description of the results. Initially, information regarding the interrater reliability relative to the experimental procedures is provided. Pursuant to this, the basic descriptive statistics are reported and the results of two MANCOVAs with univariate F tests and Bonferrone comparisons are reported.

Each rater was trained to code and rate audiotapes involving systematic densensitization and endemic imagery in an analog setting. The interrater reliability level in this training was scored by two examiners (doctoral students in the Educational Psychology Program of the City University of New York's Graduate School and University Center) for compliance with training protocols. The reliability estimates were calculated on the basis of Cohen's (1960) coefficient Kappa. Interrater agreement for scoring compliance on the training protocols was estimated at .97 for systematic desensitization and .93 for endemic imagery.

The experimental treatments were audiotaped.

Twenty-five percent of the audiotapes were randomly selected and rated by two independent raters (a doctoral level clinical psychologist and a doctoral student in the Educational Psychology Program of the City University of New York's Graduate School and University Center) for compliance with the treatment protocols. Each rater checked the appropriateness of the trainer's instructions and instructional sequence after the subject's responses in the systematic desensitization and endemic imagery conditions using a standardized scoring form designed for this purpose by the principal investigator (see Appendices G and H). The reliability estimates for compliance with the treatment protocols were also calculated on the basis of Cohen's coefficient Kappa. Viewed along these lines, agreement was estimated at 1.00 for systematic desensitization and .95 for endemic imagery.

Tables 1 and 2 present the adjusted individual means and standard deviations of each outcome measure by group (Appendix J presents tables of actual means and standard deviations) for posttest 1 and posttest 2 respectively. Insomuch as posttest 2 did not involve a final examination or heart rate reactivity measure, these outcome measures do not appear in Table 2.

Table 1

Adjusted Means and Standard Deviations

of Outcome Measures By Group

Posttest 1

	Group(n=13)					
Outcome	Systematic		Endemic		Wait-list	
Measure	Desensitization		Imagery		Control	
	M	SD	M	SD	M	SD
TAI total	54.652	35.415	59.756	27.103	79.977	15.554
TAI-W	62.846	33.424	58.231	27.249	82.308	12.815
TAI-E	47.401	32.223	64.310	30.505	75.519	17.767
BAI	8.492	16.225	10.656	10.226	16.083	8.856
BDI	6.769	8.899	9.154	6.555	11.462	7.490
Final Exam	64.462	8.743	67.846	11.268	48.615	22.670
Heart Rate	77.531	12.073	81.200	8.443	78.585	11.175

Table 2

Adjusted Means and Standard Deviations

of Outcome Measures By Group

Posttest 2

	Group(n=13)					
Outcome	Systematic		Endemic		Wait-list	
Measure	Desensitization		Imagery		Control	
	M	SD	M	SD	M	SD
TAI total	34.229	26.090	50.253	32.332	66.364	32.456
TAI-W	49.348	26.427	56.012	33.261	70.178	28.645
TAI-E	32.077	29.129	43.385	27.729	60.932	36.024
BAI	7.231	7.293	11.077	8.139	15.462	12.394
BDI	5.684	9.492	7.824	6.697	9.722	8.724

The design for this study was a basic pretest-posttest control group design. Multivariate analyses of covariance were conducted on the posttest measures using SPSS (1983) for all hypotheses to statistically control for individual group differences by covarying out the effects of the pretest from the posttest simultaneously, thereby eliminating any pretest differences. In the case where the multivariate analysis of covariance was significant, univariate F tests on each of the individual outcome measures were conducted.

The results of the multivariate analyses of covariance using Wilk's lambda to test for overall group treatment effects in posttest 1 with the pretest serving as the covariate indicated that group differences were significant, lambda value=.37638, $F(14,48)=2.16$, $p=.024$. On the basis of these results, a series of univariate F tests were calculated for each outcome measure.

The univariate F tests by outcome measure for overall group treatment effects in posttest 1 were as follows: $F(2,30)=4.29$, $p<.05$ for TAI total, $F(2,30)=3.78$, $p<.05$ for TAI-worry, $F(2,30)=4.48$, $p<.05$ for TAI-emotionality, $F(2,30)=1.62$ n.s. for BAI, $F(2,30)=$

3.575, $p<.05$ for BDI, $F(2,30)=4.64$, $p<.05$ for final grade and $F(2,30)=2.66$ n.s. for heart rate.

On the basis of posttest 1 univariate F test results, a series of Bonferrone post-hoc tests were calculated on the significant outcome measures. Table 3 presents the results for each Bonferrone comparison by outcome measure.

Table 3

Bonferrone Post-hoc Comparisons for

Significant Outcome Measures By Group (n=13)

Posttest 1

	Bonferrone Post-hoc Comparison		
Outcome Measure	Systematic Desensitization by Wait-list Control	Endemic Imagery by Wait-list Control	Endemic Imagery by Systematic Desensitization
TAI total	*	*	n.s.
TAI-W	n.s.	*	n.s.
TAI-E	*	n.s.	n.s.
BDI	n.s.	n.s.	n.s.
Final Exam	*	*	n.s.

* $p < .02$

Bonferrone post-hoc tests determined that total TAI scores at posttest 1 of the systematic desensitization group were significantly lower than the scores of the wait-list control group, $t(24)=2.36$, $p<.02$. As such, Hypothesis 1 was supported. Analogously, the total TAI scores of the endemic imagery group were significantly lower than the scores of the wait-list control group, $t(24)=2.33$, $p<.02$. Thereby, Hypothesis 13 was supported. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=.176$. In view of this, Hypothesis 25 was supported.

Bonferrone analyses indicated that TAI-worry scores in posttest 1 of the systematic desensitization were not significantly lower than the scores of the wait-list control group, $t(24)=.196$. Hypothesis 2 was therefore, unsupported. The TAI-worry scores of the endemic imagery group were significantly lower than the scores of the wait-list control group, $t(24)=2.883$, $p<.02$. As such, Hypothesis 14 was supported. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=.552$. Therefore, Hypothesis 26 was supported.

The Bonferrone tests that were conducted on the TAI-emotionality data at posttest 1 determined that the TAI-emotionality scores of the systematic desensitization group were significantly lower than the scores of the wait-list control group, $t(24)=8.87$, $p<.02$. As such, Hypothesis 3 was supported. Analogously, the TAI-emotionality scores of the endemic imagery group were not significantly lower than the scores of the wait-list control group, $t(24)=1.31$. In view of this, Hypothesis 15 was unsupported. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=1.37$. Thereby, Hypothesis 27 was supported.

Given that univariate F tests were not significant, post-hoc comparisons were not performed on BAI in posttest 1. Hypotheses 4, 16 and 28 were therefore, unsupported.

Although a significant univariate F value was noted, the results of the Bonferrone post-hoc comparisons for BDI scores in posttest 1 indicated that the total TAI scores of the systematic desensitization group were not significantly lower than the scores of the wait-list control group, $t(24)=1.46$, $p<.02$.

Thereby, Hypothesis 5 was unsupported. Analogously, the BDI scores of the endemic imagery group were not significantly lower than the scores of the wait-list control group, $t(24)=.836$, As such, Hypothesis 17 was unsupported. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=.375$. Hypothesis 29 was therefore, supported.

The Bonferrone post-hoc comparisons determined that final grades in posttest 1 of the systematic desensitization group significantly exceeded the scores of the wait-list control group, $t(24)=2.739$, $p<.02$. In view of this, Hypothesis 6 was supported. The final grades of the endemic imagery group significantly exceeded the scores of the wait-list control group, $t(24)=2.352$, $p<.02$. Therefore, Hypothesis 18 was supported. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=.855$. As such, Hypothesis 30 was supported.

Given that univariate F tests were not significant, post-hoc comparisons were not performed on heart rate in posttest 1. Thereby, Hypotheses 7, 19 and 31 were

unsupported.

The results of the multivariate analyses of covariance using Wilk's lambda to test for overall group treatment effects in posttest 2 with the pretest serving as the covariate were not significant, lambda value=.63895, $F(14,48)=1.36$. In view of these results, univariate F tests were not performed.

Table 4 presents the breakdown of the individual means and standard deviations of social validity ratings by group. The maximum score on this scale was 16 for each subject.

Post-hoc t tests determined that social validity scores of both the systematic desensitization group and the endemic imagery group significantly exceeded the scores of the wait-list control group, $t(24)=3.20$, $p<.001$ and $t(24)=3.33$, $p<.001$ respectively. No significant differences were observed when the scores of the systematic desensitization and endemic imagery groups were compared, $t(24)=.070$.

Table 4

Means and Standard Deviations of Social Validity By Group

Group(n=13)					
Systematic Desensitization		Endemic Imagery		Wait-list Control	
M	SD	M	SD	M	SD
14.692	2.720	15.077	.954	2.92	2.33

Chapter IV

Summary and Conclusions

Summary

The specific purpose of this investigation was to compare the effects of two therapeutic procedures in the treatment of test phobic undergraduate students. In so doing, 39 cases who were clinically diagnosed as test phobic as indicated by their responses to a DSM-III-R structured interview were identified and randomly assigned to one of three groups. The first group received systematic desensitization and the second group received endemic imagery, while the third group was wait-listed. Following a pretest-posttest control group regimen, outcome measures were obtained before, during and immediately after treatment as well as at a one-year follow-up.

A multivariate analysis of covariance (MANCOVA) was performed on the posttest data that was collected immediately following the treatments and a significant *F* value was observed. Univariate *F* tests and Bonferrone post-hoc comparisons revealed that the total TAI scores of the systematic desensitization and endemic imagery groups were significantly lower than the scores of the

controls. On the other hand, no statistically significant differences were observed when the total TAI scores of the treatment groups were compared. With respect to the TAI-worry scores, the only significant difference that was noted involved the endemic imagery-control group comparison. Viewed along these lines, the TAI-worry scores of the endemic imagery group were significantly lower than the control group. In contrast, the systematic desensitization group had significantly lower TAI-emotionality scores than the control group. No significant differences were observed when the TAI-emotionality scores of the experimental groups were compared.

Post-hoc comparisons revealed no significant differences between groups on the BAI and BDI. Likewise, no statistically significant differences were noted when the heart rate scores were compared across groups. With respect to final examination grades, both treatment groups evinced significantly higher scores on their final examination grades relative to the grades of the wait-list controls. As the MANCOVA for the one-year follow-up data (Posttest 2) evinced a non-significant F value, further analyses were not performed.

The social validity ratings of the three groups

also were compared. Examined in this regard, the systematic desensitization and endemic imagery ratings markedly exceeded the ratings of the wait-list controls. No significant differences were noted between treatment groups. With these points in mind, this chapter provides a discussion of the findings, implications for research and practice, and lists a series of recommendations for future research.

Discussion

With respect to the reduction in test anxiety evidenced by the significantly lower total TAI scores of the systematic desensitization and endemic imagery groups, it is apparent that both treatments demonstrated considerable efficacy in reducing test anxiety at posttest 1. Anecdotal comments which indicated that students in the treatment groups practiced their respective procedures while the treatment was ongoing, may have also contributed to this effect.

The analysis of TAI-worry data demonstrated that the worry component of test anxiety is affected by endemic imagery only. In this regard, it would seem that endemic imagery (unlike systematic desensitization) appears to specifically treat the worry component (rather than the emotionality component) of test

anxiety. These results support Cautela's (1983) view that the development and maintainence of positive mental images (e.g., endemic images) in lieu of maladaptive cognitive responses (e.g., thinking about catastrophic aversive test-taking events) may serve to distract and reciprocally inhibit maladaptive responses. As such, the subjects who received the endemic imagery treatment may have benefitted through reduced worry associated with the evaluative situations by focusing their attention on positively valenced non-academic images and by not thinking about catastrophic test-taking scenarios.

The results for TAI-emotionality data demonstrated that emotionality (the autonomic component of test anxiety; Deffenbacher,1986) was significantly reduced by systematic desensitization. Thus, emotionality, which refers to self-perceived and physiological arousal (e.g., muscle tension or nervous stomach), appears to have been reduced through the development and maintenance of deep muscle relaxation. Viewed in this context, the decreased emotionality evidenced by the desensitization subjects supports the notion that deep muscle relaxation is antagonistic to the fear-evoking physiological component of the anxiety (Wolpe,

1962). In keeping with this, Hurwitz, Kahane and Mathieson (1986) demonstrated that progressive deep muscle relaxation and EMG biofeedback were equally effective in reducing the emotionality component of test anxiety without affecting the worry component. Further, Schwartz and Higgins's (1971) view that a prerequisite for autonomic responding may require a deactivation of muscle tension that is induced through conscious mental activity may also present a plausable line of explanation.

With regard to general anxiety, as measured by BAI, an explanation for the lack of significance may have to do with the fact that test anxiety is a very specific type of anxiety (Bellack & Hersen, 1988). Further, general self-report anxiety scales may not be sensitive enough to denote this particular form of anxiety per se (Beck, Brown, Epstein & Steer, 1988). With this in mind, it may be argued that the BAI may be a poor index of the specific fear that is indicative of test phobia. As such, it would follow that this measure could not denote therapeutic effects due to it's general or holistic scope

Although the literature suggests that phobics frequently experience co-morbidity in the form of

depression (Beck,Brown,Eidelson,Steer & Riskind,1987), BDI scores have only been modestly associated with clinical ratings of anxiety. For example, Beck, Steer and Garbin (1988) reported a coefficient of $\underline{r}$=.14 when BDI scores were correlated with clinical ratings of anxiety. It may also be argued that although the subjects were clinically test phobic, their condition may not have been so pervasive or profound so as to induce elevated levels of depression.

With regard to academic performance, as measured by final examination grade, subjects who received the experimental treatments performed markedly better than the control group. These results are in keeping with the selected review of the literature which generally suggests that systematic desensitization and endemic imagery facilitate academic achievement (c.f. Hudesman, Loveday & Woods,1984; Hudesman & Wiesner,1979; Johnson & Sechrest,1968; Katahn,Strenger & Cherry,1966; Meichenbaum,1972; Saigh,1980; Saigh & Antoun,1984). The performance of the endemic imagery group is of particular interest insomuch as these data clearly indicate that this treatment was as effective as systematic desensitization (a well accepted treatment strategy) in facilitating the academic achievement of

test phobic students.

With regard to psychophysiological reactivity, as measured by heart rate, subjects did not differ in physiological arousal as measured by heart rate during posttest 1. There are several possible lines of explanations for these results. The *in vivo* physiological reactivity of test phobic individuals may have been evinced in different ways across different psychophysiological systems. As such, heart rate may be a psychophysiological measure that is relatively unreactive to this form of performance demand. Second, a college final examination, particularly a test involving multiple-choice and true-false items, may be a common, naturalistic experience that may not have generated significant heart rate acceleration during examination conditions. Other types of stress (e.g., touching a snake) may elicit cardiac arousal that may be more reactive. These comments should, however, be tempered with the realization that the heart rate results reflect a non-significant trend towards reduced heart rate in the experimental groups as compared to the control group with the univariate *F* test yielding a value approaching statistical significance ($F(2,30)=2.66, p=.086$). Given a more

robust sample, a statisically significant effect may have been obtained.

The lack of significant main effects at the one-year follow-up (posttest 2) may be explained by Eysenck's (1952) celebrated view regarding the limited longevity of neurotic (e.g., phobic) disorders. This view posits that approximately two-thirds of all neurotic behaviors spontaneously remit within two years of their onset. Rachman and Wilson (1980) provide support for this view in a literature review of spontaneous remission of neurotic disorders beginning with an early account of the phenomena published by Strype in 1720 to date. The majority of the studies cited supported Eysenck's (1952) original hypothesis. In view of this, the authors drew the following conclusion:

> There is a good deal of evidence to show that a high proportion of neurotic disorders improve spontaneously. Secondly, it is probable that most of this spontaneous improvement takes place within a year of onset. It follows by implication that the chances of a neurotic disorder remitting spontaneously five or more years after onset, are considerably diminished. (pp.39-40)

With regard to the present study, the entire sample was composed of neurotic (i.e., phobic) cases whose onset of phobia occured from one to two years prior to the final assessment. With this in mind, Rachman and Wilson's (1980) suggestion that any therapeutic trial which includes a large sample of neurotic cases of recent onset will produce a high recovery rate, may serve to explain the failure to evince main effects at the one-year follow-up.

The analysis of the social validity questionnaire data (Wolf,1978) indicated that the study was socially valid. The subjects in both treatment groups enjoyed the treatment sessions significantly more than the controls and reported that the treatment allowed them to relax more easily than they had been able to do. Further, the results demonstrate that the treated subjects believed that the treatments helped them in overcoming their fear of tests and would recommend the treatment to fellow students.

Limitations

A number of limitations are apparent. The validity of treatments relative to more serious phobias with biological significance remains to be seen. Viewed in this context, Rachman (1990), referring to Seligman's

(1971) definition, notes that phobias with biological significance for the survival of the species are very difficult to eliminate. Thus, the efficacy of treatments with prepared or biological phobias (e.g., phobias involving snakes, blood and animals) may be much more resistant to extinction than test phobia.

Finally, the modest size of the selected sample may have reduced statistical power. Particular reference is noted with regard to the trend towards significance of decreased heart rate in the treatment groups of the present investigation.

Recommendations

The following recommendations for future study are proposed:

1. Replicate the present study with phobics who have an extensive history of the disorder (i.e., the onset of phobia is greater than two years) so as to reduce the possibility of spontaneous remission.
2. Explore the efficacy of endemic imagery with phobic individuals who have physical disabilities (e.g., cerebral palsy, polio or arthritis).
3. Future investigations that use individual treatment procedures such as those described herein should utilize more robust samples sizes (i.e., at least 30

cases per cell) so as to maximize the statistical power.
4. Replicate the present study with the inclusion of other psychophysiological measures such as electrodermal and electromyographic responses.
5. Conduct a similar investigation with a study-skills component which would limit student's anxiety due to lack of preparation and follow-up training which may increase the likelihood of subjects internalizing the cognitive-behavioral goals of the treatment strategies. This may also serve to maintain treatment effects over time.
6. Develop group treatments comparable to the individual treatments so that more individuals may be treated in less time.

Test anxiety, which appears to be indicative of a more pervasive anxiety state (e.g., test phobia; Beidel,1988) may limit students academic, vocational, and affective functioning. Thus, the highly test anxious or test phobic student may be at greater risk for maladaptive behavior. Viewed along these lines, educators and counselors must be made aware of of the current conceptualizations and applications of research in test anxiety and phobia so that any impact on students may be minimalized. Further, educational

professionals must be trained to administer appropriate treatment procedures (e.g., systematic desensitization and endemic imagery) so that students who complain of "blanking out" or "freezing up" at test time or are unable to study effectively may immediately benefit from these procedures.

Finally, test anxiety and test phobia must be treated as a multifaceted problem that requires a multimodal treatment approach as opposed to the traditional "band aid" approach frequently observed in school settings. In this way, students may be able to maximize their abilities during naturalistic evaluative situations.

Appendices

Appendix A

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R,1987), a diagnosis of Simple Phobia is indicated by the following:

A. A persistant fear of a circumscribed stimulus (object or situation) other than fear of having a panic attack (as in Panic Disorder) or of humiliation or embarassment in certain social situations (as in Social Phobia).

Note: Do not include fears that are part of Panic Disorder with Agoraphobia or Agoraphobia without a history of Panic Disorder.

B. During some phase of the disturbance, exposure to the specific phobic stimulus (or stimuli) almost invariably provokes an immediate anxiety response.

C. The object or situation is avoided, or endured with intense anxiety.

D. The fear or avoidant behavior significantly interferes with the persons normal routine or with usual social activities or relationships with others, or there is marked distress about having the fear.

E. The person recognizes that his or her fear is excessive or unreasonable.

F. The phobic stimulus is unrelated to the content of the obsessions of Obsessive Compulsive Disorder or the trauma of Post-traumatic Stress Disorder.

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Appendix B

Structured Clinical Interview for Test Phobia

The following questions are asked by interviewer and results are recorded on this sheet.

	YES	NO
Do you have a persistent fear of tests ?	___	___
Does your fear of tests interfere with your normal routine ?	___	___
Do you always feel anxious when you take a test ?	___	___
Do you go out of your way to avoid tests ?	___	___
Are you more afraid of tests than you should be ?	___	___
During the past month, have you been bothered by a fear of test taking ?	___	___
During the past year, have you been bothered by a fear of test taking ?	___	___

Appendix D

Systematic Desensitization Treatment Manual

1. The therapist interviews the subject with respect to test anxiety.
2. The therapist establishes a 5-item anxiety hierarchy with subject (e.g., "What situation can you think of that frightens you the most when you think of taking a test? What situation frightens you the least when you think of taking a test? Can you think of any other situations that frighten you when you take a test?). The therapist orders the items from least to most frightening and confirms the order with the subject.
3. The therapist explains the systematic desensitization (e.g., Systematic desensitization, one way to control test anxiety makes use of the fact that anxiety is antagonistic to good performance on a test. The procedure involves helping you to relax and asking you to imagine testing situations that you are afraid of by repeatedly asking you to imagine anxiety-evoking scenes during a state of deep muscle relaxation. By doing this, you will eventually overcome your reactivity to those scenes").
4. The therapist explains deep muscle relaxation (e.g. " The exact procedure will involve asking you to contract and relax different muscle groups with your eyes closed").
5. The therapist explains the Subjective Units of Disturbance Scale (SUDS; After you are deeply relaxed, I will ask you to imagine an anxiety-evoking scene. It's expected that this scene will upset you at first. As soon as this occurs, let me know by raising your left index finger. When I see this, I'll ask you to stop thinking about the aversive scene and I'll ask you to describe how upsetting it was. In this context, you should rate the level of anxiety that the scene induced on a 0 to 100 point scale (i.e., not bothered to very bothered). After I record the response, I will ask you to relax again and I will repeat the entire sequence including relaxation again").

6. The therapist introduces relaxation training: (e.g., "Today we are going to learn what is known as 'progressive relaxation training.' It is designed to help you learn to reduce muscle tension in your body. Our goal, therefore, will be to help you to become deeply relaxed. It is very important that you pay strict attention to what I am saying. I am going to ask you to tense and then relax various groups of muscles in your body. When I ask you to tense a muscle group, I want you to only concentrate on that muscle group. When I ask you to relax that muscle group, I want you to relax that muscle group completely and immediately releasing all the tension at the same time").
7. The therapist asks subject to remove all glasses, contact lenses, watches, bracelets, or whatever may be restricting the subject's movements. The therapist then asks the subject to lean back in the chair in a comfortable position while the therapist dims the lights in the room. The therapist instructs the subject to close his or her eyes and keep them closed throughout the session (e.g.," If, for some reason, you should open your eyes, just relax and close them again.").
8. The therapist instructs the subject to tense the muscles in both hands for 8 seconds.
9. The therapist instructs the subject to stop tensing and to concentrate on developing a feeling of deep muscle relaxation for 60 seconds. After this the therapist should ask the subject if he or she feels completely relaxed.
10. Repeat #8.
11. Repeat #9.
12. Repeat #8.
13. Repeat #9.
14. The therapist instructs the subject to tense the muscles of the hands and to also tense the muscles of the eyes by squinting for 8 seconds.

15. Repeat #14.
16. Repeat #9.
17. Repeat #14.
18. Repeat #9.
19. The therapist instructs the subject to tense the muscles in both hands, eyes and bite for 8 seconds.
20. Repeat #19.
21. Repeat #9.
22. Repeat #19.
23. Repeat #9.
24. The therapist instructs the subject to tense the muscles in both hands, eyes , the bite, and tongue for 8 seconds.
25. Repeat #24.
26. Repeat #9.
27. Repeat #24.
28. Repeat #9.
29. The therapist describes the fifth scene from the anxiety hierarchy and encourages the subject to imagine this scene in considerable detail.
30. As soon as the subject experiences anxiety, he or she should raise his or her left index finger.
31. The therapist asks the subject to "Stop" thinking about the aversive scene.
32. The therapist asks subject to rate SUDs and records response.
33. Repeat #8.
34. Repeat #9.
35. Repeat #29.
36. This regimen will be maintained until 0 SUDS are reported for the scene in question.
37. STOP.

Appendix E

Endemic Imagery
Treatment Manual

1. The therapist interviews the subject with respect to test anxiety.
2. The therapist establishes a 5-item anxiety hierarchy with subject (e.g., "What situation can you think of that frightens you the most when you think of taking a test? What situation frightens you the least when you think of taking a test? Can you think of any other situations that frighten you when you take a test?). The therapist orders the items from least to most frightening and confirms the order with the subject.
3. The therapist asks the subject to fill out an the endemic imagery questionnaire (see Appendix C). This questionnaire will be scored before training begins according to a Likert-like format, (e.g., Not at all=1 through Very much=5) and five highest items are selected.
4. The therapist explains endemic imagery (e.g., Endemic imagery, one way to control test anxiety makes use of the fact that anxiety is antagonistic to good performance on a test. The procedure involves helping you to relax by asking you to imagine relaxing scenes and repeatedly asking you to imagine testing situations that you are afraid of. By doing this, you will eventually overcome your reactivity to those scenes").
5. The therapist explains how to image. (e.g. " The exact procedure involves asking you to imagine the relaxing scenes with your eyes closed").
6. The therapist explains the Subjective Units of Disturbance Scale (SUDS; After you are deeply relaxed, I will ask you to imagine an anxiety-evoking scene. It's expected that this scene will upset you at first. As soon as this occurs, let me know by raising your left index finger. When I see this, I'll ask you to stop thinking about the aversive scene and I'll ask you to describe how upsetting it was. In this context, you should rate the level of anxiety that the scene induced on a 0 to 100 point scale (i.e., not bothered to very bothered). After I record the response, I will ask you to relax again and I will repeat the entire sequence including imagining again").

7. The therapist asks subject to remove all glasses, contact lenses, watches, bracelets, or whatever may be restricting the subject's movements. The therapist then asks the subject to lean back in the chair in a comfortable position while the therapist dims the lights in the room. The therapist instructs the subject to close his or her eyes and keep them closed throughout the session (e.g.," If, for some reason, you should open your eyes, just relax and close them again.").
8. The therapist describes the fifth item from the endemic images list and encourages the subject to imagine this scene in considerable detail, until he or she is able to picture the scene. When pictured, the subject is instructed to raise the right index finger.
9. As soon as the subject raises his or her index finger, the therapist instructs the subject to stop visualizing the scene. The therapist should only proceed when subject signals.
10. The therapist describes the fifth scene from the anxiety hierarchy and encourages the subject to imagine this scene in considerable detail.
11. As soon as the subject experiences anxiety, he or she should raise his or her left index finger.
12. The therapist will ask the subject to "Stop" thinking about the aversive scene.
13. The therapist asks subject to rate SUDs and records response.
14. This regimen will be maintained until 0 SUDS are reported for the scene in question. The therapist repeats procedure in # 8 and # 9 while proceeding to descend down the endemic imagery list (e.g., fourth, third, second, first, fifth item ,etc.).
15. Repeat #11.
16. Repeat #12.
17. Repeat #13.
18. Proceed to # 19 only when 0 Suds are reported.
19. The therapist describes the next item from the endemic images list and encourages the subject to imagine this scene in considerable detail, until he or she is able to picture the scene.
20. Repeat #14.

21. The therapist describes the next scene (i.e., fourth, third, second and first in order) from the anxiety hierarchy and encourages the subject to imagine this scene in considerable detail.
21. Repeat #11.
22. Repeat #12.
23. Repeat #13.
24. Repeat #14.
25. Go to #18 and proceed through instructions in manual.
26. This regimen will be maintained until 0 SUDS are reported for all scenes in the complete anxiety hierarchy.
27. STOP.

Appendix F

Subject Informed Consent
The Graduate Center
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Investigator
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Information about
" A Comparative Analysis of the Efficacy of Endemic Images and Systematic Desensitization on the Affective, Cognitive, and Physiological Parameters of Test-Phobic Students "

Purpose of Investigation: The study is being conducted to obtain information on test anxiety, test phobia and it's treatment. Test anxious students are those who do not do well as they can because they spend their time worrying, are distracted from the task at hand, or are so nervous that they cannot focus their attention on the test questions. The treatments offered in this study are designed to change the test-taking pattern of students so they can reach their potential when taking tests.

The treatments offered will involve training students to relax through different techniques while imagining aversive testing situations.

Procedures to be Followed: In order to investigate the nature of test anxiety and test phobia, several assessment procedures will be undertaken. Assessment instruments used will be several self-report anxiety and depression inventories. Students will also be interviewed by the examiner to identify students who are test-phobic.

These measures will be administered before, during and after treatment sessions, and at a follow-up session one week following the study over a six week time interval. Finally, the heart rates of the participating students will be monitored as they take an actual examination using a hidden heart rate monitor. In addition, students will be asked to authorize release of their final exam grades for the marking periods relevant to the study.

Information relating to the student's performance will be kept in confidence. Any student who wishes to terminate testing after it begins will be allowed to stop without a reprimand.

Discomforts and risks: Minimal

Potential Benefits: Possible benefits to the student include relief from undue levels of test anxiety which could lead to better performance on tests.

Period of Time Required: Students will be asked to attend a pre-assessment session, five treatment sessions, a post-assessment session following treatment and a follow-up assessment session one week following post-assessment. In addition, each participant will be asked to sit for a final examination in a selected course during which the student's heart rate will be recorded using a hidden monitor.

Questions: Should questions arise before, during or after participation in the study, students are encouraged to contact Prof. Linden or Dr. Saigh (Telephone numbers will be provided at a later date).

Eric R. Linden, M.A. Date

Subject Statement

The study described in this paper has been described to me and I voluntarily consent to participate in this activity. I have had an opportunity to ask questions and understand that future questions that I may have about this project or the rights of the participants will be answered by Prof. Linden or Dr. Saigh.

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Witness	Date	Participant	Date

Appendix G

Systematic Desensitization Compliance Rating Form

Subject #_____
Rater_____

Y	N	
O	O	1. The therapist explained that the procedure involves deep muscle relaxation.
O	O	2. The therapist explained the Subjective Units of disturbance Scale (SUDS).
O	O	3. The therapist asked the subject to remove all glasses, contact lenses, watches, bracelets, or any restriction.
O	O	4. The therapist asked the subject to lean back in the chair in a comfortable position.
O	O	5. The therapist instructed the subject to close his or her eyes and keep them closed throughout the session.
O	O	6. The therapist instructed the subject to tense the muscles in both hands for 8 seconds.
O	O	7. The therapist instructed the subject to stop tensing and to concentrate on developing a feeling of deep muscle relaxation for 60 seconds. After this the therapist asked if the subject's hands felt completely relaxed.

Systematic Desensitization Compliance Rating Form

Subject #_____
Rater_____

Y / N

O O 8. Repeated #6.

O O 9. Repeated #7.

O O 10. Repeated #6.

O O 11. Repeated #7.

O O 12. The therapist described the fifth scene from the anxiety hierarchy and encouraged the subject to imagine this scene in considerable detail.

O O 13. The therapist asked the subject to "Stop" thinking about the aversive scene, as soon as the subject raised his or her left index finger.

O O 14. The therapist asked the subject to rate SUDs and recorded the response.

O O 15. Repeated #6.

O O 16. Repeated #7.

O O 17. Repeated #12.

O O 18. Regimen was maintained until 0 SUDS was reported.

Appendix H

Endemic Imagery
Compliance Rating Form

Subject #_____
Rater_____

Y	N	
O	O	1. The therapist explained endemic imagery.
O	O	2. The therapist explained how to image.
O	O	3. The therapist explained the Subjective Units of disturbance Scale (SUDS).
O	O	4. The therapist asked subject to remove all glasses, contact lenses, watches, bracelets, or any restriction.
O	O	5. The therapist asked the subject to lean back in the chair in a comfortable position.
O	O	6. The therapist instructed the subject to close his or her eyes and keep them closed throughout the session.
O	O	7. The therapist described the fifth item from the endemic images list and encouraged the subject to imagine this scene in considerable detail, until he or she was able to picture the scene. When pictured, the subject was instructed to raise the right index finger.
O	O	8. As soon as the subject raised his or her index finger, the therapist instructed the subject to stop visualizing the scene.
O	O	9. The therapist described the fifth scene from the anxiety hierarchy and encouraged the subject to imagine this scene in considerable detail.
O	O	10. The therapist asked the subject to "Stop" thinking about the aversive scene as soon as the subject raised his or her left index finger.
O	O	11. The therapist asked subject to rate SUDs and recorded response.

Endemic Imagery Compliance Rating Form

Subject #_____
Rater_____

Y / N

O O 12. This regimen was maintained until 0 SUDS are reported for the scene in question. The therapist repeated the procedure in # 7 and # 8 while descending down the endemic imagery hierarchy (e.g.,fourth, third, second, first, fifth item , etc.).

O O 13. Repeated #9.

O O 14. Repeated #10.

O O 15. Repeated #11.

O O 16. therapist proceeded to # 18 only when 0 SUDS was reported.

O O 17. The therapist described the next item from the endemic images list and encouraged the subject to imagine this scene in considerable detail, until he or she was able to picture the scene.

O O 18. Repeated #12.

O O 19. The therapist described the next scene (i.e., fourth,third, second and first in order) from the anxiety hierarchy and encouraged the subject to imagine this scene in considerable detail.

O O 20. Repeated #9.

O O 21. Repeated #10.

O O 22. Repeated #11.

O O 23. Repeated #12.

O O 24. Repeated #16.

O O 25. Regimen was maintained until 0 SUDS was reported for all scenes in the anxiety hierarchy.

Appendix I

Social Validity Scale

Please respond to the following statements by writing the correct number next to the statement.

Very Much=1,Much=2,A fair amount=3,
A little=4,Not at all=5.

___1. I enjoyed the treatment sessions.

___2. The treatments made me relaxed

___3. I would recommend this treatment to my classmates.

___4. I believe that this treatment helped me in overcoming my fear of tests.

Appendix J

Table 5

Means and Standard Deviations

of Outcome Measures By Group

Posttest 1

Outcome Measure	Group: Systematic Desensitization M	SD	Endemic Imagery M	SD	Wait-list Control M	SD
TAI total	54.652	35.415	59.756	27.103	79.977	15.554
TAI/W	62.846	33.424	58.231	27.249	82.302	12.815
TAI/E	48.154	32.223	64.077	30.505	75.000	17.767
BAI	10.923	16.225	11.923	10.226	12.385	8.856
BDI	5.921	8.899	8.711	6.555	15.252	7.490
Final Exam	64.462	8.743	67.846	11.268	48.615	22.670
Heart Rate	77.531	12.073	81.200	8.443	78.585	11.175

Appendix J (continued)

Table 6

Means and Standard Deviations

of Outcome Measures By Group

Posttest 2

Outcome Measure	Group: Systematic Desensitization		Endemic Imagery		Wait-list Control	
	M	SD	M	SD	M	SD
TAI total	34.231	26.090	50.231	32.332	66.385	32.456
TAI/W	49.692	26.427	56.538	33.261	69.308	28.645
TAI/E	32.077	29.129	43.385	27.729	60.932	36.024
BAI	7.231	7.293	11.077	8.139	15.461	12.394
BDI	6.461	9.492	8.231	6.697	8.538	8.724

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