

THE EFFECTS OF SYSTEMATIC DESENSITIZATION OF  
TEST ANXIETY ON COGNITIVE PERFORMANCE  
FOR COLLEGE STUDENTS OF LOW,  
AVERAGE AND HIGH  
APTITUDE

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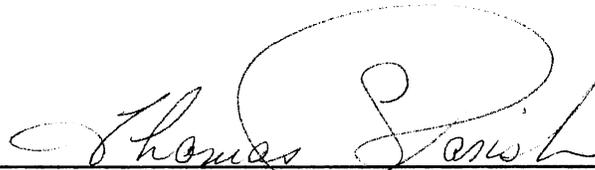
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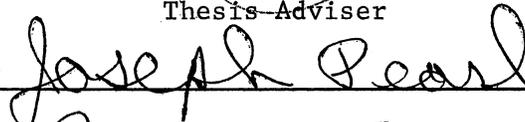
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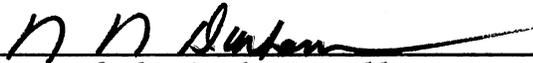
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## PREFACE

This study is concerned with the effectiveness of systematic desensitization of test anxiety for heightening cognitive performance of college students. The primary objective is to delineate subject characteristics which interact with the treatment procedures. This would make it possible to specify for what type of student systematic desensitization would be most beneficial.

The author wishes to express appreciation to his major adviser, Dr. Thomas S. Parish, for his guidance throughout the study. Appreciation is also expressed to Dr. Roy Gladstone for his guidance in the initial stages of the experiment as well as to Dr. Bill F. Elsom and Dr. Joseph H. Pearl for their invaluable assistance.

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## CHAPTER I

### INTRODUCTION

It is well known that students are subject to the debilitating effect of test anxiety on cognitive performance. Consequently, much effort has been devoted to assessing various treatment methods for reducing test anxiety. Systematic desensitization is one such technique. Although this method has been relatively effective in reducing anxiety, its use has recently come under careful scrutiny. In many cases, desensitization of test anxiety has not resulted in significant changes in performance on a variety of academic and cognitive measures. Several explanations can be offered to account for this failure. One possible explanation is that there is a differential effect of desensitization on cognitive performance dependent upon subject characteristics. It is the purpose of this experiment to investigate the influence of one such subject characteristic (e.g., students' aptitude) on 1) test anxiety and 2) cognitive performance following systematic desensitization.

#### Anxiety as a Learned Response

Since the classic study by Watson and Raynor (1920) the view that anxiety is a response that occurs through the process of learning has gained momentous support (Dollard and Miller, 1950; Paul, 1966). Anxiety is believed to be stimulated by certain cues in the environment (Paul, 1966) and may lead to adaptive or maladaptive behaviors learned through

anxiety reduction (Miller, 1951). These instrumental behaviors may be adopted by persons via the processes of trial and error or social imitation (Bandura, 1961). In the present paper, only the conditioned association of cues and anxiety will be delineated.

Anxiety may be evoked by a painful stimulus (Wolpe, 1958) or the perception of threat (Spielberger, 1972). The irrelevant stimuli present in this situation derive anxiety-evoking properties with the potential to arouse the emotional response upon subsequent presentation. That is, if a person is made anxious during an examination, the stimuli present in the situation become conditioned stimuli which possess the power to elicit anxiety upon future presentation. The emotional response thus becomes a learned reaction to the stimuli present in the original learning situation. Furthermore, stimulus generalization occurs through which stimuli similar to the original learning situation gain anxiety-evoking properties (Wolpe, 1958). The process by which this occurs is primarily learning by contiguity or classical conditioning.

#### Anxiety Reduction as a Relearning Experience

Since anxiety reactions are the result of learning processes, then it follows that psychotherapeutic techniques (where anxiety-reduction is the major goal) should be based upon the same learning principles (Bandura, 1961). Counterconditioning is one such technique employed by Wolpe (1958). An example of counterconditioning can be seen in reciprocal inhibition. Reciprocal inhibition is the concept introduced by Sherrington (1938) and when applied to anxiety, states:

If a response antagonistic to anxiety can be made to occur in the presence of anxiety-evoking stimuli so that it is accompanied by a complete or partial suppression of the anxiety responses, the bond between these stimuli and the anxiety responses will be weakened (Wolpe, 1958, p. 71).

Sexual responses, for example, are one set of reactions which are antagonistic to anxiety. A person who is anxious cannot also be sexually aroused because the sexual responses reciprocally inhibit the anxiety responses.

Wolpe (1958) made use of the reciprocal inhibition principle in systematic desensitization, a procedure based upon Jacobson's (1938) techniques of differential relaxation. An anxiety hierarchy is constructed in which a list of anxiety-evoking situations are rank-ordered with the least anxiety-evoking stimulus placed first and the most anxiety-evoking stimulus placed last. The subject first learns deep muscular relaxation and once relaxed, imagines the least anxiety-evoking situation. In like fashion, the subject proceeds through the hierarchy until the relaxation response has inhibited the anxiety response to all the hierarchy items. Thus, conditioned inhibition of the anxiety response develops and relaxation becomes the conditioned response elicited by the previous anxiety-evoking stimulus situations (Wolpe, 1958).

Many variations of the original systematic desensitization procedure have been employed to treat an assortment of maladaptive behaviors (Wolpe, 1973). Advantages of this procedure over other techniques are that 1) a minimum of therapist's time is spent (Wolpe, 1966), 2) patients can be treated in groups (Lazarus, 1961), and 3) it does not require verbal ability (Obler and Terwilliger, 1970).

### Test Anxiety as a Learned Response

Individuals differ in their predisposition to respond to a testing situation with an anxiety response. These individual differences may be viewed as a direct result of an individual's learning history. Those subjects who respond to a testing situation with an anxiety response are most likely to be the ones who perceive a threat (e.g., anticipate failure) as a direct result of prior conditioning. Conversely, those subjects who do not respond with an anxiety response do not perceive a threat (e.g., anticipate success). Interestingly, Taylor (1956) reported that those subjects with high anxiety (manifest anxiety) demonstrated superior conditionability (classical conditioning) when compared to low anxiety subjects. This may indicate that high anxiety subjects are more likely to respond to a testing situation with an anxiety response because they are more easily conditioned.

### Effects of Anxiety on Cognitive Performance

Since the initial presentation of test anxiety theory (Mandler and Sarason, 1952; Sarason, Mandler and Craighill, 1952) hundreds of studies have reported investigations of relationships between test anxiety and a variety of educational variables. Both school achievement and intelligence test scores are negatively related to test anxiety (Sarason, 1961). Furthermore, changes in anxiety level are negatively correlated with changes in achievement and intelligence test performance over time (Hill and Sarason, 1966; Sarason, Hill and Zimbardo, 1964). However, the inverse relationship is not found for subjects scoring high or low on intelligence tests (Denny, 1966; Feldhusen and Klausmeir, 1962; Spielberger

and Katzenmeyer, 1959). For example, Spielberger and Katzenmeyer (1959) found a substantial relationship between Manifest Anxiety Scale scores and grade point average for college students of average aptitude but no correlation for high or low aptitude students. Academic success seemed to be too difficult for low aptitude subjects whose poor grades were unrelated to manifest anxiety while the high aptitude subjects obtained good grades, regardless of their anxiety.

The latter finding, that high aptitude subjects performed well despite their anxiety, suggests that academic success for them was an easy task. Task difficulty is one variable found to intervene between anxiety and performance. For difficult tasks, anxiety impedes performance whereas for easy tasks, cognitive performance may be facilitated by anxiety. For example, low anxiety subjects demonstrated superior learning of a list of nonsense syllables with high intralist interference (e.g., a complex task) while high anxiety subjects performed better on a list with low interference (e.g., a simple task) (Montague, 1953).

These findings suggest that for high aptitude subjects, academic performance may not be adversely affected by anxiety since for these subjects, achievement in school is a relatively simple task. In fact, Denny (1963) has proposed that task difficulty is a joint function of task complexity and subject's intelligence. The lack of an inverse relationship between anxiety and performance for the high aptitude subjects in Spielberger and Katzenmeyer's (1959) study conforms to this notion. Since academic success was a simple task for these subjects, anxiety should have facilitated their achievement, resulting in a positive correlation between anxiety and grade point average. Why this did not occur,

is unknown. A later study, however, did find that anxiety facilitated performance for subjects of high aptitude (Denny, 1963).

The implications of the above findings are that reductions in anxiety may have differential effects for subjects of varying aptitude levels. For subjects of average aptitude, alleviation of anxiety should result in increased performance whereas reductions in anxiety for superior aptitude subjects may result in a performance decrement. Performance should undergo no change for subjects of low aptitude.

#### Systematic Desensitization of Test Anxiety

The treatment procedure most widely employed in the alleviation of test anxiety has been systematic desensitization which has been discussed above. Two dependent measures have been used to assess the effectiveness of this technique, self-reported anxiety and performance on some cognitive skill or academic test.

The use of systematic desensitization has reliably reduced self-reported anxiety when it was the only dependent variable (Crighton and Jeru, 1969; Dawley, 1973; Kondas, 1967; Scissons and Njaa, 1973; Suinn, 1968; Wickramasekera, 1972) and when it was examined in conjunction with academic performance (e.g., Allen, 1971). Only two studies reviewed by the author failed to demonstrate the effectiveness of systematic desensitization in reducing self-reported anxiety (Johnson and Sechrest, 1968; Lomont and Sherman, 1971). That systematic desensitization was reported to alleviate test anxiety in some, but not all studies suggests to the present author that other unexplained variables interact with the treatment effect resulting in these somewhat inconsistent findings. However, this has yet to be demonstrated. At the present time, it

may be concluded that systematic desensitization is an effective technique in reducing self-reported test anxiety for most subjects.

The effectiveness of systematic desensitization on the second dependent measure, cognitive performance, is much less consistent. The original proposal, that test anxiety affected cognitive performance, suggested that reductions in test anxiety would result in increased performance on a cognitive task. Several investigators found this to occur following a combination of desensitization and study counseling (Doctor, Aponte, Burry and Welch, 1970; Katahn, Strenger and Cherry, 1966) and following systematic desensitization alone (Donner, 1970; Donner and Guerney, 1969; Mann and Rosenthal, 1969). However, Johnson and Sechrest (1968) found increase academic performance without the concomitant reduction in self-reported anxiety following desensitization. Furthermore, the majority of investigators have found systematic desensitization to significantly reduce self-reported anxiety without increased cognitive performance (Allen, 1971; Emery and Krumboltz, 1967; Freeling and Shemberg, 1970; Garlington and Cotler, 1968; Laxter, Quarter, Kooman and Walker, 1969; Laxter and Wlaker, 1970; Osterhouse, 1972; Richardson and Suinn, 1973).

These inconsistencies have recently led many investigators to discard systematic desensitization as a viable technique for test anxious subjects and have begun examining cognitive strategies. For example, Wine (1973) has developed a cognitive-attentional approach and Michenbaum (1972) has investigated the effectiveness of insight-oriented discussion and training in self-instructions for avoiding worry and directing attention to tasks.

Allen (1972), however, has suggested that part of the confusion in the literature is due to the fact that subject characteristics have not been examined. The majority of the research has selected subjects with test anxiety and randomly assigned them to experimental groups. It may be that systematic desensitization is an effective technique for some but not all subjects. McMillian and Osterhouse's (1967) study is an excellent example demonstrating how subject characteristics interact with treatment effects. These investigators found systematic desensitization to be effective in reducing self-reported anxiety for all subjects, but effective in increasing academic performance only for those subjects with low generalized anxiety. Test-anxious subjects with high generalized anxiety did not improve on a college examination (McMillian and Osterhouse, 1967). Too few experiments of this type exist.

Researchers have examined the effectiveness of systematic desensitization on cognitive performance blindly assuming that the test-anxious subject would improve academically when anxiety was reduced. No concern has been directed to the cognitive abilities of the subjects. It is likely that some subjects will perform poorly on a cognitive abilities test whether they experience anxiety or not and conversely, that some subjects will perform well, regardless of their anxiety. In fact, findings discussed above suggest that anxiety differentially affects performance depending upon subject's aptitude or, expressed differently, task difficulty (which is determined, in part, by subject's aptitude). The inconsistent findings of the systematic desensitization research may merely reflect the absence of consideration of subject's ability. It seems surprising that subject's aptitude has not been offered to account for the discrepant findings, given the aforementioned studies and the

further emphasis by Denny (1966) and Hansen (1974) that intellectual ability is a crucial variable when examining test anxiety.

Therefore, it is the purpose of the present experiment to test the hypothesis that reductions in test anxiety brought about through systematic desensitization will result in differential changes in cognitive performance, depending upon subject's aptitude. The following hypotheses are offered:

1. Following the systematic desensitization procedures, the cognitive performance of low aptitude subjects will not be significantly different than low aptitude subjects who do not receive the treatment.
2. Following the systematic desensitization procedures, the cognitive performance of average aptitude subjects will be significantly greater than average aptitude subjects who do not receive the treatment.
3. Following the systematic desensitization procedures, the cognitive performance of high aptitude subjects will be significantly lower than high aptitude subject who do not receive the treatment.

## CHAPTER II

### METHOD

#### Subjects

All subjects in the present experiment were selected from undergraduate introductory psychology classes. A brief statement regarding the test anxiety treatment was read to several classes and subjects later had an opportunity to volunteer for the program. All students were aware of the departmental policy of awarding extra credit points which would be added to regular course work for participating as experimental subjects. One hundred and forty subjects volunteered. Subsequent to volunteering for the treatment program, each subject signed a release form permitting the investigator access to the subject's American College Test score and course grades.

#### Procedure

All subjects were classified as either low, average, or high aptitude subjects according to their scores on the American College Test which is recorded in the office of the University registrar. A rank-ordered list of subjects was made and then divided into three aptitude groups. Subjects whose scores were in the lower third of the distribution were classified low aptitude subjects while those subjects whose scores were located in the middle third or upper third were classified as average

aptitude and high aptitude subjects, respectively. The American College Test scores are similar to Spielberger and Katzenmeyer's (1959) measure of aptitude and Doctor et al. (1970) criterion for classifying subjects into achievement levels.

The low aptitude subjects were randomly assigned to either a systematic desensitization treatment group or a waiting list control group. Likewise, the average aptitude subjects and the high aptitude subjects were randomly assigned to either the treatment or control group.

The subjects assigned to the treatment groups received the systematic desensitization procedures as outlined by Paul (1966). The procedure involved five one hour sessions (one session per week) in which subjects met in groups of twelve. The first session was devoted to an explanation of the treatment, construction of the hierarchy and training in progressive relaxation. It was explained to the subjects that their anxiety reactions are learned responses and that treatment consists of a relearning experience. A list of test-related situations was constructed according to what the subjects felt were anxiety arousing. Each group of experimental subjects, then, rank-ordered the list in order of increasing anxiety arousal from least anxiety arousing for number one to most anxiety arousing for number ten. Although the order varied somewhat across the groups, the specific hierarchy items were held constant. A sample hierarchy is presented in Table I (see Appendix). Subjects were then instructed in progressive relaxation as introduced by Jacobson (1938) and shortened by Wolpe (1958) and Paul (1966). Subjects were requested to practice relaxation at home for fifteen minutes each day.

On the second session and every subsequent session, subjects underwent systematic desensitization proper. The experimenter induced

subjects to relax and then proceeded through the hierarchy of items. For each item, the experimenter described the stimulus situation and the subjects visualized themselves in that situation. If, during visualization, and subject experienced anxiety, he was instructed to raise his index finger, signaling the experimenter to terminate description of the hierarchy item. At that point, subjects were instructed to cease visualization and relax until the experimenter deemed it appropriate to continue the procedure. Each item in the hierarchy was presented to all subjects twice during which no subject experienced anxiety arousal.

The subjects assigned to the waiting list control group did not receive any part of the aforementioned treatment.

Following the termination of the systematic desensitization procedures, both treatment and control subjects were administered the Nelson-Denny Reading Test. Administration of the test was performed by graduate students with whom the subjects had no prior acquaintance while the investigator observed through a one-way mirror. This criterion provided a performance measure requiring acquisition and retention of information under time pressure and consequently was believed to be sensitive to the effects of test anxiety. It is similar to the dependent measure employed by Mann and Rosenthal (1969) and Lomont and Sherman (1971). Prior to administration, all subjects were given ego-involving instructions (adapted from Sarason, 1956) indicating to the subjects that their performance would be a measure of general intelligence. The specific instructions are presented in Table II (see Appendix). Following test administration, each subject was de-briefed. This insured that subjects did not experience any further anxiety concerning their performance on

the reading test. In addition, control subjects were given the opportunity to receive the systematic desensitization procedures.

Two different two by three analyses of variance were employed to analyze the results of the experiment. The first analysis compared the treatment variable ( systematic desensitization vs. control) by aptitude levels (low aptitude vs. average aptitude vs. high aptitude) with regard to the comprehension scores of the Nelson-Denny Reading Test. The second analysis compared the treatment variable by aptitude levels with regard to gain scores on course examinations in an introductory psychology course. The experimental design can best be understood by referring to Table III (see Appendix).

## CHAPTER III

### RESULTS

With regard to the scores on the Nelson-Denny Reading Test, the analysis of variance revealed no significant effect of the treatment variable on comprehension of reading material ( $F = .02$ ,  $df = 1.73$ ,  $p > .05$ ) and no treatment  $\times$  aptitude interaction ( $F = 1.53$ ,  $df = 2.73$ ,  $p > .05$ ). These results failed to support the hypothesis that the treatment would significantly affect reading comprehension and that aptitude level would interact with the treatment variable. As would be expected, aptitude level contributed to much of the variance in reading scores ( $F = 43.75$ ,  $df = 2.73$ ,  $p < .001$ ). This suggests that American College Test scores do significantly predict performance on cognitive measures, in this case, reading comprehension.

The analysis of grades in an introductory psychology class was undertaken by employing gain scores. Pretest and posttest scores on course examinations were compared to derive a gain score for each subject. These course examinations were two different multiple choice psychology examinations administered as regular course work. Analysis of these measures revealed no significant main effects of treatment ( $F = 3.35$ ,  $df = 2.73$ ,  $p > .05$ ) or aptitude ( $F = 2.61$ ,  $df = 2.73$ ,  $p > .05$ ) and no interaction ( $F = 0.23$ ,  $df = 2.73$ ,  $p > .05$ ). These results failed to support the hypotheses that the treatment variable would significantly affect

grades in an introductory psychology class and that the treatment effect would interact with aptitude level.

Source tables of the statistical tests are presented in Table II (see Appendix).

Responses to an open-ended question served as indicants of reductions in self-reported anxiety. Subsequent to administration of the reading test, experimental subjects were asked, "How would you evaluate the efficiency of the test anxiety program?" Although responses varied, all but two subjects reported positive changes with regard to anxiety during examinations. Furthermore, several subjects reported beneficial changes with regard to sleeping at nights and dealing with everyday activities. Sample responses are presented in Table V (see Appendix).

## CHAPTER IV

### DISCUSSION

The results of the statistical analyses failed to support the major experimental hypotheses. The systematic desensitization procedures failed to significantly affect differences between experimental and control groups on a reading test and grades in introductory psychology regardless of aptitude level. This may lead one to conclude that systematic desensitization may be omitted as a possible intervention strategy for accentuating performance for test-anxious individuals. However, before this conclusion can be accepted, other explanations must be considered. Several experimental conditions may have produced the non-significant findings.

A reading comprehension task was employed as a dependent measure because reading is believed to be highly influenced by anxiety. Sarason et al. (1964) originally indicated reading as a skill influenced by anxiety and Mann and Rosenthal (1969) and Lomont and Sherman (1971) subsequently examined the influence of anxiety reduction on reading performance. Despite the fact that Lomont and Sherman (1971) found no change in reading scores following anxiety reduction, reading is still viewed as a negative correlate of anxiety. A significant variation in the present experiment, however, is that the Nelson-Denny Reading Test was employed. A possible explanation of the non-significant results may be that this measure is simply insensitive to the effects of anxiety.

In order to experimentally demonstrate the beneficial effects of anxiety-reduction on cognitive performance, a sufficient amount of stress must be present during administration of the criterion measure. Without stress, anxiety will not be evoked and consequently, treated subjects will not have the opportunity to exhibit heightened performance in relation to untreated subjects. Research in anxiety reduction is thus dependent upon the degree of stress during administration of the dependent measures. It is questionable that the necessary amount of stress was present during the administration of the Nelson-Denny Reading Test. Subjects were aware that performance on the test would in no way affect their lives and although ego-involving instructions were presented prior to test administration, it is likely that the degree of anxiety evoked by the test was minimal. Support for this explanation lies in the observation by the investigator of the seemingly indifferent manner in which the subjects responded to the test. During the de-briefing session, the majority of subjects confirmed this observation by reporting that they were not very concerned about their performance. This is a basic problem in test anxiety research. For example, Laxter and Walker (1970), too, attributed their non-significant findings to the non-consequential nature of the testing situation. The solution to this problem requires the use of non-experimental tests in which stress is inherent.

The use of scores on psychology examinations as the dependent measure met the above requisite since they were part of regular course work. Yet despite fulfillment of this requirement, performance of treated subjects was not significantly different from untreated subjects. This is discrepant with the experimental hypotheses and simply furthers the enigmatic status of desensitization research. Why performance on course

examinations was not improved is unknown. It is not likely that the treatment failed to reduce test anxiety since all but two treated subjects reported positive changes resulting from the treatment program. Rather, it seems that the relationship between anxiety-reduction and cognitive performance (i.e., course examinations) is dependent upon variables other than subject's aptitude. Performance on course examinations depend not only on anxiety level but perhaps more importantly, subject's study skills. Allen (1972) has suggested that whereas desensitization can remove the avoidance of study and examination situations, it does nothing regarding study skills. Using desensitization alone thus, removes anxiety towards tests but fails to provide subjects with the abilities necessary to improve academic performance. If this proves to be the case, then desensitization alone would work best for test-anxious subjects with good study skills whereas a combination of desensitization and study skills training would be indicated for test-anxious subjects who lack these skills. Future research should be directed towards examining the interactions between treatment procedures and similar subject characteristics.

#### SELECTED REFERENCES

- Allen, G. J. Effectiveness of study counseling and desensitization in alleviating test anxiety in college students. Journal of Abnormal Psychology, 1971, 77, 282-289.
- Allen, G. J. The behavioral treatment of test anxiety: Recent research and future trends. Behavior Therapy, 1972, 3, 253-262.
- Bandura, A. Psychotherapy as a learning process. Psychological Bulletin, 1961, 58, 143-159.
- Dawley, H. Massed group desensitization in reduction of test anxiety. Psychological Reports, 1973, 30, (2), 359-363.
- Denny, J. P. Effects of anxiety and intelligence on concept formation. Journal of Experimental Psychology, 1966, 72, 596-602.
- Doctor, R. M., Aponte, J., Burry, A., and Welch, R. Group counseling versus behavior therapy in treatment of college underachievement. Behavior Research and Therapy, 1970, 8, 87-89.
- Dollard, J., and Miller, N. E. Personality and psychotherapy. New York: McGraw-Hill, 1950.
- Donner, L. Automated group desensitization: A follow-up report. Behavior Research and Therapy, 1970, 8, 241-247.
- Emery, J. R., and Krumboltz, J. D. Standardized vs. individualized hierarchies in desensitization to reduce test anxiety. Journal of Counseling Psychology, 1967, 14, (3), 204-209.
- Feldhusen, J. F., and Klausmeir, H. J. Anxiety, intelligence, and achievement in children of low, average, and high intelligence. Child Development, 1962, 33, 403-409.
- Freeling, N. W., and Shemberg, K. M. The alleviation of test anxiety by systematic desensitization. Behavior Therapy and Research, 1970, 8, 293-299.
- Garlington, W. K., and Cotler, S. B. Systematic desensitization of test anxiety. Behavior Research and Therapy, 1968, 6, 247-256.
- Hansen, J. B. Effects of feedback, learner control, and cognitive abilities on state anxiety and performance in a computer-assisted instruction task. Journal of Educational Psychology, 1974, 66, (2), 247-254.

- Hill, K. T., and Sarason, S. B. The relation of test anxiety and defensiveness to test and school performance over the elementary school years. Monographs of the Society for Research in Child Development, 1966, 31, (2).
- Jacobson, E. Progressive relaxation. Chicago: University of Chicago Press, 1938.
- Johnson, S. M., and Sechrest, L. Comparison of desensitization and progressive relaxation in treating test anxiety. Journal of Consulting and Clinical Psychology, 1968, 32, (3), 280-286.
- Kondas, O. Reduction of examination anxiety and "stage fright" by group desensitization and relaxation. Behavior Research and Therapy, 1967, 5, 275-281.
- Laxter, R. M., Quarter, J., Kooman, A., and Walker, K. Systematic desensitization and relaxation of high test-anxious secondary school students. Journal of Counseling Psychology, 1969, 16, (5), 446-451.
- Laxter, R. M., and Walker, K. Counterconditioning vs. relaxation in the desensitization of test anxiety. Journal of Counseling Psychology, 1970, 17, (5), 431-436.
- Lazarus, A. A. Group therapy of phobic disorders by systematic desensitization. Journal of Abnormal and Social Psychology, 1961, 63, 504-510.
- Liebert, R. M., and Morris, L. W. Cognitive and emotional components of test anxiety: A distinction and some initial data. Psychological Reports, 1967, 20, 975-978.
- Lomont, J. F., and Sherman, L. J. Group desensitization and group insight therapies for test anxiety. Behavior Therapy, 1971, 2, 511-518.
- Mandler, G., and Sarason, S. H. A study of anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 228-229.
- Mann, J., and Rosenthal, T. L. Vicarious and direct counterconditioning of test anxiety through individual and group desensitization. Behavior Research and Therapy, 1969, 7, 359-367.
- McMillian, J. R., and Osterhouse, R. A. Specific and generalized anxiety as determinants of outcome with desensitization of test anxiety. Journal of Counseling Psychology, 1967, 19, (6), 518-521.
- Michenbaum, D. H. Cognitive modification of test anxious college students. Journal of Consulting and Clinical Psychology, 1972, 39, 370-380.
- Miller, N. E. Learnable drives and rewards. In S. S. Stevens (Ed.), Handbook of experimental psychology. New York: Wiley, 1951.

- Montague, E. K. The role of anxiety in serial rote learning. Journal of Experimental Psychology, 1953, 45, 91-96.
- Obler, M., and Terwilliger, R. F. Pilot study on the effectiveness of systematic desensitization with neurologically impaired children with phobic disorders. Journal of Consulting and Clinical Psychology, 1970, 34, 314-318.
- Osterhouse, R. A. Desensitization and study-skills as treatment for two types of test-anxious students. Journal of Counseling Psychology, 1972, 19, (4), 301-307.
- Paul, G. L. Insight versus desensitization in psychotherapy. Stanford: Stanford University Press, 1966.
- Richardson, F. C., and Suinn, R. M. A comparison of traditional systematic desensitization, accelerated massed desensitization and anxiety management training in the treatment of mathematics anxiety. Behavior Therapy, 1973, 4, 212-218.
- Sarason, I. G. Effect of anxiety, motivational instructions, and failure on serial learning. Journal of Experimental Psychology, 1956, 51, 253-256.
- Sarason, I. G. Test anxiety and the intellectual performance of college students. Journal of Educational Psychology, 1961, 52, 201-206.
- Sarason, S. B., Hill, K. T., and Zimbardo, P. A longitudinal study of the relation of test anxiety to performance on intelligence and achievement tests. Monographs of the Society for Research in Child Development, 1964, 29, (7).
- Sarason, S. H., Mandler, G., and Craighill, P. G. The effect of differential instructions on anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 561-565.
- Scissons, E. H., and Njaa, L. J. Systematic desensitization of test anxiety: A comparison of group and individual treatment. Journal of Consulting and Clinical Psychology, 1973, 41, 470.
- Sherrington, C. S. The integrative action of the nervous system. New Haven: Yale University Press, 1947.
- Spielberger, C. D. Anxiety and behavior. New York: Academic Press, 1966.
- Spielberger, C. D. Anxiety: Current trends in research. New York: Academic Press, 1972.
- Spielberger, C. S., Gorsuch, R. L., and Lushene, R. E. State-trait anxiety inventory. Palo Alto, Calif.: Consulting Psychologists Press, 1972.

- Suinn, R. The desensitization of test anxiety by group and individual treatment. Behavior Therapy and Research, 1968, 385-387.
- Taylor, J. A. Drive theory and manifest anxiety. Psychological Bulletin, 1956, 53, 303-320.
- Watson, J. B., and Rayner, R. Conditioned emotional reactions. Journal of Experimental Psychology, 1920, 3, 1-14.
- Wechsler, D. Manual for the Wechsler Adult Intelligence Scale. New York: Psychological Corporation, 1955.
- Wickeramasekera, I. Instructions and EMG feedback in systematic desensitization: A case report. Behavior Therapy, 1972, 3, 460-465.
- Wine, J. Cognitive-attentional approaches to test anxiety modification. Paper presented as part of a symposium entitled "Anxiety and Instruction" at the American Psychological Association, Montreal, August, 1973.
- Wolpe, J. Psychotherapy by reciprocal inhibition. Stanford, Calif.: Stanford University Press, 1958.
- Wolpe, J. The conditioning and deconditioning of neurotic anxiety. In Spielberger, C. D. (Ed.), Anxiety and Behavior. New York: Academic Press, 1966.
- Wolpe, J. The current status of systematic desensitization. American Journal of Psychiatry, 1973, 130, (9), 961-965.

**APPENDIX**

**TABLES**

TABLE I  
HIERARCHY OF TEST-RELATED SITUATIONS

- 
1. Professor announces that an exam will be given in one week.
  2. Professor describes exam the day before it is to be given.
  3. Trying to fall asleep the night before an exam.
  4. Walking across campus toward classroom just before an exam.
  5. Waiting for professor in exam room. Professor is late. He walks in.
  6. Studying the night before. Not knowing what to study. Having trouble concentrating.
  7. Studying the four before an exam. Exam counts for one half of final grade.
  8. Walking into classroom the day of an exam. Other students are quizzing each other about exam material.
  9. Professor states time limits on exam and keeps you informed about how much time remains. Other students are finished and have left.
  10. Reading first item on exam and drawing a blank. Getting confused. Not knowing the answer.
-

TABLE II  
EGO-INVOLVING INSTRUCTIONS\*

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The test you are about to take involves comprehension of reading material. The skills involved are those related to general intelligence which can be used to predict such things as course grades and success in later life. Of course, your intelligence will primarily determine whether you do well or poorly on this exam. At a later date there will be an opportunity for each of you to compare your score with other students. You will then be able to determine how your abilities and capacities compare with other people like you. You should perform as best you can.

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\*These instructions were given prior to administration of the Nelson-Denny Reading Test.

TABLE III  
EXPERIMENTAL DESIGN\*

Treatment	SD			
	C			
		Low	Average	High

\*The analysis of both the reading scores and the examination grades were undertaken in the above manner.

TABLE IV  
RESULTS OF STATISTICAL ANALYSES

Source	SS	df	ms	F	p
Reading Comprehension					
Treatment	0.27	1	.27	.02	n.s.
Aptitude	103.34	2	516.1	43.75	.001
Interaction	36.23	2	18.11	1.53	n.s.
Error	862.37	73	11.81	--	
Gain Scores in Introductory Psychology					
Treatment	27.09	1	27.09	3.35	.1
Aptitude	42.14	2	21.07	2.61	.1
Interaction	3.70	2	1.85	.23	n.s.
Error	590.01	73	8.08		

TABLE V  
SAMPLE RESPONSES TO OPEN ENDED QUESTION

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Subject #1

" . . . whenever tension is in my body, I already find myself automatically relaxing. Deep breathing automatically occurs without my having to do or think about it. My test scores are the same but I'm more relaxed and can accept test taking with a smile instead of a fearful expression."

Subject #2

"I think it helped me to go to sleep easier and tests don't get me down as much anymore."

Subject #3

"It helped me relax more often not only for tests but for other aspects of my life."

Subject #4

"I feel that I can now do better on tests since I can now make myself relax more easily. I don't know if I do better on tests but I'm better able to face the situation without so much anxiety."

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VITA

Kingsley John Lentz

Candidate for the Degree of  
Master of Science

Thesis: THE EFFECTS OF SYSTEMATIC DESENSITIZATION OF TEST ANXIETY ON  
COGNITIVE PERFORMANCE FOR COLLEGE STUDENTS OF LOW, AVERAGE AND  
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