COMBINATION OF COGNITIVE GROUP THERAPY AND
SUBLIMINAL STIMULATION IN TREATMENT
OF TEST-ANXIOUS COLLEGE MALES

DISSERTATION

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Silverman's technique of subliminal psychodynamic activation via tachistoscope has been demonstrated to facilitate competitive performance in college males when a sanctioned oedipal gratification fantasy stimulus is utilized. This effect is presumed to result from a decrease in unconscious neurotic conflict. The cognitive component of Meichenbaum's Cognitive Behavior-Modification has been shown effective in reducing test anxiety. This effect is presumed to stem from conscious identification and modification of negative self-statements.

The hypothesis that a combination of the two approaches would prove more effective than the cognitive group therapy alone in reducing test anxiety was tested. Thirty-four test-anxious male students attended 10 sessions wherein they received subliminal stimulation and cognitive group therapy. Half of the students were presented active, and half neutral stimuli subliminally via tachistoscope. All received the cognitive group therapy. Therapists conducting the groups were blind to the hypothesis being tested and the assignment of subjects to experimental and control groups.
Subjects were randomly assigned to the experimental conditions in order to control for group and therapist effects.

Pretreatment and posttreatment assessments of test anxiety were made using the Digit Symbol subtest of the WAIS, Liebert-Morris Test-Anxiety Questionnaire, and magnitude estimation scales for anxiety felt prior to testing and importance of the test being taken. A magnitude estimation scale for anxiety felt prior to testing was also taken for each classroom examination taken during "midterm week."

Results show no significant effect for the subliminal treatment. Significant decreases in test anxiety are demonstrated for both experimental groups combined. No significant differences are evident between the experimental groups on the magnitude estimation scales completed in class.

Possible reasons for failure to demonstrate a subliminal effect are discussed, and it is concluded that there may well be a need for more definitive study of subliminal stimulation procedures.
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A common presenting complaint of persons seeking psychotherapy is inordinate and irrational anxiety in the face of a specific object or situation. The general clinical characteristics include heightened autonomic activity, avoidance, if possible, of the feared object or dreaded situation, and deterioration of performance of any number of functions. Removal of the feared object or escape from the dreaded situation results in abatement of these symptoms but often leaves the sufferer with feelings of frustration, embarrassment, and lowered self-esteem. For the student experiencing test anxiety, the alternatives are escape from the situation by skipping tests or dropping out of school altogether, persevering at test-taking with impaired performance, or undergoing treatment to alleviate the anxiety.

Both behavioral and psychodynamic modalities have been used in the treatment of test anxiety. Psychodynamic treatment has typically followed the procedures prescribed for the treatment of various forms of neurotic anxiety outlined in the psychoanalytic literature and derived from Freud's (1926) formulations of neurotic conflict and anxiety. The object or situation eliciting the fear or dread is given
little emphasis, but rather is assumed to have symbolic importance in activating unconscious neurotic conflict. Treatment is focused upon leading the patient to identify, understand, and overcome or "give up" this neurosis. The therapeutic process is usually lengthy, individual psychotherapy with a highly trained practitioner is advocated, and therapeutic success is based upon the alteration of unconscious psychic structures. Implied in much of the psychoanalytic literature is the concept of symptom substitution which predicts that treatment aimed at alleviation of a specific symptom (for example fear of snakes in the snake phobic) may result in a reduction of anxiety in the face of the specific stimulus (the snake) but that another symptom (perhaps phobic dread of hypodermic needles) would supplant the snake phobia. The rationale for such a formulation is that the snake and hypodermic needle are both simply symbols which activate an unconscious neurotic conflict. This criticism has been directed at behavioral treatments which are aimed at the reduction of specific symptoms rather than at the resolution of underlying conflicts which may lie festering in the unconscious (Wachtel, 1977).

Behavioral treatments of specific anxiety came into favor with Wolpe's (1958) description of his systematic desensitization treatment. Modifications of systematic desensitization, modeling techniques, rehearsal tasks, and implosion therapy are other behavioral treatments which have
been used with anxiety complaints. Factors favoring the use of behavioral treatments in test anxiety include adaptability to group procedures, shorter treatment course, less dependence upon the skill level of the therapist, and the avoidance of assuming an underlying neurosis, which, to many potential clients, implies a pathological condition or mental illness (Wachtel, 1977). Even though systematic desensitization can be described as having a major cognitive component, mental imagery, it was not until the 1970's that behavior therapists began a major shift toward the modification of covert responses as well as observable behaviors and the term "cognitive" behavior treatment became widespread (Mahoney, 1974). Heated argument, equal in intensity to that between the behaviorists and psychoanalysts, grew within the ranks of the behaviorists. Stauchly traditional behaviorists denounced cognitive formulations as a step in the wrong direction (Ledwidge, 1978), while cognitive behaviorists countered that traditional behavioral treatments depend, in fact, upon cognitive mediation (Breger & McGough, 1965, 1966).

Periodically attempts have been made to reconcile psychodynamic and behavioral theory and treatment. Most notable are the efforts of Dollard and Miller (1950) from the behavioral side and Wachtel (1977) from the psychodynamic. Unfortunately such efforts have not been warmly received by most staunch traditionalists and have stimulated little research into the efficacy of hybrid treatment techniques.
At present there are lines of convergence between behavioral and psychoanalytic research. While behaviorists are finding utility in modifying covert behaviors, psychoanalytic researchers are abandoning the metaphysics of psychoanalytic theory and embracing clinical psychoanalytic formulations which de-emphasize the role of innate drives (Silverman, 1976). Traditionally, psychoanalytic treatment has attempted to alter unconscious psychic structures whereas behavioral treatments involve no assumptions of such constructs as levels of consciousness. Cognitive behavioral treatments, aimed at altering unobservable behaviors, imply the assumption that action is mediated at (at least) the conscious level.

Psychoanalytic formulations of test anxiety postulate the testing situation acts as a symbolic event which activates unconscious neurotic conflict of an oedipal nature. German psychoanalysts of the 1930's described the psychoanalytic formulation of test anxiety and its treatment (Bergler, 1933; Neumann, 1933; Rodl, 1933; Stengel, 1936; Weber, 1934). That English translations of their works were not readily available may account for some of the lack of interest shown psychoanalysis by American researchers investigating test anxiety (Spielberger & Sarason, 1973). The current literature contains little test-anxiety research based upon psychoanalytic theory. In the single article obtained on psychoanalytic treatment of test anxiety, Brauer
(1978) describes the treatment of a test-anxious male of 25 whose test anxiety was found through analysis to be aroused by dreams containing castration themes and by a friend's well-meant statement, "You have nothing to worry about." The statement was determined to have an anxiety triggering effect on the patient's unconscious through the embedded message "You have nothing," another reflection of the castration theme. The competitive aspects of test-taking and the authority figure status vested in both the father and the teacher are believed to be unconsciously associated with the competitive feelings toward the father experienced by the male child during the oedipal stage. According to Freud's (1926) formulation the libidinal urges toward the mother felt by the 3 to 6 year old male are frustrated by the presence and threat of the father. Two common fantasies arise in the child's unconscious. One is the wish for the father's destruction, leaving the mother to the child. The other is the fear that the father will discover the boy's designs and punish him. Since the youngster's urges toward the mother are sexual, the fantasized punishment typically involves injury to, or loss of, the genitalia. This unconscious fear elicits castration anxiety, which, in turn, acts as a motivator for further psychosexual development. Normal psychosexual development proceeds with an identification with the father allowing the child to cultivate the father's goodwill and at the same time providing him with vicarious
gratification of his libidinal urges toward his mother. It is presumed that this resolution is never entirely satisfactory and that vestiges of the oedipal complex remain throughout life, even in the normal individual (Silverman, Ross, Adler, & Lustig, 1978). These remnants of the original complex may or may not result in persistent and debilitating neurosis. One area of manifestation of oedipal conflict is irrational debilitating anxiety in competitive or other achievement oriented endeavor, particularly where there are authority figures involved who might be unconsciously associated with the father introject. Healy, Bronner, and Bowers (1949) state that authority figures and those who take on a teacher or explainer role become substitutes for the father imago and are similarly cathected, this being the basis for the therapeutic transference in psychoanalysis. In the test-anxiety situation, the psychoanalytic formulation ties treatment effectiveness to the modification of the cathexis of the father introject, a restructuring of part of the unconscious. Once such restructuring is accomplished castration anxiety is alleviated at the unconscious level and a parallel reduction of test anxiety is realized at the conscious level.

The modification of unconscious psychic structure is no mean task. Various techniques are utilized to "listen" to the patient's unconscious: free association, dream analysis, projective techniques, etc. However, the communication from
the therapist to the patient's unconscious is a more convoluted process usually believed to depend upon the intensity of the transference achieved in therapy and the skillfulness with which the therapist utilizes the transference phenomena in the course of the treatment. Direct attempts to communicate with the unconscious have been made through the use of subliminal stimulation techniques (Silverman, 1976) and hypnotically induced paramnesias (Sommerschield & Reyher, 1973). While these techniques have been used in research efforts with striking success, they have not been widely accepted as therapeutic tools. Among psychoanalytically oriented psychotherapists, the treatment of choice remains individual psychotherapy, or psychoanalysis, to uncover and work through the unconscious conflicts. This involves the chipping away of various defenses that block unconscious reception of material generated at the conscious level—a time consuming process. Anything less, however, is deemed a symptomatic method, although direct communication with the unconscious would seem theoretically acceptable if it led to the alteration of unconscious psychic structures.

Behavioral formulations of test anxiety posit that the major causes of performance decrement are high emotional arousal, attentional disruption, and the intrusion of irrelevant and interfering thoughts. Spielberger (1972) offers a theory which emphasizes the emotional aspects of anxiety. He argues that emotional arousal, manifested by heightened
autonomic activity, is of primary importance. His research suggests that high levels of state anxiety result in task related error tendencies and an increase in "worry" responses. While these worry responses (interfering and demoralizing self-statements) do lead to performance decrements, they are considered as resulting from the high levels of state anxiety (Spielberger, Anton, & Bedell, 1976). Test anxiety is seen as a form of situation-specific trait anxiety which is best treated by behavioral therapies aimed at the reduction of physiological arousal.

Sarason (1975) views test anxiety as primarily a cognitive problem. According to this formulation, self-directed negative cognitions—worry—lead to loss of attention to relevant tasks, demoralizing inner dialog, and resultant autonomic arousal. Treatment goals based on Sarason's theory would involve the modification of these self-defeating cognitions. Presumably once such modification of covert behavior is effected, the secondary symptom of physiological arousal would vanish.

Morris and Liebert (1970) give equal weight to both the worry and emotionality (physiological) components of test anxiety which, in essence, incorporates the theories of Spielberger and of Sarason. The Liebert-Morris Test-Anxiety Questionnaire, derived from Mandler and Sarason's (1952) Test-Anxiety Questionnaire, is composed of two scales, one the "worry" scale, the other the "emotionality" scale.
Meichenbaum (1972) also follows this line of reasoning, adopting a two-factor theory of test anxiety. He proposes a therapeutic procedure designed to treat both aspects in his Therapist Manual for Cognitive Behavior-Modification (1972). For the reduction of the emotional component of test anxiety, he uses group systematic desensitization and for the worry component a cognitive group therapy very similar to Ellis' (1962) Rational Emotive Therapy.

Research by Liebert and Morris (1970), Wine (1971), Holroyd (1976), and Kaplan, McCordick, and Twitchell (1979) strongly supports the cognitive (worry) theory of test anxiety over the behavioral (emotionality) theory. Currently, the cognitive theory is in favor, and the preferred treatments are aimed at the modification of covert responses.

Indices of test anxiety fall into two groups: performance measures and self-report measures. Performance measures of various types have been used, including such gross measures as semester grades and grade point averages. However, most research suggests that the most useful performance measures of test anxiety are timed tasks involving fine motor response. Siegman (1956) investigated the hypothesis that time pressure has a greater disruptive effect on anxious than on nonanxious subjects. Thirty-five (35) male medical and psychiatric patients were administered the Taylor Manifest Anxiety Scale (MAS), Wechsler Adult Intelligence Scale (WAIS), Ravens Progressive Matrices (PM),
Bender-Gestalt (BG), and BG Recall test. All subjects were of at least normal intelligence, and none was psychotic or suspected of having cortical damage. Correlation between the MAS and PM scores was significant. Correlation between the MAS and BG Recall scores was also significant. Only the high MAS scorers had significantly lower scores on the time-limited subtests of the WAIS. These results suggested that anxiety has a disruptive effect on incidental learning, abstraction, and timed intelligence tests.

Instruments such as Raven's PM and the digit symbol subtest of the WAIS would seem suitable performance measures of anxiety. However, Guertin, Rabin, Frank, and Ladd (1962) indicated that no significant relationship between digit symbol performance and manifest anxiety was evident in studies using a wide variety of subjects. Boor and Schill (1967) felt that such results might be due to the failure to control for those subjects who might be faking low anxiety on the various self-report scales used to group subjects according to anxiety level. They felt that subjects classified "low-anxious" in previous studies might, in fact, have been so defensive as to answer self-report anxiety questionnaires inaccurately in an attempt to conceal their feelings of anxiety. One hundred fifty-nine (159) male and 187 female undergraduates were given the MAS and the Marlowe-Crowne Social Desirability Scale (M-C SD). Subjects were classified as high anxious (upper fourth, MAS).
and low anxious (lower third, MAS). Low anxious subjects were further divided into defensive (scores 16 and above, M-C SD) and non-defensive (scores 15 and below, M-C SD). Subjects in these selected groups were given four consecutive 90 second trials of the WAIS Digit Symbol subtest, using standard WAIS instructions. They were subsequently readministered the MAS and M-C SD. Results indicated that when Digit Symbol scores for MAS high versus low anxious subjects were compared no significant differences were observed. However, when low anxious (MAS) defensive (M-C SD) subjects were eliminated from the analysis, the high-anxious subjects were found to be significantly poorer on Digit Symbol performance than the resultant low anxious non-defensive group. To investigate the possibility of a curvilinear relationship between Digit Symbol performance and anxiety, scores for the medium anxious subjects were taken into account. However, these scores fell between those of the high anxious and low anxious groups, suggesting a linear relationship.

Self-report measures of test anxiety typically attempt to measure only debilitating test anxiety. An exception is the Achievement Anxiety Test (Alpert & Haber, 1960), which is comprised of two scales, a measure of debilitating test anxiety and a measure of facilitating test anxiety. This instrument has proven useful in demonstrating a crucial difference between self-referred subjects who complain of
test anxiety and subjects drawn from the general college population who do not report problems of test anxiety. Self-referred volunteer subjects scored higher on both subscales than did subjects from the general college population. The two subscales were found to be uncorrelated for either group. This suggests that those subjects reporting test anxiety difficulties were in fact not directly comparable to controls drawn from a non self-referred population. Additionally, facilitating test anxiety and debilitating test anxiety appear to be separate, unrelated constructs.

Mandler and Sarason (1952) developed a self-report questionnaire designed to measure debilitating test anxiety. Subsequent factor-analyses of their Test-Anxiety Questionnaire (TAQ) by Gorsuch (1966), Sassenrath (1964), and Sassenrath, Right, and Kaiser (1965) suggest two classes of factors, one having to do with emotionality (E) and the other with worry (W).

Liebert and Morris (1967) developed a short pre-examination questionnaire derived from these two components of the TAQ, the Liebert-Morris Worry-Emotionality Scale (L-M). E was conceptualized as autonomic reactions which tend to occur under examination conditions, while W was conceptualized as any cognitive expression of concern about one's own performance. They hypothesized that W scale scores would correlate negatively with performance expectancy, that is, be highest when performance expectancy is lowest.
They further hypothesized that E scale scores would be highest when performance was least certain. Subjects in Liebert and Morris' study were 54 undergraduate students. They were divided into high, medium, and low expectancy groups from their responses to the direction "By circling the appropriate probability below indicate your best guess of whether you will do as well on this test as you had hoped." Low expectancy was considered 0 to .3, medium expectancy .4 to .6, and high expectancy .7 to 1.0 (certainty). Immediately prior to the examination subjects were given 10 items from the TAQ slightly modified by the authors; five items had been judged indices of W and the remaining five indices of E. The hypothesized relationship between W scores and expectancy was found, but no relationship between E and scores and expectancy was found. Thus the W scale correlated significantly negatively with reported performance expectancy, but uncertainty of expectancy did not correlate as predicted with the E scale.

Morris and Liebert (1969) investigated the effects of anxiety on intelligence tests administered under timed and untimed conditions. Forty-eight (48) university undergraduate volunteers were selected from an initial sample of 350 who had been administered 15 W and 15 E items from the MAS. These 48 subjects were grouped in four categories based upon their reported anxiety: a) high W-high E (H-H), high W-low E (H-L), c) low W-high E (L-H), and d) low W-low E
Subjects were given the L-M immediately preceding the administration of the timed subtests of the WAIS. Half the subjects in each group were administered the subtests in standardized form (i.e., with notification that the tasks were to be timed), whereas the other half were timed surreptitiously. The L-M was administered again after the intelligence testing. Dependent variables were scores on the WAIS subtests and change scores on the L-M. Results suggested that knowledge of timing tended to disrupt the performance of the H-H subjects as opposed to the L-L subjects, but the difference was not statistically significant. Knowledge of being timed did not relate to E scores, but W scores were found to be significantly correlated to the degree of difficulty of the items presented from the WAIS subtests, lending support to the previous findings relating W scores to performance expectancy.

Morris and Liebert (1970) examined the relationship of W and E components of test anxiety to pulse rate, performance expectancy, and examination grade using subjects drawn from university and high school populations. In Study I subjects were 95 university students who monitored their own pulse rates then responded to the L-M, an expectancy item "You will do as well on this test as you would like," and a 1 through 5 rating of the statement "I feel my heart beating fast." Dependent variables were change scores in normal pulse rate versus impending examination pulse rate,
scores on the self-report measures, and examination grades. Results of Study I indicated that the W and E scales were significantly correlated \((r = .62)\). Alpha reliabilities for the two scales were .33 and .69, respectively. Utilizing partial correlations to compare the W and E scores with the other variables, it was found that both correlated significantly positively with normal pulse rate. The correlation between E and pulse rate change was significant, but the correlation between W and pulse rate change was not. The W scale correlated significantly negatively with examination grades, while E scale scores did not. It was thus indicated that W, the "cognitive component of test anxiety," affected performance on intelligence tests whereas E, the measure of physiological manifestations of anxiety, did not. Neither pulse rate nor pulse rate change was related to examination grade. W and expectancy were highly negatively correlated, whereas E and expectancy were not correlated.

In Study II 91 high school seniors were used to test the same variables, but the procedure was altered to allow the self-report estimates to precede the physiological monitoring in two of the four groups. For the other two groups pulse rates were taken prior to the administration of the questionnaire. The results of Study II indicated that previous knowledge of pulse rate had an attenuating effect on the E scale of the questionnaire and the pulse rate item "I feel my heart beating fast." In this experiment
both W and E were significantly negatively correlated with examination grade.

It appears that the preferred performance measures of test anxiety are the Digit Symbol tasks, although Raven's PM and examination grades have also been used. Self-report measures seem to correlate significantly with performance expectancy, performance, and automatic arousal. Factor analyses suggest that there may be two separate dimensions to the self-report measures, but in some studies, the proposed dimensions, W and E, correlate significantly with each other. Studies contrasting W and E indicate that W correlates significantly with performance expectancy, while E does not. E has been correlated with autonomic arousal under some conditions. Facilitating test anxiety appears to be a separate and distinct construct from debilitating test anxiety, and subjects responding to advertisements for test anxiety treatment programs appear to be distinct from subjects drawn from a general college population.

The psychodynamic approach to the treatment of test anxiety has generally followed the guidelines of psychoanalytic theory and practice. The specific complaint, test anxiety, is de-emphasized and the treatment is directed at the resolution of unconscious conflicts presumed to be at the root cause. The approach favored by the traditional behaviorists is systematic desensitization. A third approach
has emerged, the cognitive behavioral treatments such as Ellis' Rational Emotive Therapy (RET) (Ellis, 1962).

A combined approach was devised by Meichenbaum (1972). This treatment combined group systematic desensitization with group cognitive procedures designed to identify, monitor, and modify disruptive and demoralizing cognitions. In Meichenbaum's experiment 21 student volunteers responded to a university newspaper advertisement for test-anxiety treatment. Subjects were randomly assigned to one of three groups: (1) a combined treatment group, (2) a group systematic desensitization group, and (3) a waiting list control group. Each treatment group received eight sessions in addition to pre- and post-treatment assessment sessions. Outcome measures were the Alpert-Haber (1960) Achievement Anxiety Test, Zuckerman's (1960) Anxiety Adjective Checklist, Husek and Alexander's (1963) anxiety differential, Brown's (1960) digit symbol test, and Raven's (1956) PM test. On all dependent variables except scores from Raven's Matrices, the combined treatment, Cognitive Behavior-Modification, proved superior to the group desensitization procedure, and the experimental treatments both proved significantly more effective than the control procedure.

Holroyd (1976) investigated the relative effectiveness of group systematic desensitization, a cognitive-attentional treatment similar to the cognitive component of Meichenbaum's Cognitive Behavior-Modification, a combined treatment, a
pseudotherapy (body awareness), and a waiting list control procedure. Student volunteers who scored above 32 on the Debilitating Anxiety Scale of the Achievement Anxiety Test were randomly assigned to the five groups. A digit symbol test was used in an analogue testing situation where anxiety was measured by Spielberger's A State scale and the Anxiety Differential. Grade point averages for the semesters preceding and following treatment were also analyzed. Subjects were also given the Frustration Tolerance Test (McReynolds & Tori, 1972) and a self-report questionnaire in an attempt to assess the validity of the outcome measures.

The cognitive therapy group was treated according to Ellis' (1962) RET procedures in which awareness of anxiety-engendering thoughts was fostered, followed by the cultivation of incompatible self-statements designed to facilitate attention to the task at hand. The group systematic desensitization therapy paired deep muscle relaxation training with imagined aversive scenes in the standard hierarchical presentation so as to allow the relaxation response to inhibit the increasingly aversive imaginings (Paul, 1966). The combined treatment consisted of both the preceding procedures and was based upon the Liebert and Morris two-factor theory of test anxiety. In this treatment half of each session was spent on the desensitization exercises and half on the cognitive therapy. The entire hierarchy of aversive imaginings was completed by both groups undergoing
the desensitization therapy. The control group underwent pseudotherapy consisting of mediation exercises. Each group met for seven hour-long weekly sessions.

Initial group differences were not significant and results revealed no therapist effects. On self-report measures all groups except the waiting list controls showed significant anxiety reduction. On the digit symbol performance measure, both the cognitive treatment and the combined treatment showed significantly greater effect than the other three procedures. Although the cognitive treatment group showed greater gain in digit symbol performance than the combined treatment group, the difference was not significant. Follow-up assessment results were essentially identical to posttreatment results. Grade point averages for the two semesters also showed a similar pattern with the cognitive treatment group showing a significantly greater improvement than the other groups and the remaining three experimental groups showing significant improvement over the waiting list controls. No significant differences were found between the groups on the validity measures. These results indicate the superiority of cognitive-attentional therapy over automatic arousal reduction therapy in test-anxiety treatment. Only when the cognitive-attentional therapy was incorporated did any group show significantly greater anxiety reducing effect than the pseudotherapy procedure.
In a similar study comparing the effectiveness of the cognitive and behavioral components of Meichenbaum's Cognitive Behavior-Modification treatment, similar results were obtained. Kaplan, McCordick, and Twitchell (1979) randomly assigned 74 student volunteers to groups of two to four persons for group sessions twice weekly for five weeks. Treatments compared were Meichenbaum's Cognitive Behavior-Modification, the cognitive component of this treatment only, and a waiting list control. Outcome measures were the Liebert-Morris TAQ, self-ratings of W and E on a magnitude estimation scale, and a digit symbol test. Dependent variables were change scores on the self-report measures and raw scores on the digit symbol test, which was a post-treatment only measure. Planned comparisons between the four groups were made to test the linear hypothesis that the cognitive only treatment would be most successful, followed by the combined treatment group, desensitization group, and the control group. This hypothesis was supported by the analysis. Results of the comparisons of the digit symbol test scores were in the same direction as those of the self-report measures, but large within-group variability precluded statistically significant differences. Correlation between the W and E scales of the Liebert-Morris TAQ for this sample was significant ($r = .68$).

These studies strongly suggest the superiority of the cognitive treatments over the behavioral treatments for test
anxiety. The substantial correlation between the W and E scales of the Liebert-Morris TAQ support the unidimensional theory of test anxiety.

The possibility of enhancing the effectiveness of Meichenbaum's Cognitive Behavior-Modification treatment plus study skills training by the addition of videotaped modeling and rehearsal modeling was explored by McCordick, Kaplan, Finn, and Smith (1979). In addition to the two enhanced treatment procedures, a study skills training control group and a waiting list control group were also included. Subjects were 48 student volunteers recruited by announcements read to upper division psychology classes. Outcome measures were the Liebert-Morris TAQ, the Achievement Anxiety Test, the Wonderlic Personnel Test, and Z scores, standardized within classrooms, from pre-therapy and post-therapy final examinations. Significant improvement on the self-report measures was found between each experimental treatment group and the two control groups. Linear contrasts specifying order of treatment groups as rehearsal modeling, videotaped modeling, core treatment, and controls were statistically reliable for several of the self-report measures, but overall differences in effectiveness between the treatment groups was weak. No significant differences were found for the performance measure, although the direction of change was consistent with the self-report measures.
Subliminal stimulation involves perception and memory without conscious awareness of the content of the stimulus. Various techniques of subliminal stimulation have been utilized. Stimuli have been presented auditorially at low volume levels, masked by music, or while the subject slept. Visual stimuli have been presented for extremely short duration by tachistoscope or frame inserts in motion pictures. The technical refinement of visual subliminal stimulation procedures to the point of research reliability has only recently been achieved. The bulk of current research in the area has been conducted by Lloyd Silverman (1976) and his colleagues at New York University in investigating the validity of various psychoanalytic formulations through subliminal visual stimulation by tachistoscope.

In a representative early study Silverman (1966) tested the hypotheses that subliminal presentation of stimuli designed to arouse aggressive drives would result in symptoms of pathologic thinking in non-schizophrenic subjects. These subjects were 77 male nursing aides at a Veterans' Administration hospital. They were deemed free of psychosis due to VA employment standards and the clinical examinations of Rorschach protocols produced during the experiment. Subjects were divided into two groups, and each group was presented one aggressive stimulus (a picture such as an aggressive looking man with a dagger in hand) and two neutral stimuli (such as a picture of a man with neutral expression waving
his hand as if in greeting). These stimuli were presented tachistoscopically, four exposures each for a duration of 4 milliseconds. A baseline Rorschach protocol was established from Rorschach responses to five ink blot cards administered after four exposures to a neutral stimulus. The procedure was then repeated using the experimental stimulus and six different ink blot cards for one group and different neutral stimulus and the six new ink blot cards for the other group. A second session was conducted at least one week later for each subject in which the same procedure was followed except that the experimental and the neutral stimuli were given to the two groups so that all subjects had responded under the neutral and experimental conditions, and each subject served as his own control. The first 25 subjects were treated as described above, but the remaining 52 received "priming" prior to subliminal stimulation when the experimenter was provided with the results of a study by Gordon and Spence (1964). In that study two groups of subjects were presented to the stimulus word "cheese" tachistoscopically under primed and unprimed conditions. Outcome was measured by recall of the word "cheese" on a word recall task. The priming consisted of reading a passage about food prior to the subliminal presentation. For the control group, a neutral passage was provided. A significant subliminal effect was found only for the primed group. After all 77 subjects had completed
the procedure, an experienced Rorschacher who was blind to
the experimental procedure and hypothesis being tested
scored the protocols according to Holt's (1963) "Manual for
the Scoring of Primary Process Manifestations in Rorschach
Responses." Ratings of one to five were assigned according
to blatancy of manifestations of primary process thinking,
libidinal imagery, and aggressive imagery. Overall results
yielded no significant relationships. However, when the
data were re-analyzed, culling out subjects deemed "low
expressors" based on MMPI data available from a previous
study, significant differences were obtained between sub-
jects who had been primed and who had not. The primed
subjects showed increases in pathological thinking not
evident in the unprimed subjects' protocols.

Silverman (1976) reviews psychoanalytically oriented
research conducted at New York University utilizing sublimi-
nal stimulation to arouse unconscious conflicts in accordance
with psychoanalytic formulations of psychodynamic relation-
ships. He describes the priming procedure and endorses its
use in subliminal stimulation procedures. He describes the
criteria for selecting the presentation duration of 4
milliseconds as being that duration at which subjects in
several pilot studies were unable to distinguish between
stimuli presented even when urged to guess to earn a reward,
yet at which subliminal effects were elicited. Drawing on
the results of his own studies and studies of similar content utilizing hypnotically induced paramnesias (Reyher, 1967), Silverman concludes:

(a) there has been an abundant amount of clear-cut direct support for the proposition that the stimulation of libidinal and aggressive mental contents can intensify psychopathology; (b) there has been a limited amount of clear-cut direct support for the proposition that there are specific relationships between particular kinds of libidinal and aggressive mental contents and particular psychopathologies; (c) there has been a limited amount of clear-cut direct support for the proposition that there is an inverse relationship between the adequacy of an individual's defenses against the emergency of libidinal and aggressive mental contents and the appearance of psychopathology; (d) there has been clear-cut though somewhat sparse support for the proposition that the pathogenicity of libidinal and aggressive mental contents depends on the impulse to express them remaining unconscious; (e) the direct evidence for the proposition that libidinal and aggressive mental contents are pathogenic because they are potentially anxiety arousing is both somewhat sparse and equivocal; (f) the proposition that the libidinal and aggressive mental contents that underlie
psychopathology are derivations of wishes has not yet been directly supported. (p. 634)

In yet another lengthy review, Silverman presents research utilizing two unconscious fantasies as beneficial agents in psychotherapy and offers comments on the role of the "symbiotic gratification fantasy" and the "sanctioned oedipal gratification fantasy" in various types of psychotherapy (Silverman, 1979). Studies reviewed followed a basic experimental design. Subjects were seen individually for an experimental session one day and a control session on another with the order counterbalanced. The subjects were advised that at times during the tasks involved in the experiment they would be shown flickers of light through the eyepiece of the tachistoscope. A baseline measure of the subject's propensity for the given pathological manifestations was taken. Following this the subjects were presented four exposures of a neutral (control) or conflict related (experimental) stimulus for a duration of 4 milliseconds each. Then specific pathology was reassessed to determine the effect of the subliminal stimulation. The experimenter was blind to the content of the subliminal stimuli and the raters and testers were blind to the hypotheses being tested. A series of studies with psychiatric patients diagnosed as differentiated schizophrenic are described. The experimental subliminal stimulus used was the verbal message MOMMY AND I ARE ONE, presented by
itself in some experiments and accompanied by a drawing of a man and woman merged at the shoulders like Siamese twins in others. The control stimulus was the verbal message PEOPLE ARE WALKING, accompanied by a congruent drawing in those studies where the drawings were used. Eight studies are mentioned from this series, all with like results. The subliminal exposure to the symbiotic message led to a reduction of pathological symptoms not observed in the control sessions. In studies utilizing other messages of symbiotic gratification content results were equivocal. In a study with university students as subjects a symbiotic gratification fantasy stimulus group scored significantly higher than a corresponding control group on final examination grades (Parker, 1977).

Silverman, Frank, and Dachinger (1974) augmented a systematic desensitization treatment regimen with the subliminal presentation of the symbiotic gratification fantasy with a sample of 20 insect phobic women. Significantly greater improvement was observed in the experimental group.

In a study of overweight women (Martin, 1975) receiving a behavior modification treatment for overeating, augmentation by subliminal presentation of the symbiotic gratification fantasy resulted in significantly greater average weight loss than achieved for a matched group receiving the behavioral treatment only.
Studies involving the sanctioned oedipal gratification fantasy follow the same format. In a study of male homosexuals Silverman (1973) found the presentation of an incestuous stimulus (a picture of a man and a woman in a sexual pose, and the verbal message FUCK MOMMY) increased homoerotic orientation in two different groups of subjects compared to corresponding control groups. In a third sample, a third subliminal stimulus was added. This stimulus suggested destructive urges toward mother and had previously been shown to increase pathologic symptomatology in schizophrenic and depressed subjects. Results were again significant for the incestuous stimulus but the aggressive stimulus had no apparent effect.

The most graphic of the sanctioned oedipal gratification fantasy studies (Silverman, Ross, Adler, & Lustig, 1978) involved 30 male student volunteers exposed to each of five different subliminal messages along with congruent illustrations, (1) BEATING DAD IS WRONG, (2) BEATING DAD IS OK, (3) PEOPLE ARE WALKING, (4) MOMMY AND I ARE ONE, and (5) DADDY AND I ARE ONE, presented in counterbalanced order. The effects of these stimuli were related to performance in a competitive situation—dart throwing for a cash prize. The subject first threw eight darts to establish a baseline, then eight more after a presentation of one of the five stimuli. Then followed the subliminal presentation of neutral stimulus which was not among the five listed. The
rationale for this procedure was that such presentation would provide a "buffer" effect to wash out possible lingering effects from the previous subliminal presentation of experimental material. After the "buffer" presentation was completed, the procedure was repeated until each subject had thrown darts under each condition. Experimenters were blind to the content of the subliminal stimuli. Five pretest and five posttest dart scores served as dependent variables. Results indicated that the two oedipal stimuli had clear-cut effects in the expected directions: higher scores following the BEATING DAD IS OK stimulus and lower scores following the BEATING DAD IS WRONG stimulus (p < .001 in both cases). The remaining conditions resulted in no findings of statistical significance. These results were so striking that a second group of 24 male student subjects was assembled for an improved experiment. This time the DADDY AND I ARE ONE condition was dropped allowing for complete counterbalancing of the four remaining conditions. All subjects were screened to insure that they had spent their early childhood in primarily English speaking homes. Procedure was the same as in the first experiment except that after treatment 20 of the subjects were administered a discrimination task involving various subliminally presented stimuli and motivated by a cash reward for correctly differentiating the stimuli presented at 4 millisecond exposures. The results obtained in this experiment were
essentially identical to those of the first experiment and no evidence was found for the presence of partial cues from the data of the discrimination task. A third experiment was conducted using 48 more male subjects from the same subject pool. Procedure was the same except that "fear of success" was introduced as a second dependent variable. Earlier in the semester all introductory psychology students had been administered a fear of success questionnaire (Sadd, Lenauer, Shaver, & Dunivant, 1976) and 24 from the top third and 24 from the bottom third were selected for the experiment. No significant results were obtained in this experiment, in sharp contrast to the two previous experiments. It was noted, however, that the light intensity of the tachistoscope had been set at the maximum during this experiment (43 footlamberts), higher than the settings in the previous experiment although no precise measures had been taken. A fourth experiment was undertaken to test the hypothesis that subliminal effects would again be evident under lower tachistoscope illumination, whereas under the high illumination condition such effects would be eliminated. Again 48 male students served as subjects. Particular attention was paid to the relative levels of illumination of the tachistoscope (5 and 15 footlamberts in the low level condition and 42 and 43 footlamberts in the high level condition) and the room (15 footlamberts). Results indicated that the effectiveness of subliminal stimulation requires the illumination level
of the tachistoscopic field be close to ambient light level. In the low level condition results were again significant in the predicted directions, but under high levels of illumination of the subliminal stimuli no significant patterns were found in the subjects' performance. It appears likely that the brightness of the tachistoscopic presentations in the high illumination condition resulted in a "bleaching" effect, hindering perception much as one's vision is impaired upon leaving a darkened room to venture into the sunlight. No evidence was found for partial cues when the discrimination procedure was applied to this set of subjects.

Recent unsuccessful attempts to replicate Silverman's experiments have cast a shadow of controversy over the subliminal psychodynamic activation phenomenon. Heilbrun (1980) failed to elicit a subliminal effect in three experiments attempting to replicate the dart-throwing study. He suggested this failure might be due to differences in the subject populations sampled. Ethnic or regional differences might effect reactions to the sanctioned oedipal gratification stimuli. However, attempts by Heilbrun to replicate the simple discrimination of subliminal stimuli also met with failure, suggesting the more likely explanations that the effect is not very robust or that some as yet unidentified experimental characteristics are critical to elicitation of the effect.
Condon and Allen (1980) attempted to replicate the experiment combining subliminal presentation of the merging fantasy stimuli with systematic desensitization. They attribute the failure of the subliminal procedure to elicit greater therapeutic effect than the desensitization only procedure to a lack of robustness of the subliminal effect.

In a series of exchanges between Silverman (1982a and 1982b), Heilbrun (1982), and Allen and Condon (1982) additional criticisms and rebuttals are made. Unfortunately, much of these exchanges involve narrow arguments and semantic maneuvering. However, issues such as subject motivation, sex differences, and illumination characteristics appear to be worthy of consideration as relevant variables. Silverman (1982b) argues that student populations may be inappropriate in "treatment adjunct studies" wherein subliminal stimulation is combined with an established treatment, because the students may (1) lack motivation for improvement, and (2) suffer so little true pathology that the subliminal stimulation is superfluous. He also notes that studies using male subjects more consistently support the subliminal effect than those using females.

Silverman's studies appear to demonstrate that a subliminal effect is possible under the proper conditions. Illumination levels and duration of exposure are critical to insure perception and eliminate the possibility of
partial cues. Priming is effective in maximizing subliminal effect. Subliminal stimulation is effective in both intensifying and attenuating pathologic symptoms in psychiatric patients, enhances the effect of certain behavioral therapies, and can influence the performance of normal subjects both beneficially and detrimentally in competitive endeavor. The particular content of the subliminal stimuli seems crucial, some stimuli being effective in one population but not another. The sanctioned oedipal gratification fantasy stimulus appears to be effective in situations where symptoms seem to correspond to psychoanalytic formulations of oedipal conflict and its effects. As Silverman (1976) points out, such results do not necessarily depend upon the validity of psychoanalytic formulations, but they certainly offer support for certain clinical psychoanalytic formulations such as oedipal conflict as a source of anxiety in competitive situations.

In this study the effectiveness of a combination of cognitive group therapy—the cognitive component of Meichenbaum's Cognitive Behavior-Modification—and the subliminal presentation of Silverman's sanctioned oedipal gratification stimulus was investigated. In the control condition the cognitive treatment was combined with a program of subliminal stimulation utilizing material of neutral content. Thus the treatment effects realized under this condition were attributable to the cognitive therapy
alone. In the experimental condition the cognitive therapy was combined with a program of subliminal stimulation utilizing a sanctioned oedipal gratification message previously shown to be effective in decreasing anxiety (Silverman, 1979). Psychoanalytic theory would predict that the experimental condition, wherein the unconscious is directly stimulated with a conflict-reducing message, should result in a greater alleviation of test anxiety than in the case of the control condition. The experimental condition would provide conflict resolution at the unconscious level as well as the conscious level, while the control condition would not. In the control condition, only conscious defenses and adjustments would be activated, whereas in the experimental condition those benefits would be combined with a reduction of anxiety rooted in the oedipal conflict through a modification of the cathexis of the father introject. It was therefore hypothesized that the experimental condition, cognitive group therapy combined with subliminal presentation of a sanctioned oedipal gratification fantasy message would result in treatment gains significantly greater than those realized under the control condition, cognitive group therapy combined with subliminal presentation of a neutral stimulus, in treating test anxiety.

Such findings would not only provide support for the psychoanalytic formulation of test anxiety as a manifestation of oedipal conflict, but would suggest the possibility
of a more economical approach to the alteration of uncon-
scious psychic structures vis a vis the lengthy and expensive 
alternative treatments, psychoanalysis and psychoanalytically 
oriented psychotherapy.

Method

Subjects

Thirty-four (34) male students at North Texas State 
University who had responded to advertisements and announce-
ments recruiting "test-anxious men" were selected through a 
subsequent screening process for indications of oedipal 
conflict and completed the study. Mean age of the students 
on beginning the study was 21 years and 4 months.

Apparatus

A Gerbrands three field tachistoscope, Model T-3A, 
was used to present the subliminal stimuli. This apparatus 
provided a viewing distance of approximately 31 inches 
(78.7 cm) with the visual angle subtended by the viewing 
box approximately 21 degrees. Illumination level, duration 
of exposure, and sequence of presentation were adjustable 
by the operator.

Materials

An informed consent form (Appendix A) was secured from 
each student volunteer, and each participant completed a 
biographical data sheet (Appendix B). The "castration 
anxiety card" of the Blacky Pictures test (card VI) and the 
relevant portion of the inquiry (Appendix C) were used to
screen volunteers in an attempt to select subjects experiencing significant levels of oedipal conflict. Reaction to the card, which depicts two dogs, one blindfolded with an apprehensive expression and its tail on a chopping block with a knife poised above the tail, and a second dog observing the scene, is thought to reflect oedipal conflict (Neumann & Salvatore, 1958; Sarnoff & Corwin, 1959; Block & Ventur, 1963).

Subliminal stimuli were 5 in. x 7 in. (12.7 cm. x 17.8 cm.) cards with, for the active condition, a line drawing of a boy and a man smiling at each other paired with a verbal message BEATING DAD IS OK (Appendix D) and, for the neutral condition, a line drawing of several people walking paired with the verbal message PEOPLE WALKING (Appendix E). The active and neutral properties of these stimuli were demonstrated empirically in a number of researches reviewed by Silverman (1976). Priming materials used in conjunction with the subliminal stimulation procedure were Thematic Apperception Test (TAT) card 8BM and a short sentence completion form devised for this study (Appendix F).

Test anxiety was assessed prior to and following treatment by one behavioral and two self-report measures. The Digit Symbol subtest of the Wechsler Adult Intelligence Scale (WAIS) was used as the behavioral measure. Boor and Schill (1967) found that anxiety interferes with performance on this subtest and argue that it may be more sensitive to
anxiety than self-report anxiety scales because highly
defensive individuals may not admit to anxiety on the
self-report scales. The Liebert-Morris Test-Anxiety Ques-
tionnaire (Appendix G) was used as one of the self-report
measures. This instrument is a ten-item questionnaire
derived from Mandler and Sarason's (1952) Test-Anxiety
Questionnaire. Each item is scored from 1 to 5, providing
total score range of 10 (no anxiety) to 50 (maximum anxiety).
Two subscales, W and E, were originally proposed as reflec-
tive of two dimensions of debilitating test anxiety
corresponding to negative cognitive sets and autonomic
arousal, respectively (Liebert & Morris, 1967). Substantial
correlation between the two subscales (Kaplan, et al., 1979)
and factor analysis of the questionnaire (Richardson, O'Neil,
Whitmore, & Judd, 1977) suggest that it measures a single
general factor of debilitating test anxiety rather than two
distinct factors. The second self-report measure used was
a magnitude estimation scale (Appendix H) on which each
student participant gauged his anxiety on a scale of 0
(no anxiety) to 100 (totally debilitating anxiety). Two
additional scales were included on this form to measure
the subjective importance attributed to the test and its
overall weighting in determining a course grade, where
applicable. The magnitude estimation scale is thought to
offer more precision than the Liebert-Morris Test-Anxiety
Questionnaire (L-M) at middle to low ranges of anxiety (Kaplan, et al., 1979).

Procedure

Advertisements were placed in the University newspaper and on bulletin boards in dormitories and other campus buildings promoting a free treatment for test anxious male students. Announcements were also made in a number of classes. Test anxiety was defined as fear and apprehension of tests so severe that it interferes with performance on any sort of formal test. This criterion of test anxiety, utilized in studies by Kaplan, et al. (1979) and McCordick, et al. (1979), is supported by a study (Hudesman & Weisner, 1978) which found that facilitating and debilitating test anxiety occur at significantly higher levels among volunteer student subjects than among their non-volunteer counterparts. Results of that study further indicate that facilitating and debilitating test anxiety are uncorrelated and therefore appear to be separate constructs. Sixty-three (63) students were recruited through this procedure and, after a briefing and completion of informed consent agreements, were given the "castration anxiety" portion of the Blacky Pictures test as a screening procedure in an attempt to select subjects who manifested signs of oedipal conflict. It was reasoned that the hypothesized experimental treatment effects would be more apparent with such a sample. Volunteers viewed Blacky Picture VI then answered questions from the inquiry form.
Their responses were scored according to standard procedures and 41 volunteers scoring 3 or above, indicating significant oedipal conflict, were retained for the study. Volunteers released were referred to two other university affiliated treatment facilities. Student participants were then assigned to six therapy groups of four to seven members each according to scheduling constraints. Members of each therapy group were then randomly assigned to either the experimental group or control group. This procedure was used to ensure an approximately equal division of experimental and control student subjects in each therapy group, thus controlling for possible therapist and therapy group effects. Students met for hour-long sessions twice weekly for a total of 10 sessions. The first sessions for each group were devoted to pre-treatment assessment of test anxiety. Each student was administered the Digit Symbol test under a group administration procedure. Prior to actual administration of the measure, the students were informed that the "test" was a competition between them for cash prizes—$25.00, $10.00, and $5.00 to the overall top three scores and $5.00, $3.00, and $1.00 for the top three scores in each group. After this announcement each student was required to fill out both self-report measures of test anxiety, the L-M and the magnitude estimation scale. Finally, the Digit Symbol was administered and group prizes awarded. Then the students met with the therapist for their
group. These therapists were North Texas State University students enrolled in doctoral degree programs in clinical or counseling psychology. They had been selected on the basis of previous group experience and scheduling flexibility and were paid $50.00 per session conducted. They were supervised by department faculty members. Each of the subsequent eight sessions consisted of two parts. The first 15 to 20 minutes were dedicated to administration of the subliminal stimuli. Each student was seated and given the priming materials, TAT card 8BM and the sentence completion form. As each student completed his TAT story and the sentence completion exercise, he was seated at the tachistoscope and instructed to view the blank field to allow his eyes to adjust. The operator then inserted either the active or neutral stimulus cards into the tachistoscope while instructing the student that in a moment he would be shown some messages which would be presented so quickly that they would appear as no more than a flicker. The operator explained that to avoid blinking or attention lapse he or she would count down from "three" and begin the exposures. The tachistoscope was set to expose the written message for 4 milliseconds, followed by a 1 second blank field interval, then a 4 millisecond exposure of the line drawing. This sequence was repeated five times for each student at each seating. The 4 millisecond exposure time is suggested as optimal for elicitation of subliminal effect by Silverman (1976). The illumination
level of the tachistoscope was set at 32 footlamberts to match ambient room illumination (the wall immediately behind the tachistoscope) of 32±5 footlamberts. As the student finished at the tachistoscope, he left for the therapy room. The second portion of each session was then spent in group therapy conducted according to Meichenbaum's "Therapist Manual for Cognitive Behavior-Modification" (1972) modified to include only the cognitive component of the treatment and exclude the group systematic desensitization procedure (Appendix I). Therapists were blind to the assignment of group members to the experimental or control groups and were not briefed on the particulars of the hypotheses being tested or the subliminal stimulation procedure. A criterion of three absences was established as grounds for elimination from the program, and seven students were dropped during the course of the study. The last week of the study corresponded to "midterm examination" week and so the students were given magnitude estimation forms to complete immediately prior to each test taken during that week. The last sessions for each therapy group were devoted to administration of the test anxiety measures under the same procedure as in the first sessions except that the subjects were told that the Digit Symbol contest would be judged according to improvement over the pretreatment score rather than direct comparison to the other students in order to preserve a
spirit of competition even among the poor performers on the pretreatment assessment. The same cash prizes were awarded, the take-home magnitude estimation scales were collected and the students debriefed. Students were advised of other facilities available to them if they desired further treatment.

Results

Comparisons of means for the experimental and control groups on pretreatment assessment scores were made using the t ratio (Appendix J). No significant differences are seen between the groups on the Digit Symbol test, L-M, or the magnitude estimation scale for subjective ratings of importance for the Digit Symbol test. There is a significant difference between the means of the two groups on the magnitude estimation scale for anxiety felt prior to taking the Digit Symbol test ($t = 2.1703, p < .05$).

Analyses of covariance were performed for each of the instruments to allow the effects of beginning group differences and the cognitive group treatment to be partialled out. In this way effects of the subliminal stimulation treatment can be examined. None of these analyses (Appendices K through N) shows any significant effects attributable to the experimental procedure. Although the magnitude of relative change in the adjusted mean scores on the Digit Symbol test and the magnitude estimation scale for anxiety felt prior to taking the Digit Symbol test is in the
predicted direction these patterns are subtle whereas within group variance is substantial for both groups on each measure.

Magnitude estimation scales for anxiety felt prior to each test taken in class during "midterm week" were averaged for each student. The number of scales completed by each student ranged from one to six with three students completing no scales. Means for both groups, derived from the individual averages were contrasted using the t ratio. No significant differences are evident in the comparison.

Upon finding no significant differences between the experimental and control groups on any of the measures, the two groups were combined so that overall pre- to posttreatment changes could be examined. Analyses of variance, treatments by subjects design, for pretreatment versus posttreatment means for all subjects, presented in Table 1, show significant change on three of the instruments. On the Digit Symbol test, the analysis (Appendix O) shows a decrease in measured anxiety (increase in performance) yielding an $F(33,1)$ of 11.7034, $p < .005$. On the L-M the decrease in reported test anxiety is even more marked, the analysis (Appendix P) generating an $F(33,1)$ of 14.485, $p < .001$. The analysis of scores on the magnitude estimation scale for anxiety felt prior to taking the Digit Symbol test (Appendix Q) yields an $F(33,1)$ of 10.55, $p < .005$. The analysis of the magnitude estimation scale for subjective
Table 1
Means and Standard Deviations, Pre- versus Posttreatment:
All Subjects Combined

<table>
<thead>
<tr>
<th></th>
<th>Pretreatment</th>
<th>Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit Symbol test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>26.5582</td>
<td>21.8823</td>
</tr>
<tr>
<td>S.D.</td>
<td>7.7217</td>
<td>11.9441</td>
</tr>
<tr>
<td>Liebert-Morris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.2941</td>
<td>15.3724</td>
</tr>
<tr>
<td>S.D.</td>
<td>7.2661</td>
<td>5.4450</td>
</tr>
<tr>
<td>Magnitude estimation</td>
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<td></td>
</tr>
<tr>
<td>(anxiety level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>22.7360</td>
<td>16.0000</td>
</tr>
<tr>
<td>S.D.</td>
<td>8.6443</td>
<td>8.8899</td>
</tr>
</tbody>
</table>

ratings of importance of the Digit Symbol test shows no significant change (Appendix R).

Discussion

The results obtained do not support the hypothesis that the experimental condition, cognitive group therapy combined with subliminal presentation of a sanctioned oedipal gratification fantasy stimulus, would result in treatment gains significantly greater than those realized under the control condition, cognitive group therapy combined with the subliminal presentation of a neutral stimulus, in the treatment of test anxiety.
Several possibilities for the lack of effect of the experimental treatment exist. Since a number of investigators have reported positive results in similar studies, it seems likely that a subliminal effect is obtainable via tachistoscopic presentation. However, in view of the several failures to replicate these results, consideration must be granted the position that the positive results reported may be due to faulty research and that, in fact, there is no subliminal psychodynamic activation effect.

Assuming a subliminal effect can be obtained, the reasons for a lack of effect of the experimental treatment in this study are not apparent from the data generated. It has been suggested that differences in population characteristics, possibly corresponding to geographic regions, may render the sanctioned oedipal gratification stimulus used in this study ineffectual (Heilbrun, 1980). However, Heilbrun's data suggest that his subjects, drawn from the student population of the University of Texas at Austin, exhibited no subliminal effect on a simple discrimination task as well as in the study using the sanctioned oedipal gratification stimulus. This implies that his subjects did not perceive any subliminal stimuli. Since no attempt was made in the present study to demonstrate any subliminal effect other than the reduction of test anxiety through presentation of the sanctioned oedipal gratification stimuli, no indication is given of whether the lack of effect
is attributable to the stimulus used or the procedure used in its presentation.

The question of optimal duration of exposure would seem to have been settled by Silverman's (1976) investigations, but recently the 4 millisecond standard has come into question. There may be a physiological threshold involved in subliminal perception which needs to be further delineated, as some physiologists are skeptical that the neurons involved can keep pace with the 4 millisecond exposure. Several studies using tachistoscopic presentations of much longer duration suggest that the emotional meaningfulness of words presented "subliminally" may determine how readily the words are perceived, even at an unconscious level (McGinnies, 1949; Erdelyi, 1974; Williams & Evans, 1980).

The problems associated with equalization of ambient and tachistoscopic illumination levels described by Silverman, et al. (1978) were controlled in the present study. Both room and tachistoscope levels were maintained at 32± footlamberts. Theoretically such a balancing of illumination levels should provide control of any tendency toward a bleaching effect. In the dart-throwing study (Silverman, et al., 1978) the subliminal effects were lost at a tachistoscopic illumination level of 45 footlamberts but demonstrated at levels of 5 and 15 footlamberts. The possibility exists that the absolute level of tachistoscopic illumination, rather than the equivalence of ambient and
tachistoscopic levels, is the critical variable. If this is the case, the tachistoscopic level used in the present study may be too high. Alternatively, it may be that the subliminal effect is demonstrable only when both tachistoscopic and ambient illumination levels are low. These explanations are not supported by Heilbrun's (1980) study wherein no subliminal effects were seen when the levels were held at 5 footlamberts for the tachistoscope and 12 to 25 footlamberts for the room.

Experimenter bias and contamination have been suggested by Condon and Allen (1980) and Heilbrun (1980) as leading to positive results in previous studies. True double-blind studies are difficult to run when procedures as complex as those seen in subliminal stimulation studies are employed. In the present study a true double-blind condition was not attained, for, although group therapists were not informed as to the hypothesis being tested or the assignments of subjects to the experimental and control groups, the tachistoscope operators were privy to this information. These tachistoscope operators also administered the assessment measures, so the possibility of experimenter bias is present. However, this criticism is usually reserved for studies reporting positive results as one would expect any experimenter bias would tend to be in support of the hypothesis being tested.

Heilbrun (1980) argues that the subliminal effect is probably not very robust under most circumstances, and
Silverman (1982a) states that it is most reliably obtainable in studies using male subjects exposed to three or four subliminal stimulation sessions per week within a circumscribed period of time. In the present study several steps were taken to maximize the probability of obtaining a subliminal effect. The recommended male subjects were used. Volunteers were screened so that subjects utilized in the study all exhibited oedipal conflict according to scoring criteria for Blacky Pictures card IV (the "castration anxiety" card). The frequency of subliminal stimulation sessions was slightly less, at twice per week, than Silverman's suggested frequency of three or four sessions per week; however, the treatments were administered within a circumscribed period of time.

Since the subjects in both groups combined showed significant reduction of test anxiety, it could well be that optimal therapeutic effects were achieved for both the experimental subjects and the controls. Such a result could stem from the efficacy of the cognitive group treatment, a lack of severe pathology among the subjects, and/or possible confounding motivations among the subjects. The case for a lack of severe pathology among the subjects is arguable. Hudesman and Weisner's (1978) study indicates a markedly greater degree of test anxiety among student volunteers, recruited using the same procedures as in the present study, than in subjects selected from a general university student population. It would appear that self-
referred students responding to offers of a free test-anxiety treatment program do constitute a population suffering from an identifiable pathology. The severity of this pathology is debatable; the argument could be made that persons suffering truly debilitating test anxiety would have dropped out of school long before entering college. Some of the subjects in the present study were awarded volunteer subject credit by the Psychology Department, and there may have been some inclination for them to offer support for the treatment program in their responses on the self-report measures taken. However, any such bias should not be evident on the Digit Symbol test where they competed for cash prizes on a performance, rather than self-report, measure. Since the analyses of the self-report measures are in concordance with the performance measure, the "halo effect" argument is not supported.

A final possibility for negative findings relates to the complexity and inexactness of the tachistoscopic procedures used in the various studies. Although much effort has been expended in the attempt to establish reliable standard procedures, it may be that some as yet unidentifiable procedural variable will emerge as crucial to the elicitation of the subliminal effect.

The decreases in test anxiety as measured by the Digit Symbol test, L-M, and the magnitude estimation scale for test anxiety felt prior to taking the Digit Symbol test offer support for the findings of Kaplan, et al. (1979) and
Holroyd (1976) that the cognitive only treatment of Meichenbaum's Cognitive Behavior-Modification treatment is effective in the treatment of test anxiety. Since no waiting list or expectancy control groups were used as controls in the present study it cannot be said to offer definitive support for these previous findings. The results, however, are in accordance with those of the prior studies.

The present study can be utilized to formulate suggestions for future research in the area of subliminal stimulation. The physiological mechanisms of perception and their relationship to duration of exposure and illumination levels constitute an area of critical importance. The impressive demonstrations of subliminal effect in some studies juxtaposed against the utter lack of effect in others indicates that more basic research is needed in the area of establishing a set of parameters within which the effect can be reliably elicited. Only when such a level of reliability is obtained with regard to the mechanics of the presentation itself can the investigation proceed to examination of the effects of particular stimuli in particular applications. Any investigator in the area would be well-advised to utilize a pretreatment screening of potential subjects to demonstrate a subliminal effect. This could be accomplished via a simple discrimination task such as described by Silverman (1976). As susceptibility to subliminal influence is further delineated the development of a measure of subliminal susceptibility
might be undertaken. Whether the elicitation problem rests in the characteristics of the subjects or in the mechanics of presentation, a demonstration of effect is necessary early on in any investigation. Without such demonstration failures to elicit an effect further down the line cannot properly be attributed to a particular cause.

In treatment adjunct studies care must be taken to regulate treatment so that common treatments administered do not allow both experimental and control groups to reach their improvement "ceilings." Such a situation renders the subliminal adjunct treatment superfluous.

It is probable that Silverman and the other experimenters who have demonstrated the subliminal effect have incorporated some as yet unidentifiable procedural variable into their investigations which is critical to success. Other explanations for the lack of consistent findings in the studies surveyed are not consistently supported themselves, suggesting that they are either inadequate or that a combination of factors exist which serve to destroy the effect in the "failure" studies. It is therefore concluded that more research is necessary into the workings of the physiological/mechanical interface and that, for the present studies dealing with subliminal effect should incorporate a demonstration of a simple subliminal effect prerequisite to the investigation of any particular effects.
Appendix A

USE OF HUMAN SUBJECTS

INFORMED CONSENT

NAME OF SUBJECT: ________________________

1. I hereby give consent to __________________ to perform or supervise the following investigational procedure or treatment: Dissertation research consisting of a combination of two techniques intended to reduce test anxiety and various measures of efficacy of these procedures.

2. I have (seen, heard) a clear explanation and understand the nature and purpose of the procedure or treatment; possible appropriate alternative procedures that would be advantageous to me; and the attendant discomforts or risks involved and the possibility of complications which might arise. I have (seen, heard) a clear explanation and understand the benefits to be expected. I understand the procedure or treatment to be performed is investigational and that I may withdraw my consent for my status. With my understanding this, having received this information and satisfactory answers to the questions I have asked, I voluntarily consent to the procedure or treatment designated in Paragraph 1.

__________________________
DATE

SIGNED: ________________________ SIGNED: ________________________
Witness Subject or Person Responsible

SIGNED: ________________________ SIGNED: ________________________
Witness Relationship

Instructions to persons authorized to sign:

If the subject is not competent, the person responsible shall be the legal appointed guardian or legally authorized representative. If the subject is a minor under 18 years of age, the person responsible is the mother or father or legally appointed guardian. If the subject is unable to write his name, the following is legally acceptable: John H. (His X Mark) Doe and two (2) witnesses.
Appendix B

Subject Number: 

Group: 

-----------------------------------------------

Do not write above this line.

Please answer the following:

Date of Birth:

Classification: Fr So Jr Sr Gr

Number of Brothers:
Ages:

Number of Sisters:

Ages:

On a scale of 1 to 5, with 1 least and 5 most, rate the degree of power you felt each family member had when you were a child.

Yourself:
Father:
Mother:
Other(s):

Do you come from a broken home? Yes  No

If yes, which parent left home?

At what ages (yours) was this parent absent from your home?

Was the absent parent replaced by a new parent figure?

If yes, at what age did the new parent figure come into your life?

Did you experience anything between yourself and a parent or parental figure during your childhood which you consider extraordinary? If so, please explain briefly.

GPA last semester:
Appendix C

Here is a cartoon of two dogs, Blacky and Tippy. Please look at the picture then respond to the items of the questionnaire.

1. Here Blacky is watching Tippy. Write a brief story of what you feel might be happening.

2. How does Blacky feel here?
   a) Terrified that he's going to be next.
   b) Puzzled and upset.
   c) Curious but calm.

3. What does Blacky suspect might be the reason for this scene?
   a) He suspects Tippy is being punished for having done something wrong.
   b) He suspects Tippy is the innocent victim of someone else's ideas.
   c) He suspects Tippy is being improved in some way.

4. How does Blacky feel about his own tail?
   a) He's not particularly worried about it.
   b) He's thinking desperately about a way to save it.
   c) He thinks it might look better if it is cut off.
   d) He's so upset he wishes he never saw or heard of tails.

5. Do you suppose Blacky would prefer to have his own tail cut off right away rather than go through the suspense of wondering if it will happen to him? ... Why?
6. Which member of Tippy's family (Father, Mother, Blacky, or Tippy) most likely arranged for Tippy's tail to be cut off?

7. What will other dogs in the neighborhood do when they see Tippy's short tail?

   a) Start worrying about their own tails.
   b) Make fun of Tippy.
   c) Wonder what's going on.
   d) Admire Tippy.
Appendix D

BEATING DAD
IS OK
Appendix E

PEOPLE WALKING
Appendix F

Subject #: ______________

Date: ______________

Instructions: Complete the following sentences.

For me, taking tests

When I was very young my mother

I hated it when my dad

When I was very little I was happiest

My instructors have always

When I am in control of things

My dad used to

I am most relaxed when

When I look at the first question of a test

My mom and dad
Appendix G

L-M TAQ

Subject #: ________________

Date: ________________

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

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

____ I feel my heart beating fast.
____ I feel regretful.
____ I am so tense that my stomach is upset.
____ I am afraid that I should have studied more for this test.
____ I have an uneasy, upset feeling.
____ I feel that others will be disappointed in me.
____ I am nervous.
____ I feel I may not do as well on this test as I could.
____ I feel panicky.
____ I do not feel very confident about my performance on this test.
Appendix H

Subject #: ____________
Date: ________________
Course: ______________

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Answer by circling the dot on each scale which represents your best estimate of the question asked at this moment.
Appendix I

Brief Description of the Cognitive Component
of Meichenbaum's Cognitive Behavior-
Modification (Meichenbaum, 1972)

A sequential procedure is utilized to treat (test) anxiety based upon cognitive behavioral principles. In the first meeting rapport is established between group members and the therapist. Then the common problem is defined and the rationale of the treatment explained. According to the theory underlying the treatment, negative self-statements (coverts) trigger the (test) anxiety. These negative coverts typically take the form of self-criticism ("You should have studied more for this test."), self-depreciation ("You're just too dumb to do college work."), or dire prediction ("You're going to fail the test. Then you'll flunk out. Then you'll end up on welfare . . . , etc."). In the next meetings group members are led to identify their own negative coverts through group discussions and homework assignments. The common themes of the negative coverts are then discussed and their detrimental effect is explained. New positive coverts are invented reflecting mastery ("You know this material backwards and forwards."), self-confidence ("You're a very intelligent and capable student."), and logical thinking ("Take this test one step at a time. Do the easy questions first."). The remaining group sessions are spent
substituting the positive coverts for the negative ones. Various techniques are employed in this phase; however, practice and group support are emphasized as the therapists' most potent tools.

The therapy manual gives detailed instructions and explicit examples with regard to the cognitive treatment. Basic techniques of group therapy are not included in the manual, and the therapist is left free to utilize his or her preferred techniques in this broader area.
Appendix J

Comparison of Group Means Prior to Treatment

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*Raw scores on Digit Symbol Test were converted (90-X) so that direction of score increase would correspond over all dependent variables.
Appendix K

Analysis of Covariance
(WAIS) Digit Symbol

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Notes: (1) The SS and ms values for treatment and error have been adjusted.

(2) Test for homogeneity of regression: $F = 1.43428 (1, 30)$.

Adjusted Means and Standard Deviations

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Dependent variable: Posttreatment scores

Covariate: Pretreatment scores
Appendix L

Analysis of Covariance: Liebert-Morris TAQ Scores

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Notes. (1) The SS and ms values for treatment and error have been adjusted.

(2) Test for homogeneity of regression: $F = 0.0004 \ (1,30)$.

Adjusted Means and Standard Deviations

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Dependent variable: Posttreatment scores

Covariate: Pretreatment scores
Appendix M

Analysis of Covariance: Magnitude Estimation Scale Test Anxiety Felt

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Notes. (1) The SS and ms values for treatment and error have been adjusted.
(2) Test for homogeneity of regression: \( F = .02129 \) (1,30)

Adjusted Means and Standard Deviations

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Dependent variable: Posttreatment scores
Covariate: Pretreatment scores
Appendix N

Analysis of Covariance Magnitude Estimation Scale: Importance of Test

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Notes. (1) The SS and ms value for treatment and error have been adjusted.

(2) Test for homogeneity of regression: $F = .134497 (1,30)$.

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Dependent variable: Posttreatment scores
Covariates: Pretreatment scores
## Appendix O

### Analysis of variance: Treatments by Subjects Design (WAIS) Digit Symbol Subtest Scores

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### Means and Standard Deviations

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Analysis of Variance: Treatments by Subjects Design
Liebert-Morris TAQ Scores

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### Means and Standard Deviations

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Appendix Q

Analysis of Variance: Treatments by Subjects Design
Magnitude Estimation Scale: Test Anxiety Felt

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Means and Standard Deviations

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Appendix R

Analysis of Variance: Treatments by Subjects Design
Magnitude Estimation Scale: Importance of Test

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Means and Standard Deviations

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References


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