THE UNIVERSITY OF CALGARY

THE EXTENT TO WHICH SUBJECT VERSUS EXPERIMENTER CONTROL, GRADUATED VERSUS NON-GRADUATED TIME EXPOSURE, AND CORRESPONDING FEEDBACK ARE EFFECTIVE IN FEAR REDUCTION.

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Extent to which Subject versus Experimenter Control, Graduated versus Non-Graduated Time Exposure, and Corresponding Feedback are Effective in Fear Reduction" submitted by Alain Hepner in partial fulfillment of the requirements for the degree of Master of Science.

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ABSTRACT

Recent research has demonstrated the efficacy of Leitenberg's model as an effective therapy in reducing overt avoidance and subjective fear. The procedural factors accounting for the success of the therapy were determined to be: a) the graduated exposure to the phobic stimulus; b) feedback of exposure times, and c) subject control over the amount of exposure. The present study was designed to specify the extent to which each of these variables is effective in the reduction of snake phobic behavior.

Fifteen subjects were randomly assigned to one of the following three treatment groups: S control, graduated exposure, feedback; E control, graduated exposure, feedback; and E control, constant time exposure, feedback. The exposure time data of the two E control treatment groups was yoked to the data of the S control group.

All treatments significantly reduced phobic behavior, as measured by avoidance behavior in the presence of the phobic object, and subjective fear. Greatest differential reduction in behavioral avoidance was experienced by the S control, graduated exposure, feedback treatment, followed by the E control, graduated exposure, feedback treatment. The E control, constant exposure, feedback treatment experienced the least differential reduction. The results indicate the relative importance of S control and graduated exposure as facilitory variables in the reduction of behavioral avoidance. In addition, the selection procedures used were found to be effective in identifying Ss with intense fear of snakes.

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CHAPTER I

INTRODUCTION

It has been said that, at first glance, phobias seem to be one of the more tangible, as well as circumscribed, of abnormal behaviors presented in psychiatric clinics (Meyers and Crisp, 1970). A phobia is generally described as a recurrent, intrusive, excessive, specific fear which is recognized as unreasonable or even absurd by the person who experiences it. Marks (1969) defined the phobia as a special kind of fear which (1) is out of proportion to the demands of the situation, (2) cannot be explained or reasoned away, (3) is beyond voluntary control, and (4) leads to avoidance of the feared situation. A phobia is considered to involve at least three distinct components: (1) subjective-verbal, the inner state feeling; (2) behavioral-motor, the outer aspects visible to observers; and (3) physiological-autonomic, the accompanying physiological change (Lang, 1969).

It has been generally accepted by many theorists that phobias appear to be analogous to experimentally established avoidance responses, hence, resulting in a wide acceptance of Mowrer's (1947) two-factor theory of avoidance learning as an acceptable account of the development of phobias. Eysenck and Rachman (1965) have clearly endorsed this position in presenting the essentials of the behavior therapist's theory of phobia development by stating:

> Neutral stimuli which are associated with a noxious experience(s) may develop (secondary) motivating properties. This acquired drive is termed the fear drive. Responses (such as avoidance) which reduce the fear drive are reinforced (p. 82).

It is assumed that in the development of phobias, a conditioned fear drive (anxiety) becomes attached, in a traumatic learning situation,

to a previously neutral stimulus by means of classical conditioning. The acquired fear drive then maintains phobic responses that permit avoidance of the anxiety-provoking situation.

Therapists have tended to use Wolpe's (1958) technique of systematic desensitization for the treatment of phobic conditions. This technique is based on the assumption that systematic desensitization weakens the anxiety response by what Wolpe refers to as reciprocal inhibition. The general principle underlying systematic desensitization states that "if a response antagonistic to anxiety can be made to occur in the presence of anxiety-provoking 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)." Thus, the treatment consists of gradual introduction of carefully graded, subjectively noxious stimuli to the imagination of a deeply relaxed or hypnotized individual until he is able to visualize the most distressing stimuli in a list of stimuli, usually referred to as an "anxiety hierarchy", without experiencing any anxiety. Wolpe (1962) claims that, at every stage of this process, freedom from anxiety to an imagined stimulus confers freedom from anxiety upon confrontation with the real equivalent. Hence, systematic desensitization treatment functions to reciprocally inhibit the conditioned anxiety response which maintains the avoidance behaviors.

Evidence of the success of this type of therapy has been impressive in individual case reports (Ullman and Krasner, 1965; Eysenck, 1960) as well as in controlled laboratory studies (Lang and Lazovik, 1963; Lang, Lazovik and Reynolds, 1965; Lazarus, 1961; Paul, 1966). Paul (1969), in a review of seventy-five papers dealing with systematic desensitization,

concluded that the findings were overwhelmingly positive, and for the first time in the history of psychological treatments, a specific therapeutic package reliably produced measurable benefits for clients across a broad range of distressing problems in which anxiety was of fundamental importance.

Despite the unlimited support attesting to the utility of systematic desensitization, there appears to be a continuous increase in the literature challenging the efficacy of the procedures in systematic desensitization. The crucial procedures by which this method achieves fear reduction has not yet been determined. The three features that have been identified, those of: (1) deep muscle relaxation; (2) gradual introduction of graded noxious stimuli; and (3) imagining (or visualization) of the distressing stimuli, concommitant with muscle relaxation, have been regarded essential for successful treatment. However, recent literature suggests that none of the above are necessary for successful treatment. Wolpin and Raines (1965) found muscle relaxation to be unnecessary as a mode of fear reduction. They found that muscle tension, rather than muscle relaxation, during the visualization of scenes in the graded hierarchy, was also successful in fear reduction. In addition, they found that reversing the hierarchy (presentation of the most disturbing scenes of an anxiety) was equally effective as a gradual presentation of the scenes from the least to the most disturbing. Wilson and Smith (1968) reported success with treatment in which relaxation was accompanied by the imagination of free association scenes instead of scenes organized into a hierarchy. Emery and Krumboltz (1967) found that individualized tailoring of hierarchy was no more effective in anxiety reduction than the standard hierarchy developed by the investigators prior to interview-

ing subjects. Leitenberg, Agras, Barlow, and Oliveau (1969) found similar results. They also successfully reduced fear using a standard non-individualized hierarchy. Davison (1966) demonstrated that muscle relaxation and anxiety are not mutually antagonistic, since anxiety can be experienced while a person is in a state of chemically produced muscle relaxation.

The theoretical formulation upon which desensitization is based, appears inadequate as well. According to Wolpe, the concept of reciprocal inhibition is central to the technique of systematic desensitization. However, Wilson and Davison (1971) stated that "Wolpe's celebrated formulation of the reciprocal inhibition principle constituted an unwarranted and probably unparsimonious transformation of a narrow physiological principle to explain very complex and occassionally insufficiently controlled behavioral data (page 3)." They also stated that reciprocal inhibition is functionally equivalent to Hull's reactive inhibition, and that Wolpe explicitly accepts the basic logic of the Hullian fatigue theory of extinction which has recently been severely embarrassed (e.g., Adams, 1963; Deutch, 1960; Jensen, 1961). The reciprocal inhibition concept, therefore, appears to represent a behavioral system which is based on shaky neurologization and which has serious logical and empirical shortcomings.

The behavior therapists' acceptance of Mowrer's two-factor theory of avoidance as an experimental paradigm of phobia development has also been criticized. Herrnstein (1969), in questioning the role of the conditioned stimulus (CS) in avoidance learning, suggested that, instead of viewing the CS as a conditioned aversive stimulus, the termination of which is an essential feature in the maintenance of avoidance responses, the CS should be viewed as a discriminative stimulus. Herrnstein sub-

stantiated his view by presenting a list of experimental evidence which was extended by Costello (1970). The types of conditioned avoidance responses that have been regarded by behavior therapists as providing adequate experimental analogues of phobic behaviors are dissimilar to such behaviors because (1) the avoidance responses are adequate (coping) behaviors, and (2) they do not involve a conflict with approach behaviors and such a conflict appears to be characteristic of clinical phobias (Costello, 1970).

The success of systematic desensitization in treatment of phobias might be viewed as lending support to underlying theoretical formulation. However, this premise is not sound. The success of a therapy often has little to do with its theoretical underpinnings. Experimental findings point to variables other than those proposed by Wolpe, which appear equally effective in fear reduction. Nelson (1967) suggested that stimuli such as food, which supposedly elicits an anxiety competing response, may actually facilitate extinction of fear through the increased exposure to the CS which it can bring about. He found the presence of food facilitates fear reduction by serving as an incentive for exposure to the CS. Valins and Ray (1967) found that leading subjects to believe that phobic stimuli do not affect them, by presenting false heart rate feedback during exposure to stimuli, was an effective therapeutic agent in reducing avoidance behaviors.

The crucial elements involved in the systematic desensitization procedure are far from having been teased out. The success of desensitization suggests that some variable(s) manipulated in the procedure are responsible for the reduction of phobic behavior. However, variables once

thought to be essential to desensitization, in accordance with theoretical, behavioral, and practical formulations, are not representative of plausible experimental findings.

Recent work by Leitenberg, Agras, Thompson, and Wright (1968) and Leitenberg, Agras, Butz, and Wincze (1971) has suggested a simplified therapy of fear reduction as an alternative to systematic desensitization. They found that graduated practice in facing phobic stimuli, along with feedback of exposure time, resulted in the removal of a variety of clinical phobias. It was suggested that patients can gradually learn to act differently in spite of their anxiety, and as a result of such changes in behavior, anxiety may subsequently subside (Leitenberg, et al., 1971).

The "feedback" variable was initially discovered to be an essential factor in the development of this technique. Leitenberg, et al. (1968) reported two instances of single case research in which an isolated therapeutic variable was sequentially introduced, withdrawn, and re-introduced while changes in clinically relevant behavior were measured. A claustrophobic patient and a knife-phobic patient received graduate practice in facing their phobic stimuli. They were merely asked to remain in the presence of the phobic stimulus until they felt anxious. Exact exposure time was measured and when feedback of these time scores was given to the patients, the patients improved. When feedback of these time scores was withdrawn, ongoing progress was retarded. Reinstatement of feedback led to renewed improvement. Adding and removing contingent verbal praise against a constant background of precise feedback did not significantly alter the rate of progress.

The development of this paradigm, in addition to reducing the

complexity of therapeutic procedure, suggested an alternative theoretical formulation to that proposed for systematic desensitization. The Leitenberg model utilizes a method of training phobics to cope with their anxiety by remaining in a fearful situation: the individuals control exposure duration to the anxiety-producing stimulus; when their anxiety becomes intolerable, exposure to the stimulus is terminated. It was hypothesized that during such treatment, anxiety reduction would be a consequence rather than a cause of behavioral change. Hence, the learning of coping behavior (White, 1959) was considered to be an important factor in fear reduction, and phobias might be better regarded as a result of a failure to develop coping behaviors rather than the learning of avoidance behavior.

In support of this hypothesis, Leitenberg, et al. (1971) presented data from nine phobic volunteers who were treated by the graduated exposure method. Simultaneous measures of approach behavior and heart rate were obtained while subjects were exposed to the phobic situations. It was predicted that if the behavioral hypothesis was correct, phobic behavior would decrease first, followed by a decline in heart rate. Alternatively, the two-factor theory would predict a decline in heart rate followed by a reduction of phobic behavior. Different relationships were in fact observed between these two variables. In two cases, heart rate increased as phobic behavior declined; in three cases, heart rate and phobic behavior declined together; and in four cases, phobic behavior decreased without an accompanying change in heart rate. As no subjects showed a decline in heart rate before phobic behavior decreased, the authors concluded that physiologically defined anxiety need not be inhibited prior to behavioral change.

Three criticisms were directed at the Leitenberg study (Davis, McAmmond and Trimble, 1972; Becker, 1973). First, heart rate was the only physiological measure recorded. Individualized variation in the pattern of autonomic response to a stressor is a commonly observed phenomenon. For example, one subject might react to a stressor with a large heart rate increase and only minimal change in skin conductance, while a second subject could react in the reverse manner to the same stressor. Individual response patterns, or response specificity to stressors have been shown to be reproducible over time (Lacey, 1960) and across stressors (Lacey and Lacey, 1958). It is possible that subjects who failed to show a decline, or who actually showed an increase in heart rate as phobic behavior decreased, would have displayed a decrease in autonomic arousal in another response mode. It is also possible that physiological arousal in another response dimension might have declined befor declines in phobic behavior occurred.

The second criticism concerned the failure to provide an adequate evaluation of the therapeutic efficacy of the treatment procedure. The Leitenberg model had not proven therapeutic effectiveness in terms of generalization to laboratory and non-laboratory situations.

Finally, presumably as a result of using a clinical population, no control groups had been used in any of the studies. Hence, a demonstration of the effectiveness of the therapy, as compared to non-treated controls, had not been fully realized.

In spite of these major criticisms, this alternative technique appeared to have impressive clinical benefits. Irrespective of the process involved in fear reduction, and in addition to the criticisms

discussed, supplementary problems had been encountered by desensitization which needed to be dealt with by any therapy procedure attempting to reduce phobic behavior. These two problems were: (1) an adequate measurement of fear; and (2) proper selection of phobic individuals.

Becker (1973) remedied these two procedural problems, in addition to correcting for the three criticisms directed towards the Leitenberg et al. (1971) study. He replicated the Leitenberg technique measuring skin resistance and heart rate, and used a five-factor post-therapeutic evaluation to test for generalization effects of the technique. He found the model to be successful in reducing phobic behavior when the treatment group was compared to a non-treated control group, and that this therapy generalized to non-laboratory situations. He also validated the selection procedures for detecting phobic individuals (Lang and Lazovik, 1965) when predictions are being made from these procedures to avoidance behaviors and self-reported fear in the presence of a phobic stimulus.

A satisfactory physiological index of fear has not been found. Becker (1973) suggested that the measurement of fear is a function of a response consisting of two definite components: (1) subjective-verbal, and (2) behavioral-motor responses, and that the third component--the physiological-autonomic response--reveals very little systematic change in relation to fear reduction. Leitenberg, et al. (1971) also suggested that behavioral progress in phobic patients can occur without a parallel decline in the physiological expression of fear. Rachman (1968), Zeisset (1968), and Lomont and Edwards (1967), in reducing fear by desensitization, reported studies in which physiological activity of

subjects receiving treatment has been recorded. No significant differences on the physiological level have been found between treatment and control subjects, or between pre- and post-measures in subjects receiving successful treatment, even though significant differences are observed in behavioral and self-report measures of fear. Following treatment, the desensitized group sometimes showed less reduction than untreated subjects in physiological activity recorded in the presence of the previously feared stimuli. This casts serious doubts on the notion that physiological reactions serve an information function influencing reduction in fear and avoidance behavior.

As a viable alternative to systematic desensitization, Leitenberg's technique of graduated exposure has proven to be successful in reducing overt and subjective fear. Its effects were found to be long term and generalized to laboratory situations, as well as to non-laboratory situations. The procedural factors that may account for the success of the therapy have been identified. The extent to which each of these elements is effective in the reduction of fear has not yet been determined.

Statement of the Problem

Systematic desensitization, developed by Wolpe (1958) for the treatment of phobic conditions, is not based on generally accepted theoretical rationale. Methods other than systematic desensitization appear equally successful in reducing fear, and suggest an alternative theoretical formulation to that proposed by desensitization. The problem is an important one for both the theoretical aspects of the acquisition and removal of phobias, and for the development of the most efficient therapies.

The efficacy of Leitenberg's therapy has been demonstrated. Several procedural variables accounting for its success can be identified: (1) graduate exposure to phobic stimuli; (2) feedback of exposure times; and (3) subject control over the amount of exposure time. The extent to which each of these factors is effective in reduction of fear was examined in the present study. In comparing graduated exposure with non-graduated exposure, subject control with experimenter control over the amount of exposure time, corresponding feedback, and the inter-relationships of these factors, the extent to which each variable contributes to the success of Leitenberg's model was determined.

Hypothesis

Leitenberg et al. (1968, 1971) and Becker's (1973) studies demonstrated that three combined variables produce therapeutic benefit: S control of exposure time, graduated increase of exposure time, and precise trial by trial feedback of exposure duration. It was hypothesized that, in the present study, of the three factors, subject control over length of exposure to the phobic stimulus is the important element of the therapy.

Leitenberg et al. (1968) has shown that the feedback factor can facilitate behavioral change in phobic disorders, with respect to exposure duration, when the graduated exposure technique is applied. As a result, this variable was not manipulated. Mandler and Watson (1969) have shown evidence that when Ss are in control of the onset or offset of potentially stressful stimuli, there is likely to be less anxiety. Leitenberg et al. (1969, 1971, 1973) and Becker (1973) have demonstrated that the graduated time exposure factor is, indeed, an effective therapeutic agent. In accordance with these findings, it was predicted that a combination of these three variables - S control, graduated time exposure, and feedback - would produce greater reduction in phobic behavior than the combined E control, graduated time exposure, feedback factors. Similarly, it was expected that this latter combination would be more effective than the E control, constant time exposure, feedback paradigm in facilitating changes in phobic behavior.

CHAPTER II

METHOD

Subjects

Fifteen undergraduate students from The University of Calgary served as subjects. Their ages ranged from 18 to 60 years, and included 11 females and 4 males. Subjects were solicited on a volunteer basis, and were paid $15 for their participation.

Subject selection was dependent upon the following criteria:

1. A score of five on the Fear Survey Schedule -- III (FSS-III). The original Fear Survey Schedule, developed by Lang and Lazovik (1963), is a list of common fears, each rated by subjects as to their degree of fear, using a five point scale. It was extended by Wolpe and Lang (1964) to 72 common fears that include animal phobias (e.g. snake), social phobias, illness and injury fears and classical phobias (e.g. height). Each item is rated by subjects on a five point fear scale ranging from "not at all" (score of 1), to "very much" (score of 5). (See Appendix A).
2. A score of 19 or above on the Snake Fear Questionnaire (SNAQ) which consists of 30 true-false items related to situations involving snake stimuli (Lang, Melamed and Hart, 1970). (See Appendix B).
3. A score of 6 or more on a personal interview concerning the subjects' fear. The interview procedure was standardized in the form of a questionnaire consisting of 9 questions (Becker, 1973). (See Appendix C).
4. Avoidance behavior in the presence of a live but harmless snake. The subject was disqualified if he could approach within 3 feet of the snake. (See Appendix D).

Apparatus

The apparatus consisted of a grey wooden box 24" x 12" x 13". The front of the box was made of a clear plastic through which a snake could be seen, but an automated opaque door covered the plastic concealing the contents of the box (the snake) from view. This door was connected to a motor located at the top of the box, and to a switch which was connected to an elapsed time meter located in the adjoining control room. Opening and closing the door of the box activated a timer, giving the length of time the door remained open. The contents of the box (the snake) were not visible to the S upon entering the room. Ss were seated six feet from and facing the box.

Procedure

The Ss were randomly assigned to one of three groups, five per group. Each was tested individually.

Pre- and Post-Measures

On day 1, Ss were all pre-tested with the behavioral avoidance measure and the fear thermometer. The former, a direct estimate of the S's avoidance behavior, was obtained by confronting the S with the phobic object. He was informed that a non-poisonous, harmless snake was confined in a glass cage in a nearby laboratory. The snake was confined at a point 15 feet from the entrance of the room. The S, once again reassured that the snake was harmless, was requested to enter the room, and to approach the cage in order to examine the snake. If S refused, he was asked to come as close as comfortably possible. If the S was able to come all the way to the cage, he was asked to touch the reptile (a 6 foot Boa Constrictor--Constrictor constrictoris). If the S

succeeded in this, he was invited to hold it. The closest point of approach to the reptile provided a basis for the S's test score. If the S held the reptile, he received a score of 1; if he touched it, a score of 2; examining snake while standing close to the case, a score of 3; the one foot mark, 4; the two foot mark, 5; and so on up to a score of 19 for the Ss who refused to enter the testing room and observe the snake (see Appendix D).

The second measure of the pre-test was a subjective estimate of the S's fear. Following the avoidance test, Ss were asked to rate their anxiety during the behavioral avoidance test on a 10 point "fear thermometer" (Walk, 1956). The fear thermometer is a 10 point scale on which the S judges his degree of fear during the avoidance test, from a low of "completely relaxed" (score of 1) to a high of "as scared as I've ever been" (score of 10 (see Appendix E).

All Ss were pre-tested on Day 1; Day 2 to 6 involved the administration of the various therapeutic procedures to the three groups of Ss.

On Day 7, all Ss were post-tested in a manner identical to the Day 1 pre-test.

Treatment Procedure

A. Group 1 - Graduated exposure under S control, with feedback.

Ss were taken to the experimental room in which the apparatus was located. They were seated six feet from and facing the box, and given the following instructions.

> "The box you see before you contains a harmless, non-poisonous snake. It has been constructed in such a way that it is impossible for the snake to escape. On the right before you, you see a small box with a button at the top of it. By pushing this button, a motor will be

activated which will lift up the front cover of the box and expose the snake inside to your view. The snake, however, is still behind glass and cannot harm you. To conceal the snake, you simply push the button again.

There will be 4 sessions a day, ten trials per session with a 30 second rest period between trials. There will be an upper limit of 5 minutes exposure time per trial. That is, 5 minutes continuous exposure to the snake will constitute one trial. A trial consists of opening and closing the door to expose and conceal the snake. During these sessions, I want you to practice opening the door and looking at the snake for as long as you can before you close the door. Do not turn away, close the door instead.

At the end of each trial, you will be informed as to the exact amount of time you have spent looking at the snake. At the end of each session, you will be given the total time spent viewing the snake.

Are there any questions?"

If Ss had any questions, they were briefly answered. The E gave one demonstration of how the box worked and then left the room and informed the S, over the intercom, that each trial was preceded by a ready signal. After a 30 second rest period, the E signalled to begin the first session.

There were four sessions per day for five days, ten trials per session and a 30 second inter-trial interval. Precise feedback was provided in the following manner. When the S closed the door, thus concluding a trial, the E reported over the intercom, "that was x seconds." In addition, at the end of each session, he reported the cumulative time spent in observing the snake (see Appendix F).

B. Group 2 - Yoked control--Graduated Exposure under E control, with feedback.

The Ss were treated in a similar manner as those in Group 1, however, the graduated exposure to the stimuli was under E control.

To insure that observed changes in behavior could be attributed to the self-control variable, a yoked design was used. The exposure time of Group 2 Ss was yoked to Group 1 Ss. Thus, if S #1, Group 1, kept the door open for 30 seconds on trial #1, session #1, then Group 2 S #1 had the door open for 30 seconds on trial #1, session #1. All Ss in Group 2 were yoked for the experimental conditions to their respective Group 1 Ss. Latency between the E's ready signal and the S's commencing each trial was also yoked accordingly. Instructions given to these Ss were as follows:

> "The box you see before you contains a harmless, non-poisonous snake. It has been constructed in such a way that it is impossible for the snake to escape. Throughout the sessions, I will be in the next room controlling the front cover of the box. When activated, the front cover of the box will lift up, exposing you to view the snake. The snake, however, is still behind glass and cannot harm you. The door will be lifted and lowered according to a pre-determined schedule. If at any time you are so uncomfortable and anxious that you wish to conceal the snake before the designated time, you may do so by pushing the button on your right. However, please bear in mind that this will conclude your participation in the study. Thus, please try to view the snake throughout the alloted exposure time unless you find it absolutely mandatory to terminate the trial.
>
> There will be 4 sessions a day, 10 trials per session, a 30 second rest period between trials, with an upper limit of 5 minutes. A trial consists of the door opening and closing, thus exposing and concealing the snake.
>
> At the end of each trial, you will be informed as to the exact amount of time you have spent looking at the snake. At the end of each session, you will be given the total time spent viewing the snake. Are there any questions?"

As this group was yoked to Group 1, the treatment as to days, sessions and trial was identical to that of Group 1. When the E closed

the door of box concluding a trial, feedback was provided to the Ss in the same manner as to the Group 1 Ss. With the exception of S control being substituted for E control, the treatment of this group was essentially the same as that for Group 1.

C. Group 3 - Non-graduated exposure, under E control, feedback constant.

The Ss in this group were subject to a non-graduated exposure (NGE) paradigm. Again, the procedure for Ss in Group 3 was similar to that of Groups 1 and 2, however, a constant time exposure was given on all trials throughout all sessions. The constant time exposure selected was derived in the following manner:

Using results obtained from Group 1 Ss, the mean time per trial on the 10 trials in session #2, Day 1 was divided into the total time that Group 1 Ss spent viewing the snake. This yielded the total number of presentations given to each Group 3 S.

$$\frac{T}{\bar{t}} = P$$

Where: T = Total time spent by Group 1 Ss in viewing the snake.

$\bar{t}$ = Mean trial time for the 10 trials Session #2, Day 1, of all Group 1 Ss.

P = Total number of presentations given to each subject in Group 3.

The total number of presentations were equally divided over days, session, and trials.

*(NOTE: selection of session 2, day 1, trials 1 to 10 to obtain $\bar{t}$, the selected constant time exposure, was an arbitrary choice. Any session or individual trial could have been chosen, however, early therapy

sessions and/or trials were preferred. This facilitated the non-graduated exposure paradigm in insuring that the constant time exposure derived was not too large. It was feared that the impact of a large time exposure in the initial sessions might have created a high degree of anxiety resulting in the Ss wishing to terminate their participation).

$\bar{t}$ was found to be 25.3 sec.

P was found to be 163.

The latency of response between the E's ready signal and the S's commencing a trial was also constant. The selected time was the mean latency on the 10 trials, session 2, day 1. This response lag was calculated to be 4.5 seconds.

Therefore, each S received 163 trials, exposure time per trial was 25.3 seconds. Dividing the total number of trials over four daily sessions for five days, yielded 33 trials per day, eight trials per session, and one extra trial randomly assigned to any of the four sessions.

Instructions given to these Ss were as follows:

> "The box you see before you contains a harmless, non-poisonous snake. It has been constructed in such a way that it is impossible for the snake to escape. Throughout the sessions, I will be in the next room controlling the front cover of the box. When activated, the front cover of the box will lift up, exposing you to view the snake. The snake, however, is still behind glass and cannot harm you. The door will be lifted and lowered according to a pre-determined schedule. If at any time you are so uncomfortable and anxious that you wish to conceal the snake before the designated time, you may do so by pushing the button on your right. However, please bear in mind that this will conclude your participation in the study. Thus, please try to view the snake throughout the alloted exposure time unless you find it absolutely mandatory to terminate the trial.
>
> Your exposure time schedule will be as follows: there will be 4 sessions a day for 5 days, 8 trials per session with one additional trial on the xth session (where x = 1, 2, 3, or 4). Each trial will last 25.3 seconds, and then there will be a 30 second inter-trial interval. A trial consists of the door opening and closing to expose and conceal the snake. Each trial

will be preceded by a ready signal. Are there any questions?"

Two Es were used in this study. The E who assessed pre-measures and post-measures of avoidance and self-report behavior was unaware as to which group the Ss had been assigned. Similarly, the E who performed the therapy was not aware of the pre-treatment scores of the Ss.

The following were the specific hypotheses tested. Group 1 (S control, graduated exposure, corresponding feedback) will experience greatest fear reduction, as shown by closer behavioral approach, and improved verbal self-report, closely followed by Group 2 (E control, graduated exposure, corresponding feedback). The fear reduction demonstrated by Group 3 (E control, non-graduated exposure, feedback constant) will be significantly less than that of Groups 1 and 2.

CHAPTER III

RESULTS

Subject Selection

From a total of 500 FSS-III questionnaires distributed, 26 Ss rated their fear of harmless snakes as "very much" (score of 5). The criterion score was obtained by 19 of the 26 Ss on the SNAQ; 17 of the 19 Ss reached criteria on the Standardized Interview; and 16 of the 17 Ss obtained criterion scores on the avoidance measure. As a result, intense fear of snakes was found to occur in 3.2% of the population sampled.

Avoidance Behavior Data

A one-way analysis of variance on the pre-test measure showed no significant differences between the three groups ($F = 1.88$, $df = 2/12$, $p > .05$; see Table 1).

To determine the effect of the three treatments, percentage change scores were assigned to all Ss on the basis of the pre- and post-measures. It is logical that the probability of a positive increase in approach lessens the closer the S is to the phobic object; movement from a score of 15 to 12 is more likely or easier than movement from a scale score of 4 (2 feet away) to a score of 1 (holding the snake). Hence, a simple difference score was not the best estimate of change. Percentage change scores also allowed data from this study to be related to earlier studies (Lang and Lazovik, 1963; Lang, Lazovik and Reynolds, 1965; Lang, Melamed and Hart, 1970). The change score

TABLE 1

Analysis of Variance Summary Table

Behavioral Avoidance Data Before Treatment

Source	df	S.S.	M.S.	F
Between groups	2	86.8	43.4	1.88
Within groups	12	276.8	23.1	
Total	14	363.6		

used in the analysis was the difference between pre-therapy and post-therapy scores, divided by pre-therapy scores. For example, an S who achieved a scale score of 12 on the pre-test and a score of 5 on the post-test, was assigned a change score of .58.

$$\text{Change score} = \frac{12 - 5}{12} = .58 \text{ (Lang and Lazovik, 1963)}$$

Table 2 presents a summary of the percentage change score data for all treatment groups.

A one-way analysis of variance on the percentage change scores revealed significant differences between the three treatment groups ($F = 10.47$, $df = 2/12$, $p < .01$; see Table 3). A Duncan's Multiple Range Test was used to compare treatment means. Table 4 reveals that behavioral changes from pre-testing to post-testing are significantly greater for group 1 than for groups 2 and 3. The difference between group 2 and group 3 was also significant, the change in group 2 being greater.

A t-test carried out on the pre- and post-measures revealed a significant effect for each treatment: group 1: $t = 11.4$, $df = 4$, $p < .001$; group 2: $t = 3.0$, $df = 4$, $p < .05$; group 3: $t = 5.4$, $df = 4$, $p < .01$.

Fear Thermometer Data

A one-way analysis of variance on the pre-test measure showed no significant difference between the three treatment groups ($F = 2.2$, $df = 2/12$, $p > .05$; see Table 5).

To facilitate the comparison of this data to related studies using similar subjective fear measures (Lang and Lazovik, 1963; Lang, Lazovik and Reynolds, 1965; Leitenberg and Callahan, 1973), simple

TABLE 2

Percentage Change Scores on the Behavioral Avoidance Measure.

	Treatment Group 1	Treatment Group 2	Treatment Group 3
Subject			
1	.81	.28	.33
2	.47	.62	.31
3	.68	.66	.25
4	.84	.42	.31
5	.93	.68	.43
Mean	.74	.53	.32
Standard Deviation	.178	.174	.0655

TABLE 3

Analysis of Variance Summary Table for Behavioral Avoidance Data, After Treatment.

Source	df	S.S.	M.S.	F
Between groups	2	.44	.22	10.47*
Within groups	12	.26	.021	
Total	14	.70		

* $p < .01$

TABLE 4

Duncan's Multiple Range Test Applied to the Percentage Change Scores of the Behavioral Avoidance Measure from the Pre-test to Post-test.

		Group 1	Group 2	Group 3	Shortest Significant Range
	Means	.74	.53	.32	
Group 1	.74				
Group 2	.53	.21*			R_2 = .200
Group 3	.32	.42*	.21*		R_3 = .209

* $p < .05$

TABLE 5

Analysis of Variance Summary Table for Verbal Self-Report (Fear Thermometer) Data before Treatment.

Source	df	S.S.	M.S.	F
Between groups	2	5	2.5	.66
Within groups	12	45	3.75	
Total	14	50		

change scores were used. The change score was obtained by subtracting the post-fear thermometer measure from the pre-measure. That is, an S who scored 8 on the pre-measure and 3 on the post-measure was assigned a change score of 5.

Change score - 8 - 5 = 3 (Lang and Lazovik, 1963).

A one-way analysis of variance on the change scores revealed no significant therapy effect between groups ($F = 1.24$, $df = 1/12$, $p > .05$; see Table 6). However, t-tests carried out on the pre- and post-measures within each group did show a significant effect for each treatment: group 1: $t = 4.63$, $df = 4$, $p < .01$; group 2: $t = 5.7$, $df = 4$, $p < .01$; group 3: $t = 5.7$, $df = 4$, $p < .01$.

Exposure Time Data

The exposure time data for group 1 was analyzed by a mixed analysis of variance. The levels investigated were days, sessions, and trials. The levels of the days factor were days 1 to 5; for sessions, the levels were sessions 1 to 4; and for trials, the levels were trials 1 to 10. Observations of all factors were repeated.

A 3-factor repeated measures analysis of variance of exposure times for group 1 revealed a significant trials effect, sessions effect, and days effect. Examination of the means indicated a general increase in exposure time over trials, sessions, and days. The 2-way interactions, and the one 3-way interaction, were also found to be significant (see Table 7). Figures 1, 2, and 3 graphically represent the above results.

Latency Scores

The latency scores for group 1 were analysed in a manner identical to the exposure time analysis. A 3-factor repeated measures analysis

TABLE 6

Analysis of Variance Summary Table for the Verbal Self-Report (Fear Thermometer) Data after Treatment.

Source	df	S.S.	M.S.	F
Between groups	2	6.2	3.1	1.24
Within groups	12	30.2	2.5	
Total	14	36.4		

TABLE 7

Analysis of Variance Summary Table

for Group 1 Exposure Time Data.

Source	df	S.S.	M.S.	F*
Within Ss				
Days (D)	4	5074682.91	1268670.72	10.38*
error	16	1955295.27	122205.95	
Sessions (S)	3	360552.29	120184.04	4.7*
error	12	306700.72	25558.39	
Trials (T)	9	81136.26	9015.14	4.75*
error	36	68223.33	1895.09	
D x S	12	309865.04	25822.08	1.97*
error	48	627631.37	13075.65	
D x T	36	61530.33	1709.17	1.56*
error	144	158005.56	1097.26	
S x T	27	72425.00	2682.40	1.53*
error	108	183836.14	1748.48	
D x S x T	108	167788.74	1553.59	1.36*
error	432	492244.75	1139.45	

* $p < .05$

FIGURE 1

MEAN EXPOSURE TIME OVER DAYS

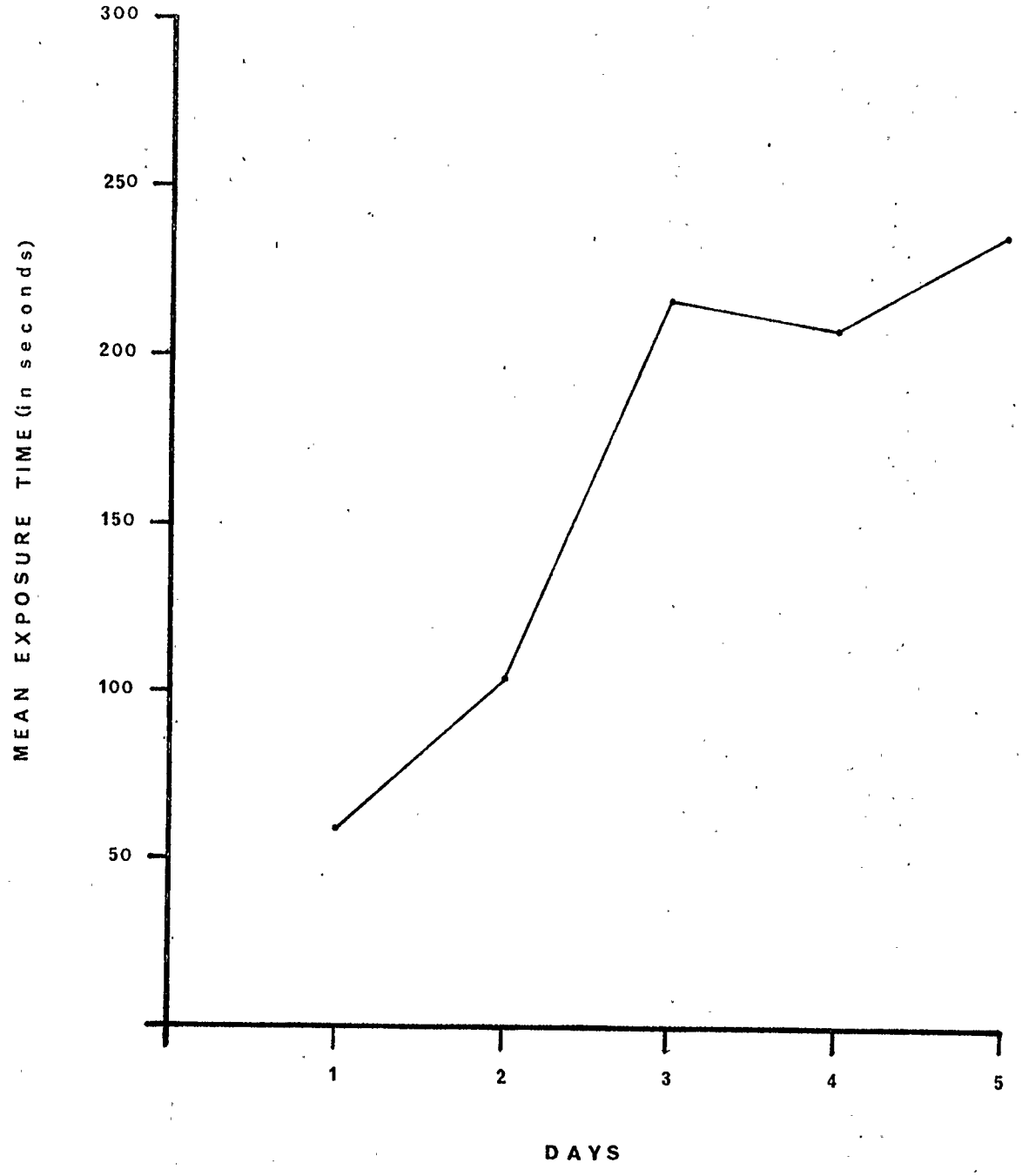


FIGURE II

MEAN EXPOSURE TIME OVER SESSIONS

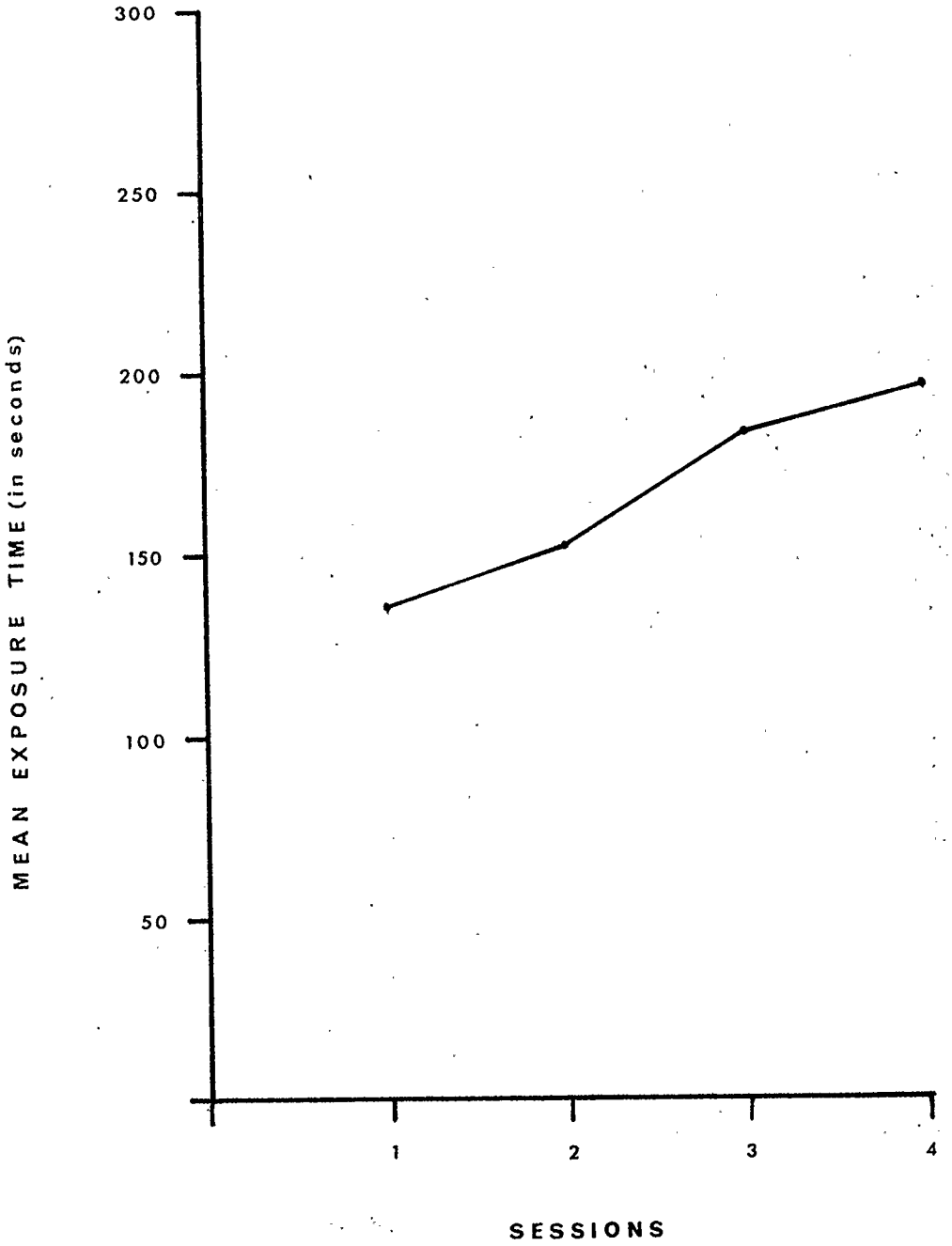
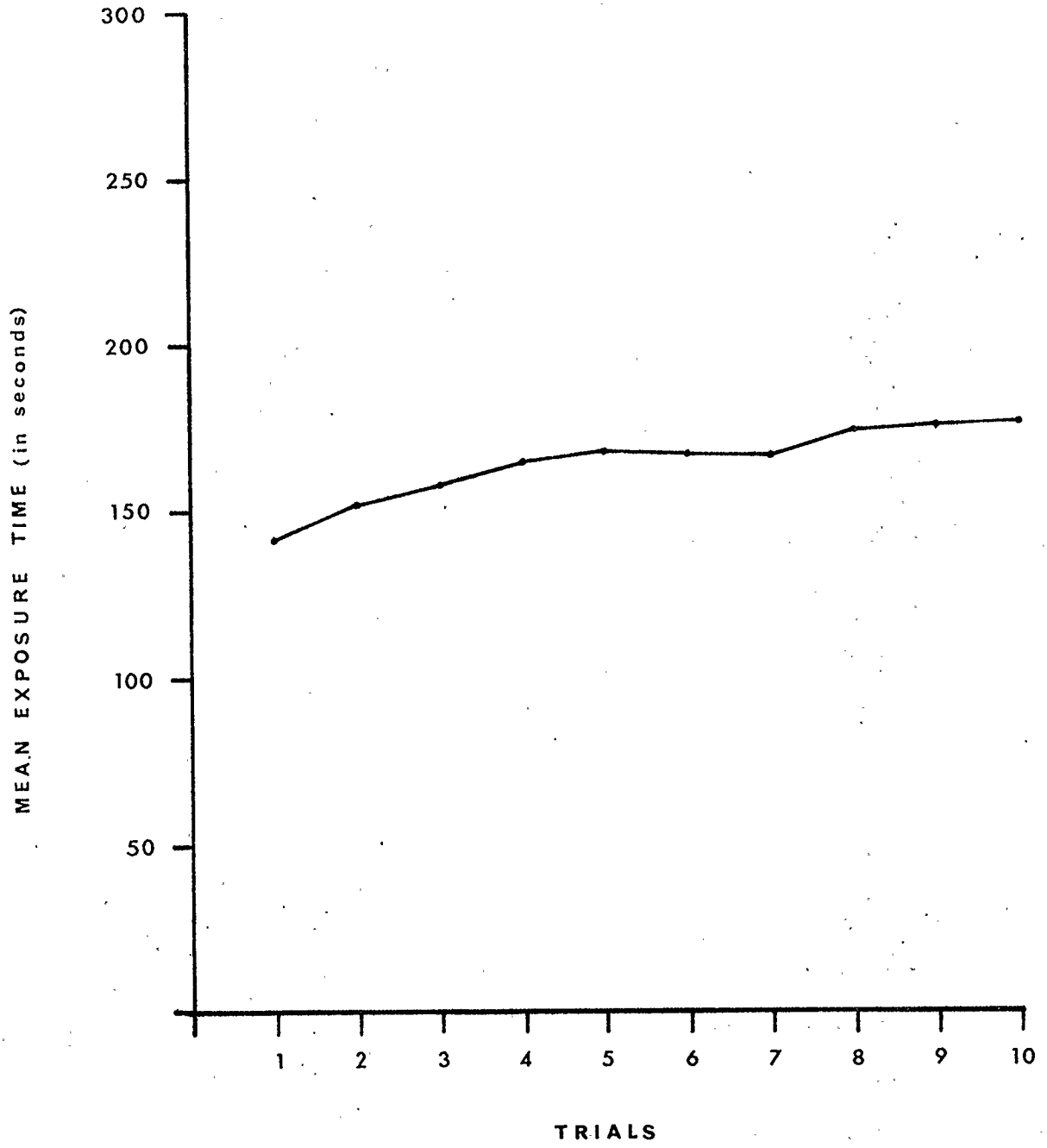


FIGURE III

MEAN EXPOSURE TIME OVER TRIALS



of variance of latency times revealed a significant days effect and trials effect. Examination of means indicated a general decrease in latency scores (response lag between the E's ready signal and the S's commencing a trial) over days and trials. The results of this analysis are shown in Table 8. For an illustration of the days and trials main effects, see Figures 4 and 5.

TABLE 8

Analysis of Variance Summary Table

for Group 1, Latency Scores.

Source	df	S.S.	M.S.	F
Within Ss				
Days (D)	9	690.40	172.60	7.86*
error	16	356.74	22.29	
Sessions (S)	3	28.49	9.49	1.56
error	12	72.88	6.07	
Trials (T)	9	66.94	7.43	15.4*
error	36	17.42	.48	
D x S	12	45.49	3.79	.72
error	48	251.95	5.24	
D x T	36	24.01	.66	1.1
error	144	85.88	.5964	
S x T	27	11.57	.4287	1.3
error	108	33.05	.31	
D x T x S	108	35.54	.3569	1.1
error	432	139.68	.32	

* $p < .01$

FIGURE IV

MEAN LATENCY OVER DAYS

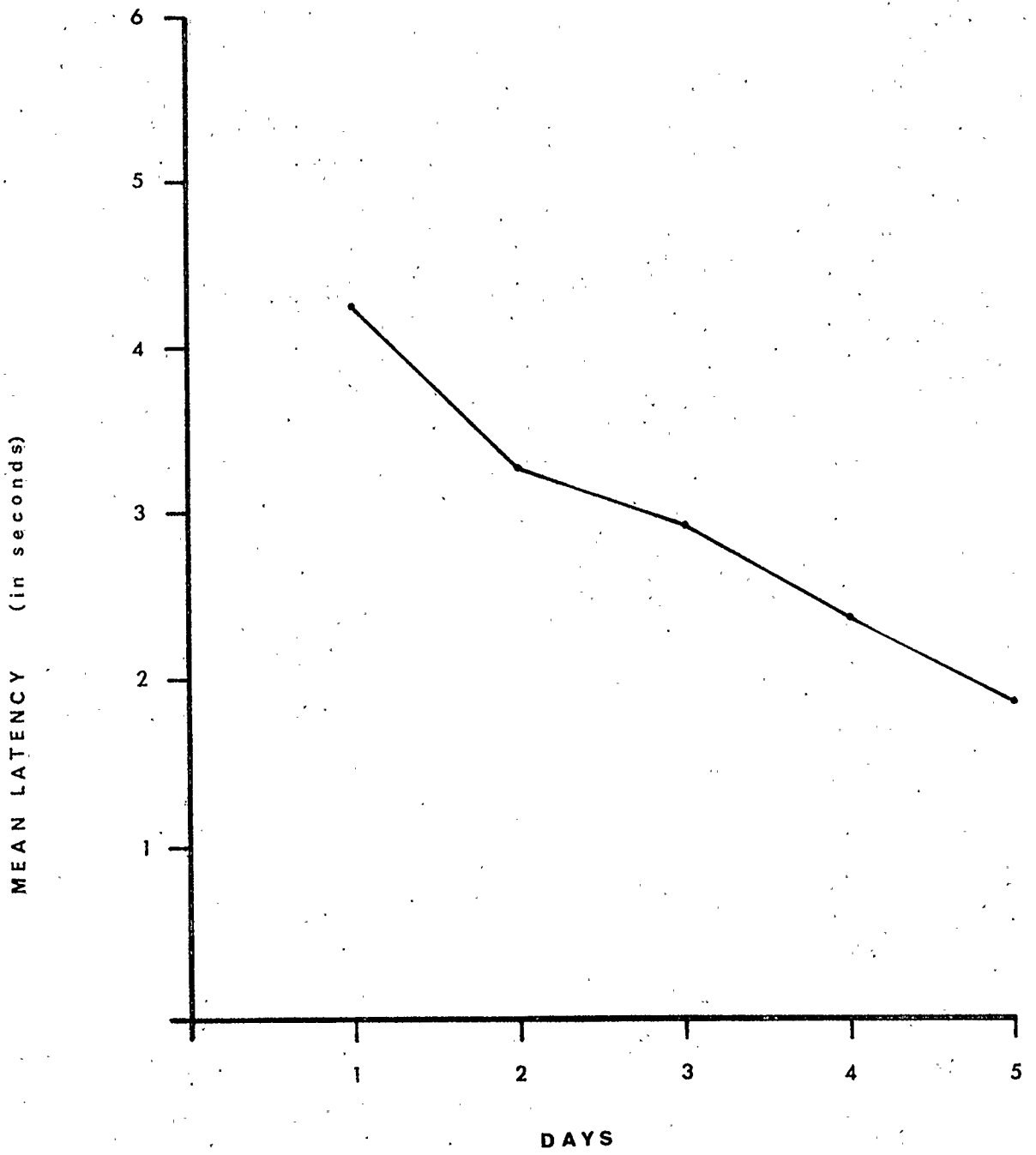
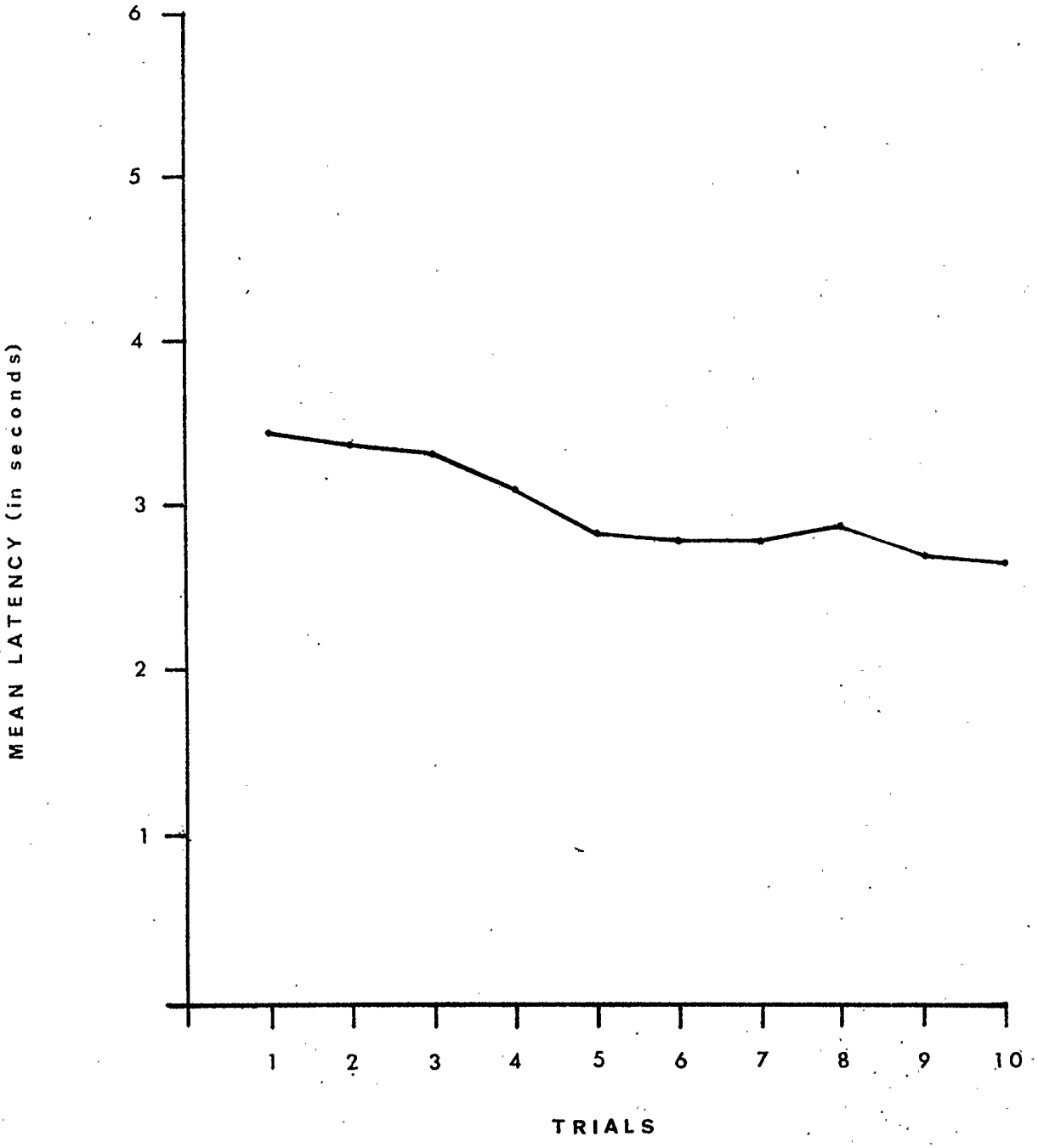


FIGURE V

MEAN LATENCY OVER TRIALS



CHAPTER IV

DISCUSSION

The findings of this investigation supported the hypothesis tested; the application of Leitenberg's model of graduated exposure resulted in greater differential reduction of avoidance behavior than in therapy groups in which one or more of the procedural variables had been removed.

The results are consistent with the findings of Leitenberg et al. (1968) and Becker (1973), which showed that a structured, graduated therapeutic program under S control with precise feedback of trial by trial performance can facilitate behavioral change in phobic disorders. The present study demonstrated that this change is significantly greater than that of other treatments in which the S control and E control, and the graduated exposure and non-graduated exposure factors were manipulated. The data indicated that subjects exposed to the graduated exposure, feedback, E control paradigm experienced significantly greater differential reduction in avoidance behavior than subjects exposed to a non-graduated exposure, feedback, E control model. As stated, however, greatest reduction was observed when the Leitenberg technique was utilized. In addition to the differential decrease, close inspection of the data showed a significant reduction of behavioral avoidance within each group. This indicates that each treatment was effective in reducing avoidance behavior.

In contradiction to the differential decreases in avoidance behavior for all Ss, Fear Thermometer scores were not differentially

affected by the treatments. The results of the verbal self-report data at post-testing indicated no significant differences in subjective fear between the experimental groups. However, an examination of the data, from pre-test to post-test, did reveal a significant reduction in subjective fear within each treatment group. This suggests that each treatment was effective in reducing subjective fear, but there were no significant differences between the groups.

The finding that avoidance behavior was differentially reduced by the therapy, but subjective rating, although reduced, showed no differential change, is consistent with the findings of Lang and Lazovik (1963), Davison (1968) and Becker (1973). Lang and Lazovik stated that "...initial changes in phobic behavior seem to occur in one dimension or the other, rather than in both simultaneously. Most frequently, subjective report lags behind overt behavior (1963, p. 525)." This would suggest that the behavioral and subjective components of fear reduction can operate largely independent of one another.

A number of investigations support the notion that the three components of fear--behavioral-motor, subjective-verbal, and physiological-autonomic--operate independently of one another. Leitenberg et al. (1971) suggested that behavioral progress can occur without a parallel decline in physiological and subjective expression of fear. Lang and Lazovik (1963), Davison (1968), and the present study, in part, support the premise of a relative independence among two different components, subjective and behavioral. Lang (1968) has suggested that different measures produce different estimates of fear intensity.

If the various systems within the multisystem of fear are largely independent of one another, these methods of fear reduction may affect only one, or two, or all three of the systems to a different degree. This would suggest that a technique, specific to the systems that are to be changed, could be applied. For example, if avoidance behavior is dominant, therapy would be most suited if directed towards the behavioral mode of response. If the subjective report of fear is dominant, a concentrated effort could be directed towards the subjective event. The results of decreased overt phobic behavior, without a corresponding decrease in subjective fear, might suggest that the Leitenberg model is only effective in reducing overt phobic behavior. However, this conclusion is not supported. In Becker's (1973) investigation, the Leitenberg model was applied to the reduction of intense fear of snakes. He found that lower subjective ratings accompanied lower avoidance scores in a series of post-therapy generalization tests. Immediately following therapy, however, he had found no significant differential changes in the subjective ratings--similar to the results found in the present study. This suggests that the Leitenberg model is effective in reducing subjective fear, as well as overt behavior, although subjective fear lagged behind overt behavior.

In the present study, one of Becker's (1973) E group treatments was replicated, and identical results were found on the subjective and behavioral post-measure. It is pre-supposed that similar results would have also been obtained on generalization tests, had they been employed.

The results of the exposure time data indicated that Ss in the first treatment group displayed a progressive increase in the exposure

time, similar to those observed by Leitenberg et al. (1968), Leitenberg et al (1971), and Becker (1973). Close examination of the data indicates a significant increase over trials, sessions, and days. A ceiling effect was observed in three of the five Ss in group 1; one S reached criterion time on all trials by day 3 of therapy, two Ss reached criterion time on all trials by day 4, and four Ss reached the criterion level on day 5. This ceiling effect was responsible for the second and third level interactions.

The continuous rapid improvement of all Ss, in conjunction with the ceiling effect discussed above, led to the three way interaction of days, sessions, and trials.

The data of the latency scores represent an accompanying overt measure of the reduction of the phobic behavior. Ss, not aware that this measure was being recorded, displayed a progressive decrease in the response lag between the E's ready signal, and the commencement of a trial. As exposure time increased for group 1 Ss, there was an accompanying decrease in latency. A significant decrease was observed over days and trials.

These results, taken together with the behavioral avoidance test, indicate an overall agreement in behavioral measures and lend support to the notion that S control is a primary variable in this type of therapy. The data demonstrated that greatest differential reduction in avoidance behavior was shown by group 1 (S control, graduated exposure and feedback), followed by group 2 (E control, graduated exposure and feedback) and lastly, group 3 (E control, non-graduated exposure, feedback). In spite of this differential reduction, with no

corresponding differential decrease in subjective fear, all groups showed a within treatments reduction in avoidance behavior as well as subjective fear. This suggests that all three conditions were effective in reducing fear. Treatment group 3, utilizing constant exposure under E control, was individually effective in reducing avoidance behavior and subjective fear. The group 2 treatment, using graduated time exposure under E control, was also effective and differentially better than treatment 3 in reducing avoidance behavior. The evidence thus far suggests that graduated exposure is not a necessary condition, but a facilitory variable in reduction of avoidance behavior. The addition of S control, as opposed to E control, to the graduated exposure paradigm, as in treatment 1, showed greatest differential reduction of avoidance behavior, in addition to significant subjective fear reduction within the group. These results are supportive of the importance of S control in the application of Leitenberg's technique. It should be noted that graduated exposure and S control are not necessary conditions for reduction of subjective and behavioral fear, but certainly facilitated the improvement from the pre- to post-measure.

Further examination of the data may lend more support to the importance of S control. Results show a low correlation between percentage change scores in the avoidance measure of treatments 1 and 2. This, in turn, suggests that total improvement on the behavioral measure is not correlated to the total exposure time. One possible explanation accounting for these findings is the absence of individual tailoring of exposure time for group 2 Ss. Tailoring implies that improvement may be a function of an interphase between graduated exposure and S control.

This suggests a second explanation; that S control in therapy, as opposed to E control, may be important in the subsequent reduction in avoidance behavior.

The homogeneity of percentage change scores in group 3 indicated that the more constant the exposure, the more constant the improvement. In comparison to groups 1 and 2, variance decreased as a result of non-graduated exposure or less total exposure time, as opposed to individual differences. The small amount of variance, contributed by S differences only, in group 3, suggests that total exposure time is confounded with graduated exposure. This indicates the importance of total exposure and graduated exposure; and that research be directed to eliminate this confound.

In addition, the latency score measure is consistent with the exposure time and avoidance behavior data. Accompanying the progressive increase in exposure times, the latency of response progressively decreased. Ss, aware that they controlled duration of the exposure to the stimulus, appeared to become less fearful of attempting to "cope" [using White's (1959) term] with the sight of the anxiety producing stimulus. As a result, the response lag between the E's ready signal, and the S's commencing a trial progressively decreased. The subsequent result was a reduction of avoidance behavior. The uniformity of the latency, exposure time and avoidance behavior data is evidence of partial support for the experimental hypothesis.

In addition to the quantitative data discussed above, qualitative support for these results were found. With the progression of therapy, Ss in the first and second treatment groups became less hesitant in

entering the experimental room, and generally displayed less overt avoidance to the experimental procedures. In the initial stages of therapy, a number of these Ss had appeared extremely anxious: some shuddered, made facial grimaces, tensed body muscles, and even cried out at the sight of the snake. However, in the later stages of the treatment, these behaviors became almost non-existent. The group 3 Ss, however, were always apprehensive about entering the experimental room, and a certain degree of anxiety was observed throughout all sessions. In fact, one S in group 3 refused to return after only one day of treatment. She claimed that her anxiety level had been so high during the four sessions that she felt the discomforts experienced during the four sessions did not warrant her to resume participation in the study.

It should be noted, however, that the behavior exhibited by the group 3 Ss could be a function of using only one level of exposure time throughout all trials. The exposure time selected may have been initially too high, or total exposure time too little, and this may have confounded subsequent results for Ss in this treatment group.

Dramatic reduction in fear was observed in two individual Ss of the first treatment group. On the third day of therapy, one woman achieved criterion time of five minutes observation by the second session. She repeated this performance on sessions three and four, and throughout all sessions of the fourth day of therapy. Being extremely pleased with her progress, she asked the S "if she could possibly touch the snake after the last therapy session?". Another S commented on her inability to view a television commercial involving snakes. Prior to the therapy,

she would leave the room whenever the commercial appeared on the screen. Following the day 7 post-test, she stated:

> Last night, as I was watching T.V., the snake commercial came on. For the first time, I stayed in the room and watched the entire commercial. I felt slightly uncomfortable, but I managed to watch the entire sequence, without even having to turn my head.

An additional finding was that the selection procedure used by Lang (1968) and further validated by Becker (1973) was successful in differentiating between high snake-fearing Ss and low or moderate fearing Ss. However, one additional measure was added to Becker's (1973) procedure. Supplementing the self-report instruments and the Standardized Interview, avoidance behavior in the presence of the feared stimuli was recorded and a criterion score established (see Method). The combined use of the FSS-III, the SNAQ, the Standardized Interview, and the "avoidance" measure is a useful selection device in identifying Ss with an intense fear of snakes.

In summary, the Leitenberg model has been successfully applied to the reduction of fear in high snake-fearing Ss. The three procedural factors, identified by Becker (1973), which contribute to the success of this therapy have been investigated. Using Leitenberg's graduated exposure technique, the S control element was found to be of prime importance, followed by gradual increase in exposure times, given precise, corresponding feedback on every trial. Hence, the S control, graduated exposure, feedback paradigm results in greatest differential reduction of avoidance behavior. Graduated exposure, corresponding feedback, and E control is also effective in decreasing avoidance behavior, but to a lesser degree than the S control paradigm. The non-graduated exposure,

feedback, E control model resulted in the least reduction of overt fear. All treatments proved to be effective in reducing both subjective and behavioral fear, but best differential results were obtained using the graduated time exposure, S control, feedback technique. These implications support the hypothesis that S control, followed by graduated exposure time, with corresponding feedback of trial by trial performance, are primary factors involved in the reduction of fear.

It should be pointed out that the relationship between the Es and the Ss was a favourable one. The Es were not automated equipment; they interacted with Ss in a friendly atmosphere, attempting to respond to all questions while minimally informing Ss as to content of the study. Although there was no intent, overt reactions of the therapists may have influenced the variables of S expectancy, praise, or suggestibility. Such variables have been shown to be effective in fear reduction (Lang, Lazovik, and Reynolds, 1965). As the mechanism of the present therapy is simple, an automated apparatus could be constructed and a similar study could be replicated providing minimal contact with the Es.

Although the feedback factor was determined to be essential for optimal fear reduction in applying the Leitenberg model (Leitenberg et al., 1968), the investigator's results are based on single case histories. Further research, therefore, should be directed to the investigation of the feedback versus non-feedback variable in combination with the E control and S control, and graduated versus non-graduated exposure factors.

Because the group 3 data may have been confounded as a result of using only one constant-time exposure, further research should examine

the effect of using various constant-time exposures. Several groups, similar to the group 3 paradigm, would be given different constant exposure times. This would also facilitate the investigation of the effect of distributed practice in fear reduction. In addition, different yoking procedures could be designed to determine the effect of S control on a non-graduated exposure model.

It should be noted that the verbal self-report measure exhibited a large error variance in this study. Statisticians warn that the presence of a large error mean squared, in combination with small samples, could result in "stacking the deck" in favour of the null hypothesis. Although the hypothesis has been partially supported, it is suggested that this study be replicated with a larger number of subjects.

In conclusion, the findings of this investigation not only confirm the use of Leitenberg's model as an effective treatment of phobic conditions, but determined the relative importance of the procedural factors which account for the success of the therapy. As the underlying variables of Leitenberg's treatment are more clearly delineated, its utility is strengthened.

REFERENCES

Adams, J. A. Comment on Feldman's "Reconsideration of the extinction hypothesis of warm-up in motor behavior." Psychological Bulletin, 1963, 60, 460-463.

Becker, H. G. The effect on snake phobia of graduated exposure with feedback of exposure time. Doctoral Thesis Dissertation, University of Calgary, May, 1973.

Costello, C. G. Dissimilarities between conditioned avoidance responses and phobias. Psychological Review, 1970, 7, 250-254.

Davis, L., McAmmond, D., & Trimble, M. An investigation of physiological and behavioral change during the treatment of clausterphobia by a graded exposure technique. Unpublished paper; University of Calgary, 1972.

Davison, G. C. Anxiety under total curarization: Implications for the role of muscular relaxation in the desensitization of neurotic fears. Journal of Nervous and Mental Diseases, 1966, 143, 443-448.

Deutsch, J. A. The structural basis of behavior. Chicago: University of Chicago Press, 1960.

Emery, J. R., & Krumboltz, J. O. Standard versus individualized hierarchies in desensitization to reduce test anxiety. Journal of Counseling Psychology, 1967, 14, 204-209.

Eysenck, H. J. Behavior therapy and the neuroses. Oxford: Pergamon Press, 1960.

Eysenck, H. J., & Rachman, S. The causes and cures of neurosis. London: Routledge & Kegan Paul, 1965.

Herrnstein, R. J. Method and theory in the study of avoidance. Psychological Review, 1969, 76, 49-69.

Jensen, A. R. On the reformulation of inhibition in Hull's system. Psychological Bulletin, 1961, 58, 274-298.

Lacey, J. I. Individual differences in somatic response patterns. Journal of Comparative and Physiological Psychology, 1950, 43, 338-350.

Lacey, J. I., and Lacey, B. C. Verification and extension of the principle of autonomic response-stereotypy. American Journal of Psychology, 1958, 71, 50-73.

Lang, P. J. The mechanics of desensitization and the laboratory study of human fear. In C. Franks (Ed.), Behavior Therapy: Appraisal and status. New York: McGraw-Hill, 1969.

Lang, P. J., & Lazovik, A. D. Experimental desensitization of a phobia. Journal of Abnormal and Social Psychology, 1963, 66, 519-525.

Lang, P. J., Lazovik, A. D., & Reynolds, D. J. Desensitization, suggestibility and pseudotherapy. Journal of Abnormal Psychology, 1965, 70, 395-402.

Lang, P. J., Melamed, B. G., & Hart, J. A psychophysiological analysis of fear modification using an automated desensitization procedure. Journal of Abnormal Psychology, 1970, 76, 220-234.

Lazarus, A. A. Group therapy of phobic disorders by systematic desensitization. Journal of Abnormal Psychology, 1961, 63, 504-510.

Leitenberg, H., Agras, W. S., Barlow, D. H., & Oliveau, D. C. Contribution of selective positive reinforcement and therapeutic instructions to systematic desensitization therapy. Journal of Abnormal Psychology, 1969, 74, 113-118.

Leitenberg, H., Agras, S., Butz, R., & Wincze, J. Relationship between heart rate and behavioral change during treatment of phobias. Journal of Abnormal Psychology, 1971, 78, 59-68.

Leitenberg, H., Agras, S., Thompson, L. E., & Wright, D. E. Feedback in behavior modification: An experimental analysis in two phobic cases. Journal of Applied Behavior Analysis, 1968, 1, 131-137.

Leitenberg, H., and Callahan, E. J. Reinforced practice and reduction of different kinds of fears in adults and children. Behavior Research and Therapy, 1973, 11, 19-30.

Lomont, J. F., and Edwards, J. E. The role of relaxation in systematic desensitization. Behavior Research and Therapy, 1967, 5, 11-25.

Mandler, G., and Watson, D. L. Anxiety and the interruption of behavior. In C. D. Spielberger (Ed.). Anxiety and Behavior. New York: Academic Press, 1966.

Marks, I. M. Fears and phobias. New York: Academic Press, 1969.

Meyers, V., and Crisp, A. H. Phobias. In C. G. Costello's (Ed.), Symptoms of Psychopathology: A Handbook. New York: John Wiley and Sons, Inc., 1970.

Mowrer, O. H. On the dual nature of learning: A reinterpretation of "conditioning" and "problem solving." Harvard Educational Review, 1947, 17, 102-148.

Nelson, F. Effects of two counterconditioning procedures on the extinction of fear. Journal of Comparative and Physiological Psychology, 1966, 62, 208-213.

Paul, G. L. Insight versus desensitization in psychotherapy. Stanford: Stanford University Press: 1966.

Paul, G. L. Outcome of systematic desensitization: I & II. In C. M. Franks (Ed.), Behavior therapy: Appraisal and Status. New York: McGraw-Hill, 1969.

Rachman, S. Systematic desensitization. Psychological Bulletin, 1967, 67, 93-103.

Rachman, S. The role of muscular relaxation in desensitization therapy. Behavior Research and Therapy, 1968, 6, 159-166.

Ullman, L. P., & Krasner, L. Case studies in behavior modification. New York: Holt, Rinehart & Winston, 1965.

Valins, S., and Ray, Alice, A. Effects of cognitive desensitization on avoidance behavior. Journal of Personality and Social Psychology, 1967, 7, 345-350.

Walk, R. D. Self-ratings of fear in a fear-invoking situation. Journal of Abnormal and Social Psychology, 1956, 52, 171-178.

White, R. W. Motivation reconsidered: The concept of competence. Psychological Review, 1959, 66, 297-333.

Wilson, G. T., & Davison, G. C. Processes of fear reduction in systematic desensitization: Animal studies. Psychological Bulletin, 1971, 76, 1-14.

Wilson, A., & Smith, F. J. Counterconditioning therapy using free association: A pilot study. Journal of Abnormal Psychology, 1968, 73, 474-478.

Wolpe, J. Psychotherapy by reciprocal inhibition. Stanford: Stanford University Press, 1951.

Wolpe, J. The experimental foundations of some new psychotherapeutic methods. In A. J. Bachrack (Ed.). Experimental foundations of clinical psychology. New York: Basic Books, 1962.

Wolpe, J., & Lang, P. J. A fear-survey schedule for use in behavior therapy. Behavior Research and Therapy, 1964, 2, 27.

Wolpin, M., & Raines, J. Visual imagery, expected roles and extinction as possible factors in reducing fear avoidance behavior. Behavior Research and Therapy, 1965, 4, 25-37.

Zeisset, R. M. Desensitization and relaxation in the modification of psychiatric patients interview behavior. Journal of Abnormal Psychology, 1968, 73, 18-24.

APPENDICES

APPENDIX A

Fear Survey Schedule (FSS-III)

The items in this questionnaire refer to things and experiences that may cause fear or other unpleasant feelings. Write the number of each item in the column that describes how much you are disturbed by it nowadays.

	Not at all	A little	A fair amount	Much	Very much
1. Noise of vacuum cleaners					
2. Open wounds					
3. Being alone					
4. Being in a strange place					
5. Loud voices					
6. Dead people					
7. Speaking in public					
8. Crossing streets					
9. People who seem insane					
10. Falling					
11. Automobiles					
12. Being teased					
13. Dentists					
14. Thunder					
15. Sirens					
16. Failure					
17. Entering a room where other people are already seated					
18. High places on land					

	Not at all	A little	A fair amount	Much	Very much
19. People with deformities					
20. Worms					
21. Imaginary creatures					
22. Receiving injections					
23. Strangers					
24. Bats					
25. Journeys a-Train b-Bus c-Car					
26. Feeling angry					
27. People in authority					
28. Flying insects					
29. Seeing other people injected					
30. Sudden noises					
31. Dull weather					
32. Crowds					
33. Large open spaces					
34. Cats					
35. One person bullying another					
36. Tough looking people					
37. Birds					
38. Sight of deep water					
39. Being watched working					
40. Dead animals					

	Not at all	A little	A fair amount	Much	Very Much
41. Weapons					
42. Dirt					
43. Crawling insects					
44. Sight of fighting					
45. Ugly people					
46. Fire					
47. Sick people					
48. Dogs					
49. Being criticized					
50. Strange shapes					
51. Being in an elevator					
52. Witnessing surgical operations					
53. Angry people					
54. Mice					
55. Blood a-Human b-Animal					
56. Parting from friends					
57. Enclosed places					
58. Prospect of a surgical operation					
59. Feeling rejected by others					
60. Airplanes					
61. Medical odors					
62. Feeling disapproved of					

	Not at all	A little	A fair amount	Much	Very Much
63. Harmless snakes					
64. Cemeteries					
65. Being ignored					
66. Darkness					
67. Premature heart beats (missing a beat)					
68. (a) Nude men (b) Nude women					
69. Lightning					
70. Doctors					
71. Making mistakes					
72. Looking foolish					

APPENDIX B

Snake Fear Questionnaire (SNAQ)

This instrument is composed of 30 items regarding your feelings about snakes. After each question there is a "true" and a "false".

Try to decide whether "true" or "false" most represents your feelings as associated with your most recent thoughts or experiences, then put a circle around the "true" or "false". Remember that this information is completely confidential and will not be made known to your instructor. Work quickly and don't spend much time over any question. We want your first impression on this questionnaire. Now go ahead, work quickly, and remember to answer every question.

1.	I avoid going to parks or on camping trips because there may be snakes about.	T	F
2.	I would feel some anxiety holding a toy snake in my hand.	T	F
3.	If a picture of a snake appears on the screen during a motion picture, I turn my head away.	T	F
4.	I dislike looking at pictures of snakes in a magazine.	T	F
5.	Although it may not be so, I think of snakes as slimy.	T	F
6.	I enjoy watching snakes at the zoo.	T	F
7.	I am terrified by the thought of touching a harmless snake.	T	F
8.	If someone says that there are snakes anywhere about, I become alert and on edge.	T	F
9.	I would not go swimming at a beach if snakes had ever been reported in the area.	T	F
10.	I would feel uncomfortable wearing a snakeskin belt.	T	F
11.	When I see a snake, I feel tense and restless.	T	F
12.	I enjoy reading articles about snakes and other reptiles.	T	F

13.	I feel sick when I see a snake.	T	F
14.	Snakes are sometimes useful.	T	F
15.	I shudder when I think of snakes.	T	F
16.	I don't mind being near a non-poisonous snake if there is someone there in whom I have confidence.	T	F
17.	Some snakes are very attractive to look at.	T	F
18.	I don't believe anyone could hold a snake without some fear.	T	F
19.	The way snakes move is repulsive.	T	F
20.	It wouldn't bother me to touch a dead snake with a long stick.	T	F
21.	If I came upon a snake in the woods I would probably run.	T	F
22.	I'm more afraid of snakes than any other animal.	T	F
23.	I would not want to travel "down south" or in tropical countries, because of the greater prevalence of snakes.	T	F
24.	I wouldn't take a course like biology if I thought you might have to dissect a snake.	T	F
25.	I have no fear of non-poisonous snakes.	T	F
26.	Not only am I afraid of snakes but worms and most reptiles make me feel anxious.	T	F
27.	Snakes are very graceful animals.	T	F
28.	I think that I'm no more afraid of snakes than the average person.	T	F
29.	I would prefer not to finish a story if something about snakes was introduced into the plot.	T	F
30.	Even if I was late for a very important appointment, the thought of snakes would stop me from taking a shortcut through an open field.	T	F

APPENDIX C

Interview Questionnaire

Try to decide whether "YES" or "NO" most represents your feelings as associated with your most recent thoughts or experiences, then put a circle around the "YES" or "NO".

1.	Do you feel uneasy or upset when you see a picture of a snake?	YES	NO
2.	Do you feel uneasy or upset when you see a snake on T.V.?	YES	NO
3.	Do you enter the reptile section of the zoo?	YES	NO
4.	Do you avoid walking through an open field for fear that a snake may be in it?	YES	NO
5.	Do you avoid walking through an open field for fear that a snake may be in it even if you are late for an important appointment?	YES	NO
6.	Do you avoid going camping for fear that snakes may be about?	YES	NO
7.	Do you often think about snakes?	YES	NO
8.	Do you dream about snakes?	YES	NO
9.	If you were to face a harmless snake, would you experience any of the following physiological reactions: get sweaty palms, feel sick to your stomach, or become generally tense?	YES	NO

APPENDIX D

Behavioral Avoidance Measure:

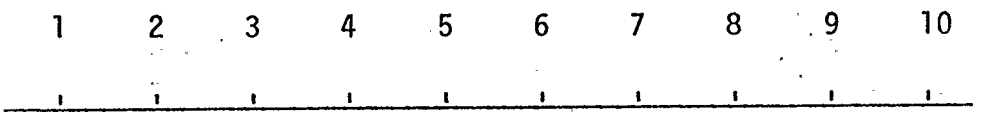
Measure of Ss' Approach to Snake

Description	Score
Held snake	1
Touched snake	2
Observed snake, touching cage and glass	3
Stood 1 foot away	4
Stood 2 feet away	5
Stood 3 feet away	6
Stood 4 feet away	7
Stood 5 feet away	8
Stood 6 feet away	9
Stood 7 feet away	10
Stood 8 feet away	11
Stood 9 feet away	12
Stood 10 feet away	13
Stood 11 feet away	14
Stood 12 feet away	15
Stood 13 feet away	16
Stood 14 feet away	17
Stood 15 feet away	18
Refused to enter room	19

APPENDIX E

FEAR THERMOMETER

I WOULD LIKE YOU TO JUDGE THE DEGREE OF FEAR EXPERIENCED DURING THE RECENT AVOIDANCE TEST. PLEASE RATE YOUR FEAR ON THE SCALE BELOW, BY CIRCLING THE APPROPRIATE NUMBER.



"Completely Relaxed"

"As scared as I've ever been"

APPENDIX F

SUBJECT:

Group _____ Day _____

Session 1

Trials	Latency	Exposure
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Session 2

Trials	Latency	Exposure
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Session 3

Trials	Latency	Exposure
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Session 4

Trials	Latency	Exposure
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

APPENDIX G

Raw Data

Group 1 Mean Exposure Time per Session, in Seconds

	Day 1				Day 2				Day 3			
Session	1	2	3	4	1	2	3	4	1	2	3	4
Subject 1	81.5	49.9	122.1	144.8	92.2	239.6	209.3	166.1	204.7	300	300	300
	$\bar{X}$ = 99.57				$\bar{X}$ = 176.8				$\bar{X}$ = 276.1			
Subject 2	21.9	36.2	154.8	174	98	185.1	216.4	155.3	224.9	300	300	300
	$\bar{X}$ = 96.72				$\bar{X}$ = 163.7				$\bar{X}$ = 281.2			
Subject 3	2.8	2.94	2.8	2.6	2.96	3.56	2.79	3.31	3.4	3.54	3.76	3.37
	$\bar{X}$ = 2.78				$\bar{X}$ = 3.15				$\bar{X}$ = 3.64			
Subject 4	11.9	15.4	14	78.4	52.3	55.2	55.7	58.5	212.4	206.9	203.1	247.7
	$\bar{X}$ = 29.92				$\bar{X}$ = 55.42				$\bar{X}$ = 217.5			
Subject 5	7.5	23.1	59.7	152.4	14.6	63.2	199.4	197.3	300	300	300	300
	$\bar{X}$ = 60.67				$\bar{X}$ = 118.6				$\bar{X}$ = 300			

$\bar{X}$ = daily means.

APPENDIX G (Continued)

	Day 4				Day 5			
	1	2	3	4	1	2	3	4
Subject 1	300	300	300	300	300	300	300	300
		$\overline{X}$ = 300				$\overline{X}$ = 300		
Subject 2	96.2	20.5	266	300	300	300	300	300
		$\overline{X}$ = 170.7				$\overline{X}$ = 300		
Subject 3	2.86	3.52	3.44	4.16	3.62	3.62	4.39	4.96
		$\overline{X}$ = 3.49				$\overline{X}$ = 4.14		
Subject 4	300	188.1	246.9	300	300	300	300	300
		$\overline{X}$ = 258.55				$\overline{X}$ = 300		
Subject 5	300	300	300	300	300	300	300	300
		$\overline{X}$ = 300				$\overline{X}$ = 300		

$\overline{X}$ = daily means.

APPENDIX H

Raw Data

Group 1 Mean Latency Time per Session, in Seconds

	Day 1				Day 2				Day 3			
Session	1	2	3	4	1	2	3	4	1	2	3	4
Subject 1	3	2.3	3	2.3	2.8	1.85	1.6	1.6	1.2	2	1.86	2
		$\overline{X}$ = 2.6				$\overline{X}$ = 1.96				$\overline{X}$ = 1.76		
Subject 2	4.2	3.1	3.39	3.3	3.28	1.64	3	2.6	3	2.4	1.8	2
		$\overline{X}$ = 3.49				$\overline{X}$ = 2.63				$\overline{X}$ = 2.3		
Subject 3	4	4	4	4	3.6	3.8	3.83	3.4	4.9	4.9	4.2	3.8
		$\overline{X}$ = 4				$\overline{X}$ = 3.65				$\overline{X}$ = 4.4		
Subject 4	9	9	8	5	4.7	4	7.9	5	4.4	5.15	4.0	4.6
		$\overline{X}$ = 7.75				$\overline{X}$ = 5.4				$\overline{X}$ = 4.76		
Subject 5	3.9	4.25	2.8	5.3	3.4	2.88	3.0	2.49	2.93	1.9	1.9	1.9
		$\overline{X}$ = 4.06				$\overline{X}$ = 2.94				$\overline{X}$ = 2.15		

$\overline{X}$ = daily means.

APPENDIX H (Continued)

	Day 4				Day 5			
Session	1	2	3	4	1	2	3	4
Subject 1	1.44	1.56	2.18	1.9	2.4	1.6	1.8	1
	$\overline{X}$ = 1.77				$\overline{X}$ = 1.7			
Subject 2	3	3	2.4	4.3	1.8	2	1.6	1.8
	$\overline{X}$ = 3.1				$\overline{X}$ = 2.3			
Subject 3	3.4	3.1	2.4	2.91	1.85	2.6	1.4	3.1
	$\overline{X}$ = 2.9				$\overline{X}$ = 2.2			
Subject 4	4.2	3.8	4.05	3.4	2.2	2.6	4	1.98
	$\overline{X}$ = 3.86				$\overline{X}$ = 2.6			
Subject 5	1	1	1.2	1	1.23	1.49	1.38	1
	$\overline{X}$ = 1.05				$\overline{X}$ = 1.27			

$\overline{X}$ = daily means.

APPENDIX I

Raw Data

Pre- and Post-Measures: Avoidance Test.

Treatment	S	Pre-test score	Post-test score
Group 1	1	16	3
	2	19	3
	3	19	10
	4	19	6
	5	15	1
Group 2	1	7	5
	2	8	3
	3	18	6
	4	7	4
	5	19	6
Group 3	1	9	6
	2	18	12.5
	3	8	6
	4	19	13
	5	14	8

S - Subject number.
Group 1 - S control, graduated exposure, feedback.
Group 2 - E control, graduated exposure, feedback.
Group 3 - E control, non-graduated exposure, feedback.

APPENDIX J

Raw Data

Pre- and Post-Measure: Fear Thermometer.

Treatment	S	Pre-test score	Post-test score
Group 1	1	5	2
	2	9	2
	3	9	6
	4	8	3
	5	10	1
Group 2	1	5	3
	2	6	2
	3	8	3
	4	10	3
	5	7	2
Group 3	1	4	2
	2	7	4
	3	8	2
	4	8	4
	5	6.5	2

S - Subject number.
Group 1 - S control, graduated exposure, feedback.
Group 2 - E control, graduated exposure, feedback.
Group 3 - E control, non-graduated exposure, feedback.