# DIFFERENTIAL EFFECTS OF HEART RATE FEEDBACK AND SYSTEMATIC DESENSITIZATION ON SNAKE PHOBIC BEHAVIOR

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## ABSTRACT

Group 1 Ss were led to believe (through presentation of simulated heartrate feedback) that as the number of exposures to threat scenes increased, their own heartrate responses to snakes decreased. Group 2 Ss also received simulated heartrate feedback, but were led to believe that this was of another person's heart. Control Ss did not receive feedback treatment.

At the end of the experiment, Group 1 Ss manifested more approach behavior when confronted with a live snake and demonstrated a greater reduction in Willoughby's Neuroticism Scale scores than Group 2 or C Ss. No significant difference was demonstrated on a self-rating fear questionnaire or on heartrate measures among all three groups, nor was there a significant difference among groups when the E "coaxed" Ss to approach even closer to the snake.

It was concluded that cognitions about internal reactions are important modifiers of fear behavior, although some behavioral systems are affected more than others.

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# CHAPTER I

## INTRODUCTION AND STATEMENT OF THE PROBLEM

Wolpe (1958) concluded, on the basis of both experimental and clinical observations, that "fundamental psychotherapeutic effects followed reciprocal inhibition of neurotic responses" (p. iv). The general principle which he outlined was as follows:

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

Thus, reciprocal inhibition was put forth as a therapeutic principle, and systematic desensitization was employed as a major therapeutic technique.

Despite the fact that there is now good evidence for the effectiveness of systematic desensitization (Lazovik and Lang, 1960; Lazarus, 1961, 1963; Lang and Lazovik, 1963; Lang, Lazovik, and Reynolds, 1965; Davison, 1966), there remains a significant question as to whether this efficacy is correctly explained by the principle of reciprocal inhibition (Wolpin and Raines, 1966). Moreover, the issue has been raised (Valins, 1966) as to whether a physiological interpretation, previously given to reciprocal inhibition, is indeed the correct one since alternative explanations have since been made known. Furthermore, there remains a great deal of speculation (Valins and Ray, 1967; Larsen, 1966; Lazarus,

1965) as to those specific factors responsible for producing positive changes in fear behavior, thereby contributing to the ultimate success of desensitization therapy. The present research is an attempt to investigate the problem of what factor or factors serve as vehicles of change in systematic desensitization.

The present investigation is based upon the assumption that cognitive factors are influential in determining the success of systematic desensitization. Until recently there has been relatively little indication that emotional behavior is dependent upon such cognitive elements, and researchers have subsequently persisted in weighing heavily the role of physiological factors as the important modifiers of fear behavior within the context of desensitization therapy.

Schachter (1959) and Valins (1966) have demonstrated that cognitive factors may well be the major determinants of emotional states. Schachter (1959) suggested that internal physiological events may serve as cues which provide sources of cognitive information. In other words, it is the cognitive representation of internal events that influences emotional behavior. Valins (1966) suggested that this cognitive representation may be non-veridical, and he demonstrated that the cognitive interpretation of internal events occurs independent or irrespective of one's actual internal state. Within the procedural framework of systematic desensitization, such non-veridical cognitive interpretations may be operating.

Relaxation has generally been employed as a response which is antagonistic to anxiety, and Ss are instructed to relax while in the

presence of frightening stimuli. Whether actual relaxation is induced may be irrelevant, as long as the S is led to believe that he is relaxed. In other words, if it were possible to manipulate the cognitive representation of internal events to the extent that the cognitions were incompatible with the reactions one usually experienced when confronted with anxiety-provoking stimuli, an individual might be led to re-assess the fear value previously associated with those stimuli. Under such circumstances, the cognitions alone may be the important modifiers of behavior. To the extent that the individual is successful in believing he is relaxed, his cognitive interpretation of his feelings, regardless of his actual state of internal events, should be of the nature "That stimulus does not affect me internally, therefore I am not afraid."

If the above generalizations have some factual basis, we can expect that substituting the appropriate cognitive set for the relaxation response generally employed in systematic desensitization will lead to a reduction of fear behavior.

Physiological relaxation may or may not accompany such cognitions. In order to ascertain whether an attenuation of sympathetic arousal is indeed coincident with an appropriate cognitive set induced during desensitization therapy, a portion of this research was devoted to an investigation of one form of physiological response, viz., the cardiac response.

It is assumed in the present research that cardiac activity is part of a complex of responses through which the fear response may manifest itself. This study is designed to examine specifically the

fear of snakes; or more precisely, it is designed to examine several modifications of the systematic desensitization procedure which may be significant in reducing this fear. The author holds to a basic premise proposed by Wolpe (1958) which states that neuroses (fear of snakes was considered a form of neurotic behavior) are "persistent, unadaptive learned habits of reaction" (p. 32). In terms of behavior theory, phobias may be regarded as conditioned anxiety (fear) reactions. In other words, "Any neutral stimulus ... that happens to make an impact on an individual at about the time that a fear reaction is evoked acquires the ability to evoke fear subsequently." (Wolpe and Rachman, 1960, p. 135). It thereby follows that the elimination of anxiety-response habits may be achieved through the adoption and modification of the principles of learning. This view of neurosis is in opposition to that expounded by a purely psychoanalytical model which considers phobic behavior to stem from problems of inner-dynamics relating to the Oedipus complex. As Freud stated in his case of Little Hans (Freud, 1950), the child desires to possess the mother sexually, and is jealous and hostile towards the father. The child fears his father because of these wishes, and in particular, dreads castration. The fear of avenging the father is then projected onto some external and formerly innocuous object.

Because of increasing success over a wide range of clinical problems, behavior therapies today are making a significant impact in the field of psychotherapy. Yet in order to solve the complex problems posed by mental illness, psychologists must be able to answer some very basic questions pertaining to the methods of therapy they employ, e.g.,

"Are they effective, if so, how, and under what conditions?" The present research is an attempt to illuminate through experimentation, those variables which may be influential in reducing fear through the method of systematic desensitization.

# CHAPTER II

## REVIEW OF THE LITERATURE

A great deal of the previously documented research in this area was pertinent to the problem at hand in an indirect manner. Therefore, in order to promote clarity, this Chapter has been divided into general topics with a separate review of each.

### A. DEVELOPMENT OF THE BEHAVIOR THERAPIES

One of the earliest advocates of conditioning procedures was Mary Cover Jones (1924) who established through experimentation a method which proved to be effective in modifying unadaptive responses by changing the characteristics of the stimuli which controlled them. The method of "direct conditioning" (i.e. introducing a fearful stimulus gradually in the context of stimuli which evoked pleasurable responses) was used to eliminate a fear of white rats, fur, and other similar objects in a three year old boy. The child was gradually introduced to a white rabbit during periods of play with his friends. Over an interval of several days the distance between the boy and the phobic stimulus was decreased as the child's toleration of the rabbit slowly improved. Feeding responses were also employed, whereby a positive reinforcer (candy) was presented whenever the rabbit was shown. The fear responses were completely eliminated and replaced by those more

favorable and adaptive.

Wolpe (1958) extended the paradigm which Jones originally proposed, and devised a theoretical model for the treatment of neuroses based on an application of Hullian learning theory, Jacobson's (1938) method of inducing deep muscle relaxation, and Sherrington's discussion of the neurological aspects of reciprocal inhibition.

Wolpe elaborated the principle of reciprocal inhibition as the main basis of psychotherapeutic effects. Specifically, the treatment was designed to substitute muscular relaxation for anxiety. Subjects thus learn to make responses to phobic objects which reciprocally inhibit (are incompatible with) fear. Systematic desensitization, the specific technique based on this theory is described by Wolpe as follows:

> The patient is given preliminary training in relaxation by Jacobson's method (1938). Meanwhile an 'anxiety hierarchy' is constructed. This is a list of stimuli to which the patient reacts with unadaptive anxiety. The items are ranked according to the amount of disturbance they cause, the most disturbing items being placed at the top and the least at the bottom. The patient is hypnotized and made to relax as deeply as possible. Then he is told to imagine the weakest item in the anxiety-hierarchy - the smallest 'dose' of phobic stimulation. If the relaxation is unimpaired by this, a slightly greater 'dose' is presented at the next session. The 'dosage' is gradually increased from session to session, until at last the phobic stimulus can be presented at maximum intensity without impairing the calm, relaxed state. It will then be found that the patient has ceased to react with his previous anxiety to encounters in real life with even the strongest of the once phobic stimuli (p. xii).

This particular technique of systematic desensitization has shown itself to be effective in the treatment of conditioned fear.

Lang and Lazovik (1963), using Ss with strong avoidance and fear reactions to harmless snakes found desensitization using snake scenes more effective than the hierarchical presentation of irrelevant topics. Paul (1966) found systematic desensitization to be superior to traditional "insight" therapy, to "attention-placebo" therapy, and to no therapy, in the treatment of public speaking fears. Cooke (1966) also found it superior to no therapy.

Literature on Snake Phobia

The literature on systematic desensitization reveals that a wide variety of phobias have been successfully treated by deconditioning procedures. The following section is a review of several articles dealing with the experimental desensitization of snake phobia.

In a study conducted by Lazovik and Lang (1960), four Ss with a fear of non-poisonous snakes were given Wolpian systematic desensitization therapy. Results indicated that desensitization affected a persistent reduction in the phobic behavior of these Ss.

Lang and Lazovik (1963) performed an experiment in which 24 snake phobic Ss participated in an investigation of systematic desensitization therapy. It was shown that Ss who participated in desensitization revealed a greater reduction in phobic behavior (as measured by avoidance behavior in the presence of the phobic object and self-rating) than did non-participating controls. Subjects tended to hold or increase therapy gains at a 6-month follow-up evaluation.

Lang, Lazovik, and Reynolds (1965) successfully treated a group

of snake phobic college students using Wolpian systematic desensitization. After treatment, desensitization Ss showed significantly greater fear reduction than controls as measured by an avoidance test, a fear thermometer, and an open-ended interview.

Wolpin and Pearsall (1965) report a single case study which illustrates the deconditioning of the fear of snakes. A snake phobic female was trained in muscular relaxation following Wolpe's model. During the eighth session the patient commenced visualizing, while deeply relaxed, anxiety-producing scenes related to snakes. The hierarchy of 20 steps was completed during the one session. Following this the patient was able to pick up and play with two snakes. A 23-day follow-up indicated that the patient was able to maintain her therapy gains.

Wolpin and Raines (1966) demonstrated the reduction of the snake phobia of 2 female Ss by presenting only the most disturbing imagery items in the fear hierarchy.

Valins (1966), Valins and Ray (1967) and Lomont and Edwards (1967) have also demonstrated the successful deconditioning of snake phobia.

In summary, the literature indicates that the use of systematic desensitization therapy for the treatment of snake phobia produces demonstrable reductions in fear behavior.

## B. EVALUATION OF FACTORS ESSENTIAL TO DESENSITIZATION THERAPY

Whereas desensitization therapy has shown itself to be an effective therapeutic procedure, there remains the question as to which factors are

essential in producing positive reductions in fear behavior. A great deal of experimentation has been devoted to this problem over the past few years, and the following is a review of some of the more relevant research in this area.

1. Relaxation

Wolpe's (1958, 1961) method of systematic desensitization relies on the patient's willingness and ability to develop adequate skills of muscular relaxation. He states that "patients who cannot relax will not make progress with this method" (1958, p. 141).

Rachman (1965b) has shown that neither relaxation nor desensitization is effective in its own right. Subjects visualizing scenes without relaxation did not progress at the rate of Ss who were relaxed during visualization.

Davison (1966) has also shown the importance of relaxation during desensitization, and he has demonstrated that it is neither relaxation alone nor desensitization alone which produces reductions in fear behavior. In this study Davison employed three treatment procedures for the fear of snakes: desensitization treatment, in which graded aversive stimuli were paired in imagination with anxiety-competing relaxation responses, "pseudo desensitization" treatment, in which relaxation was paired with stimuli that were irrelevant to snakes, and exposure treatment, whereby the Ss were exposed without relaxation to the same series of aversive stimuli employed in the first treatment condition. A control group did not receive treatment. Between group comparisons revealed that Ss in the

desensitization group exhibited significantly greater decrements in avoidance behavior than Ss in the other three groups, which did not differ from one another. Davison concluded that the significant increase in approach behavior on the part of desensitization Ss was due to an actual reduction in the underlying anxiety drive. The author also concluded that the overall findings provided strong evidence that the beneficial effects of systematic desensitization therapy were based on a counter-conditioning process requiring the contiguous pairing of a graded series of fear-eliciting stimuli with a response (muscular relaxation) which inhibits the occurrence of the fear response.

Lazarus (1965) made use of a procedure which called for forceful muscular activity in immediate association with an anxiety-provoking or otherwise disturbing thought or image. Three phobic Ss and one depressive S all derived considerable benefit from the treatment in a mean of ten sessions.

Wolpin and Raines (1966) also explored the necessity for using relaxation in reducing fear and avoidance behavior. Two snake phobic Ss were presented with an anxiety-hierarchy without concurrent relaxation; two snake phobic Ss went through the hierarchy with their muscles tensed; and two Ss received only the top hierarchy items without relaxation or tensing. After treatment, all six Ss were able to handle the previously feared snake. The authors thus demonstrated reductions in anxiety even in the absence of relaxation.

Lomont and Edwards (1967) also examined the role of relaxation in systematic desensitization. Two groups of female snake phobic college

students were administered two different treatment procedures for reducing fear. One group received systematic desensitization with relaxation while the other group underwent a procedure that was intended to be as similar as possible to the desensitization procedure except for the omission of relaxation. The experimental outcome was consistent with the results obtained by Rachman (1965b) and Davison (1966). On three out of five measures of snake phobia change, systematic desensitization with relaxation produced significantly greater (or very nearly significantly greater) fear reductions than desensitization without relaxation, which appeared totally ineffective.

In summary, recent research has indicated the relative importance of relaxation in desensitization therapy. However, the exact role of relaxation is difficult to assess. Although Wolpe has regarded relaxation as a physiological response incompatible with fear, the author has found no studies specifically testing relaxation as a generator of fear competing physiological responses. Valins and Ray (1967) have summed up the situation quite adequately by stating, "Until it has been demonstrated that a muscularly relaxed subject is less physiologically responsive to a phobic stimulus than a subject who is not relaxed, we may continue to question the necessity of physiological incompatibility for desensitization therapy" (p. 50).

2. Hypnosis and Suggestibility

Although Wolpe (1958) has made use of hypnosis to enhance the effects of desensitization therapy, the question remains open as to

whether hypnosis is a necessary component of the therapeutic process. Several experiments have been conducted to assess the relationship between hypnosis, suggestibility and therapy change.

Lang, Lazovik and Reynolds (1965) examined the contribution of suggestibility and placebo effects to progress in desensitization and post-therapy fear reduction. One group of Ss was administered "pseudo-therapy," a treatment procedure which was therapeutically neutral except for the therapist-client relationship. All procedures used in systematic desensitization (hypnosis, visualization of scenes, relaxation instruction, and utilization of the hierarchy) were employed, but the hierarchy and the conversation between the S and the therapist were unrelated to fear. There was no difference in pre- to post-test scores between no treatment and pseudotherapy for any of the fear measures. On the other hand, desensitization Ss showed a significant positive change with treatment. The findings indicate that hypnosis in itself did not produce change in fear behavior, nor did the reduction in fear following desensitization stem from a suggestion to change implicit in being in therapy.

Larsen (1966) studied the effects of hypnotic therapy on snake phobia. One group of Ss was asked to recall earlier encounters with snakes while relaxing during recall (Relaxation Group). A second group simply re-experienced early fear of snakes as fully as possible (Arousal Group), and a third group was given post-hypnotic suggestions about symptom removal. Results showed that immediately after treatment all three procedures were equally effective in reducing phobic behavior and were

superior to no treatment controls. The data thus indicate that direct suggestion was as efficient as scene visualization in producing short term reductions in fear behavior. However, after a two-week follow-up, only the Arousal Group was no longer significantly improved over control. Whereas Larsen concludes that hypnotizability was positively related to the degree of final approach behavior, the more important suggestion implicit in this study is, when looking at the differential relapse rates, that visualization with relaxation led to the most persistent change. Larsen also reports a significant positive correlation between the Stanford Hypnotic Susceptibility Scale and snake approach behavior, and suggests that this indicates a relationship between hypnotizability and improvement. However, since no non-hypnotic therapy was included in this study, the issue as to whether reductions in fear behavior are enhanced by hypnosis was undetermined.

Schubot (1966) also reports high positive correlation between change in approach behavior and the Stanford Hypnotic Susceptibility Scale for snake phobic Ss who were desensitized using a hypnosis plus relaxation technique.

In summary, although research has shown that the use of hypnosis as part of the desensitization procedure may attribute to fear change, hypnotic susceptibility is not in itself responsible for the specific desensitization effect. In general, further research seems necessary to determine if these conclusions continue to be warranted.

3. Anxiety Hierarchies

Wolpe has considered the presentation of the anxiety hierarchy to be a crucial element of desensitization therapy. Other researchers (Lang, Lazovik, and Reynolds, 1965) have felt that progress in the hierarchy is strongly related to the degree of fear change. The latter authors have indicated that nearly all Ss who complete more than fifteen items of a hierarchy show reduced fear, whereas those who complete less are not significantly different from controls. However, recent research has shown that it is possible to reduce avoidance behavior by employing certain variations in the use of anxiety hierarchies.

Larsen (1965) did not utilize anxiety hierarchies in the hypnotic treatment of snake phobic Ss, and reported some positive gains in the reduction of fear following treatment.

Cooke (1966) tested the efficacy of Direct and Indirect treatment procedures for the fear of rats. One-half of the Ss were exposed to the actual stimulus, and one-half of the Ss were administered the desensitization procedure to the imaginal stimulus. When the data was compared for Direct and Indirect treatments, there was a slight, although non-significant difference in favor of the Direct treatment on all fear measures. However, when the data was compared for highly anxious and low anxiety Ss, Ss under Imaginal treatment with a high general anxiety level, exhibited a greater reduction in fear than Ss with a low general anxiety level. Under Direct treatment, high and low anxious Ss showed no significant difference in the degree of fear reduction.

Wolpin and Raines (1966) administered deconditioning treatment

to six Ss, all of whom were fearful of snakes. Two Ss proceeded through a twenty-step hierarchy without relaxation; two Ss went through a twenty-step hierarchy with their muscles deliberately tensed; and two Ss were simply subjected to the top of the hierarchy without relaxation or tensing of muscles. All Ss, including the two who were exposed only to the most intensely disturbing imaginal stimuli, were able to handle the originally feared snake after treatment.

Rachman (1966) also examined the effectiveness of the flooding technique in reducing phobic behavior. In this study phobic Ss imagined strong anxiety-producing stimuli. Flooding treatment was found to be ineffective in reducing fear. On the other hand, all Ss who received treatment consisting of desensitization plus relaxation showed stable improvement.

Kirchner and Hogan (1966) instructed rat phobic Ss to visualize maximally frightening scenes without utilizing a graduated approach. These Ss demonstrated significantly more approach behavior following treatment than did no treatment controls.

In summary, research indicates that while the anxiety hierarchy may be a useful component in desensitization therapy, a graduated approach in the presentation of anxiety-producing stimuli may not be necessary. Furthermore, wide variations in Wolpian presentation of the hierarchy appear to be equally effective in reducing avoidance behavior.

4. Cognitive Set

Kanfer and Marsten (1963) have suggested that operant schedules

for shaping verbal behavior are made use of in desensitization therapy. They indicate that the successful desensitization of an item in the anxiety hierarchy may be reinforced by the therapist (either implicitly or explicitly), and moreover, the S may also reinforce himself, those responses which to him represent a reduction in feelings of fear and anxiety.

Schachter and Singer (1962) have recently indicated the importance of cognitive set in determining emotional behavior. The authors argue that an emotional state may be considered as a joint function of physiological arousal and of a cognition which is appropriate to the state of arousal. Cognitions are given an all important role in determining what label will be affixed to the state of physiological activity. Subjects in the experiment were given either epinephrine (a sympathomimetic drug which reproduces physiological patterns caused by activation of the sympathetic nervous system) or a placebo. Subjects who received epinephrine did so under one of three conditions: some Ss were informed as to the correct side effects of epinephrine, other Ss received no information as to the side effects of epinephrine, and yet other Ss received incorrect information as to the side effects of this drug. Uninstructed Ss injected with epinephrine entered into more euphoric or aggressive behavior when in the presence of a stooge trained to act elated or angry than Ss in the other groups. The data suggest, therefore, that when an individual has no immediate explanation for a given state of physiological arousal, he will both label and interpret his feelings in terms of the cognitions available to him. It follows

that given a state of physiological arousal for which an individual has a satisfactory explanation, he will not label or interpret these feelings in terms of available alternate cognitions.

Schachter and Wheeler (1962) conducted an experiment to test the hypothesis that experimentally manipulated emotional states would be most intensely experienced by Ss injected with epinephrine, less intensely by Ss injected with saline (a placebo) solution, and least intensely by Ss injected with chlorpromazine (a sympathetic blocking agent). Subjects who received either epinephrine, chlorpromazine, or saline were shown a funny movie which supposedly would be effective in manipulating the cognitive component of their emotional state. Results were in the predicted direction. Epinephrine Ss found the film funnier and were rated by judges to display greater euphoric behavior than placebo Ss, who in turn enjoyed the film more than chlorpromazine Ss.

Valins (1966) investigated the effects that information about internal reactions would have on the labelling of emotional stimuli. Subjects who thought that their heart rates had increased (when in fact their heart rates were pre-recorded) in response to slides of a nude female, rated these slides as more attractive than slides to which they thought had no effect on their heart rates. The authors suggest that the bogus feedback did not have any direct (i.e., physiological) effects other than cognitive ones, although physiological variables were not in fact measured.

Valins and Ray (1967) conducted two rather ingenious experiments designed to eliminate phobic behavior inducing non-veridical cognitions

concerning internal reactions. One group of snake phobic Ss were presented with slides of snakes and listened to what they thought were their heartrate reactions to these stimuli. It appeared to the Ss that the snake slides did not affect their heart rates. A second group of Ss listened to the same sounds, but were not instructed to associate these sounds with their heart rates; these Ss were under the impression that the sounds were extraneous and meaningless. Subjects who thought that snake stimuli did not affect them internally manifested more approach behavior in the presence of a live snake than did the group of Ss who received no information about this internal state.

In summary, although research indicates that manipulation of instructional variables and cognitive set may reduce the effects of threatening stimuli, the evidence is not entirely conclusive in determining that successful desensitization is based solely upon the induction of such cognitions.

## C. SUMMARY AND STATEMENT OF HYPOTHESES

Within the last decade a great deal of research has been devoted to the study of systematic desensitization. Yet, there still remains a great deal of speculation as to which factors are responsible for producing positive changes in fear behavior. This is not to say that no progress has been achieved.

Results show that it is not necessary to include hypnotic induction as part of the therapeutic procedure to achieve the specific

desensitization effect. The necessity of employing relaxation is questionable, although the data does indicate that the use of such seems to potentiate the effectiveness of desensitization. Recent research has challenged the exact role anxiety hierarchies play in this procedure, and wide variations in the presentation of hierarchy items seem to be effective in reducing avoidance behavior. Although only a few recent articles have dealt with the role of cognitions, the data appears to indicate that cognitive set may be an important modifier of avoidance behavior and may exert a great deal of power over emotional control.

Lang (personal communication) has indicated that the success of desensitization may well lie in the fact that it is a multiple level treatment, designed to modify the somatic, overt, and verbal responses of individuals. Relatively few studies have examined the exact nature of physiological responses within the context of desensitization therapy.

The present research has focused on the effect of cognitive set on threatening stimuli in the hope of further increasing our understanding of the role this variable plays in desensitization therapy. In view of the lack of evidence regarding somatic responses which occur during desensitization, attention has also been given to this problem.

The following hypotheses were tested in the present research:

1. The verbal components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

2. The overt motor components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

3. The somatic components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

4. The somatic and overt motor components of fear behavior will be attenuated even further than predicted in Hypotheses 2 and 3 by urging Ss to approach a feared object.

# CHAPTER III

## METHOD

### Subjects

The Ss were thirty female undergraduates at the University of Manitoba. Fifteen Ss were non-credit volunteers, and fifteen Ss were volunteers from a group required to participate in psychology experiments in order to fulfill credit requirements.

The initial selection of all Ss was made on the basis of the Fear Survey Schedule (FSS-111) (Wolpe and Lang, 1964), which was administered in a number of psychology classes at the University of Manitoba. The FSS-111 is a revised and extended version of two previous Fear Survey Schedules (FSS-1, Lang and Lazovik, 1963; FSS-11, Geer, 1963) which were developed for purposes of assessing change in phobic behavior and generalized anxiety in experimental studies of desensitization therapy. The FSS-111 consists of a list of 76 words referring to fear-producing stimuli. Testees rate their fear of each item on a 4-point scale ranging from "none" to "intense" (see Appendix A, Fear Survey Schedule). Only those testees who rated their fear of harmless snakes as intense were selected as Ss.

Candidates from the non-credit volunteer group were contacted by mail for purposes of soliciting their cooperation in participating as Ss. These Ss were informed that the purpose of the experiment was to examine a therapeutic process designed to reduce feelings of tension

and anxiety. Candidates from the credit volunteer group were also informed by mail as to the nature and purpose of the experiment. (See Appendix B, Letters to Subjects.) At no point prior to the commencement of this study were Ss informed that the therapeutic techniques under investigation were designed to reduce the fear of snakes.

## Measures

The present research was designed to investigate an experimental treatment of the fear of snakes. In dealing with the problem of fear measurement, the author incorporated several assumptions outlined by Lang (1968) which relate to the fear response. Lang states that fear is a "complex of responses ... [which] may be evidenced in the main, expressive modes of the body." In other words, fear and fear change may be apparent in: a) cognitive (verbal) behavior, b) overt motor behavior, and c) pertinent somatic responses. Because there is some question as to which system assumes greater fundamental importance, this study has examined and measured all three responses of this complex.

### A. Measures of Cognitive (Verbal) Behavior

(i) Fear Survey Schedule - The Fear Survey Schedule, as indicated previously, was used for the purpose of subject selection. One measure was derived from the FSS-III for each S, the S's rating of the snake item.

(ii) Willoughby's Neuroticism Schedule - Willoughby's Neuroticism Schedule (Willoughby, 1934) consists of twenty-five questions which

yield information regarding both the S's present neurotic reactions in common social situations, as well as the S's general sympathetic reactivity. According to Wolpe (1967), the total score reflects the severity of the S's neurotic state.

Wolpe and Lazarus (1967) indicated that Willoughby's Neuroticism Schedule may be a useful instrument in judging the success of therapy, for when therapy has been effective, a high score on this test comes down proportionately. Willoughby's Neuroticism Schedule was therefore administered on two occasions: prior to therapy and after completion of the experimental treatment. In order to avoid any disagreeable connotations which Ss could associate with the term "neuroticism," this test was relabelled and called the "Personality Schedule." (See Appendix A, Personality Schedule.)

(iii) Self-Rating Questionnaire - Two self-rating questionnaires (SR-1 and SR-2) were administered on two occasions during this experiment: SR-1 was completed by the S following the pre-treatment Proximity Test, and SR-2 was completed following the post-treatment Proximity Test. (See description of Proximity Test below.) The questionnaires consisted of several statements (about S's feelings during the experiment) which the S was required to rate on a 7-point scale ranging from "not at all" to "an intense amount." (See Appendix A, Self-Rating Questionnaire.)

The self-rating questionnaires were included among the measures of cognitive behavior for two purposes: first, they provided a subjective report of the S's discomfort or physical arousal when in the presence of

a live snake and, b) when imagining snakes; second, they provided an indication of the S's cognitive interpretation attached to these feelings of arousal, i.e., "I am afraid" or "I am not afraid."

B. Measures of Overt Motor Behavior: Proximity Test

Three tests were administered during this experiment, a pre-treatment, a post-treatment, and a final measure. The Proximity Test was an objective measure of the S's fear response to a non-poisonous snake. The snake was enclosed in a glass aquarium which was located ten feet from the door of one of the experimental rooms. The S was informed immediately prior to this test that a live snake was encaged in a nearby room, and that, upon entering the room, she was to come as close as possible to the snake. The E observed and rated the S's behavior according to the method outlined in Table 1.

The points range from 0 (holding the snake for over 30 seconds), to 10 (refusing to enter the room). No S was permitted to continue in the experiment whose score on the pre-treatment test was lower than 4 points. Scores ranging from 3 to 0 were considered to indicate minimal fear responses in the presence of the snake, and Ss obtaining such scores were not regarded as snake phobic.

C. Measures of Somatic Responses

In the present experiment measures of cardiac activity were taken under several conditions. One measure of the S's heart rate was made during conditions of rest and relaxation in order to

TABLE 1

METHOD OF RATING Ss AVOIDANCE BEHAVIOR

| Avoidance Behavior | Proximity Rating |
|---|---|
| Holding the snake outside the cage for over 30 seconds | 0 points |
| Holding the snake outside the cage for less than 30 seconds | 1 point |
| Picking up the snake without removing it from the cage | 2 points |
| Touching the snake | 3 points |
| Reaching in the cage | 4 points |
| Taking the cover off the cage | 5 points |
| Advancing until within 2 feet of cage | 6 points |
| Advancing until within 4 feet of cage | 7 points |
| Advancing until within 6 feet of cage | 8 points |
| Entering the room | 9 points |
| Unable to enter the room | 10 points |

obtain a stable baseline measure of cardiac activity. This measure was only taken once.

Measures were also made of the S's level of cardiac activity during physical exertion (jumping on the spot for one minute). This measure of heart rate, when compared with the baseline figure of cardiac activity, provided an index useful in estimating the degree of change in heart rate for each S. This measure was only taken once.

Indications of heart rate were also taken for each S as pre-treatment, post-treatment, and final measures during the Proximity Test in order to assess the S's level of cardiac arousal during exposure to the fear stimulus.

Measures of cardiac activity were taken for all experimental Ss during treatment for their snake fear in order to examine the dependence of positive reductions in fear behavior on the attenuation of sympathetic arousal. According to Wolpe (1958), the essence of desensitization is "reciprocal inhibition," whereby the S learns to substitute incompatible physiological responses for fear. Decrements in heart rate are presumed to be one of these responses (Malmo, 1958).

## Apparatus

### A. Cardiac Apparatus

All measures of cardiac activity were taken by a Harco E.C.G. Activated Cardiac Monitor which converts E.C.G. signals into audible "beeps" and visible meter readings, the latter indicating the rate of cardiac activity. The E.C.G. signals were transmitted to the monitor

via cable electrodes that were attached to the S's body with adhesive pads. (See Figure 1 for an illustration of electrode placement).

The monitor rate scale was divided into units representing beats per minute (bpm), and covered a range from 0 to 200. The number of beats per minute was read directly from the scale.

B. Threat Tapes

A master recording was made containing five different fear situations (see Appendix C, Fear Situations). The playback times of the fear situations are displayed in Table 2.

There was a 60 second time interval between each fear situation, making each threat tape 12 minutes and 52 seconds long.

The 60 second interval between fear situations was used for programming "beeps" of varying frequencies. (These "beeps" were used to simulate actual heartbeats.) A Cousino cartridge tape recorder (Model SR 7341) was used in the present study because it contained two playback channels, the first for the audible playback of threat scenes, and the second for the programming of simulated heartbeats. A manually operated button on the tape recorder transferred a special tone to the second channel of the tape recorder. By pushing this "tone button" at the desired frequency, the tones during playback activated a relay within the tape recorder at the same frequency. When the relay activated a low output energy source, which in turn activated the heart rate monitor, a simulation of veridical heart rate was thereby achieved.

Table 3 illustrates the frequencies at which the "beeps" were

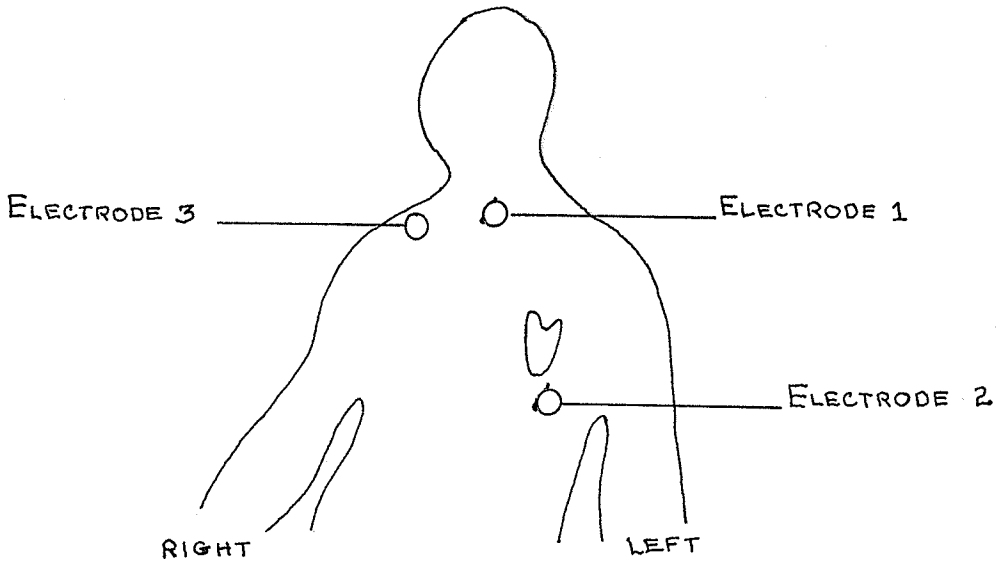



FIGURE 1

ILLUSTRATION OF ELECTRODE PLACEMENT

TABLE 2

PLAYBACK TIMES OF FEAR SITUATIONS USED IN THE TREATMENT PHASE

| Fear Situation | Playback Time | |
|---|---|---|
| 1 | 1'35" | |
| 2 | 1'37" | |
| 3 | 1'38" | |
| 4 | 1'29" | |
| 5 | 1'33" | |
| | 7'52" | Total playback time of aversive stimulation |

TABLE 3

"BEEP" FREQUENCIES RECORDED BETWEEN FEAR SITUATIONS

| Tape Number | Range of "Beep" Frequency (beeps per minute) |
|---|---|
| 1 | 120 - 125 b.p.m. |
| 2 | 100 - 105 b.p.m. |
| 3 | 80 - 85 b.p.m. |
| 4 | 70 - 75 b.p.m. |
| 5 | 60 - 65 b.p.m. |

recorded during the 60 second interval between fear situations for each threat tape. Although each of the five tapes presented on its programme track a distinct "beep" frequency, the audio (or threat) portion containing the five fear situations was the same.

All five tape recordings used in this research were made on continuous loop tape cartridges. Each tape contained a small piece of magnetic foil which caused the tape to stop automatically after all five threat and five "beep" sequences were completed. The tape could be re-started manually by turning the starter switch on.

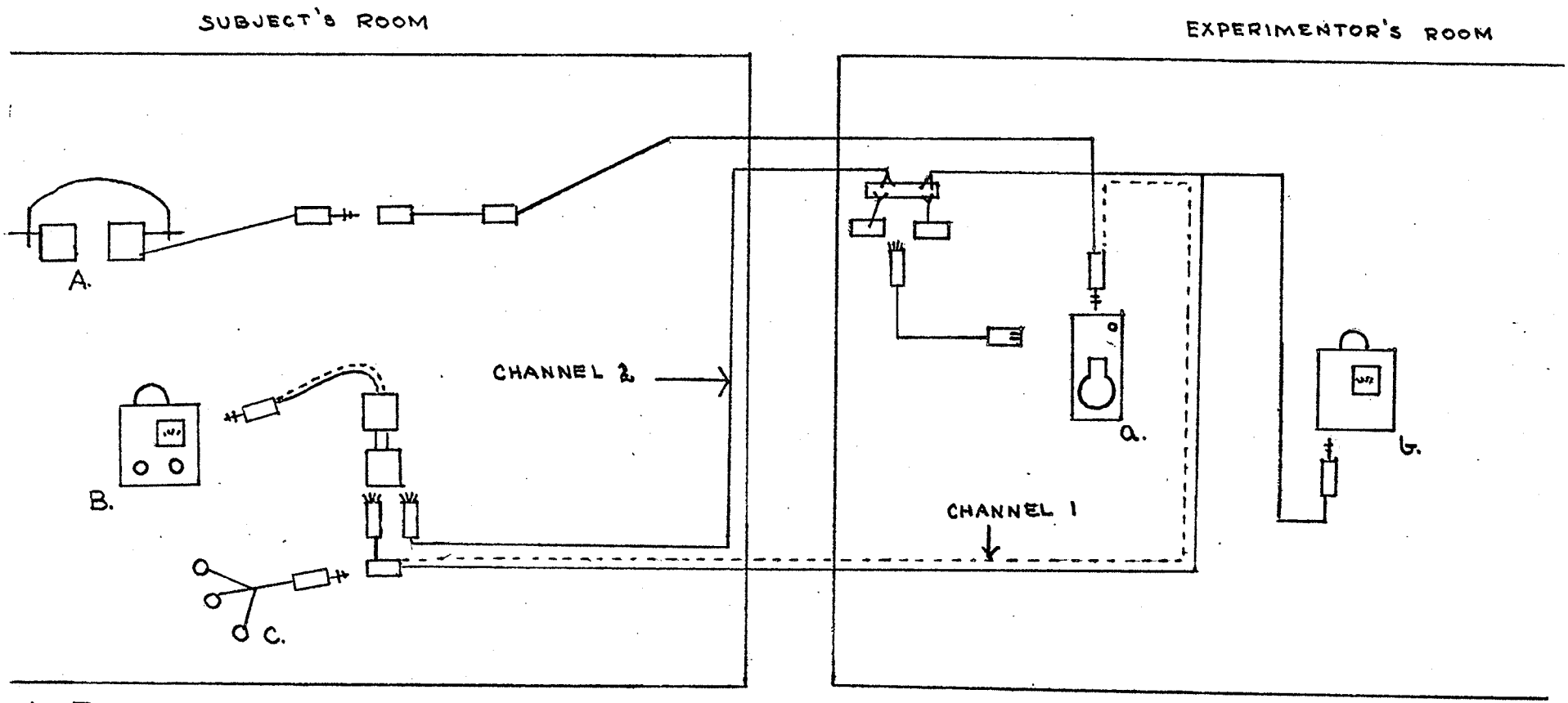
C. Treatment Apparatus

A schematic diagram illustrating the arrangement of apparatus used during the treatment sessions for Ss under Conditions 1 and 2 is shown in Figure 2.

As noted in the diagram, the S, who remained on one side of a two-way mirror, had available to her a set of earphones (A), and an E.C.G. Activated monitor (B) together with the corresponding set of electrodes (C). The S used the earphones for listening to the fear situations and the pre-recorded "beeps" (i.e. simulated heartrate feedback). A meter on the cardiac monitor made it possible for the S to view her simulated b.p.m. level.

The cable electrodes attached to the S's body (in the manner previously illustrated in Figure 1) were used for transmitting actual heartbeats to the E.C.G. Activated monitor (b) located in the E's room.

The E, who remained on the opposite side of the two-way mirror,




A. EARPHONES
B. ECG MONITOR
C. ECG ELECTRODES

a. TAPE RECORDER
b. ECG MONITOR

FIGURE 2

ARRANGEMENT OF APPARATUS USED IN THE TREATMENT SESSIONS FOR GROUPS 1 AND 2

controlled the presentation of the fear situations and heartrate feedback, both being transmitted to the S from recorder (a). As noted in the diagram, it was possible to deliver heartrate feedback through either of two channels; Channel 1, which was supposedly connected to the heartrate electrodes and, Channel 2, obviously disconnected to the heartrate electrodes. The former arrangement was used with Ss under Condition 1 (who had to believe that they would be receiving their own heartrate feedback when in fact they were not). The latter arrangement was used for Ss under Condition 2 (who had to be assured that they were not receiving their own heartrate feedback).

Experimental Design

The present research was primarily designed to examine the cognitive, behavioral, and somatic effects of false heartrate feedback. Several modifications of desensitization therapy were incorporated into the design of this research, and their effectiveness in reducing the fear of snakes was investigated.

Therapy was conducted in a minimal relationship setting (i.e. without the presence of a therapist). Presentation of anxiety stimuli was carried out through the use of a tape recorder. It was presumed that therapy conducted under these conditions would decrease the likelihood of a patient-therapist relationship developing which could then become a contaminating variable. Contrary to Wolpe's technique of systematic desensitization, training in muscle relaxation was omitted entirely, and there was no encouragement of relaxation during treatment

at any time. Cardiac feedback was substituted for Wolpian training and practice in deep muscle relaxation. Fear hierarchies, as generally constructed for use in desensitization therapy were not employed. Instead, Ss were asked to visualize five separate scenes, and a graduated approach (graded exposure) level within each scene was utilized. Unlike desnsitization therapy, whereby once an item in the anxiety hierarchy has been mastered it is not included in the further presentation of items, the design of this experiment called for aversive stimulus repetition, similar to "flooding" (Stampfl, 1967).

The present study was designed to test the following hypotheses:

1. The verbal components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

2. The overt motor components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

3. The somatic components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

4. The somatic and overt motor components of fear behavior will be attenuated even further than predicted in Hypotheses 2 and 3 by urging Ss to approach a feared object.

Both credit and non-credit Ss were combined and were randomly placed in one of three sets of experimental conditions in order to test the above hypotheses.

Condition 1: Non-Veridical Cognitive Cues

Ss in this treatment condition were exposed to a "threat tape" describing five different situations involving snakes. Following each

fear situation the S was exposed to 60 seconds of heartrate feedback ("beeps" previously programmed within specific frequency ranges). Five tapes were used altogether, the only difference among tapes being the frequency of the pre-programmed "beeps." The tapes were presented to the S in descending order of frequency. In other words, Ss began the therapy sessions by listening to tapes which simulated a fast heart rate, and they completed the therapy sessions by listening to tapes which simulated a slow heart rate. The schedule of tape presentation is illustrated in Table 4.

Three non-veridical cues were presented to each S in order to manipulate the S's cognitive set. The two instructional cues were as follows:

1. Each S was informed that at the end of each fear situation she would hear the beating of her own heart and,

2. Each S was informed that since the heart beats faster under conditions of fear, she could gauge the success of her treatment by observing the pattern of her heart rate throughout therapy.

A third equipment cue was presented to the Ss as well. The apparatus used during therapy sessions was so arranged as to make it appear that Ss were receiving their own heartrate feedback directly. (See Channel 1, diagram, in Figure 2.)

Condition 2: Veridical Cognitive Cues

This treatment condition was identical to Condition 1 with the exception of the instructional and equipment cues available to the S. Ss under Condition 2 were presented with the following instructional cues:

TABLE 4

SCHEDULE OF THREAT TAPE PRESENTATION

| Experimental Session | Tape Number | "Beep" Frequency |
|---|---|---|
| 2 | 1 | 120-125 b.p.m. |
| 3 | 1 | 120-125 b.p.m. |
| 4 | 2 | 100-105 b.p.m. |
| 5 | 2 | 100-105 b.p.m. |
| 6 | 3 | 80-85 b.p.m. |
| 7 | 4 | 70-75 b.p.m. |
| 8 | 4 | 70-75 b.p.m. |
| 9 | 5 | 60-65 b.p.m. |
| 10 | 5 | 60-65 b.p.m. |
| 11 | 5 | 60-65 b.p.m. |
| 12 | 5 | 60-65 b.p.m. |

1. Each S was informed that at the end of each fear situation she would hear the pre-recorded beats of another person's heart and,

2. Each S was informed that by observing the pattern of heartbeats she would know how fast the other person's heart was beating when the tape was originally recorded.

The equipment cue for this condition consisted of arranging the apparatus used during therapy sessions in such a manner so as to assure the Ss that they were not receiving their own heartrate feedback. (See Channel 2, diagram, in Figure 2.)

Since Ss under this condition were aware that they were not receiving their own heartrate feedback, they were referred to as Veridical Feedback Ss.

Condition 3: No Treatment

Subjects under this condition served as controls, and were only subjected to pre- and post-therapy assessments of fear behavior without treatment intervening.

Procedure

This experiment involved a total of thirteen sessions which comprised several different phases. Table 5 shows the overall schedule of the experiment for Ss under Conditions 1 and 2. The Ss were seen individually by the E in all sessions, and no S participated in more than one session per day.

In order to eliminate the possibility of a therapeutic relationship developing between the S and the E, personal communications were kept at a minimum. All instructions used in this research were provided

TABLE 5

OVERALL SCHEDULE OF THE EXPERIMENT

| Sessions | Length of Session | Procedure |
|---|---|---|
| 1 | 60 min. | a. S reads Instruction Sheet #1<br>b. E takes S's normal and activity heart rate<br>c. S reads Instruction Sheet #2<br>d. S fills out Willoughby's Neuroticism Schedule<br>e. S reads Instruction Sheet #3 |
| 2 | 90 min. | a. S reads Instruction Sheet #4<br>b. E assists S in attaching cardiac monitor electrodes<br>c. S reads Instruction Sheet #5<br>d. S participates in Proximity Test<br>e. S reads Instruction Sheet #6<br>f. S fills out Self-Rating Questionnaire Form SR-1<br>g. S reads Instruction Sheet #7 (sheet 1 for Group 1 and sheet 2 for Group 2)<br>h. S listens to threat tape - tone 120 bpm |
| 3 | 30 min. | a. S listens to threat tape - tone 120 bpm |
| 4 | 30 min. | a. S listens to threat tape - tone 100 bpm |
| 5 | 30 min. | a. S listens to threat tape - tone 100 bpm |
| 6 | 30 min. | a. S listens to threat tape - tone 80 bpm |
| 7 | 30 min. | a. S listens to threat tape - tone 70 bpm |
| 8 | 30 min. | a. S listens to threat tape - tone 70 bpm |
| 9 | 30 min. | a. S listens to threat tape - tone 60 bpm |

TABLE 5 (continued)

OVERALL SCHEDULE OF THE EXPERIMENT

| Sessions | Length of Session | Procedure |
|---|---|---|
| 10 | 30 min. | a. S listens to threat tape - tone 60 bpm |
| 11 | 30 min. | a. S listens to threat tape - tone 60 bpm |
| 12 | 30 min. | a. S listens to threat tape - tone 60 bpm |
| 13 | 60 min. | a. S reads Instruction Sheet #A<br>b. S fills out Willoughby's Neuroticism Schedule<br>c. S reads Instruction Sheet #B<br>d. S reads Instruction Sheet #C<br>e. S participates in Proximity Test<br>f. S reads Instruction Sheet #D<br>g. S fills out Self-Rating Questionnaire Form SR-2 |

*Control Ss participated in Session 1, Session 2 excluding sections g and h, and Session 13.

on type-written sheets and were located in the experimental room used by the S.

All Ss under the three conditions began the first session by reading Instruction Sheet #1 (see Appendix D, Instructions to Subjects), which prepared the S for the first heartrate measure (Cardiac Activity under Rest Conditions). Since it was important at this time that the S remain as relaxed as possible, as soon as the E entered the S's room she explained in some detail the workings of the cardiac monitor and answered any questions the S had relating to the apparatus; it was hoped that this procedure might deter any feelings of apprehension the S might have about the heartrate test. The electrodes were attached to the S by the E, and the S was asked to observe the procedure carefully so that she would be able to apply the electrodes herself during subsequent sessions. The E observed and noted the S's heart rate as indicated by the monitor rate scale at 30 second intervals for a total of two minutes.

After obtaining a measure of the S's normal heart rate, the E proceeded to take the second measure of cardiac activity (Cardiac Activity under Physical Exertion Conditions). The E verbally communicated to the S that:

> We are interested in observing your heart rate during a brief period of physical activity. I would like you to jump on the spot for one minute. I will tell you when to begin. When I say 'Stop', please sit down in your chair and remain as still as you can for one more minute. You may now begin.

The E observed and noted the S's heart rate as indicated by the monitor rate scale at 30 second intervals for a total of two minutes.

After the measures of cardiac activity during rest and physical exertion were taken, the S was asked to continue with Instruction Sheets #2 and #3 (see Appendix D, Instructions to Subjects). The Personality Schedule which the S was required to complete was Willoughby's Neuroticism Schedule. Session 1 terminated with the S arranging her timetable for the remainder of the sessions.

The second session consisted primarily of the administration of the snake fear measures; desensitization treatment for Ss under Conditions 1 and 2 was also initiated at this time.

Session 2 commenced by having the S read Instruction Sheet #4 (see Appendix D, Instructions to Subjects), following which the E assisted the S in attaching the heartrate monitor electrodes. When the electrodes were properly secured, the S was asked to proceed with Instruction Sheet #5 (see Appendix D, Instructions to Subjects) which prepared her for the first measure of snake phobia, the Proximity Test.

By observing the S through the two-way mirror, the E could judge when the S had completed reading the instruction sheet. At that point, the E approached the S in order to offer assistance by carrying the heart-rate monitor. The S proceeded down the hall to a nearby room where the snake was located; the door to the room was open, and the snake was clearly visible in his cage. The distance from the door to the cage was ten feet, and markers were placed on the floor at one foot intervals. Throughout the Proximity Test the E remained as far behind the S as possible; there was no communication between the S and the E at this time. The E noted the S's heart rate when the S had come as close to the

snake as she could; the E also noted the distance approached to the snake.

When the Proximity Test was completed, the E asked the S to return to her room and proceed with Instruction Sheet #6 together with the Self-Rating Questionnaire (SR-1) and Instruction Sheet #7 (see Appendix D, Instructions to Subjects). Ss under Condition 1 received Instruction Sheet #7, sheet 1, and Ss under Condition 2 received Instruction Sheet #7, sheet 2. Control Ss terminated Session 2 by completing SR-1. These Ss were requested to return for the remainder of the experiment in eleven days following the completion of Session 2. Sessions 3-12 were devoted entirely to desensitization therapy for Ss under Conditions 1 and 2 only. The procedure for carrying out treatment for the two experimental groups was identical, and it did not vary from one session to the next. All therapy sessions lasted for 30 minutes, and there was a total of eleven therapy sessions.

The S sat in a reclining chair on one side of a two-way mirror, and the E remained in the adjoining room on the opposite side of the mirror. When the S was observed to be settled in her chair, with her earphones on, and the electrodes properly placed and secured, the E began the threat tape. The E noted, by observing the monitor rate scale, the S's heart rate at a) the end of each fear situation and, b) at the end of each interval of heartrate feedback. The fear situations were presented in decreasing order of "beep" frequency throughout the eleven sessions of treatment. The schedule of tape presentation is indicated in Table 4.

As noted in both forms of Instruction Sheet #7, each S under Conditions 1 and 2 was required to record in a heartrate log her E.C.G. Activated monitor meter reading, indicating the rate of heartrate feedback which followed the presentation of each fear situation. This was a crucial requirement for Ss under Condition 1 since it made available a permanent record of what would appear to them as a pattern of cardiac rates that decreased with increasing exposure to fear stimuli. To keep the therapy situations as similar as possible between all experimental Ss, Ss under Condition 2 were also required to maintain heartrate logs.

Session 13, in which all Ss (including controls) participated, comprised the final assessment of the S's behavior. This session commenced by asking the S to read Instruction Sheet A (see Appendix D, Instructions to Subjects), after which the S completed Willoughby's Neuroticism Schedule. This schedule was re-administered during the final assessment phase to ascertain whether any of the positive gains produced by treatment transferred to areas other than that which was as specific and circumscribed as snake phobia.

When the schedule was completed, the S proceeded with Instruction Sheet B (see Appendix D, Instructions to Subjects) which simply informed the S that the E would be assisting her in applying the heartrate monitor electrodes. After the electrodes were attached, the S was asked to read Instruction Sheet C (see Appendix D, Instructions to Subjects) which prepared her for the final Proximity Test. The procedure for the post-therapy test was identical to that of the pre-therapy test with one

exception. After the E had noted the distance approached to the snake, and after noting the S's heart rate, the E encouraged the S to make further gains in approaching the snake by saying:

> Now I would like to see if you can do even better than that. The snake is really very harmless and he won't hurt you at all. See if you can pick the snake up and take him out of his cage. I would really like you to try. See if you can.

The E noted the S's heart rate at 30 second intervals for a total of two minutes during "coaxing," and any changes in overt motor behavior were noted.

When the Proximity Test was completed, the E assisted the S in removing the electrodes and also asked the S to complete Instruction Sheet D (see Appendix D, Instructions to Subjects) together with the final Self-Rating Questionnaire (SR-2). SR-2 contained one additional question not included on SR-1. Statement #7 was included in order to detect a) any Ss under Condition 1 who suspected that the heartrate feedback was not of their heart rate, and b) any Ss under Condition 2 who considered the heartrate feedback to be of their heart rate. Such persons would necessarily have to be disqualified as Ss in this research. This in fact did not occur.

# CHAPTER IV

## RESULTS

A simple one-way analysis of variance, fixed model for independent measures (Hayes, 1966) was used to test the significance of each difference between the amounts of change shown by the experimental and control groups. The statistical analyses were based on difference scores obtained by subtracting the post-treatment from the pre-treatment scores for each S (unless otherwise specified). Difference score means and standard deviations for Cognitive, Overt-Motor, Somatic, and "Coaxing" measures are shown in Table 6 for Ss under Condition 1 (Non-Veridical Feedback or NVF), Condition 2 (Veridical Feedback or VF), and Condition 3 (Control or C).

1. Tests of Hypothesis 1: The verbal components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

An analysis of variance of the pre- post-test difference scores for Willoughby's Neuroticism Schedule revealed that the three groups differed significantly from one another. (See Table 7.) A Duncan's Range Test (McGuigan, 1963) for a randomized groups design with more than two groups was used to test the difference between pairs of means following a significant overall F obtained with the analysis of variance. As indicated in Table 8, the NVF group differed significantly from both

TABLE 6

DIFFERENCE SCORE MEANS AND STANDARD DEVIATIONS

| | NVF Group | | VF Group | | C Group | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standar Deviatio |
| Hypothesis 1: Cognitive Variables | | | | | | |
| 1. Pre-Post Willoughby's Neuroticism Schedule Scores | 6.8 | 2.31 | .3 | 1.78 | -4.0 | 4.86 |
| 2. Pre-Post Self Rating Questionnaires: | | | | | | |
| Statement 1 | 1.2 | 1.60 | -.4 | 1.69 | .6 | 1.28 |
| 2 | .6 | 2.20 | -.1 | 2.02 | 1.1 | 1.13 |
| 3 | .9 | 2.54 | -.3 | 1.42 | 1.1 | 1.70 |
| 4 | 1.7 | 2.19 | 1.1 | 1.34 | .9 | 2.39 |
| 5 | 1.7 | 2.05 | 1.5 | 1.96 | 1.2 | 2.32 |
| 6 | 2.0 | 1.84 | 1.1 | 1.37 | 1.5 | 1.02 |
| Hypothesis 2: Overt-Motor Variables | | | | | | |
| 1. Pre-Post Proximity Scores | 2.8 | 1.536 | .3 | .458 | 0 | 1.613 |
| Hypothesis 3: Somatic Variables | | | | | | |
| 1. Baseline vs Activity Heart Rate | -39.57 | 13.52 | -33.07 | 11.66 | -34.37 | 14.70 |
| 2. Heart Rate During Session 3 vs Heart Rate During Session 12 | 1.19 | 11.941 | -.43 | 10.705 | - | - |
| 3. Threat Scene Heart Rate During Session 3 vs Threat Scene Heart Rate During Session 12 | 1.82 | 12.016 | -.74 | 11.423 | - | - |

TABLE 6 (continued)

DIFFERENCE SCORE MEANS AND STANDARD DEVIATIONS

| | NVF Group | | VF Group | | C Group | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation | Mean | Standard Deviation |
| 4. Feedback Heart Rate During Session 3 vs Feedback Heart Rate During Session 12 | .55 | 11.684 | -.12 | 10.287 | - | - |
| 5. Pre- post Proximity Heart Rate | 8.1 | 17.62 | 6.1 | 18.41 | -1.8 | 9.26 |
| Hypothesis 4: Coaxing Variables | | | | | | |
| 1. Post Proximity Scores vs Coaxing Proximity Scores | 0 | 0 | .6 | 1.2 | 0 | 0 |
| 2. Post Proximity Heart Rate vs Coaxing Proximity Heart Rate | -1.43 | 3.28 | -1.17 | 2.801 | -.33 | 2.740 |

TABLE 7

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT WILLOUGHBY'S NEUROTICISM SCHEDULE SCORES

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 315.27 | 2 | 157.64 | 3.42* |
| Error | 1244.10 | 27 | 46.08 | |
| Totals | 1559.37 | 29 | | |

*significant at .05

TABLE 8

DUNCAN'S RANGE TEST ON THE DIFFERENCE BETWEEN PAIRS OF MEANS FOR WILLOUGHBY'S NEUROTICISM SCHEDULE

| Comparisons | Obtained Difference Between Means | Critical F |
|---|---|---|
| NVF vs C | 7.20* | 6.56 |
| NVF vs VF | 6.50* | 6.26 |
| VF vs C | .70 | 6.26 |

*significant at .05

VF and C groups. The latter two groups did not differ significantly from each other. That is, NVF Ss showed a greater reduction in Willoughby's Neuroticism Schedule scores than Ss in both VF and C groups.

The analyses of variance on the difference scores between pre-treatment(SR-1) and post-treatment (SR-2) Self-Rating Questionnaires (Statements 1-6 inclusive) are shown in Tables 9-14. The results indicated that the NVF, VF, and C groups did not differ significantly in their responses to the post-treatment Self-Rating Questionnaire.

2. Tests of Hypothesis 2: The overt-motor components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

An analysis of variance of the pre- post-test difference scores for the Proximity Test indicated that the three groups were significantly different from one another. (See Table 15.) As shown in Table 16, the Duncan's Range Test indicated that the NVF group was significantly different from both VF and C groups. The latter two groups did not differ significantly from one another. That is, NVF Ss demonstrated more approach behavior when exposed to a live snake than Ss in both VF and C groups.

3. Tests of Hypothesis 3: The somatic components of fear behavior will be attenuated by manipulating cognitive set (i.e. by inducing Ss to think that their physiological fear level has been lowered).

Analyses of variance were also used to test for significant differences among NVF, VF, and C groups using as the basic measure:

TABLE 9

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 1: I WAS AWARE OF MY OWN HEART PALPITATIONS WHEN CONFRONTED WITH THE SNAKE DURING THE PROXIMITY TEST

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 13.07 | 2 | 6.54 | 2.51 NS |
| Error | 70.40 | 27 | 2.61 | |
| Totals | 83.47 | 29 | | |

TABLE 10

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 2: I FELT AFRAID WHEN CONFRONTED WITH THE SNAKE DURING THE REACTION TEST

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 5.00 | 2 | 2.50 | <1.00 NS |
| Error | 102.20 | 27 | 3.79 | |
| Totals | 107.20 | 29 | | |

TABLE 11

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 3: I FELT MY HEART POUNDING WHEN CONFRONTED WITH THE SNAKE DURING THE PROXIMITY TEST

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 11.47 | 2 | 5.74 | 1.36 NS |
| Error | 113.9 | 27 | 4.21 | |
| Totals | 125.37 | 29 | | |

TABLE 12

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 4: THINKING ABOUT SNAKES AFFECTS ME INTERNALLY

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 3.47 | 2 | 1.74 | <1.00 NS |
| Error | 117.90 | 27 | 4.37 | |
| Totals | 121.37 | 29 | | |

TABLE 13

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 5: PICTURING SNAKES IN MY IMAGINATION AFFECTS ME INTERNALLY

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 1.27 | 2 | .64 | <1.00 NS |
| Error | 134.2 | 27 | 4.97 | |
| Totals | 135.47 | 29 | | |

TABLE 14

ANALYSIS OF VARIANCE ON THE PRE- AND POST-TREATMENT SELF-RATING SCORES FOR STATEMENT 6: I AM AFRAID OF SNAKES

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 4.07 | 2 | 2.04 | <1.00 NS |
| Error | 63.40 | 27 | 2.35 | |
| Totals | 67.47 | 29 | | |

TABLE 15

ANALYSIS OF VARIANCE OF THE PRE- AND POST-TREATMENT PROXIMITY SCORES

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 47.27 | 2 | 23.64 | 12.38* |
| Error | 51.70 | 27 | 1.91 | |
| Totals | 98.97 | 29 | | |

*significant at .01

TABLE 16

DUNCAN'S RANGE TEST ON THE DIFFERENCE BETWEEN PAIRS OF MEANS FOR THE REACTION TEST

| Conditions | Obtained Difference Between Means | Critical F |
|---|---|---|
| NVF vs C | 2.8 | 1.34* |
| NVF vs VF | 2.5 | 1.27* |
| VF vs C | .3 | 1.34 NS |

*significant at .05

i) The difference between cardiac activity under rest conditions (baseline) and cardiac activity under physical exertion conditions (activity), both during pre-treatment.

ii) The difference between heart rate during Session 3 and heart rate during Session 12. Ss were under NVF and VF conditions only. The five heartrate measures taken after the threat scenes and the five heartrate measures taken after cardiac feedback were combined to give an estimate of the average heart rate for the entire session.

iii) The difference between heart rate only after threat scenes during Session 3 and heart rate only after threat scenes during Session 12. Ss were under NVF and VF conditions only.

iv) The difference between heart rate only after cardiac feedback during Session 3 and heart rate only after cardiac feedback during Session 12. Ss were under NVF and VF conditions only.

v) The difference between heart rate during the pre-treatment Proximity Test and heart rate during the post-treatment Proximity Test, both measures taken after Ss had come as close to the snake as possible without "coaxing."

In all cases, the analyses of variance were computed using difference scores. The difference scores for Conditions ii, iii, and iv were derived by subtracting heart rate obtained during Session 12 from heart rate obtained during Session 3. The difference scores for Conditions i and v were derived by subtracting the post-treatment from the pre-treatment scores. The results of these analyses are indicated in Tables 17, 18, 19, 20, and 21 respectively.

An examination of Tables 17-21 reveals that there is insufficient evidence to warrant the conclusion that mean differences truly exist among groups under the above mentioned conditions.

TABLE 17

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE
BETWEEN BASELINE vs ACTIVITY HEART RATE

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 236.68 | 2 | 118.34 | <1.00 NS |
| Error | 5352.48 | 27 | 198.24 | |
| Totals | 5589.16 | 29 | | |

TABLE 18

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE BETWEEN HEART RATE DURING THERAPY SESSION 3 vs THERAPY SESSION 12

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 13.04 | 1 | 13.04 | <1.00 NS |
| Error | 2572.05 | 18 | 142.89 | |
| Totals | 2585.09 | 10 | | |

TABLE 19

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE BETWEEN HEART RATE DURING THREAT SCENE PRESENTATION FOR SESSION 3 vs SESSION 12

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 32.76 | 1 | 32.76 | <1.00 NS |
| Error | 2770.41 | 18 | 153.91 | |
| Totals | 2803.17 | 19 | | |

TABLE 20

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE BETWEEN CARDIAC FEEDBACK PRESENTATION FOR SESSION 3 vs SESSION 12

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 2.24 | 1 | 2.24 | <1.00 NS |
| Error | 2454.62 | 18 | 136.37 | |
| Totals | 2456.86 | 19 | | |

TABLE 21

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE BETWEEN PRE-TREATMENT AND POST-TREATMENT PROXIMITY TEST HEART RATES

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 548.07 | 2 | 274.04 | <1.00 NS |
| Error | 7351.40 | 27 | 272.27 | |
| Totals | 7889.47 | 29 | | |

4. Tests of Hypothesis 4: The somatic and overt-motor components of fear behavior will be attenuated even further than predicted in Hypotheses 2 and 3 by urging Ss to approach a feared object.

The analysis of variance was used to test for significant heart-rate differences among NVF, VF, and C groups during the post-treatment Proximity Test as compared to "coaxing." The difference score was derived by subtracting the heartrate scores obtained during "coaxing" from the heartrate scores obtained during the post-treatment Proximity Test. The analysis indicated that the NVF, VF, and C groups were not significantly different from one another. (See Table 22.) The analysis of variance performed on the proximity scores obtained during "coaxing" showed no significant difference among groups. (See Table 23.) There were only two VF Ss who demonstrated a change in avoidance behavior. In both cases, the Ss touched the cage following "coaxing" whereas they had previously advanced to within one foot of the cage.

TABLE 22

ANALYSIS OF VARIANCE OF THE DIFFERENCE SCORE BETWEEN POST-PROXIMITY TEST HEART RATE AND "COAXING" HEART RATE

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 6.55 | 2 | 3.28 | <1.00 NS |
| Error | 261.37 | 27 | 9.68 | |
| Totals | 267.92 | 29 | | |

TABLE 23

ANALYSIS OF VARIANCE OF THE DIFFERENCE BETWEEN POST-PROXIMITY TEST SCORES AND "COAXING" SCORES

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Between Groups | 0 | 2 | 0 | <1.00 NS |
| Error | 14.4 | 27 | .533 | |
| Totals | 14.4 | 29 | | |

# CHAPTER V

# DISCUSSION

## Subject Matching

The results of the present study indicate that NVF Ss showed significantly greater improvement on Willoughby's Neuroticism Schedule and the Proximity Test than VF and C Ss; there were no significant differences among groups on any of the heartrate measures, on any of the six items of the Self-Rating Questionnaire, or on the "coaxing" Proximity Test.

The significant results could have been obtained if the three groups had not been similar on basic characteristics at the beginning of therapy, even though the procedure of randomly placing Ss into groups was employed to partially control for such differences.

In order to offer a clearer interpretation of the results, the E felt that it would be necessary to determine the degree to which any pre-treatment variability among Ss could have accounted for the research findings. An analysis of variance, fixed model (Hayes, 1966) was performed on all pre-therapy measures (Baseline Heart Rate, Activity Heart Rate, Willoughby's Neuroticism Schedule, and all six items on the Self-Rating Questionnaire). As no significant differences were found among NVF, VF, and C Ss on any of these measures (see Table 24), it was felt that the randomized groups were, in fact, relatively well matched, and that any group differences on post-therapy tests were therefore

TABLE 24

ANALYSIS OF VARIANCE ON PRE-TEST MEASURES
FOR NVF, VF, AND C GROUPS

| Test | SS Between | SS Error | MS Between | MS Error | df | F | |
|---|---|---|---|---|---|---|---|
| 1. Willoughby's Neuroticism Schedule | 74.4 | 6678.8 | 37.2 | 247.36 | 29 | <1.00 | NS |
| 2. Self-Rating Questionnaire (SR-1): | | | | | | | |
| Statement 1 | 6.07 | 61.40 | 3.04 | 2.27 | 29 | 1.34 | NS |
| Statement 2 | .87 | 78.60 | .44 | 2.91 | 29 | <1.00 | NS |
| Statement 3 | .27 | 70.70 | .14 | 2.61 | 29 | <1.00 | NS |
| Statement 4 | 4.2 | 84.1 | 2.1 | 3.11 | 29 | <1.00 | NS |
| Statement 5 | 11.4 | 73.4 | 5.70 | 2.72 | 29 | 2.09 | NS |
| Statement 6 | .27 | 31.60 | .14 | 1.17 | 29 | <1.00 | NS |
| 3. Proximity Test | .20 | 10.1 | .10 | .04 | 29 | 2.5 | NS |
| 4. Baseline Heart Rate | 125.34 | 3286.76 | 62.67 | 121.73 | 29 | <1.00 | NS |
| 5. Activity Heart Rate | 408.93 | 3023.64 | 204.47 | 111.99 | 29 | 1.83 | NS |

attributable to specific treatment effects.

Fear Measures and Fear Change

The results of the present study indicate that cognitions about internal reactions may be important modifiers of fear behavior. Fear change, however, was not consistently found in the verbal (cognitive), overt-motor, and somatic responses of the fear complex. Change in one behavioral mode did not automatically signal change in the Ss' overall response system. Lang (1968) reports that correlations among these separate measures of fear or fear change are surprisingly low. It would thus seem that fear treatment may be similarily specific, or perhaps that certain dimensions of change assume greater fundamental importance, whereas others are merely of peripheral consequence.

In the present study it appears as though fear changes resulting from the manipulation of Ss' cognitions about their internal reactions were greatest along the overt-motor response dimension, whereas such manipulations had no differential effect on the somatic (cardiac) responses. This would indicate that proximity behavior (i.e. how close one can approach a feared object) can be modified by information about one's simultaneous physiological reactions, but that heartrate responses are not similarily modified. Subjects who had reason to believe that snake stimuli did not affect them internally were more likely to touch a live snake than Ss who had no such information about their internal reactions, or who received no treatment at all.

Subjects who thought that snake stimuli did not affect them

internally were also more likely to show a decrease in Neuroticism scores than Ss who received no information concerning their internal reactions, or who received no treatment at all. Thus, it seems certain measures of verbal (cognitive) behavior can also be modified by manipulating Ss' cognitions about internal reactions. However, the Self-Rating Questionnaire, a second measure of verbal (cognitive) behavior did not appear to be as sensitive an instrument as Willoughby's Neuroticism Schedule in reflecting differential changes effected by the experimental treatment. (As indicated in Tables 9-14, an analysis of variance on the pre- post difference scores for each of the six items of the Self-Rating Questionnaire revealed no significant difference among NVF, VF, and C groups.) It is interesting to note that Lang and Lazovik (1963) also found no differences in "subjective" fear between their control Ss and desensitized Ss immediately after treatment, although desensitized Ss did manifest more snake-approach (proximity) behavior.

The situation in the present study is very similar. It is possible that the groups in this study did not differ in subjectively reported fear of snakes because they were observed before their subjective reactions could "catch up" with actual behavior. Valins and Ray (1967) also found no difference in rated fear of snakes for control and experimental Ss, although Ss who were led to believe that snake stimuli did not affect them internally manifested more approach behavior when confronted with a live snake. Few experimental studies show a direct transfer of non-verbal changes in behavior to verbal changes (Lovass, 1961). Brodsky (1967) argues that there is not likely to be any general

solution for the question of the cause and effect relation holding between verbal and non-verbal behavior.

Although other experimenters (Hobbs, 1962) have found results similar to those obtained in the present research, this does not necessarily give further credence to the suggestion that certain response systems are of greater importance than others when assessing fear change. The time factor involved in fear change assessment may be a crucial element. As Lang and Lazovik (1963) have demonstrated, fear change can manifest itself in different behavioral modes at different times. In their study, "subjective" reports of fear change were not observed at the end of treatment but were observed during a six-month follow-up interview. It is possible that in the present study group differences in self-report of fear were not apparent immediately after treatment, but would be in a later interview.

However, Willoughby's Neuroticism Schedule did reflect therapeutic changes at the end of treatment. It is likely that the different types of verbal measure employed in the Willoughby and the Self-Rating Questionnaire is important, for these different instruments would seem to measure different phenomena. The Self-Rating Questionnaire dealt with a relatively circumscribed and specific sample of responses, viz. Ss' ratings of snake fear and ratings of physiological reactivity when confronted with (or when imagining) snakes. On the other hand, Willoughby's Neuroticism Schedule included questions which covered a wider segment of the entire personality, and was designed to indicate various emotional personality traits. In other words, should changes

occur for Ss in several of these traits, the Willoughby offers enough scope to detect at least some of them. It would be difficult to assess any overall improvement in behavior from the Self-Rating Questionnaire since it is so restricted in its content area. Or put another way, even if there were improvement, the specific items of the Self-Rating Questionnaire would probably not manifest this change immediately after treatment, although after a time lapse some changes might be observed.

Treatment Groups

1) NVF Ss - Comparing the three treatment groups involved in this study, NVF Ss demonstrated fear reduction along both motoric and cognitive dimensions, displaying more improvement in avoidance (proximity) behavior and on Willoughby's Neuroticism Schedule than both VF and C groups. The improvement (reduction) in Neuroticism scores is particularly important, for it serves as an indication that therapy had been successful. In fact, Wolpe and Lazarus (1967) state, "We have not known a score to decline when therapy has not been effective." The E concluded that these changes demonstrated by NVF Ss were brought about by inducing Ss to think that they were not affected internally by snake stimuli. In other words, manipulating Ss' cognitions about their internal reactions yielded a specific "treatment" effect, viz. Ss who are led to believe that they are not as afraid of snakes as they once thought they were are more likely to demonstrate greater reductions in fear behavior than others without such information.

2) VF and C Ss - As previously indicated, differences in fear

behavior following treatment were shown to exist between VF and C Ss on the one hand and NVF Ss on the other on motoric and cognitive measures of fear behavior. One of the most consistent findings in the present study, however, was the fact that VF and C groups did not differ significantly from one another on any of the pre- post difference measures, including the somatic measure. It is possible that VF and C Ss were so consistently similar because both groups may have been, in fact, "therapy" groups. That is, Ss in both groups were presented with therapeutic stimulation (viz. repeated exposure to the feared stimulus) and Ss in both groups were led to believe that the study actually involved therapeutic procedures.

First, exposure to the snake during pre- and post-treatment Proximity Tests (i.e. therapeutic stimulation) may have served as comparable "in vivo" deconditioning therapy for both VF and C groups. Cooke (1966) has indicated that direct treatment (i.e. "in vivo" therapy) may be effective as a method of fear reduction for both high and low anxious Ss. Second, simply "being in therapy" may have had certain therapeutic ramifications for VF and C Ss. Merely by participating in a therapy experiment, Ss may have expected, themselves, to show some improvements in behavior. This is similar to what Goldstein (1960) has referred to as "nonspecific therapy remission," i.e. patients' expectancies regarding improvement, nonspecific therapist intervention, and test-taking are in themselves sufficient for inducing symptomatic changes in individuals waiting to participate in formal psychotherapy. Hathaway (1948) and Imber, Frank, Nash, Stone, and Gliedman (1959) have

also noted that any form of attention given to a patient's problems is likely to result in improvement.

Although perhaps both VF and C groups can be regarded as "therapy" groups, therapy seems to have been less effective for Ss in both of these groups than for Ss in the NVF group. Since the latter group showed significantly greater improvement on Willoughby's Neuroticism Schedule and the Proximity Test than the former two groups, it seems that the belief that one is engaging in therapy may bring about a significant leveling effect; so in order for a significant therapeutic effect to be obtained Ss may have to hold the compound belief that (a) one is engaging in therapy, and (b) he is in fact improving physiologically.

Heart Rate

The one subresponse of the fear complex in which no differences were shown to exist among NVF, VF, and C groups was the somatic (cardiac) response.

The results seem to indicate that treatment did not have a differential effect on heart rate, even though heartrate feedback was the basis of treatment. Perhaps heart rate is too unreliable or contaminated by extraneous variables to be fruitfully employed in such studies as this. However, other interpretations of the present results are also possible.

1) Heart Rate and Threat Scenes - Since heart rate tended to be generally similar to the baseline heart rate for both NVF and VF groups throughout the duration of therapy, it is possible that the visualized

scenes were not threatening enough to Ss to evoke maximum physiological distress. Stampfl (1967), who concentrates on attaining maximal levels of anxiety during desensitization, states that the degree of fear experienced is proportional to the number of cues presented to the Ss. The number of fear cues presented to Ss in this study were, in fact, relatively few (there were only five different threat scenes which were repeatedly presented to Ss) as compared to the greater number of differential fear cues presented to Ss using the Wolpian hierarchy of anxiety items. It is also apparent that the threat scenes used in the present study were not geared to the unique stress responses of each S. Thus difficulty in visualization may have had some influence on the lack of cardiac reactivity of NVF and VF Ss.

However, that maximum physiological activity was not achieved during treatment may not be the crucial issue here. What perhaps is more important is that both NVF and VF Ss showed similar somatic patterns of response when exposed to threat scenes. Valins (1966) indicates that Ss exposed to bogus heartrate-increase and extraneous-sound-increase manipulations react alike physiologically as indicated by galvanic skin response and heartrate measurements. It is thus possible that the shaping of verbal and motoric behavior is the most important aspect of desensitization therapy, so that the observed effects of non-veridical heartrate feedback are primarily a result of cognitive factors and not physiological ones. In fact, a competing response mechanism, favoring cognitive set, may be suggested at this point. Physiological concomitants may be merely peripheral factors relating to changes in fear

behavior.

It may also be argued, since heart rates were generally close to each S's baseline and therefore were about "normal," that Ss were relaxed during therapy and physiological relaxation served as the anxiety-competing or inhibiting response mechanism. In this event, any changes in fear behavior following treatment could be attributed to desensitization by reciprocal inhibition as expounded by Wolpe (1958). Had this been the case, Ss from both NVF and VF groups should have shown very similar changes in fear behavior, since both groups of Ss appeared to have been equally relaxed. As results indicated, NVF Ss showed significantly greater change in fear behavior on two fear measures than VF Ss. Therefore, inducing Ss to think that fear stimuli did not affect them internally appears to be the crucial factor. In fact, the similarity between false heartrate feedback manipulation and the muscle relaxation procedure used in Wolpian desensitization therapy is apparent. Presenting Ss with non-veridical feedback leads them to think that phobic stimuli do not affect them internally. Such cognitions are also induced during desensitization therapy with relaxation, and might be the primary factor contributing to successful treatment of phobic patients.

2) Actual Versus Feedback Heart Rate - As indicated previously, the simulated heartrate feedback was presented to NVF and VF Ss in decreasing order of "beep" frequency over the eleven sessions of therapy. However, an inspection of Ss' heart rates (i.e. raw data as well as heartrate means contained in Table 6) revealed that there was no concurrent decrease in actual cardiac activity as the number of exposures

to the fear stimuli increased. For both NVF and VF Ss, there tended to be no difference in true heart rate from the second to the last session of therapy, nor was there any similarity, on these two sessions, between feedback and actual heart rates. This finding further strengthens the suggestion that physiological factors did not play a major role in modifying fear behavior as dealt with in this experiment, whereas cognitive factors (i.e. thinking that snake stimuli no longer affected one internally) did have fundamental effects on changing fear behavior. Had systematic decreases in actual heart rate accompanied the systematic decreases in simulated heartrate feedback, physiological factors, as compared to cognitive factors, clearly would have assumed far greater importance; Ss, in that case, would likely not only think snake stimuli no longer affected them internally, but they also would have demonstrated physiologically that such was the case.

3) Heart Rate and Proximity Tests - The results of the present research also indicated that there was no difference in heart rate among NVF, VF, and C Ss during the post-treatment Proximity Test. Subjects who thought that snake stimuli did not affect them internally were not any more likely to reduce their heart rates when exposed to a live snake than Ss who had no information about internal reactions or control Ss. It will be recalled that NVF Ss, however, demonstrated significant improvement in snake-approach behavior. These findings would appear to strengthen the suggestion that cognitive factors, rather than physiological ones, may be the more important or fundamental modifiers of behavior.

Coaxing

The "coaxing" hypothesis in the present research received no experimental support. In other words, there was no indication that the somatic and overt-motor components of fear behavior were influenced by encouraging Ss to increase their approach behavior while in the presence of a live snake. In general, Ss showed no change in approach behavior, nor any changes in cardiac activity during "coaxing." Valins and Ray (1967), on the other hand, found coaxing procedures to be effective in producing behavioral changes. Their data showed that experimental Ss required less pressure than control Ss to touch the snake. Subjects in the Valins and Ray study were offered from $1.00-$2.00 to pick up a snake, and this procedure clearly permitted an objective assessment of the amount of pressure required to induce Ss to touch or pick up the snake. In the present research the type of pressure used, i.e. "coaxing", may have been an ineffective approach, or it may be that the "coaxing" was simply not forceful enough.

The possibility also remains that the sample of Ss used in this experiment was relatively unsuggestible. Orne (1962), however, reports that college students who volunteer to participate in experiments are typically cooperative, and in this sense they may all be moderately suggestible. With regard to the Ss in this study, since no other measures (aside from "coaxing") were employed to assess suggestibility, such an interpretation cannot be substantiated at this point.

Suggestions for Future Research

Desensitization research generally involves multiple measures of

fear. Nevertheless, they do not all occasion change, or if they do, not at the same time or to the same degree. Subjects in the present research have to some extent supported this trend. This does not necessarily mean that fear responses are unrelated to each other; one system may have great effects on another. In terms of future studies of desensitization, it would seem fruitful to explore fully the relationship between various behavioral systems.

Although the results of the present research indicate that cognitions about internal reactions are important modifiers of behavior, it cannot be concluded that successful desensitization therapy is based upon the induction of these cognitions. However, as Valins and Ray (1967), have indicated, the question yet remains open as to whether physiological incompatibility is a necessary component for desensitization therapy. Until further research provides conclusive evidence that muscularly relaxed Ss are less physiologically responsive to fear stimuli than Ss who are not muscularly relaxed, this question will remain unanswered.

The S's control of the imagined fear stimulus, its length, frequency, and sequence of presentation would also seem to be important variables to include in any future study of systematic desensitization. In terms of such a study, it might be revealing to examine more closely the effects of control on the outcome of therapy.

The E also suggests that future studies of desensitization explore more fully the effects of both extensive and intensive "coaxing" procedures on fear behavior. It would be revealing, as well, to conduct

research which would determine both the durability of therapeutic cognitions, once they have been acquired, and the degree of generalization of improvements in fear behavior to the outside world. It is likely that variables other than heartrate feedback may be used successfully to induce therapeutic cognitions, and further research should be undertaken to explore the range of variables which could be used to provide feedback information. Most researchers in the area of desensitization have tended to treat all Ss in any one group in similar ways to the point where individual differences have often been overlooked; it would be fruitful, in terms of future research, to attempt to adjust both the degree of threat stimulation and fake heartrate feedback to each S's individual mode of responding to fearful situations.

# CHAPTER VI

## SUMMARY

The present research was an attempt to investigate the problem of what factor or factors serve as vehicles of change in systematic desensitization. It was hypothesized that the modification of snake-fear behavior by systematic desensitization is dependent upon one's cognitions about his internal reactions. Subjects under Condition 1 were led to believe (through the presentation of simulated heartrate feedback) that as the number of "therapeutic" exposures to threat scenes increased, the amount of fear aroused by snakes decreased. Subjects under Condition 2 also received simulated heartrate feedback, but were led to believe that this feedback was of another person's heart. Subjects under Condition 3 (Control) did not receive "therapeutic" feedback treatment. At the end of the experiment, Ss under Condition 1 were observed to manifest more approach behavior when confronted with a live snake than Ss under Conditions 2 or 3; Ss under Condition 1 also demonstrated a significantly greater reduction in Willoughby's Neuroticism Scale scores than Ss under both Conditions 2 and 3. No significant difference was demonstrated on a subjective fear questionnaire or on heartrate measures among all three groups, nor was there a significant difference among groups when the E "coaxed" Ss to approach even closer to the snake. It was concluded that cognitions about internal reactions are important modifiers of behavior, and the hypothesis is advanced that

successful desensitization therapy may be based upon the induction of these cognitions.

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# APPENDICES

## APPENDIX A

## FEAR SURVEY SCHEDULE

The items in this questionnaire refer to things and experiences that may cause fear or other unpleasant feelings. Draw a circle around the term that best describes the amount of fear or unpleasantness that you presently associate with each item.

| | | | | | |
|---|---|---|---|---|---|
| 1. | Noise of vacuum cleaners | none | mild | moderate | intense |
| 2. | Open wounds | none | mild | moderate | intense |
| 3. | Being alone | none | mild | moderate | intense |
| 4. | Being in a strange place | none | mild | moderate | intense |
| 5. | Loud noices | none | mild | moderate | intense |
| 6. | Dead people | none | mild | moderate | intense |
| 7. | Speaking in public | none | mild | moderate | intense |
| 8. | Crossing streets | none | mild | moderate | intense |
| 9. | People who seem insane | none | mild | moderate | intense |
| 10. | Falling | none | mild | moderate | intense |
| 11. | Automobiles | none | mild | moderate | intense |
| 12. | Being teased | none | mild | moderate | intense |
| 13. | Dentists | none | mild | moderate | intense |
| 14. | Thunder | none | mild | moderate | intense |
| 15. | Sirens | none | mild | moderate | intense |
| 16. | Failure | none | mild | moderate | intense |

| | | | | | |
|---|---|---|---|---|---|
| 17. | Entering a room where other people are already seated | none | mild | moderate | intense |
| 18. | High places on land | none | mild | moderate | intense |
| 19. | Looking down from high buildings | none | mild | moderate | intense |
| 20. | Worms | none | mild | moderate | intense |
| 21. | Imaginary creatures | none | mild | moderate | intense |
| 22. | Receiving injections | none | mild | moderate | intense |
| 23. | Strangers | none | mild | moderate | intense |
| 24. | Bats | none | mild | moderate | intense |
| 25. | Journeys by train | none | mild | moderate | intense |
| 26. | Journeys by bus | none | mild | moderate | intense |
| 27. | Journeys by car | none | mild | moderate | intense |
| 28. | Feeling angry | none | mild | moderate | intense |
| 29. | People in authority | none | mild | moderate | intense |
| 30. | Flying insects | none | mild | moderate | intense |
| 31. | Seeing other people injected | none | mild | moderate | intense |
| 32. | Sudden noises | none | mild | moderate | intense |
| 33. | Dull weather | none | mild | moderate | intense |
| 34. | Crowds | none | mild | moderate | intense |
| 35. | Large open spaces | none | mild | moderate | intense |
| 36. | Cats | none | mild | moderate | intense |
| 37. | One person bullying another | none | mild | moderate | intense |
| 38. | Tough-looking people | none | mild | moderate | intense |
| 39. | Birds | none | mild | moderate | intense |
| 40. | Sight of deep water | none | mild | moderate | intense |

| | | | | | |
|---|---|---|---|---|---|
| 41. | Being watched working | none | mild | moderate | intense |
| 42. | Dead animals | none | mild | moderate | intense |
| 43. | Weapons | none | mild | moderate | intense |
| 44. | Dirt | none | mild | moderate | intense |
| 45. | Crawling insects | none | mild | moderate | intense |
| 46. | Sight of fighting | none | mild | moderate | intense |
| 47. | Ugly people | none | mild | moderate | intense |
| 48. | Fire | none | mild | moderate | intense |
| 49. | Sick people | none | mild | moderate | intense |
| 50. | Dogs | none | mild | moderate | intense |
| 51. | Being criticized | none | mild | moderate | intense |
| 52. | Strange shapes | none | mild | moderate | intense |
| 53. | Being in an elevator | none | mild | moderate | intense |
| 54. | Witnessing surgical operations | none | mild | moderate | intense |
| 55. | Angry people | none | mild | moderate | intense |
| 56. | Mice | none | mild | moderate | intense |
| 57. | Blood | | | | |
| | a. human | none | mild | moderate | intense |
| | b. animal | none | mild | moderate | intense |
| 58. | Parting from friends | none | mild | moderate | intense |
| 59. | Enclosed places | none | mild | moderate | intense |
| 60. | Prospect of a surgical operation | none | mild | moderate | intense |
| 61. | Feeling rejected by others | none | mild | moderate | intense |
| 62. | Airplanes | none | mild | moderate | intense |
| 63. | Medical odors | none | mild | moderate | intense |
| 64. | Feeling disapproved of | none | mild | moderate | intense |

| | | | | | |
|---|---|---|---|---|---|
| 65. | Harmless snakes | none | mild | moderate | intense |
| 66. | Cemeteries | none | mild | moderate | intense |
| 67. | Being ignored | none | mild | moderate | intense |
| 68. | Darkness | none | mild | moderate | intense |
| 69. | Premature heart beats (missing a beat) | none | mild | moderate | intense |
| 70. | Nude men (a) | none | mild | moderate | intense |
| | Nude women (b) | none | mild | moderate | intense |
| 71. | Lightning | none | mild | moderate | intense |
| 72. | Doctors | none | mild | moderate | intense |
| 73. | People with deformities | none | mild | moderate | intense |
| 74. | Making mistakes | none | mild | moderate | intense |
| 75. | Looking foolish | none | mild | moderate | intense |
| 76. | Losing control | none | mild | moderate | intense |

# PERSONALITY SCHEDULE

Instructions: The questions in this schedule are intended to indicate various emotional personality traits. It is not a test in any sense because there are no right and wrong answers to any of the questions in this schedule.

After each question, you will find a row of numbers whose meaning is given below. All you have to do is to draw a ring around the number that describes you best.

0 means "no", "never", "not at all", etc.
1 means "somewhat", "sometimes", "a little", etc.
2 means "about as often as not", "an average amount", etc.
3 means "usually", "a good deal", "rather often", etc.
4 means "practically always", "entirely", etc.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | Do you get stage fright? | 0 | 1 | 2 | 3 | 4 |
| 2. | Do you worry over humiliating experiences? | 0 | 1 | 2 | 3 | 4 |
| 3. | Are you afraid of falling when you are on a high place? | 0 | 1 | 2 | 3 | 4 |
| 4. | Are your feelings easily hurt? | 0 | 1 | 2 | 3 | 4 |
| 5. | Do you keep in the background on social occasions? | 0 | 1 | 2 | 3 | 4 |
| 6. | Are you happy and sad by turns without knowing why? | 0 | 1 | 2 | 3 | 4 |
| 7. | Are you shy? | 0 | 1 | 2 | 3 | 4 |
| 8. | Do you day-dream frequently? | 0 | 1 | 2 | 3 | 4 |
| 9. | Do you get discouraged easily? | 0 | 1 | 2 | 3 | 4 |
| 10. | Do you say things on the spur of the moment and then regret them? | 0 | 1 | 2 | 3 | 4 |
| 11. | Do you like to be alone? | 0 | 1 | 2 | 3 | 4 |
| 12. | Do you cry easily? | 0 | 1 | 2 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13. | Does it bother you to have people watch you work even when you do it well? | 0 | 1 | 2 | 3 | 4 |
| 14. | Does criticism hurt you badly? | 0 | 1 | 2 | 3 | 4 |
| 15. | Do you cross the street to avoid meeting someone? | 0 | 1 | 2 | 3 | 4 |
| 16. | At a reception or tea do you avoid meeting the important person present? | 0 | 1 | 2 | 3 | 4 |
| 17. | Do you often feel just miserable? | 0 | 1 | 2 | 3 | 4 |
| 18. | Do you hesitate to volunteer in a class discussion or debate? | 0 | 1 | 2 | 3 | 4 |
| 19. | Are you often lonely? | 0 | 1 | 2 | 3 | 4 |
| 20. | Are you self-conscious before superiors? | 0 | 1 | 2 | 3 | 4 |
| 21. | Do you lack self-confidence? | 0 | 1 | 2 | 3 | 4 |
| 22. | Are you self-conscious about your appearance? | 0 | 1 | 2 | 3 | 4 |
| 23. | If you see an accident does something keep you from giving help? | 0 | 1 | 2 | 3 | 4 |
| 24. | Do you feel inferior? | 0 | 1 | 2 | 3 | 4 |
| 25. | Is it hard to make up your mind until the time for action is past? | 0 | 1 | 2 | 3 | 4 |

SELF-RATING QUESTIONNAIRE (SR-1)

Please rate yourself on each of the following statements by circling the most appropriate number on the self-rating scale.

(1) I was aware of my own heart palpitations (actual feelings of heartbeat) when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6

not at all — an intense amount

(2) I felt afraid when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6

not at all — an intense amount

(3) I felt my heart pounding when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6

not at all — an intense amount

(4) Thinking about snakes affects me internally.

0 1 2 3 4 5 6

not at all — an intense amount

(5) Picturing snakes in my imagination affects me internally.

0 1 2 3 4 5 6

not at all — an intense amount

(6) I am afraid of snakes.

0 1 2 3 4 5 6

not at all — an intense amount

SELF-RATING QUESTIONNAIRE (SR-2)

Please rate yourself on each of the following statements by circling the most appropriate number on the self-rating scale.

(1) I was aware of my own heart palpitations (actual feelings of heartbeat) when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6
not at all an intense amount

(2) I felt afraid when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6
not at all an intense amount

(3) I felt my heart pounding when confronted with the snake during the Reaction Test.

0 1 2 3 4 5 6
not at all an intense amount

(4) Thinking about snakes affects me internally.

0 1 2 3 4 5 6
not at all an intense amount

(5) Picturing snakes in my imagination affects me internally.

0 1 2 3 4 5 6
not at all an intense amount

(6) I am afraid of snakes.

0 1 2 3 4 5 6
not at all an intense amount

(7) A subject's attitudes about the research in which he is involved may have an important bearing on the results of the experiment. In trying to out-guess what the experiment is "all about" or what is "really" happening to him in the study, a subject may unintentionally influence its outcome. Therefore, in order that we may appropriately interpret the results of our present investigation, we ask that you summarize briefly:

1. What you see to be the purpose of the study -

2. Any questions or suspicions you had about the study -

3. Any suggestions or comments you have about the study.

APPENDIX B

LETTERS TO SUBJECTS

Letter to Non-Credit Volunteers

During the summer months the Department of Psychology will be conducting some research designed to examine a new therapy technique.

At this point you may be wondering why we have contacted you in particular. If you recall, a short time ago we administered a Personality Schedule in your Introductory Psychology class. On the basis of information gained from this questionnaire, we compiled a list of individuals who responded in a similar manner to the questions we asked. Thus we obtained a group of students who seemed to share certain feelings and attitudes in common. You are among this group.

We are now in the process of contacting all persons in the group in the hope that they will become a part of our research project and assist us in investigating this new therapeutic method. You will be joining with us in an endeavor that will certainly prove to be of great benefit to you.

We are unable to disclose much information about the experiment at this time. However, we can tell you that the therapeutic process we are studying is designed to reduce feelings of tension and anxiety, which, as you know, are common to most people. This "therapy" will be conducted in a novel way, without the presence of a real therapist. All therapeutic sessions will be carried out on an individual basis.

As a subject, you may begin the therapy sessions at any time, commencing July 10. When you become involved in this research, we will ask you to participate for twelve half-hour sessions. The exact times and days that you would come depends entirely on your own personal schedule.

## Letter to Credit Volunteers

During the summer months the Department of Psychology will be conducting some research designed to examine a new therapy technique.

At this point you may be wondering whey we have contacted you in particular. If you recall, a short time ago we administered a Personality Schedule in your Introductory Psychology class. On the basis of information gained from this questionnaire, we compiled a list of individuals who responded in a similar manner to the questions we asked. Thus we obtained a group of students who seemed to share certain feelings and attitudes in common. You are among this group.

We are now in the process of contacting all persons in the group in the hope that they will become part of our research project and assist us in investigating this new therapeutic method. You will be joining with us in an endeavor that will certainly prove to be a great benefit to you.

We are unable to disclose much information about the experiment at this time. However, we can tell you that the therapeutic process we are studying is designed to reduce feelings of tension and anxiety, which, as you know, are common to most people. This "therapy" will be conducted in a novel way, without the presence of a real therapist. All therapeutic sessions will be carried out on an individual basis.

As a subject, you may begin the therapy sessions at any time, commencing July 10. When you become involved in this research, we will ask you to participate for twelve half-hour sessions. The exact times and days that you would come depends entirely on your own personal schedule.

As you know, you are required to complete 5 credit hours participating in Psychological experiments. This particular study (SNAX) requires one additional hour. Of course, you will receive full credit for your participation.

We hope that you will seriously consider assisting us in this research study. Should you wish to become a SNAX subject, either call this department (474-9222) or see the department secretary in Room 109, Fletcher Argue Building.

APPENDIX C

FEAR SITUATIONS

Threat Scene #1

You are downtown on a Saturday afternoon and find yourself with a free hour. You decide to spend the time in the Museum of Natural History. You enter the museum and are directed to the first room by the museum guard. The room contains several large glass tanks filled with different species of fish. You pass through the room slowly and into a second. The second room contains a number of similar tanks. In these, you discover a large variety of amphibians. As you enter the third room which is devoted to reptiles, you see a crowd of spectators gathered at the far end. You move towards the crowd to find out what is attracting so many people. Working your way into its midst, you finally see the object of attraction. The museum curator is demonstrating the handling of live snakes. He holds an extremely large snake in his hands. It is about 10 feet long and 3 inches in diameter at its widest part. As you stand gazing at the snake you do not notice that the crowd has drawn back and you are now at the front. Suddenly, the snake strikes out, escaping the curator's grasp, and tumbling to the floor. Slowly, it begins to wind its way towards you. You try to move back, but the spectators behind you prevent your movement. The snake is now only 5 feet away from you, and is coming steadily closer. Now it is only 3

feet away ... two ... one. Now it is only inches away. You can see its tongue darting furiously ... its slithering ominous form ... you can hear its soft hissing.

Threat Scene #2

You are making your first visit to the home of a new friend. You have just entered the house and are being shown around it by your host when the telephone rings. He directs you to the den and excuses himself to answer the telephone. As you enter the den, your foot slips on a scatter rug, hurling you forwards into the room. Your arms reach out instinctly to find some means of supporting yourself and preventing your fall. Your right hand clutches the top of a glass aquarium and dashes it to the floor behind you. You turn around to inspect the damage you have done. As you approach the shattered aquarium and bend down over it, you are surprised to discover that there are no signs of water, just broken glass, some small rocks, and a large branch. You begin to wonder what your friend was keeping in such an aquarium, when suddenly, out of the corner of your eye, you notice something moving near your shoe. You are startled by the movement and quickly stand upright. Moving ever so slowly across the toe of your shoe is the body of a large snake. You see the rubble of glass and gravel quiver and then fall away to reveal clearly the snake's rearing head. Its eyes dart back and forward rapidly ... a hissing sound comes from its mouth. The snake begins to wind its way slowly around you ... closer and closer to your legs ... its long shiny body gleaming. Its eyes are watching you, keeping you fixed to the spot. The snake begins to slither over your entire foot and spiral around your leg. You can hear it hissing ... hissing as it moves closer to your waist.

Threat Scene #3

You are leading a group of elementary school children through the woods on a nature hike. There are several children in the group - you are the only adult. As you proceed along the forest trail, you stop occasionally to show the children a flower, point out a bird's nest, or identify the tracks of some woodland creature. To the left of the path you spy an enormous oak tree. You lead the children to the tree, intending to explain its growth cycle to them. As you bend down to examine the roots of the tree, you hear a faint rustling in the grass. Thinking you may have disturbed a small gopher, you proceed to run your hands along the gnarled roots of the giant oak. Suddenly the root seems to come alive beneath your fingers. Someone crys out ... Snake! The children are alarmed, and begin to flee. As you turn to run, you trip over a hidden root and fall to the ground. As you try to move you notice that you have ensnared your foot in a tangle of roots. You can't wrench yourself free. As you lay there, helpless, you notice the snake about 4 feet away. Thinking that you can free yourself, you wrestle to break your trap. The snake is coming closer ... ever so close ... its black tongue darting in and out ... its soft hissing piercing your ears in the stillness of the woodland. The snake is about 1 foot away now, its glistening eyes watching every move you make. You can see it clearly now, as it crawls alongside your body, touching you as it moves closer towards your shoulder ... closer and closer until it is finally upon you. Wriggling and squirming over your arm, it darts its tongue in and out, softly hissing.

Threat Scene #4

You are spending the weekend at your uncle's farm. It is before breakfast and your aunt has asked you to bring in some wood for the stove from the woodpile outside. You go outside, and return with an armful of logs. As you move towards the fireplace you notice that one of the branches is somewhat smaller than the others - smaller and smoother. As you bend down and are about to put the logs in the fire the small branch seems to move. Startled, you throw the wood to the ground. As the logs sprawl over the floor, they roll beneath your feet, sending you hurtling to the ground. You are stunned by the blow, and as you attempt to pull yourself up, you notice that a long, dark, slender object is stirring amidst the fallen logs. The form slowly winds its way towards you, and as it comes closer you realize that it is a live snake. In your fall, you notice that you have badly twisted your leg - you can't get up - you are panic-stricken and unable to move as the snake comes closer and closer. It is now at your feet, and you can plainly see its long, black tongue darting in and out ... in and out. This slithering form rears itself and curls about your leg. Its soft hissing reaches your ears. You are paralyzed with fear. All you can do is watch the snake make its way along your body ... its small shiny eyes staring at you, as its triangular head comes nearer and nearer to your own.

Threat Scene #5

It is a cool morning at the lake. You have risen earlier than the others in order to take a canoe ride before breakfast. You leave the cabin and walk downhill to the lakeshore, where your overturned canoe lies on the bank. You upright the craft and push it alongside the dock into the water. You step into the canoe and settle yourself on the wooden seat. You slip the paddle from the bottom of the canoe and push yourself from the dock and onto the lake. After you have been paddling for awhile, you remember that you have forgotten to take your life jacket with you. For a few more minutes you paddle along contentedly, enjoying the warm morning sun on your back. Suddenly, you hear a soft hissing sound, and simultaneously feel a slithering touch against your bare foot. You look down to find a long, thin snake coiling itself about your ankle. You jerk your foot to free yourself, and almost upset the canoe. Looking down again you see a second snake beside you, his glistening body draped across the wooden seat. Its black, forked tongue darts in and out of its mouth sporadically, and its head slides alongside your hip and up onto your thigh. You can't afford another escape attempt, for you are out in the middle of the lake now, and the distance to the shore is too great for you to swim. You watch breathless as the two writhing bodies move slowly over your own. The once seemingly soft hissing now seems to thunder in your ears. The snakes which you have disturbed are crawling all over you ... slithering and sliding over your bare skin.

APPENDIX D

INSTRUCTIONS TO SUBJECTS

Instruction Sheet #1

PLEASE READ ENTIRE SHEET BEFORE FOLLOWING INSTRUCTIONS

You are now about to enter the initial phase of this research project.

Under situations of stress, tension, or anxiety, the heart beats at a rate somewhat faster than it does when you are completely relaxed. Heart rate, therefore, can be used as an indicant of an individual's normal tension level. Because we feel that important information is gained through knowledge of this typical heart rate reaction, we shall be taking several measures of your heart rate throughout the course of the experiment.

On the desk you will notice the equipment which will be used to obtain the heart rate measures. You may be assured that this equipment is perfectly safe; it does not deliver an electric shock. This particular piece of equipment is rather simple to operate; but because you are most likely unfamiliar with this kind of equipment, one of our assistants will be here shortly to set up the apparatus and take the required measures.

All that we would like you to do now is to simply relax. This is important, for we are interested in noting your typical heart rate reaction under normal, everyday conditions. When you are through reading these instructions, please notify the research assistant.

## Instruction Sheet #2

PLEASE READ ENTIRE SHEET BEFORE FOLLOWING INSTRUCTIONS

Now that you have completed the initial phase of the experiment, we would like to give you some general information as to the nature and purpose of this research project. In order not to invalidate the experiment, we ask you not to discuss any portion of this experiment with any person whatsoever. There will be ample opportunity for you to ask questions of the experimenter when the study is completed.

At this point, you may still feel somewhat unsure or anxious about your role as a subject. We would like to assure you that this research in which you are involved will be carried out at all times on a highly professional level.

The purpose of the experiment is to investigate certain factors and procedures that may facilitate the effectiveness of a new therapy technique. This type of therapy shows great promise as a method for reducing tension, stress, and feelings of anxiety, which as you know, are common to most people.

In order to evaluate the effectiveness of our method for reducing anxiety, we feel that this research must progress through three stages:

1. Pre-therapy evaluation of normal tension level through heart rate tests.
2. Participation in the new therapy process for tension reduction.
3. Post-therapy evaluation of normal tension level.

We will continue with the initial assessment of your behavior by having you fill out a brief questionnaire. If you turn the page, you will find 25 questions on the Personality Schedule. Please answer <u>all</u> questions to the best of your ability. Instructions are located at the top of the Personality Schedule.

Instruction Sheet #3

PLEASE READ ENTIRE SHEET BEFORE FOLLOWING INSTRUCTIONS

We will commence with therapy during the next few sessions. Will you please fill out the time schedule and indicate twelve half-hour sessions during which you are able to come for therapy. Make sure that you keep a copy of your schedule for your own use. We would like you to come for one session each day, not including week-ends. (Please try to approximate this as closely as possible without scheduling two sessions in one day.) We will contact you by phone to confirm your next appointment. Thank you.

## Instruction Sheet #4

During today's session we will again be taking some measures of your heart rate. An assistant will be in shortly to aid you in attaching the heartrate apparatus. This assistant will tell you when to proceed with Instruction Sheet #5.

## Instruction Sheet #5

PLEASE READ ENTIRE SHEET BEFORE FOLLOWING INSTRUCTIONS

We are now about to proceed with the final assessment phase of pre-therapy.

As you may already know, when we talk about anxiety we must also make some reference to particular situations that are capable of arousing anxiety. Some situations or events cause us to feel more fearful or anxious than others. We noticed, after examining the results of a questionnaire administered some time ago (not the one you just finished), that a large number of persons said they felt highly fearful of even harmless snakes. According to your own responses on this questionnaire, you were among this group.

The therapy you will soon be undergoing may well enable you to remain calm or reduce anxiety under a variety of situations. However, we are interested at this time in specifically reducing that fear which was found to be most common among this large group of persons - namely the fear of snakes.

In order that we may better understand your fear reactions, we are going to request that you take part in a Reaction Test. In Room 115A you will find a live, non-poisonous snake encaged in a glass aquarium. You may be assured that this snake is perfectly harmless; he is tame and will not bite you. In fact, this snake has no teeth.

As you enter Room 115A the snake cage can be seen at the far end. Try to go as close to the cage as you honestly feel you can. If at all possible, please touch the snake and pick him up. At least go as close to the cage and snake as you can. When you are sure that you cannot go any closer, please remain at that spot until you have counted slowly to 60 (by ones). A measure of your heart rate will be taken at this time. Remember, we want you to come only as close to the snake as you honestly feel you can. You can be assured you will not come into contact with any snake during the remainder of therapy. It is important that you do not remove your heart rate equipment. Please leave it on you until you have completed the Reaction Test.

When you have completed the Reaction Test, you may return to Room 114 where the assistant will remove the cords attached to you.

## Instruction Sheet #6

Now that you have completed the Reaction Test, we would like to know how you felt during your experience with a live snake. We have prepared a Self-Rating Questionnaire for this purpose. If you turn the page, you will find the Self-Rating Questionnaire. Please give ratings on all six statements. Instructions are located at the top of the Questionnaire.

Instruction Sheet #7 (Non-Veridical Feedback Ss)

You are now to begin the treatment phase of the experiment. Research has shown that frequent exposure to fearful stimuli may have a "desensitizing" effect upon a person. That is, one may become progressively less afraid of a threatening stimulus as the number of exposures to it increases. In this experiment, you will be listening to what we call a "threat tape". This tape recording will describe 5 different situations involving snakes. (At no time will you be exposed to a live snake.) The 5 scenes will be played twice, so you will hear 10 fear situations each day for 12 days. At the end of the experiment we anticipate that you will be less afraid of snakes and perhaps also less afraid of other stimuli which seem to be overly threatening to you now.

We want you to visualize the scenes described on the threat tape as clearly and as realistically as you can. It is very important that you picture these scenes as vividly as possible while they are being played to you. After each fear situation has terminated, you are to stop imagining that particular scene.

Because it is sometimes difficult to "turn off" your imagination at will, we have devised a task to keep your mind busy with other things. At the end of each fear situation you will hear the beating of your own heart. The cord attached to your body goes to your own heartrate monitor as well as to some rather cumbersome and complicated equipment located in an adjoining room. You will receive two simple measures of your heart rate in the form of (1) a soft "beep" heard through your earphones and (2) a visual display of beats-per-minute read directly from the meter on your heartrate monitor. By watching the meter, as you listen to the beeps, you will know how fast your heart is beating.

In order to ensure that you are not dwelling on any of the recorded fear scenes, we want you to observe your metered heart rate carefully and after about 30 seconds, record it on the log provided for you. There will be some normal variations in rate at any one time, but we would like you to record the MOST STABLE AND TYPICAL HEART RATE as indicated by the meter. Keeping this heartrate log should divert your attention from the last fear scene as well as enable you to have a permanent record of the metered heart rate. Since the heart typically beats faster under conditions of threat, you can get some indication about the success of our fear-desensitization-treatment by observing whether the metered heart rate increases or decreases throughout therapy.

When you are ready to begin, please sit back in the chair so you are as relaxed as possible. Place the earphones over your ears and adjust them so they are comfortable. Then close your eyes so you can "see" the scenes

more vividly. Remember, you will hear all scenes twice, and you are to log the most stable number of beeps-per-minute you hear in between scenes. Now sit back and adjust your earphones. When you close your eyes, the "threat tape" will begin.

## Instruction Sheet #7 (Veridical Feedback Ss)

You are now to begin the treatment phase of the experiment. Research has shown that frequent exposure to fearful stimuli may have a "desensitizing" effect upon a person. That is, one may become progressively less afraid of a threatening stimulus as the number of exposures to it increases. In this experiment you will be listening to what we call a "threat tape." This tape recording will describe 5 different situations involving snakes. (At no time will you be exposed to a live snake.) The 5 scenes will be played twice, so you will hear 10 fear situations each day for 12 days. At the end of the experiment we anticipate that you will be less afraid of snakes and perhaps also less afraid of other stimuli which seem to be overly threatening to you now.

We want you to visualize the scenes described on the threat tape as clearly and as realistically as you can. It is very important that you picture these scenes as vividly as possible while they are being played to you. After each fear situation has terminated, you are to stop imagining that particular scene.

Because it is sometimes difficult to "turn off" your imagination at will, we have devised a task to keep your mind busy with other things. At the end of each fear situation, you will hear the prerecorded beats of another person's heart. The cord attached to your body goes to some rather cumbersome and complicated equipment in an adjoining room. The connector which would normally give you your own heart rate has NOT been attached to your heartrate monitor. Instead, we have recorded on the "threat tape" the heartbeats of a person who underwent therapy before you. You will receive two simple measures of this prerecorded heartbeat in the form of (1) a soft "beep" heard through your earphones and (2) a visual display of beats-per-minute read directly from the meter on your heartrate monitor. By watching the meter, as you listen to the beeps, you will know how fast the person's heart was beating when the tape was originally recorded. In order to ensure that you are not dwelling on any of the recorded fear scenes, we want you to observe the metered heart rate carefully and after about 30 seconds, record it on the log provided for you. There will be some normal variations in rate at any one time, but we would like you to record the MOST STABLE AND TYPICAL HEART RATE as indicated by the meter. Keeping this heart rate log should divert your attention from the last fear scene as well as enable you to have a permanent record of the metered heart rate. Since the heart typically beats faster under conditions of threat, you can get some indication about the success of our fear desensitization treatment by observing whether the metered heart rate increases or decreases throughout therapy.

When you are ready to begin, please sit back in the chair so you are as relaxed as possible. Place the earphones over your ears and adjust them

so they are comfortable. Then close your eyes so you can "see" the scenes more vividly. Remember, you will hear all scenes twice, and you are to log the most stable number of beeps-per-minute you hear in between scenes. Now sit back and adjust your earphones. When you close your eyes, the "threat tape" will begin.

## Instruction Sheet A

At this time we would like to reassess your behavior by having you fill out the Personality Schedule. If you turn the page, you will find 25 questions on the Personality Schedule. Please answer all questions to the best of your ability. Instructions are located at the top of the Personality Schedule.

## Instruction Sheet B

During today's session we will again be taking some measures of your heart rate. An assistant will be in shortly to aid you in attaching the heartrate apparatus.

Instruction Sheet C

At this time we want you again to take part in the Reaction Test. In Room 115A you will find a live, non-poisonous snake encaged in a glass aquarium. You may be assured that this snake is perfectly harmless; he is tame and will not bite you. In fact, this snake has no teeth.

As you enter Room 115A the snake cage can be seen at the far end. Try to go as close to the cage as you honestly feel you can. If at all possible, please touch the snake and pick him up. At least go as close to the cage and snake as you can. When you are sure that you cannot go any closer, please remain at that spot until you have counted slowly to 60 (by ones). A measure of your heart rate will be taken at this time. Remember, we want you to come only as close to the snake as you honestly feel you can. It is important that you do not remove your heartrate equipment. Please leave it on you until you have completed the Reaction Test.

When you have completed the Reaction Test, you may return to Room 114.

PLEASE DO NOT REMOVE THE CORDS ATTACHED TO YOU.

## Instruction Sheet D

Now that you have completed the Reaction Test, we would like to know how you felt during your experience with a live snake. We have prepared a Self-Rating Questionnaire for this purpose. If you turn the page, you will find the Self-Rating Questionnaire. Please give ratings on all seven statements. Instructions are located at the top of the Questionnaire.