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THE UNIVERSITY OF ALBERTA

THE USE OF NONVERIDICAL HEART-RATE FEEDBACK AS AN ADJUNCT TO MODELING TECHNIQUE IN THE EXTINCTION OF AVOIDANCE RESPONSES

BY

© LARRY WYLLIS FERGUSON

A THESIS

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DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Use of Non-veridical Heart-Rate Feedback as an Adjunct to Modeling Technique in the Extinction of Avoidance Responses" submitted by Larry Wyllis Ferguson in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

Supervisor

External Examiner

Date: Nov 2, 1968

ABSTRACT

The purpose of this experiment was to determine whether the combination of a nonveridical heart-rate feedback technique and a modeling technique is more effective in extinguishing avoidance responses than is either technique used individually.

A sample of undergraduate education students who were highly fearful of snakes was selected. This sample was selected on the basis of the students' responses on a written test of fears, the "Fear Survey Schedule II" and a behavior test of approach behavior, the "Test of Approach Behavior."

Four randomly assigned groups of students were each exposed to one of the following four experimental treatments: combined nonveridical heart-rate feedback and modeling technique, modeling technique, nonveridical heart-rate feedback technique, and exposure to the fearful stimuli. The experimental subjects were exposed to their respective experimental treatments over a period of four consecutive days.

The data from pre-, post-, and follow-up tests of approach behavior were analyzed and the results of this analysis led to the following conclusion: The combined use of nonveridical heart-rate feedback and modeling technique is more effective in extinguishing snake avoidance responses than is either technique used individually.

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INTRODUCTION AND PROBLEM

A. Introduction

Early in the history of psychotherapy maladaptive behavior was conceptualized as symptomatic of a pathological state. In more recent years, however, there has been an increasing tendency for psychotherapists to view maladaptive behavior as a problem in learning. The field of psychotherapy was influenced early by the psychoanalytic school of psychotherapy. This group of therapists conceptualized maladaptive behavior as being symptomatic of psychic illness and hypothesized various internal dynamic entities as accounting for this pathological state. It was assumed by this school of thought that once a patient came to understand the dynamics underlying his psychic illness, this newly acquired insight would result in him being able to cope more successfully with his problem and change his behavior. Therapy, then, consisted of promoting insight on the part of the patient into the dynamics of his illness.

Although this disease model of psychological disorders achieved wide spread popularity, it was not embraced as enthusiastically by some of the psychotherapists during the last two decades. Dissatisfaction with this conceptualization of maladaptive behavior led to the development of two new schools of thought: client-centred psychotherapy and behavioristic psychotherapy. These two groups completely rejected the disease model as an explanation of maladaptive behavior and conceptualized it instead as a problem in learning. This new view of deviant behavior resulted in a fresh approach to psychotherapeutic treatment and the development of many new techniques. The behaviorist school of thought has been particularly active in this regard and has brought to bear varied learning theories in an attempt to derive useful psychotherapeutic techniques. Although there are still some psychotherapists who doubt the merit of conceptualizing maladaptive behavior as a problem in learning, it is difficult to deny the experimentation and development of successful psychotherapeutic techniques that have resulted from this reformulation in thought. The success of these new developments in theory and technique is perhaps most noteworthy in the treatment of maladaptive behavior involving avoidance responses.

Maladaptive avoidance responses have long posed a problem for mankind. The first recorded incident of treatment of avoidance behavior was reported by Freud in 1909, in the case of Hans, a boy suffering from horse phobia. Since that time the psychoanalytic school of psychotherapy has followed Freud's writings on the subject and attempts by analysts to modify avoidance behavior have met with disappointment. Not only have psychoanalytic techniques been relatively unsuccessful in the treatment of avoidance behavior but they have also been prohibitively time consuming. This is partly explained by the fact that an avoidance response, due to its very nature, does not allow the patient to confront the situation which gives rise to the response. As soon as the anxiety-inducing stimuli are encountered, the individual immediately makes an avoidance response which is designed to preclude any further encounter with that stimuli and consequently the individual is not able to confront the anxiety-inducing stimuli or learn a more adaptive response. Because of the anxiety aroused by the given stimuli and the avoidance response associated with that arousal, any attempt to directly promote insight or understanding is met with extreme difficulty. Client-centred therapy has, for the same reason, achieved only very limited success in the treatment of phobic avoidance responses. More recently, however, certain of the behavioral techniques like Stamfle's Implosive Therapy, Wolpe's Systematic Desensitization Therapy, and Bandura's Modeling Techniques to mention a few, have met with considerable success in extinguishing these maladaptive responses. (Hagan and Kirchner, 1967; Gelden, Marks, Wolff, and Clark, 1967; and Bandura and Menlove, 1968).

Moreover, not only have these techniques proven to be more effective, they have also proven to be more efficient in terms of the time required for treatment (Gelfond and Hartmann, 1968; Grossberg, 1964). These recent therapeutic successes by the behaviorist school of psychotherapy have tended to stimulate further theorization and research in an attempt to improve upon existing psychotherapeutic techniques and discover new ones.

This present study is a continuation of the above mentioned trend and has investigated the effect of combining two recent innovations in psychotherapeutic technique in the treatment of avoidance responses.

B. The Problem

Throughout the history of learning theory there has been a continuing interest in the phenomenon of response acquisition through observation. This phenomenon was first described by Morgan (1896) as an innate propensity and was later interpreted by others in terms of the current theories of the day. Allport (1924), Holt (1931), and others attempted to account for imitative behavior in terms of classical conditioning theory while Miller and Dollard (1941) later explained it as a special case of instrumental conditioning. More recently, Mowrer (1960) described imitation in terms of proprioceptive feedback theory in which positive and negative emotions are classically conditioned to matching response correlated stimuli. Despite these various theoretical explanations, the full import of the phenomenon of imitative learning was not recognized until more recently when a theoretical analysis of this learning process (Bandura, 1962; Sheffield, 1961) resulted in a reformulation of its theoretical basis. This reformulation, placing primary emphasis on the role of stimulus contiguity and associated cognitive response stimulus events, seemed to stimulate lively speculation and important research as to the role of imitation in social learning. The results of this line of inquiry are perhaps best summarized by Bandura (1967) when he says:

> . . . We have found that almost any learning outcome that results from direct experience can also come about on a vicarious basis through observation of other person's behavior and its consequences for them. Indeed, providing an appropriate "model" may accelerate the learning process. . . . (p. 78)

The observation of modeled responses and their reinforcing consequences was found to have several different behavioral effects. Numerous investigations (Bandura and Walters, 1963) revealed that an observer may acquire, through vicarious learning, novel responses that did not previously exist in his behavioral repertoire. Similarly, observation of response consequences to a model was noted to produce incremental or decremental changes in existing classes of behavior by modifying the strength of inhibitory responses. Lastly, observation of another person's behavior was found to facilitate the occurrence of previously learned but noninhibited responses through the stimulus enhancement and discriminative functions of modeling cues. As the variables controlling these diverse behavioral outcomes were identified and controlled, researchers were repeatedly able to demonstrate the effect of modeling procedures on behavioral modification.

Once it was demonstrated that modeling techniques were effective in modifying behavior, it seemed only a matter of time before its value for psychotherapy was recognized. The recognition of modeling as a means of modifying behavior was accelerated by the work of such writers as Rosenthal (1955), bandura (1965b, 1967) and Shoben (1965) who pointed out that therapists were in fact acting as models for their clients in the therapeutic relationship and were unwittingly applying social-learning principles in bringing about many of their therapeutic changes. These writers went on to point out that the same beneficial results could be achieved more readily by the systematic application of social-learning principles. One of the first therapists to implement the suggestions of these early writers was Chittenden (1942) who employed symbolic modeling procedures in modifying children's hyper-aggressive reactions to frustration. The continuing use of modeling techniques to facilitate social-learning is illustrated by Lovaas' (1967) work with schizophrenic children, in which he successfully used modeling procedures to develop their intellectual and social capabilities.

More recently, Bandura and his associates (Bandura, Grusec, and Menlove, 1967; Bandura and Menlove, 1968) following the very early lead of Jones (1924) and Masserman (1943) have employed modeling techniques in extinguishing avoidance responses in children. This work was prompted by the realization that if instrumental classes of responses can be vicariously acquired, they can also be extinguished on a vicarious basis. Vicarious extinction was achieved by exposing the observer to modeled dtimulus events involving either the omission of reinforcement or the presentation of positive reinforcing stimuli to the performing subject. Although the use of modeling procedures in the extinction of avoidance responses has resulted in significant behavioral change in treatment subjects and much enthusiasm among the investigators who have employed them, Bandura and Menlove (1968) caution that:

> The finding that high emotional proneness attenuates vicarious extinction indicates that modeling procedures must be further modified or supplemented with additional techniques to effect substantial reduction of avoidance tendencies in subjects who display a generalized pattern of anxiety. (p. 106)

The finding that high emotional proneness attenuates vicarious extinction is not surprising since numerous studies of direct aversive classical conditioning have demonstrated that conditioned responses are developed more rapidly and, once acquired, extinguish less readily under conditions of high arousal (Daerfler and Kramer, 1959; Spence, 1958, 1964). As Bandura (1965a) points out:

> From these findings it might be expected that vicarious conditioning would likewise be positively related to degree of psychologically induced arousal. (p. 34)

The finding that high arousal attenuates the extinction of conditioned responses would seem to suggest that arousal has a disruptive effect on the response extinction process. Although the manner in which high arousal produces this disruptive effect remains to be demonstrated, post-experimental replies to a questionnaire by subjects participating in conditioning experiments conducted by Bandura and Rosenthal (1965) suggest that the disruptive effect of high arousal on the extinction of conditioned responses may be mediated by self-generated competing responses designed to reduce the aversiveness of the vicariously experienced situation. It was suggested by Bandura (1965a) that unpleasant arousal is attenuated by a person either producing competing cognitive responses or by selectively attending to stimuli other than those eliciting the unpleasant arousal. Accordingly, a subject thinks of something else more pleasant in an attempt to keep his mind off the anxiety inducing stimuli or he focuses intensively on irrelevant external stimuli to the exclusion of the anxiety inducing stimuli. Since modeling procedures, in order to be effective in extinguishing avoidance responses, require that the subject observe a model make approach responses without accruing harmful consequences, it is not difficult to understand why the efficacy of such a procedure is reduced by emotionally prone subjects who, seeking to reduce arousal, either interject competing cognitions or selectively inattend the arousal inducing modeling stimuli. It would seem to follow that if modeling technique is to be effective with subjects displaying a generalized pattern of anxiety, a means must be found of either controlling both the subject's cognition and attention or of reducing his arousal level to the point where the former control is not necessary. Since any means of reducing a subject's arousal level and/or of controlling his cognition and attention must of necessity be employed along with modeling procedures, an adjunctive or supplementary technique would appear to be required.

A supplementary technique which holds promise of being able to reduce emotional arousal in emotionally prone subjects is suggested by the recent work of Valins and Ray (1967). Basing their research on Schachter's theory of emotion, these investigators argue that regardless of the subject's actual internal state, the cognition "that stimulus has not affected me internally" will result in reduced or no emotion. In an attempt to test their hypothesis, these investigators conducted an experiment designed to reduce avoidance behavior by manipulating the cognitions of their subjects regarding the subjects' internal reactions to feared stimuli. This cognitive manipulation was achieved by means of nonveridical heart-rate feedback which indicated to the subjects that the feared stimuli were not, in fact, affecting them internally.

Thus, if as Schachter claims, cognitive representation of internal events is important to emotional behavior then nonveridical representation of physiological changes should have the same effects as veridical ones. Valins and Ray (1967) were able to demonstrate reduced avoidance responding as a result of their experimental treatment and in so doing appear to have lent some support to their hypothesis that nonveridical physiological feedback, indicating that a stimulus situation is not affecting the subject internally, results in the subject having reduced or no emotional response to the stimulus situation. If, as these investigators appear to have demonstrated, cognitive manipulation regarding a subject's internal reactions to feared stimuli results in reduced or no emotional arousal, then nonveridical physiological feedback appears well suited as an adjunctive technique to modeling procedure in reducing avoidance responses in phobic subjects.

It is felt by the present experimenter that when arousal is reduced or entirely eliminated, the disruptive effects of competing cognitive responses or selective inattention to the relevant stimuli are not in evidence to attenuate the vicarious extinction of conditioned responses. Once these disruptive effects of high arousal are controlled the modeling technique should become much more effective in the modification of avoidance responses. It therefore seems logical to investigate the effect of combining nonveridical physiological feedback technique and modeling technique in the treatment of avoidance responses.

The problem to be investigated by the present study is: Will the use of cognitive manipulation regarding internal reactions to feared stimuli in combination with modeling procedures result in more effective reduction of avoidance responding than either treatment used separately? In examining this problem the following hypotheses will be tested.

Hypotheses Tested

Hypothesis One: The combined use of a modeling technique and a nonveridical heart-rate feedback technique results in subjects making more approach responses than either technique used individually or does exposure to the feared stimulus.

<u>Hypothesis Two</u>: The use of modeling technique results in subjects making more approach responses than either the use of a nonveridical heart-rate feedback technique or exposure to the feared stimulus.

<u>Hypothesis Three</u>: The use of a nonveridical heart-rate feedback technique results in subjects making more approach responses than does exposure to the feared stimulus.

<u>Hypothesis Four</u>: Changes in approach behavior achieved as a result of the experimental treatments will be maintained over a two-week period of time.

CHAPTER II

REVIEW OF RELATED RESEARCH

A. Modeling Technique

The behavioral effect of observing model's responses and their reinforcing consequences has been amply demonstrated by many different investigators in the areas of novel response acquisition, inhibition, and disinhibition of existing behavioral repertoires and elicitation of behavior neither entirely novel nor inhibited as a result of prior learning. This large body of research provides an exceptionally stable theoretical basis upon which modeling procedures have been developed.

Since the present study is employing modeling primarily as a means of vicariously extinguishing conditioned avoidance responses, the research concerning vicarious reinforcement and conditioned emotional responses is of central importance as it bears directly on the extinction process.

A number of studies (Bandura, 1965c; Bandura, Ross and Ross, 1963; Walters and Park, 1964) have demonstrated the phenomenon of vicarious reinforcement. These effects have been demonstrated when the behavior of observers is modified as a function of having witnessed reinforcing stimuli administered to models. Research by Kanfer and Marston (1963) has further shown that changes exhibited by observers experiencing vicarious reinforcement are of the same or even greater magnitude (Berger, 1961) than that of performers receiving direct reinforcement. In addition, current research (Kanfer, 1965; Bruning, 1965) has shown that vicarious reinforcement is a function of the same variables of percentage, intermittency, and magnitude as direct reinforcement.

While it has generally been accepted that vicarious reinforcement is effective in modifying observer behavior, the manner in which this effect is achieved is still open to interpretation. It has been suggested by Bandura (1965a) that vicarious reinforcement achieves its effect by providing information concerning both probable reinforcement contingencies and controlling environmental stimuli and also by displaying incentives possessing activating properties. In addition, vicarious reinforcement provides affective expressions of the rewarded or punished model. These pleasure and pain cues generally elicit corresponding affective responses in the observer which in turn can readily become conditioned, through repeated contiguous association, either to the modeled responses themselves or to the environmental stimuli associated with the model's affective reaction (Bandura and Rosenthal, 1965; Berger, 1962). These studies constitute very compelling evidence for vicarious conditioning of emotional responses to previously neutral stimuli. It appears possible, therefore, that the facilitative or suppressive effects of vicarious reinforcement are mediated by the arousal of vicariously acquired emotional responses.

For purposes of the present study, it is also important to note that when an observer witnesses the non-occurrence of anticipated aversive consequences to a model, previously established conditioned emotional responses can be extinguished (Bandura and Rosenthal, 1965). Studies by Doerfler and Kramer (1959) and Spence (1958, 1964) have demonstrated that responses are directly conditioned more rapidly under high arousal as compared with low arousal conditions, and once acquired are more difficult to extinguish, under conditions of high as compared with low psychologically induced arousal. It has been suggested by Bandura (1965a) that vicarious conditioning is likely subject to the same conditions of arousal as direct conditioning. Similarly, it is interesting to note that Bandura (1965b) and Walters and Parks (1964) have observed that when socially disapproved behavior is exhibited by a model and is not followed by anticipated punishment, this behavior takes on, by contrast, positive qualities and is modeled to the same extent that one might have expected had the behavior been positively reinforced. It has been suggested by Bandura (1965a) that the incremental changes produced in observers by the omission of anticipated punishment to the model may be attributed to two factors: a weakening of inhibition through vicarious extinction and the informational value of the situation regarding the permissibility of the modeled responses.

Early in the history of modeling theory attempts to apply these principles of vicarious learning to the psychotherapeutic setting were initiated but did not become popular, until recent reformulation of the theoretical basis of these principles. Some early evidence for the efficacy of vicarious extinction in treatment of conditioned emotionality was provided by Jones (1924) in her work with children's phobias. She was able to extinguish children's phobic responses by having them observe their peers behave in a non-anxious manner in the presence of the feared objects. Masserman (1943) provided further evidence of the effectiveness of modeling in achieving vicarious extinction of avoidance behavior with his experimentation on subhuman species. He conditioned strong feeding inhibitions in cats, and then allowed them to observe an uninhibited cage mate (who had not been similarly conditioned) make prompt approach and feeding responses without negative consequences occurring to it. Although subjects cowered at the initial presentation of the conditioned stimulus, with continued exposure to the fearless cage mate most of them eventually made approach and feeding responses. However, some regression was noted when the fearless cage mate was subsequently removed.

Following these two initial studies in the use of modeling for purposes of extinguishing avoidance responses, the literature is devoid of any further recorded attempts to utilize modeling to that end. There are, however, reports of the use of modeling technique in psychotherapy for purposes of modifying aggressive responses in children (Chittenden, 1942). This was accomplished by having the subjects observe a model who was differentially reinforced for aggressive and co-operative acts. In addition, Lovaas (1967) was reported to have used modeling procedures in developing intellectual and social capabilities in schizophrenic children by rewarding them for imitation of their instructors.

Following Bandura's reformulation of the theoretical basis of observer learning and its subsequent popularization as an explanation of social learning and personality development, there was a renewed interest in the use of modeling procedures in psychotherapy. This renewed interest has stimulated three recent studies in the use of modeling as a means of vicariously extinguishing avoidance behavior. The first of these to be reported was that of Bandura, Grusec, and Menlove (1967) in which children who displayed avoidant behavior towards dogs were assigned to one of the following four treatment groups: group one, in a positive (party-like) atmosphere, observed a fearless model make progressively stronger approach behavior towards a dog while the second group observed the same modeling sequence as the first group but in a neutral atmosphere. The third group, in a positive (party-like) atmosphere, merely observed the dog without the modeling sequence while the last group only participated in the positive setting without being exposed to either the dog or the modeling sequence. Each group was subjected to eight, ten-minute treatment sessions conducted on four consecutive days. Results of a post-test of approach behavior indicated that the two groups which had observed the modeling sequence displayed stable and generalized reduction in avoidance behavior. Furthermore, they differed significantly from both the dog-exposure group and the positive context group but did not differ significantly from one another. The same could be said of the latter two groups as well. Of marked interest, however, was the finding that the positive (party-like) atmosphere which was designed to reduce competing anxiety responses did not significantly facilitate extinction through modeling.

Geer and Turteltaub (1967) report similar results in an experiment in which sixty adult, undergraduate, university subjects demonstrated reduction of fear of snakes following the observation of one modeling sequence of approach behavior by a low-fear confederate. In this study the subjects were randomly assigned to three experimental groups. One group acted as a control group while subjects in the other two groups were induced to observe either a low- or high-fear confederate demonstrating approach behavior. Accordingly, the subjects were asked to evaluate the emotionality of the models they observed thereby insuring their attentiveness to the model. The results of this study indicated that the subjects who had observed the low-fear confederate, when compared with those subjects who had observed the high-fear confederate, demonstrated significantly less fear as measured by greater approach behavior ($p < .05$). Similarly, when compared with the control group, only the low-fear confederate group demonstrated significantly less fear ($p < .02$). It is perhaps interesting to note that, while the observation of a low-fear confederate model significantly reduced avoidance responses, the high-fear confederate model did not have the opposite effect as one might have expected.

The most recent study to be reported in which modeling techniques were employed for the purpose of extinguishing avoidance responses was that of Bandura and Menlove (1968). This study tested the hypotheses that magnitude of vicarious extinction is partly governed by the diversity of aversive modeling stimuli which are neutralized and by observer's susceptibility to emotional arousal. To test these hypotheses, forty-eight children evidencing fear of dogs were randomly assigned to three different groups. The first group observed a graduated series of eight, three-minute films over a four day period in which a single model displayed progressively more intimate approach behavior with a single dog. The second group observed similar films with the exception that there were several different models and dogs displayed in this series of films. The control group simply watched an interesting film in which there were no dogs. The results of this study indicated that, compared with pre-therapy measures of approach behavior, the children in the single model group displayed significantly more approach behavior immediately after completion of treatment ($p < .01$) and one month later ($p < .005$). Similarly, as compared with pre-treatment measures of approach behavior, subjects who observed multiple modeling demonstrated significantly more approach behavior immediately after treatment ($p < .005$) and one month later ($p < .005$). The approach behavior of control subjects did not change. It is interesting to note that while both the single and multiple modeling sequences significantly reduced avoidance responses, only the multiple model treatment extinguished the subjects' fear sufficiently to enable them to perform potentially threatening interactions with dogs. Of interest to this present study, are Bandura and Menlove's (1968) findings that emotional proneness, as measured by mothers' ratings of children's fears on a forty-two item fear survey, was found to be unrelated to the degree of vicarious extinction in the single model procedure and negatively related ($r = -.60$) to the degree of vicarious extinction in the multiple model procedure. A similar relationship between generalized emotionality and therapeutic success was reported in a recent study which employed Wolpé's desensitization technique in an attempt to extinguish avoidance responses to snakes (Lang and Lazovik, 1963). These experimenters observed a negative relationship between measures of emotionality obtained on the Fear Survey Schedule and Taylor Manifest Anxiety scales and the number of desensitization items completed by experimental subjects. Since the number of desensitization items completed constitutes a good index of treatment success, Lang and Lazovik (1963) concluded that high generalized emotionality militates against therapeutic desensitization treatment.

B. Cognitive Desensitization

In 1958, Wolpé popularized a psychotherapeutic technique for the treatment of avoidance responses which is referred to as systematic desensitization. Before active desensitization can be initiated, however, the subject must be trained in deep muscle relaxation. This latter response is, according to Wolpé, both incompatible with and inhibitory of the physiological correlates of fear. Although the efficacy of relaxation technique in systematic desensitization therapy is no longer in question, the mechanism through which relaxation has its effect has long been open to speculation. One of the lines of research that has evolved from this controversy has been that of Valins (1966) and Valins and Ray (1967). It is argued by these investigators that the actual physiological state of a subject is not as important as his cognitions about that state. Thus, regardless of the subject's actual internal state, the cognition, "that stimulus has not affected me internally" will result in reduced or no emotion.

To demonstrate the effect of cognition regarding internal physiological events on emotion, Valins (1966) conducted an experiment in which these cognitions were manipulated. Subjects viewed ten slides of seminude females while hearing sounds that were allegedly their heart-beats. One group of subjects heard their heart-rate speed up with five of the slides and remain steady (unspeeded) with the other slides. The second group of subjects heard their heart-rate slow down markedly with five of the slides and remain steady for the other slides. Two control groups viewed the same slides and heard the same heart-rate sound but did not associate the sound with their heart-beat. The results indicated that by comparison with those slides of seminude females in which the heart-rate had remained steady, those in which the heart-rate was observed to either slow down or speed up were rated as significantly more attractive. The control groups did not rate the sound reinforced slides more attractive than the non-reinforced slides. These results were found to remain stable over a four to five week follow-up period. In addition, those slides of seminude females rated as more attractive by the experimental subjects were chosen significantly more often as remuneration for experimental participation than were those slides rated as unattractive. Thus, the hypothesis that subjects will spontaneously label their feelings toward a stimulus by reference to their knowledge of how their hearts have reacted, received considerable support.

Having demonstrated that the manipulation of cognitions concerning the subject's internal reactions to stimuli can influence emotional responding, Valins and Ray (1967) applied their technique to the psychotherapeutic treatment of troublesome avoidance responses. They conducted two experiments to determine whether such cognition manipulation could affect snake-avoidance behavior. In the first experiment subjects who had demonstrated moderate snake avoidance behavior were required to view twenty slides, ten of which were pictures of snakes and ten of which had the word "shock" written on them. Associated with the "shock" slides, the experimental subjects experienced a mild shock to their index finger and heard their alleged heart-rate increase markedly. When they viewed a snake slide, the same subjects heard their alleged heart-rate decrease markedly. The "shock" and snake slides were alternated. A control group experienced the same conditions except that they did not associate the heart-rate sound with their own heart-beat. Compared with the extraneous sound control group, the heart-rate feedback experimental group was observed on a post-treatment test to make significantly more snake approach behavior ($p < .02$). This difference was not significant, however, until all of those subjects who had reported prior experience with snakes were eliminated from the sample.

The second experiment reported by Valins and Ray (1967) employed subjects who were very fearful of snakes. The experimental conditions were similar to the first experiment except that a second treatment session one week later was employed to strengthen the experimental manipulation. In this second session a different snake stimulus was used. The new stimulus consisted of a light shining on a live snake which was located in an adjacent room separated by a glass wall. Again, the experimental subjects were observed to make significantly more snake-approach behavior than the control group regardless of prior experience with snakes ($p < .05$). Analysis of the data indicated that prior experience with snakes was not, in fact, a significant variable.

In summary, a review of the literature would seem to indicate that modeling techniques are moderately successful in reducing avoidance responses but that proneness towards general emotionality attenuates vicarious extinction of these avoidance responses. In addition, the literature strongly suggests that manipulation of cognitions concerning the internal effects of a stimulus influences emotional responses. Also, these cognitive manipulations have been demonstrated to reduce avoidance responses with modest success.

CHAPTER III

THEORETICAL ORIENTATION

A. Theory

As mentioned earlier, learning by vicarious experience has arbitrarily been described by many different labels and accordingly explained by a variety of theoretical models throughout the history of psychology. For purposes of the present study, the terms imitative, observational, and vicarious learning have been employed interchangeably to refer to behavioral modifications resulting from exposure to modeling stimuli. Similarly, a vicarious learning event has been defined after the fashion of Bandura (1965a), as one in which new responses are acquired or the characteristics of existing response repertoires are modified as a function of observing the behavior of others and the reinforcing consequences of their behavior, without the modeled responses being overtly performed by the viewer during the exposure period.

The theoretical model adopted by the present writer as an explanation of vicarious learning is that of Bandura and Walters (1963) which places primary emphasis on the role of stimulus contiguity and associated cognitive response-stimulus events in the acquisition process. This theory states that as a function of contiguous stimulation, an antecedent stimulus can acquire the capacity to elicit imaginal representations of associated stimulus events even though they are no longer physically present. In addition to the acquisition of imaginal responses, once verbal labels have become attached to objective stimuli during the period of exposure, the observer acquires verbal equivalents of the model's behavior. These symbolic or representational responses have cue properties capable of eliciting at some later time overt responses corresponding to those that had been modeled. Bandura, Grusec, and Menlove (1966) have demonstrated the importance of representational processes to vicarious learning by showing that verbalization of the modeled behavior, when compared with passive observation, significantly facilitates vicarious learning.

Although stimulus contiguity explains the acquisition of new responses or the modification of already established repertoires of behavior, it does not adequately explain the performance of these new or modified responses once learned. To explain the performance of a learned response, Bandura (1963b) depends upon response consequences to the model and attributes of the model as perceived by the observer as explanatory variables. A model who is seen as rewarding, prestigeful, or competent, who possesses high status and who has control over rewarding resources is more readily imitated than one who lacks these qualities. Similarly, an observer is more likely to imitate the behavior of a model who has been rewarded than one who has been punished. In addition, Rosekrans (1967) has demonstrated that perceived similarity to the model enhances the model's attributes affecting both the learning of imitative responses as well as the performance of such responses. It seems as though the immediate or inferred consequences of the model's behavior are experienced vicariously by the observer and, as previously reported, the vicariously experienced reinforcement is equally as powerful, if not more so, than direct reinforcement. Further, it is under the control of the same variables as direct reinforcement. In addition to its informational and motivational properties, vicarious reinforcement provides the affective expressions of the reinforced model which elicit corresponding affective responses in the observer. These affective responses of the observer are then conditioned to either the modeled responses themselves or to environmental stimuli present at the time. Thus, the facilitative or suppressive effects of vicarious reinforcement are mediated not only by their motivational and informational cues but also by the arousal of vicariously acquired emotional responses. The importance of this vicariously acquired emotional arousal on further vicarious learning is inferred from studies on direct conditioning which have demonstrated that responses are learned more rapidly, and once acquired are extinguished more slowly, under conditions of high psychologically induced arousal (Spence, 1958; Doerfler and Kramer, 1959; Bandura and Menlove, 1968). It has been suggested by Bandura and Rosenthal (1965) that the attenuating effect of high psychological arousal on the vicarious extinction of learned responses can be explained by the fact that when the arousal level becomes too high the stimuli with which these emotional responses are associated become aversive in nature. In an attempt to reduce the aversiveness of the stimuli to which he has been attending, an observer may either think of something else thus introducing competing responses or simply attend to some irrelevant but less arousal inducing stimuli. Once elicited, either of these responses may become established due to their arousal reductive reinforcing value. The disruptive effect of high psychological arousal becomes particularly important when the nature of vicarious extinction of previously learned avoidance responses is considered.

Vicarious reinforcement is such that when a response for which punishment is expected is modeled and is not followed by the expected punishment, the given response takes on a positive quality. It is then modeled as though it had been positively reinforced. If this response for which punishment is expected is followed by positive reinforcement instead of simply the omission of punishment, it takes on an even greater positive valence (Bandura, 1965b); (Walters and Parks, 1964). The probability of a previously learned approach response being imitated is increased as a result of observing a model demonstrate the response without incurring anticipated aversive consequences. This increased probability is attributed to a weakening of inhibitions through vicarious extinction and the informational value of the situation concerning the permissibility of the modeled response. Further, knowledge concerning the correct response is obtained through observing the model. The importance of this learning is pointed out by

Anant (1966) when he describes how the lack of knoledge concerning the correct response resulted in a blocking of the desensitization of fears in a number of subjects he was treating. The block was overcome by simply discussing the correct response with the subjects.

The research on conditioned affective arousal, vicarious extinction of conditioned responses and modeling technique already cited suggests that, if previously conditioned avoidance responses are to be vicariously extinguished through modeling procedures, psychologically induced arousal in the observer must be kept at a low level. If control of affective arousal is to be attempted, a complete understanding of the basic components of arousal is first necessary. Although there are many other theories of affective arousal, Schachter's theory of emotion is, because of its implications for the control of emotion, of central importance to this theoretical discussion.

Schachter (1964) states that an emotional state may be considered as a joint function of a state of physiological arousal and of a cognition appropriate to that state of arousal. Thus, when experiencing a state of physiological arousal, subjects will behave most emotionally if they identify an emotional stimulus as the source of their arousal (Schachter and Singer, 1962; Nesbett and Schachter, 1966). In an attempt to account for the influence of autonomic arousal on emotional behavior, Schachter (1964) has emphasized the importance of the cognitive effects of internal events. This point of view is very much in evidence when he says:

> I would guess that the labels and hedonic evaluation attached to an amazing variety of bodily conditions are cognitively determined. (p. 78)

Physiological changes are considered to function as stimuli or cues and are represented cognitively as feelings or sensations. Given these cognitions regarding his internal state, an individual is cognitively motivated to evaluate and understand this kind of information. As Gerard and Rabbie (1961) have commented, a number of kinds of internal unclarity may exist regarding a person's aroused state. There may be the need to label the emotion by identifying the situation that precipitated the given feelings or the person may want to measure the intensity of these feelings. Similarly, the person may want to determine in a normative sense whether the feelings are appropriate. In reducing the internal unclarity resulting from the dissonant cognitive representation of physiological changes, a person often seeks and utilizes information from similar others regarding that aspect of themselves. Although Schachter (1964) comments on this phenomenon, it is perhaps best explained by Festinger's theory of cognitive dissonance and social comparison.

Festinger (1954) points out that cognitive dissonance exists when a person possesses one cognition which follows from the obverse of another he possesses. He further states that cognitive dissonance is a psychological tension having motivational characteristics. These motivational characteristics are such that a person experiencing cognitive dissonance actively seeks additional information in order to reduce dissonance. The universality of the motivating characteristics of cognitive dissonance is such that it has led Festinger (1954) to posit the theory that, there exists, in the human organism, a drive to evaluate his opinions and his abilities. When objective, non-social means of evaluation are not available, he states, people evaluate their opinions and abilities by comparison with those of available social others. On the basis of Festinger's (1954) theoretical exposition of cognitive dissonance, it seems reasonable to expect that, when a person both observes a stimulus which he thinks is fearful and receives information indicating that the stimulus is not affecting him internally, he will experience cognitive dissonance. This cognitive dissonance motivates him to seek further information as a means of resolving the dissonance and results in social comparison with similar others.

If, as stated earlier, internal events function as cues or stimuli, then these events can be thought of as potential cognitive information. As Valins (1966) points out, however, these events are subject to the same mechanisms that process any stimulus before it is represented cognitively. Such mechanisms can result in internal events being denied, distorted, or simply not perceived. It is thus plausible that cognitive representation of an internal event can be nonveridical. Rogers (1961) suggests that this does, in fact, happen in instances of incongruence between experience and awareness. Similarly, Mandler (1962) has questioned the veridicality of internal sensations by observing that people learn to make statements about internal events under the control of environmental stimuli or irrelevant internal stimuli, as when a person states that he is blushing in an embarrassing situation when he is in fact not. In addition, psychosomatic medicine is replete with reports of nonveridical internal events. Thus, if as Schachter claims, cognitive representation of internal events is important to emotional behavior, then nonveridical representation of physiological changes should have the same effects as veridical representation. Valins (1966) has reported data to support this position. When commenting on this aspect of his study, Valins (1966) observed that:

> In fact, the bogus feedback appears to mask veridical feedback by diverting the subject's attention from his actual internal reactions. (p. 407)

This effect of the nonveridical feedback concerning internal events was further supported by post-experimental interviews which indicated that it aroused in the subjects a strong need to evaluate and understand the information derived from these nonveridical stimuli. Jones (1956) has further demonstrated the effect of nonveridical representation of physiological changes in his treatment of urinary frequency wherein he employed nonveridical physiological feedback to mask veridical feedback.

That the cognitive activity aroused by the nonveridical heart-rate feedback was attributable to the latter and not to actual physiological change was indicated by an adjunctive study in which Valins (1966) demonstrated, through the use of physiological measures, that the nonveridical heart-rate feedback did not result in actual physiological changes in the subjects. Therefore, it was concluded that the observed effects of bogus heart-rate feedback were primarily a result of cognitive factors and not physiological ones. Theoretically it seems to follow that if by nonveridical physiological feedback a subject is informed that a stimulus is not affecting him internally then he will evaluate the stimulus accordingly and be incapable of labeling it as emotion-inducing. Valins and Ray (1967) received at least partial support for this proposition when they were able to increase approach behavior to snakes in previously fearful subjects by manipulating their cognitions concerning the internal effects of snake stimuli.

The effect of nonveridical physiological feedback should be enhanced when used in conjunction with techniques involving the modeling of avoidance responses because not only does the subject receive cognitive information telling him that the modeled approach behavior is having no internal effect on him but, in addition, when he attempts to evaluate and understand this new information through social comparison, in all probability he compares himself with the fearless model. In addition, as Rosekrans (1967) points out, if this model is perceived as similar to himself, social comparison is greatly facilitated for the subject. This results in the subject labeling the approach behavior as much less fear inducing. Once the subject's arousal level is reduced in this manner, he is capable of attending to the modeled approach behavior without being hindered by the disruptive effects of self-generated competing responses. The effect of observing the model demonstrate approach behavior without the occurrence of anticipated punishment should further extinguish previously conditioned emotional responses and have an additive effect on the overall extinction of avoidance responses in the behavioral domain in question.

B. Operational Definition

Approach behavior. The proximity to the feared stimulus which a subject achieved as a result of his performing the successive responses as set down in Table I, on page 37.

CHAPTER IV

EXPERIMENTAL DESIGN

A. Sample

The subjects who participated in this study were volunteers from among 650 undergraduate summer session students at the University of Alberta. Their ages varied from twenty to fifty years and although both sexes were represented, women outnumbered men five to one.

Subjects were selected from among volunteers on the basis of their responses to both an initial written test and a final behavioral test. This selection procedure is described later under the section on "procedure."

B. Test Instruments

Fear Survey Schedule II: This scale was developed by Geer (1965) for the purpose of measuring fear. It is based upon an earlier scale developed by Akutagawa (1956) which has been used by Lang and Lazovik (1963) and their colleagues in studies evaluating systematic desensitization therapy. A similar scale has been employed by Wolpe and Lang (1964) as an adjunct to behavioral therapy. The present scale (Appendix A) consists of a list of fifty-one phobic stimuli each of which is rated by the subject on a seven point scale of fear ordered as follows: none, very little, a little, some, much, very much, and terror. One of the fifty-one phobic stimuli responded to by the subjects is that of fear of snakes. An estimate is thus obtained not only of the subject's snake phobia but of other related and unrelated fears. Statistically, each item correlated with total scale scores at the 0.01 level of significance with the actual correlation coefficients ranging between 0.306 and 0.654. Item number 39, dealing with fear of snakes correlates 0.482 with the total score. Geer reports a KR_{20} reliability coefficient of 0.939. In addition, in an attempt to validate the scale, Geer accepted the top three categories as high fear and the bottom category as low fear. Using these two categories he found an average correlation of 0.75 between people's responses on specific fear items and an independent test of approach behavior. Similarly, a significant relationship was obtained between this scale and measures of self-report and other report ratings of anxiety intensity and fear. As Geer (1965) comments:

> The statistics relating to the internal consistency of the FSS-II and the studies validating several of the individual items suggest that the FSS-II has good reliability and validity. (p. 51)

Its use for screening prospective subjects fearful of snakes has been demonstrated by Geer and Turteltaub (1967) when they successfully employed the Fear Survey Schedule II to identify experimental subjects with high or low fear of snakes.

Test of Approach Behavior

This test was devised in such a way as to obtain a direct estimate of the subject's approach behavior. It is similar in nature to behavioral tests employed by other researchers for similar purposes (Valins and Ray, 1967; Geer and Turteltaub, 1967; Bandura, Grusec, and Menlove, 1967; Lang and Lazovik, 1963). The present test consisted of twelve responses (Table I) which required the subjects to approach progressively closer to a live snake. The magnitude of fear associated with each of these responses was subjectively estimated for a normal population through the use of a scaling technique known as the "method of magnitude estimation" (Torgerson, 1958). Accordingly, groups of undergraduate students (N = 128) were presented with the randomized list of approach responses (Appendix B) and were asked to arrange these responses, according to the perceived magnitude of fear associated with each, along an equal-interval scale ranging from one to twenty. To facilitate this, the subjects were provided with two anchor stimuli and were cautioned against assuming any particular distribution of the stimuli. The response of "entering a room in which a snake is housed in a glass terrarium" was assigned a number of <u>one</u>, while the response of "allowing the snake to wind around an arm" was assigned a number of <u>twenty</u>. To further facilitate their task, the present experimenter demonstrated the approach responses in question to the students using a live, four-foot boa constrictor snake. The mean placements on the equal interval scale assigned each response were accepted as an indication of the magnitude of fear associated with that response and are listed below in Table I.

TABLE I

RESPONSES MAKING UP THE TEST OF APPROACH BEHAVIOR AND THE MAGNITUDE OF FEAR ESTIMATES ASSOCIATED WITH EACH

	Responses	Magnitude of Fear
a.	Enter the room in which a live snake is housed in a glass terrarium.	1.00
b.	Approach to within twelve feet of the snake.	2.34
c.	Approach to within six feet of the snake.	3.61
d.	Approach to within three feet of the snake.	4.66
e.	Walk right up to the terrarium and look down at the snake.	6.72
f.	Lift the screen off the top of the terrarium.	10.29
g.	Put your hand into the terrarium past the wrist.	13.03
h.	Touch the snake with a finger.	15.04
i.	Lift a portion of the snake's body.	16.65
j.	Lift the snake off the bottom of the terrarium.	17.50
k.	Lift the snake out of the terrarium and hold it for a minute.	18.58
l.	Allow the snake to wind around an arm.	20.00

C. Procedure

Initial Screening of Subjects

In an effort to select prospective subjects, the Fear Schedule Survey II was administered to approximately 650 undergraduate summer session students. These students were informed that the examiner was doing a comparative study of patterns of fear among different professional groups. They were asked to note their name and telephone number on the test blank and were assured that although the examiner may want to contact them later concerning their fear profile, their test data would remain confidential. Those students (N = 81) who indicated "very much" fear or "terror" of snakes were later contacted by telephone and asked to meet with the examiner to discuss their test profile. Upon meeting with these students it was explained that the examiner was planning a program of research aimed at providing a basis for the development of a screening device for prospective counsellors. It was further explained that empathy is one of the main attributes of a counsellor and that this ability to perceive and understand emotion in others is a trait that discriminates between good and bad prospective counsellors. Consequently, they were told that as part of this program this investigator was interested in testing the hypothesis that those observers who had experienced a given emotion in response to an arousal inducing situation would better be able to recognize the given emotion in others experiencing the same situation than would those observers who had neither experienced the given emotion nor the arousal inducing situation. With this in mind, it was explained that the present researcher had decided to work with the basic emotion of fear and a fearful stimulus situation which would involve a snake. The students chosen were then informed that they had been selected as having a high degree of fear of snakes and had been called together in an attempt to solicit their participation in the proposed study. It was carefully explained that should they agree to participate as subjects in this study, the time required of them would be fifteen minutes per day for five consecutive days. They were told that during that time they would be asked to observe and estimate the amount of fear being experienced by other subjects who would be approaching and attempting to handle a live but harmless snake. However, in keeping with the theory, each subject would be asked on two occasions to experience the same arousal inducing situation as the subjects they were observing. This would require them to follow taped directions asking them to approach progressively closer to a live but harmless snake. In addition, the students were told that a secondary purpose of the experiment was to study internal physiological correlates of emotion. To facilitate this, some subjects would be connected to a machine which measured heart-rate while other subjects would simply be observed while being exposed to an emotion inducing stimulus. At this point, questions were answered and the students were asked to participate in the study by acting as subjects. Those who agreed were asked to sign their name along with their telephone number and an indication of the most convenient time during which they could volunteer for the experiment. Approximately seventy of the initial 650 volunteers tested were obtained in this manner for the final screening and pretest.

Pretest

A test of approach behavior served both as a final screening measure and as a pretest on the dependent variable. The testing was done over a period of two days and took approximately five minutes per subject. Prior to testing, it was again explained to each subject that they would be required to follow directions that would ask them to approach progressively closer to a live but harmless snake. They were further advised that it was desireable that they experience a small degree of arousal but that they approach only as close as they comfortably could. They were then taken to the entrance of a room in which twenty feet from the entrance a terrarium containing a live, four-foot long boa constrictor snake had been placed. White strips on the floor demarked three, six, and twelve foot distances from the terrarium. At this point the experimenter walked over, opened the terrarium and touched the snake so that it moved thereby demonstrating to the subject that it was both alive and harmless. Following this procedure a tape recorder was switched on and the following message was heard:

> In a few seconds you will be asked to make a number of responses that will take you progressively closer to a live snake which is housed in a glass terrarium within this room. The snake is harmless and will not bite. However, it is asked that you not consider this a dare as I in no way want you to show how much nerve you have. Simply follow the directions as long as you comfortably can. I repeat, only as long as you comfortably can. Ready: One--Enter the room in which a live snake is housed in a glass terrarium. Two-- --- --- ---.

Subsequently, the balance of the approach responses listed earlier (Table I) were called over the tape recorder at seven-second intervals with each response being preceded by its chronological number. The point at which the subject was no longer able to continue was noted and a score was later assigned according to the approach behavior completed. Only those subjects who did not touch the snake were selected as final subjects. Of the seventy subjects tested, sixty were finally selected and placed into two levels near equal in number. Level one consisted of those subjects who had completed less than six approach responses and level two consisted of those who had completed less than eight but more than six approach responses. Subjects were then randomly assigned from each level to one of four treatment groups. Because of the high correlation between item responses on the Fear Survey Schedule II and appropriate approach behavior, it is felt that the groups were randomly equated on emotionality as measured by the FSS II.

Treatment One

This treatment involved exposing the subjects to four modeling sessions during which they heard what they thought was their heart-rate, when in fact they actually heard a prerecorded nonveridical heart-rate.

Subjects assigned to this treatment condition were contacted by telephone and were scheduled to appear once each day for five consecutive days. Each treatment session lasted fifteen minutes. The subjects in this condition were told that they would be judging the emotional reactions of other subjects who would be approaching and perhaps handling a live snake. It was explained that while they could readily observe the subject from this side of the one-way mirror, the subject could not see them and would be unaware that he or she was being observed by anyone other than the present investigator. These "approach subjects" were described to the experimental subjects as high fear summer school students like themselves who had agreed to approach the snake as close as they possibly could. They were thus described as differing from the experimental subjects only in that the approach subjects were asked to approach as close as they "possibly" could rather than as close as they "comfortably" could. In fact, the "approach" subjects were three women in their twenties and one man in his forties, all of whom possessed snakes as pets and were unafraid of them.

When completing the instructions, the experimental subjects were informed that the experimenter was interested in their heart-rate reactions when observing the other subject. It was explained to them that people who had experienced a very traumatic fear would have a visceral reaction to a fearful stimulus which would be evidenced by a marked increase in their heart-rate. For those people who did not evidence this increased heart-rate, it could be concluded that their fear was more cognitive in nature and probably not realistic. It was further explained that this distinction had important implications for psychotherapeutic practice.

A modified Beckman Dynograph (RS model) was used to simulate the measuring of each subject's heart-rate. The dynograph was equipped with an audio coupler which amplified the heart-rate sounds. This coupler was modified through the use of a transformer which allowed the heart-rate to be amplified through a tape recorder. The advantage of this was that when the prerecorded tape was switched on it automatically cut out the heart-rate impulses from the dynograph and since the same amplifier was being employed for both the veridical and nonveridical heart-rate, the two were virtually indistinguishable. This resulted in the experimenter being able to attach the electrodes to the subject's body allowing him to hear his own veridical heart-rate. To convince the subjects of its veridicality, they were asked in session one to do a number of deep knee bends and then to notice the increased heart-rate resulting from their exertion. The subjects appeared, without fail, to be impressed by this demonstration. When a resting heart-rate was established the subjects were advised that the experimenter would be recording their heart-rate on a tape for purposes of analysis at a later date. However, with this, the tape recorder was activated and instead of being switched to "record" it was switched to "play." This automatically stopped the veridical heart-rate sound and amplified a prerecorded sound of a nonveridical resting heart-rate. Since treatment two was being carried out simultaneously in the same room on the opposite side of a high screen, treatment one subjects were asked to use an earplug in listening to their (nonveridical) heart-rate. This served two purposes: it resulted in no distracting heart-rate sounds being heard by the treatment two subjects on the other side of the screen and it also had the effect of the recorded nonveridical heart-rate sounding as though it were coming from within the subject. It was felt by the experimenter and his advisor that by hearing their heart-rate in this way instead of from an external source, it would have the effect of masking any of the subject's veridical heart-rate feelings.

At this point the curtain in front of the one-way mirror was opened allowing the subjects to see into the adjoining room (Figure 1). The subject was then given a rating sheet (Appendix C) adopted from a study by Geer and

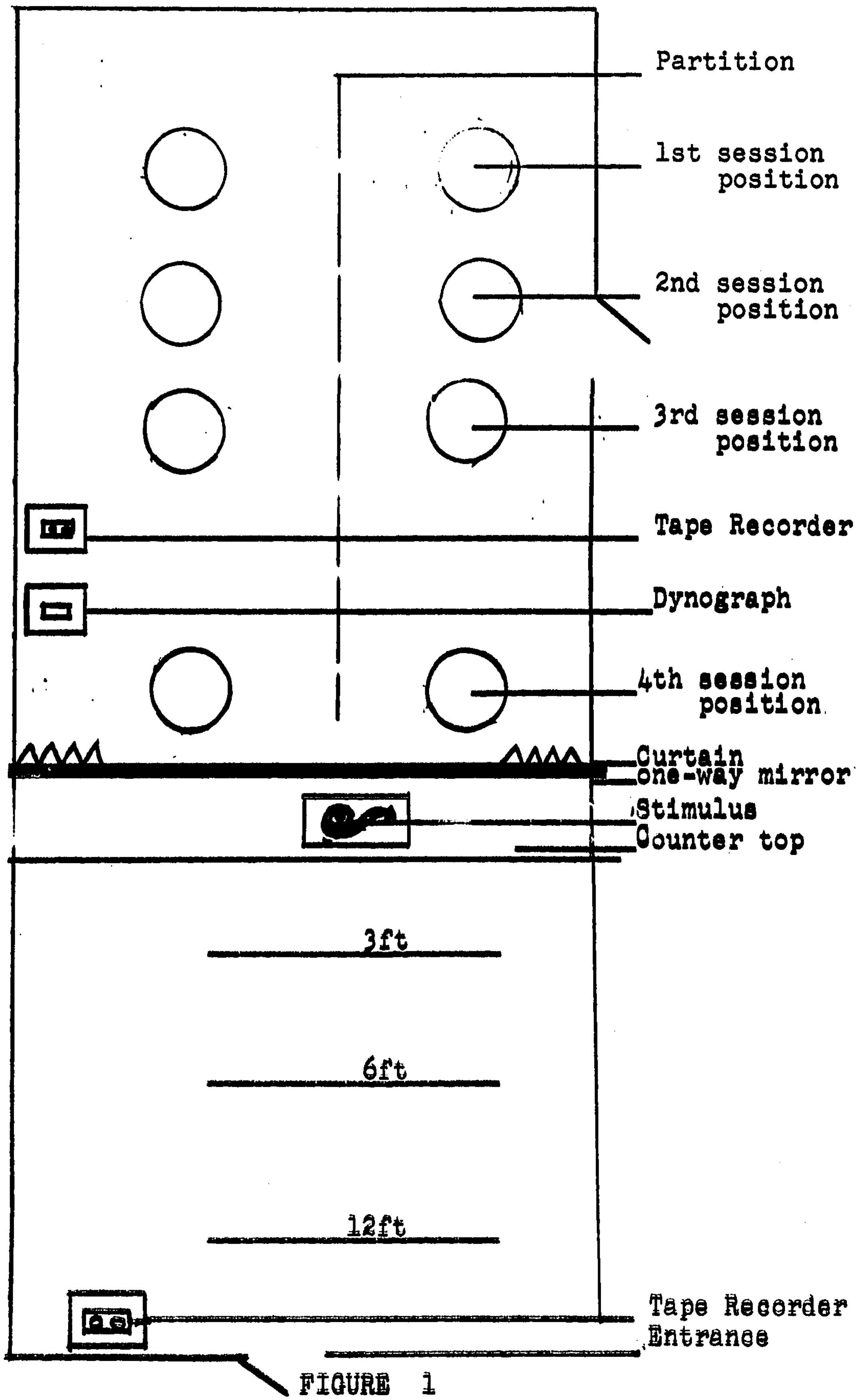

FIGURE 1

FLOOR PLAN OF EXPERIMENTAL ROOMS

Turteltaub (1967) which was to be used in judging the emotional reactions of the subject who would be making snake-approach responses on the other side of the one way mirror. It was explained that the rating sheet was to be filled out at the end of each session. It was further explained that their ratings would be compared with a rating sheet filled out after each session by the model. The subjects were told that a comparison between how the model reported feeling and their subjective evaluation of his feelings would yield a good indication of their ability to empathize. While the subjects were acquainting themselves with the rating sheet the researcher excused himself for a minute and could be observed talking to an "approach subject" at the entrance of the adjoining room. Upon returning to the observation room the researcher asked the subjects to watch the person in the adjoining room and to attend particularly to his facial expression as he or she attempted to approach the snake. The model allowed one minute for the experimenter to return to the observation room and alert the experimental subjects before beginning the program of modeled approach behavior. During the approach behavior the researcher carefully observed his subjects for evidence of excessive arousal. In an attempt to insure that an excessive degree of arousal was avoided, the subjects were seated at the far end of the room (twelve feet) from the one-way mirror. On each successive session they were moved progressively closer to the mirror until on the last session they were within three feet of the mirror which separated them from the model and snake.

The fearless models demonstrated snake-approach behavior according to a pre-arranged program. This approach behavior was programmed so as to elicit as little arousal as possible while still allowing the model to demonstrate all the approach responses encountered on the test of approach behavior. Each sequence of approach behavior required approximately five minutes to complete. Following the completion of a sequence of approach behavior the experimenter asked the subjects to fill out the rating sheet. He then left the room and could be observed in the adjoining room happily commending the model on his or her approach behavior. Upon returning to the observation room the experimenter collected the rating sheets, thanked his subjects, and re-affirmed their appointment for the next day.

Although the modeling sequences did not change from day to day, as indicated earlier, the models did. In addition, the experimental subjects were exposed to a variety of snakes. This was necessitated by the fact that each model was most comfortable working with his or her own pet. As a result, the subjects saw models demonstrate approach behavior towards a four-foot, an eight-foot, a six-foot, and a four-foot long boa constrictor in each of four consecutive modeling sessions.

Treatment Two

Treatment two involved exposing the subjects to four modeling sessions in which snake-approach behavior was demonstrated as described earlier in treatment one. Subjects in this treatment group thus received the same experience as those of treatment one, with the exception of the veridical and nonveridical heart-rate stimuli which were omitted.

Treatment Three

Subjects in this treatment condition received the same nonveridical heart-rate feedback treatment as did the subjects in treatment one. However, instead of a modeling sequence and associated data sheets, these subjects simply viewed each of the snakes in its terrarium with a bright light shining on it. The approach behavior required of them in the post-test was explained as a procedure employed in another study with which the present one would be compared. Subjects were told that if the two bodies of research were to be compared the procedure must of necessity be duplicated in the present study. The subjects appeared to accept this explanation as plausible.

Treatments three and four were carried out simultaneously on opposite sides of a high screen. It was felt that this controlled for stimulus inconsistencies.

Treatment Four

In this condition, treatment consisted of simply having the subjects sit and observe the same stimulus employed in treatment three, except that the nonveridical heart-rate feedback was omitted. The same explanation for the necessity of approach behavior was given and was accepted by the subjects of this treatment group with the same credibility as those in treatment group three.

Of the initial sixty subjects selected, three subjects were lost. One subject was lost from the modeling treatment group (Group II) after the first session, due to extreme arousal and an inability to observe the modeling stimuli. One subject from each of the nonveridical heart-rate feedback group (Group III) and the stimulus exposure group (Group IV) was lost as a result of having finished their course of studies and having left the city before these parts of the study were started.

Post-Test

The post-tests of approach behavior were carried out immediately following the completion of the experimental treatment in the fourth and last session of each treatment group. Accordingly, following the experimental treatment, each subject was immediately taken to the testing room where the pretest procedure was replicated.

Follow-Up Test

On the thirteenth and fourteenth day following the post-tests of the last treatment groups, a follow-up testing procedure was carried out in an attempt to ascertain the stability of changes in approach behavior. Accordingly, the subjects from all four treatment groups were contacted and arrangements made for them to complete a follow-up test of approach behavior. The same procedure was followed in this testing as was followed in all previous tests of approach behavior. Of the original fifty-seven subjects who completed the four treatment sessions, forty-eight were successfully recruited for the follow-up test. The nine subjects who were lost were accounted for by illness and holidays.

Experimental Schedule

The time schedule followed throughout this experiment was as follows:

Week One: Initial screening of approximately 650 volunteers by means of the Fear Survey Schedule II instrument for subjects highly fearful of snakes.

Week Two: Pretest and final screening of the eighty-one subjects initially selected. The Test of Approach Behavior was employed in selecting the final experimental subjects.

Week Three: Treatment groups one and two received their respective modeling and nonveridical heart-rate feedback combination and modeling treatments. These experimental treatments were immediately followed by a post-test using the Test of Approach Behavior.

Week Four: Treatment groups three and four received their respective nonveridical heart-rate feedback and exposure to feared stimuli treatments. These experimental treatments were immediately followed by a post-test using the Test of Approach Behavior.

Week Six: A follow-up test using the Test of Approach Behavior was administered to all the experimental subjects that could be relocated.

CHAPTER V

STATISTICAL TREATMENT AND RESULTS

The data accumulated from pre-treatment, post-treatment, and follow-up tests of approach behavior were subjected to statistical analysis in an effort to ascertain the tenability of the hypotheses stated earlier concerning the effect of different treatments on the reduction of avoidance responses.

On each testing period the point at which the subject was no longer able to continue his approach behavior was noted and the number of approach responses he completed was recorded. The completed approach responses were later interpreted in terms of the magnitude of fear estimates associated with each response making up the test of approach behavior (Table I). Through this interpretation, a final score of total approach behavior (Appendix D) was calculated for each subject on each testing by adding up the magnitude of fear estimates associated with each completed approach response.

The difference between pre-test and post-test scores of Approach behavior was calculated for each subject and an analysis of variance for unequal n's was performed to determine whether the observed differences were significant. A summary of the analysis of variance is presented in Table II.

TABLE II

SUMMARY OF ANALYSIS OF VARIANCE OF SCORE DIFFERENCES BETWEEN PRE-TREATMENT AND POST-TREATMENT TESTS OF APPROACH BEHAVIOR

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value	Probability
Groups	202.08	3	67.36	9.00	0.001
Error	396.80	53	7.49	--	--

The difference between groups was found to be statistically highly significant ($p < 0.001$). The Neuman-Keuls procedure for making comparisons between all possible pairs of ordered means was used to test for statistical significance between treatment group means.

The Neuman-Keuls comparison between ordered means of pre-test and post-test differences is presented in Table III. Using an alpha level of 0.05, the difference between the mean for group one and the means for group two, three, and four were found to achieve statistical significance. The data supported hypothesis one and it was concluded that the combined use of a modeling technique and a nonveridical heart-rate feedback technique (Group One) did result in subjects making more approach responses than did exposure to the feared stimulus (Group Four) or either modeling (Group Two)

TABLE III

NEUMAN-KEULS COMPARISON BETWEEN ORDERED MEANS OF PRE-TEST AND POST-TEST DIFFERENCES FOR EACH TREATMENT GROUP WITH LEVELS COMBINED

Treatments		1	2	3	4
	Means	5.731	3.561	1.816	0.826
4	0.826	4.906	2.736	0.990	--
3	1.816	3.916	1.746	--	
2	3.561	2.170	--		
1	5.731	--			
			r = 4	r = 3	r = 2
	q.95	(r.53)	3.765	3.420	2.845
$\sqrt{\text{MS error}/\hat{n}}$	q.95	(r.53)	2.726	2.472	2.059

	1	2	3	4
4	xxx	xxx		
3	xxx			
2	xxx			
1				

xxx indicates significance at the .05 level of significance whenever it occurs in the study.

or nonveridical heart-rate feedback (Group Three) techniques used individually. The difference between the means for treatment groups two and four was also found to be statistically significant while the difference between means for groups two and three did not achieve statistical significance. These data appear to partially support hypothesis two and it was concluded that while the use of a modeling technique (Group Two) did result in subjects making more approach responses than did exposure to the feared stimulus (Group Four), there was no difference between the effect of a modeling technique (Group Two) and a nonveridical heart-rate feedback technique (Group Three). Similarly, the difference between the means for groups three and four was not found to be statistically significant. These data appeared to reject hypothesis three and it was concluded that the use of a nonveridical heart-rate feedback technique (Group Three) did not result in subjects making more approach responses than did exposure to the feared stimulus (Group Four).

In examining the tenability of the fourth hypothesis, concerning the continuance of changes in approach behavior arising out of the different treatment conditions, the present experimenter had planned to perform an analysis of variance with repeated measures on score differences between post-treatment and follow-up treatment tests of approach behavior. It was discovered, however, that due to the nature of the program available an analysis of variance procedure was not possible. An alternate analysis was therefore decided upon and a correlated t test was performed on the mean post-treatment and follow-up treatment scores of approach behavior to determine if the observed differences were statistically significant. These observed differences between post-test and follow-up test means did not achieve statistical significance in any of the treatment groups and it was concluded that changes in approach behavior achieved as a result of experimental treatments did not change significantly over the follow-up period of time. The results of the t tests are summarized in Table IV.

TABLE IV

MEANS, STANDARD DEVIATIONS, DEGREES OF FREEDOM, AND OBTAINED T VALUES OF POST-TREATMENT AND FOLLOW-UP TREATMENT SCORES OF APPROACH BEHAVIOR

	Post-Test		Follow-up Test		Degrees of Freedom	Obtained t Value	Probability
Group	$\bar{x}$	S.D	$\bar{x}$	S.D			
1	65.74	29.36	73.05	33.14	11	2.125	0.057
2	52.98	34.10	59.34	42.00	11	0.996	0.341
3	33.88	14.97	33.88	14.97	12	0.000	1.000
4	29.79	11.82	27.81	10.03	10	1.372	0.200

The disparity between the standard deviations of the first two and the last two treatment groups was noted in Table IV. An examination of the raw data (Appendix D) indicated that this disparity resulted from differential increases in approach behavior among subjects in the combined modeling and nonveridical heart-rate feedback treatment group (Group One) and the modeling treatment group (Group Two) as compared with relatively small changes in the heart-rate feedback treatment group (Group Three) and exposure to feared stimulus treatment group (Group Four).

Although the difference between post-test and follow-up test means did not achieve statistical significance, a general trend of increased approach behavior was noted in the follow-up tests of treatment groups one and two (Appendix E). These trends of increased approach behavior are represented in graph form in Figure 2.

As a further test of this fourth hypothesis, an analysis of variance was performed on the change scores between pre-test and follow-up test data for each treatment group (Table V) to determine if the trend towards further increases in approach behavior would result in conclusions different from that arrived at on the basis of pre-test and post-test change scores. An observed F statistic that exceeded the critical value for a 0.05 level test of significance resulted in the conclusion that the treatment group variances differed for pre-test and follow-up test scores of approach behavior.

Following this finding of a significant difference in group variances, a Neuman-Keuls procedure for making comparisons between all possible pairs of ordered means

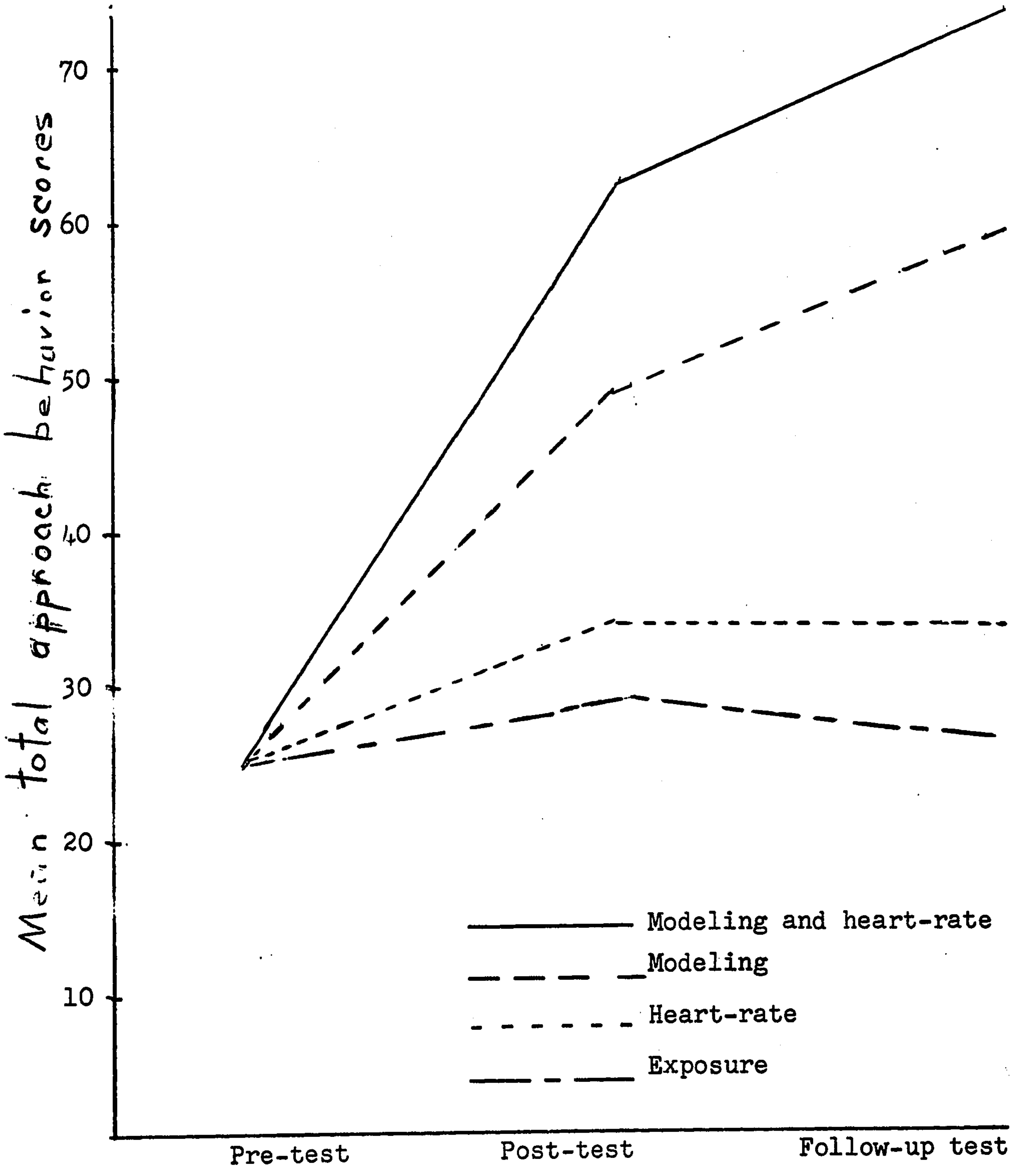

FIGURE 2

TRENDS OF INCREASED APPROACH BEHAVIOR ASSOCIATED WITH DIFFERENT TREATMENT CONDITIONS was performed to test for statistical significance between

TABLE V

SUMMARY OF ANALYSIS OF VARIANCE OF SCORE DIFFERENCES BETWEEN PRE-TEST AND FOLLOW-UP TEST SCORES OF APPROACH BEHAVIOR FOR TREATMENT GROUPS

Source of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Values	Probability
Groups	249.88	3	83.29	11.39	0.001
Error	321.80	44	7.31	--	--

treatment group means. The Neuman-Keuls comparison between ordered means of pre-test and follow-up test differences is presented in Table VI, page 60.

The results of this comparison between ordered means of pre-test and follow-up test differences did not result in any changes in conclusions different from those arrived at on the basis of the earlier comparison between ordered means of pre-test and post-test differences. These findings appear to further support the hypothesis that changes in approach behavior resulting from the experimental treatments were maintained over a two-week period of time.

In summary, the foregoing analysis of the data collected as a result of the pre-testing, post-testing, and follow-up testing procedures seem to suggest the following conclusions:

TABLE VI

NEUMAN-KEULS COMPARISON BETWEEN ORDERED MEANS OF PRE-TEST AND FOLLOW-UP TEST DIFFERENCES FOR EACH TREATMENT GROUP

Treatments		1	2	3	4
	Means	6.350	3.706	1.586	0.249
4	0.249	6.101	3.457	1.337	--
3	1.586	4.764	2.120	--	
2	3.706	2.644	--		
1	6.350	--			

		r = 4	r = 3	r = 2
	q.95 (r.44)	3.753	3.410	2.837
$\sqrt{\text{MS error}/\hat{n}}$	q.95 (r.44)	3.014	2.737	2.277

	1	2	3	4
4	xxx	xxx		
3	xxx			
2	xxx			
1				

1. The combined use of modeling and nonveridical heart-rate techniques results in fearful subjects making more approach responses than does exposure to the feared stimuli or either modeling or nonveridical heart-rate feedback techniques employed individually.

2. Modeling results in subjects making more approach responses than does exposure to the feared stimuli but there is no difference between the effect of modeling and nonveridical heart-rate feedback techniques.

3. Similarly, there is no difference between the effect of a nonveridical heart-rate feedback technique and exposure to the feared stimuli on the subject's approach behavior.

4. Changes in approach behavior resulting from the experimental treatments remain stable over a two-week period of time.

CHAPTER VI

DISCUSSION AND IMPLICATIONS

A. Discussion

As the results and conclusions of this study already indicate, the combined use of a modeling procedure and a nonveridical heart-rate feedback technique result in a markedly superior therapeutic effect than either procedure used individually. A careful observation of the experimental subjects has led the present researcher to conclude that the informational value of the nonveridical heart-rate feedback was particularly apparent in the subjects who received this treatment in addition to the modeling technique. At first they appeared, in general, surprised to learn of their lack of internal reaction and listened to their heart-rate very intently. Once they were convinced that their heart-rate was not going to change, there appeared to be a very careful examination of the model as he or she demonstrated snake-approach behavior. This attention on the part of the heart-rate feedback subjects did not appear to be shared with their counterparts on the other side of the screen who were receiving only the modeling technique. These treatment two subjects appeared by contrast to be more uneasy and were observed to make overt avoidance responses such as looking away or adjusting their seating positions on many occasions. As previously mentioned, one subject was forced to withdraw from this experimental group due to extreme arousal which resulted in her shuddering and being unable to view the modeled behavior. The effect of the nonveridical heart-rate information was further elucidated by the comments of the subjects during and following treatment. A typical comment was that of one of the female subjects who, when she discovered that the stimulus was not affecting her internally, said: "I guess it really isn't fear so much as revulsion." The next session, after many such attempts to evaluate her feelings, she concluded that "it must be in my head; it must be what I am thinking as I walk towards that snake." Post-study interviews with many of these subjects indicated that they had been caused to re-evaluate their feelings as a result of the heart-rate feedback they received. In these interviews, no one voiced any doubt concerning the veridicality of the heart-rate feedback.

As the theoretical orientation had suggested, the effect of the nonveridical heart-rate feedback, it appeared, was to reduce arousal, enabling the subjects to attend more closely to the relevant modeling cues. In addition, the cognitive dissonance created by the dissonant heart-rate feedback which indicated to the subject that he was not reacting internally to what he thought was a fearful stimulus, appeared to result in a need for social comparison which resulted, in turn, in sustained attentiveness to the modeling stimulus. Both the present investigator's observations and the superior results achieved by the use of this treatment procedure would seem to lend support to this theoretical position.

In an effort to investigate whether the experimental treatments have differential effects on subjects according to their level of approach behavior, the difference between the pre-tests and post-tests was calculated for each subject and a two-way analysis of variance for unequal n's was performed to determine whether the observed differences were significant. Using an alpha level of 0.05 the observed F value of 3.989 for differences between levels did not exceed the critical F value of 4.04 and it was concluded that the treatment effects did not differ according to the level of approach behavior evidenced by the subjects. Similarly, the interaction effect between levels and groups was not found to be statistically significant (p 0.66).

Although the levels effect did not achieve statistical significance it very closely approached significance. This outcome was not surprising and is partly explained by further consideration of the raw data. Closer inspection of the data indicated that the level evidencing the greatest degree of avoidance responding on the pre-test had tended to respond to the treatment more than the less extreme level. This is explained in part by the fact that the more extreme level had more potential for change than its counterpart level. Also, a regression effect due to test unreliability contributed to the observed change.

B. Implications

The superior results obtained in this present study with the combined nonveridical heart-rate feedback and modeling techniques would suggest the use of nonveridical physiological feedback as an adjunctive technique to be employed with modeling procedures in the treatment of phobic subjects. This, then, is a clear alternative to the adjunctive techniques described by Bandura and Menlove (1968) as a means of effecting, through modeling procedures, substantial reduction of avoidance tendencies in subjects who display a generalized pattern of anxiety. These therapists have suggested three factors which may be incorporated along with modeling procedures to increase the therapeutic power of this method. These include a self-regulated program of modeling stimuli, relaxation training and, when all else fails, repeated exposure to the most fear inducing modeling stimuli followed by assistance in practicing actual approach behavior as a means of treating those people resistant to other therapeutic attempts. It is the opinion of the present investigator that a well programmed modeling procedure eliminates the necessity for the first of these three factors and that the last of these may be risky at best. Relaxation training, on the other hand, when used with systematic desensitization procedures has considerable clinical and experimental evidence to recommend its use and should be a valuable adjunct to modeling procedures. Although the efficacy of relaxation training in inhibiting anxiety is no longer in question, the mechanisms through which this anxiety inhibition takes place have been called into question by recent investigators such as Davison (1966) and Valins and Ray (1967). In a review of the literature on curare conditioning experimentation, Davison (1966) casts doubt on the Jacobson-Wolpé position which explains the effect of relaxation as resulting from a reduction in proprioceptive feedback from the flaccid muscles, a state which is incompatible with anxiety. Davison (1966) pointed out that during curare paralysis animals evidenced anxiety providing they were not deprived of exteroceptive stimulation. Thus animals receiving no proprioceptive feedback were capable of marked anxiety. Dismissing the reduction of proprioceptive striate muscle feedback as an explanation of the mechanism by which relaxation has its effect, Davison (1966) proposes that the reduced anxiety associated with relaxation results from either a strong positive affect state or a reduction in efferent messages to muscles by way of inhibitory efferents from the cortex. Thus it would appear as though a subject who induces his own relaxation is in fact saying to himself "relax, this does not bother you." This results in inhibitory efferents from the cortex that block further efferents to the flaccid muscles.

Unlike the cognitions concerning internal effects which resulted from nonveridical heart-rate feedback, the cognitions resulting from relaxation training are veridical. If, however, as recent research would suggest, nonveridical cognitions have the same effect as veridical cognitions, then perhaps the effect of a nonveridical heart-rate feedback technique is similar to that of relaxation technique in that they both result in efferents from the cortex that inhibit further efferents to the muscles resulting in reduced or no anxiety. Put in another way, both procedures lead subjects to believe that phobic stimuli are not affecting them internally. In addition, the above reasoning seems totally consistent with Schachter's (1964) theory that cognitive labeling processes are important determiners of emotion.

Should subsequent experimentation involving nonveridical physiological feedback verify its worth as an adjunctive technique to modeling procedures, it would have much to recommend itself over relaxation techniques now in use. The greatest advantages would seem to be economy of time, since relaxation training would no longer be required, and its effectiveness with all clients as compared with relaxation training which cannot be successfully employed with all clients.

Further research concerning the effect of nonveridical heart-rate feedback on actual heart-rate in response to phobic stimuli would be important if the mechanism underlying this nonveridical feedback technique is to be elucidated. It would be interesting to know if nonveridical heart-rate feedback actually has an inhibiting effect on veridical heart-rate when a subject is either exposed to the fearful stimuli or caused to demonstrate approach behavior to the feared stimuli.

If nonveridical heart-rate feedback technique is to be widely employed as an adjunct to modeling technique in the treatment of phobic clients, logically, the next phase of research should investigate the effectiveness of nonveridical heart-rate feedback techniques when used in conjunction with film mediated modeling stimuli. Should nonveridical heart-rate feedback technique prove equally effective when combined with film mediated modeling stimuli, the implications for its widespread application in psychotherapy would be greatly enlarged.

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APPENDICES

APPENDIX A

FEAR SURVEY SCHEDULE II

Confidential   Name: ____________

The items of this questionnaire refer to things or situations that may cause fear or other unpleasant feelings. Please check the colomn opposite the item that most nearly describes the amount of fear you feel toward the object or situation noted in the item.

	None	Very Little	A Little	Some	Much	Very Much	Terror
1. Sharp objects							
2. Being a passenger in a car							
3. Dead bodies							
4. Suffocating							
5. Failing a test							
6. Looking foolish							
7. Being a passenger in an airplane							
8. Worms							
9. Arguing with parents							
10. Rats and mice							
11. Life after death							
12. Hypodermic needles							
13. Being criticized							
14. Meeting someone for the first time							
15. Roller coasters							
16. Being alone							

	None	Very Little	A Little	Some	Much	Very Much	Terror
17. Making mistakes							
18. Being misunderstood							
19. Death							
20. Being in a fight							
21. Crowded places							
22. Blood							
23. Heights							
24. Being a leader							
25. Swimming alone							
26. Illness							
27. Being with drunks							
28. Illness or injury to loved ones							
29. Being self-conscious							
30. Driving a car							
31. Meeting authority							
32. Mental illness							
33. Closed places							
34. Boating							
35. Spiders							
36. Thunderstorms							
37. Not being a success							
38. God							
39. Snakes							

	None	Very Little	A Little	Some	Very Much	Terror
40. Cemeteries - - -	- -	- - -	- - -	- -	- -	- - -
41. Speaking before a group - - - -	- -	- - -	- - -	- -	- -	- - -
42. Seeing a fight - -	- -	- - -	- - -	- -	- -	- - -
43. Death of a loved one	- -	- - -	- - -	- -	- -	- - -
44. Dark places - - -	- -	- - -	- - -	- -	- -	- - -
45. Strange dogs - - -	- -	- - -	- - -	- -	- -	- - -
46. Deep water - - -	- -	- - -	- - -	- -	- -	- - -
47. Being with a member of the opposite sex	- -	- - -	- - -	- -	- -	- - -
48. Stinging insects -	- -	- - -	- - -	- -	- -	- - -
49. Untimely or early death - - -	- -	- - -	- - -	- -	- -	- - -
50. Losing a job - - -	- -	- - -	- - -	- -	- -	- - -
51. Auto accidents - -	- -	- - -	- - -	- -	- -	- - -

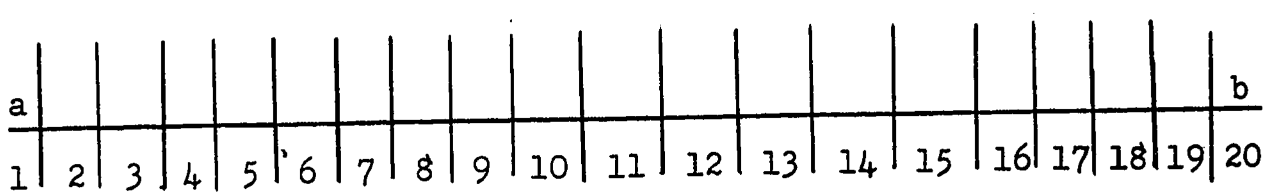
A P P E N D I X B

Scale for Magnitude Estimation of Fear Associated with Approach Responses

APPENDIX B

Scale for Magnitude Estimation of Fear Associated with Approach Responses

Magnitude of Fear	Responses
1	a. enter the room in which a live snake is housed in a glass terrarium (approx. 20ft.).
20	b. allow the snake to wind around your arm and shoulders.
___	c. approach to within three feet of the snake.
___	d. touch the snake with a finger.
___	e. approach to within twelve feet of the snake.
___	f. lift the snake out of the terrarium and hold it for a minute.
___	g. walk right up to the terrarium and look down at the snake.
___	h. approach to within six feet of the snake.
___	i. lift the screen off the top of the terrarium.
___	j. lift the snake off the bottom of the terrarium.
___	k. put your hand into the terrarium past the wrist.
___	l. lift a portion of the snake's body.



APPENDIX C

Scale for Rating Emotional Responses of "Approach Subjects"

Appendix C

Scale for Rating Emotional Responses

of "Approach Subjects"

NAME: _________ SESSION______

1. Upon first viewing the snake, subject experienced the following amount of fear:

None Very Little A Little Some

Much Very Much Terror

2. How much tension or anxiety do you think subject felt when she was nearest the snake?

None Very Little A Little Some

Much Very Much Terror

3. Rate your impression of subject's overall fear level.

None Very Little A Little Some

Much Very Much Terror

APPENDIX D

Scores Resulting from the Interpretation of Approach Responses in Term of the Magnitude of Fear Estimates Associated with each Response for Each Subject on Each Test of Approach Behavior.

Appendix D

Combined Modeling and Nonveridical Heart-Rate Feedback Treatment Group

Subject	Pre-test	Post-test	Follow-up test
1	3.34	18.33	18.33
2	6.95	41.65	41.65
3	18.33	73.34	73.34
4	41.65	109.42	129.42
5	18.33	73.34	--
6	28.62	129.42	129.42
7	11.61	18.33	--
8	41.65	41.65	41.65
9	18.33	41.65	56.69
10	41.65	73.34	109.42
11	28.62	56.69	--
12	28.62	73.34	73.34
13	41.65	56.69	56.69
14	18.33	56.69	73.34
15	41.65	73.34	73.34

APPENDIX D (continued)

Modeling Treatment Group

Subject	Pre-test	Post-test	Follow-up test
1	18.33	56.69	41.65
2	18.33	56.69	56.69
3	41.65	129.42	129.42
4	41.65	73.34	73.34
5	28.62	28.62	28.62
6	41.65	90.84	109.42
7	28.62	28.62	28.62
8	41.65	56.69	129.42
9	11.61	11.61	11.61
10	41.65	73.34	73.34
11	11.61	11.61	11.61
12	11.61	41.61	--
13	6.95	18.33	18.33
14	6.95	11.61	--

APPENDIX D (continued)

Nonveridical Heart-Rate Feedback

Treatment Group

Subject	Pre-test	Post-test	Follow-up Test
1	41.65	41.65	41.65
2	28.62	41.65	41.65
3	18.33	18.33	18.33
4	28.62	41.65	--
5	18.33	41.65	41.65
6	41.65	73.34	73.34
7	41.65	41.65	41.65
8	6.95	18.33	18.33
9	18.33	18.33	18.33
10	41.65	41.65	41.65
11	28.62	28.33	28.33
12	11.61	18.33	18.33
13	28.62	28.62	28.62
14	18.33	28.62	28.62

APPENDIX D (continued)

Stimulus Exposure Treatment Group

Subject	Pre-test	Post-test	Follow-up test
1	28.62	18.33	18.33
2	41.65	41.65	41.65
3	41.65	56.69	41.56
4	28.62	56.69	--
5	28.62	28.62	28.62
6	28.62	28.62	28.62
7	18.33	18.33	--
8	18.33	18.33	18.33
9	18.33	28.62	28.62
10	18.33	18.33	18.33
11	11.61	18.33	11.61
12	28.62	28.62	28.62
13	28.62	41.65	41.65
14	6.96	6.95	--

A P P E N D I X E

Mean Approach Behavior Associated with the Different Treatment Conditions

APPENDIX E

Mean Approach Behavior Associated with the Different Treatment Conditions

	Pre-test	Post-test	Follow-up test
Heart-rate and Modeling	25.95	62.48	73.05
Modeling	25.06	49.22	59.34
Heart-rate	26.09	34.46	33.91
Exposure	24.78	29.27	27.82