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The Relative Effectiveness of Audio-Taped Relaxation and Live-Therapist Presented Relaxation in Terms of Physiological Parameters

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THE RELATIVE EFFECTIVENESS OF AUDIO-TAPED RELAXATION AND LIVE-THERAPIST PRESENTED RELAXATION IN TERMS OF PHYSIOLOGICAL PARAMETERS

by

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ABSTRACT

The Relative Effectiveness of Audio-Taped
Relaxation and Live-Therapist Presented
Relaxation in Terms of Physiological Parameters

by

Cris M. Quayle, Doctor of Philosophy

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In order to assess the relative efficacy of audio-taped relaxation as compared to live-therapist induced relaxation, 80 volunteer subjects were randomly assigned to one of the following eight groups: (1) live-therapist (male) contingent, (2) live-therapist (male) non-contingent, (3) taped contingent (male), (4) taped non-contingent (male), (5) live-therapist (female) contingent, (6) live-therapist (female) non-contingent, (7) taped (female) contingent, and (8) taped (female) non-contingent. The subjects were exposed to treatment conditions for five sessions during which they received a relaxation sequence via either a live-therapist or audio-taped format in a contingent or non-contingent (subject controlled pace or non-subject controlled pace, respectively) progression. The subjects were monitored with an EMG and Skin Temperature device for 10 minutes following the relaxation sequence. Following the relaxation sequence, each subject was administered a subjective relaxation scale. The first session data were compared to the last session data via a 4 way ANOVA at a .05 alpha level.

The analysis of variance indicated that all groups on all of the dependent variables became more relaxed (EMG reduction and skin temperature increase) from pre to post period monitorings. On the variables of EMG and skin temperature, the live-therapist and contingent progression groups produced greater relaxation than did the taped and non-contingent groups. The combination of live-therapist and contingent progression proved to be the most effective in reducing EMG and increasing peripheral skin temperature. (Both indications of relaxation.) All the treatment groups responded similarly on verbal report with the live-therapist contingent and taped-therapist non-contingent groups decreasing most on the verbally reported subjective scale. Implications for the use of live and taped-therapist presentations along with contingent progression formats were discussed.

(60 pages)

CHAPTER I

INTRODUCTION

Therapists are constantly confronted with decisions concerning the use of specific therapeutic techniques; that is, are the techniques in question of any clinical value? The use of relaxation training has become a central therapeutic technique used by a variety of professionals on a multitude of target behaviors ranging from insomnia to test phobias. Several forms of relaxation training have been evidenced in the literature. Generally, relaxation training can be dichotomized into the techniques utilizing a live-therapist format and those which utilize audio-taped relaxation sequences in lieu of a live therapist.

Within the past five years there has been a move toward the use of audio-taped relaxation sequences by many therapists. Unfortunately, little data is available on the relative effectiveness of (1) live-therapist and (2) audio-taped relaxation techniques. What data are available are of a conflicting nature and lack the experimental rigor necessary to formulate valid conclusions. The necessary controls that have been absent in the research revolve around the (1) reliance upon subjective data (Lang, 1966; Allen, 1973; Gershman and Clouser, 1974), (2) a lack of sufficient time in treatment conditions (Weiher, 1975), and (3) a general confounding of the procedural techniques (Paul and Trimble, 1970; Devine, 1970).

Problem

There appears, in the literature, a great deal of data concerned with the use of recorded audio-taped relaxation sequences used as an adjunct to several types of therapy, especially desensitization. Several investigators have shown that audio-taped relaxation has been effective in the treatment of a variety of target behaviors. Unfortunately, most of these studies are in a case study format and lack the rigor of experimental analysis. Also lacking in the literature are data concerned with the relative effectiveness of audio-taped relaxation as compared to live-therapist presented relaxation. This question is a central one for a variety of therapists. If audio-taped relaxation is as effective as live-therapist relaxation, it would prove most economic in terms of both time and money for not only the therapist but also the client. When used as an adjunct to ongoing therapy, (i.e. taking audio tapes home to relax in environments other than the therapist's office) audio-taped relaxation might also increase generalizability of the therapeutic process to extra-therapeutic settings. These tapes could be utilized to induce relaxation in situations more appropriate to the individual's anxiety. Availability of psychological services would be greatly affected by any such technique that frees the therapist and client from structured time and locations for treatment.

The problem is then, that there is a lack of data concerned with the factors related to the relative effectiveness of audio-taped relaxation. This apparent lack of knowledge stems from insufficient

experimental control in the previous studies coupled with conflicting findings as reported by Paul and Trimble (1970) and others (Devine, 1973; Donner and Guerney, 1969; Kahn and Baker, 1968).

The present study was designed to, using objective physiological data, directly compare the effectiveness of audio-taped relaxation to live-therapist relaxation and to evaluate the response-contingent progression theory of relaxation acquisition which, to date, has gone untested.

Purpose

The present study was designed to answer several questions related to relaxation. First, the design was constructed to examine the viability of the response-contingent progression theory which attempts to account for differences between live-therapist and taped relaxation techniques via a subject readiness model of progression. Subject readiness refers to the type of progression that is responsive to the individual's readiness to progress from one muscle group to another. Essentially, the subject controls the pace of the sequence in order to prevent rushing the subject through the relaxation progression. Secondly, the question of the relative effectiveness of live-therapist relaxation and audio-taped relaxation was examined in terms of objective physiological data supplied by electromyograph and skin temperature devices. The present study also examined the effects of two different therapists (different in terms of sex) on the relaxation procedure. The addition of a second therapist provided further information on therapist interaction with the relaxation procedure. Finally, within

the design of the present study, the investigator assessed the effect of relaxation training on skin temperature, which to date has been insufficiently examined. Several investigators have suggested that skin temperature is as valid, and perhaps more valid than EMG, as an indicator of relaxation (Sargent, Green, Walters, 1973; Peper, 1972).

Hypotheses

The research hypotheses were that there is no difference from pre to post periods for each of the variables of EMG, skin temperature and verbal report, between subjects who received: 1) live-therapist presented relaxation, and those receiving taped relaxation; 2) contingent relaxation and subjects who received non-contingent relaxation; 3) male therapist and those subjects who received a female therapist. It was also hypothesized that there would be no interaction effects.

Definitions

For the purposes of the present study, relaxation was defined primarily as the reduction of muscle activity at the site of electromyograph monitoring and, secondarily, as an increase in peripheral skin temperature on the dominant hand. Within the design of the present study is incorporated a "contingent" group. This group differs from the non-contingent group in that the former group's progression from one muscle group to another is controlled or paced by the subject. That is, when the subject has completely relaxed one muscle group he will progress to the next muscle group by indicating his readiness by raising his index finger of his non-dominant hand. At that time,

the therapist would proceed with the relaxation script.

Limitations

As a result of the proposed research, several limitations need to be mentioned. The nature of the population used hinders attempts at generalizing obtained data to other non-college volunteer populations. The fact that the population was essentially a "normal tensive" population also constricts generalizations to vastly different types of populations. Generalization to other therapists must also be done with caution. That is, only two therapists were used to dispense the relaxation script in the present study. Generalization to other therapists with different relaxation scripts must be examined.

Another limitation related to the present research deals with the dependent variables of EMG and skin temperature. The present research defines "relaxation" as a reduction in EMG and an increase in peripheral skin temperature. This type of definition needs to be kept in mind when exploring the "relaxation" phenomenon.

CHAPTER II

REVIEW OF THE LITERATURE

The review of the literature that follows is one limited to the relevant research dealing with relaxation techniques and does not include a comprehensive review dealing with systematic desensitization and biofeedback.

Progressive Relaxation

Progressive relaxation is the result of the work done by Edmund Jacobson, a physician, in the early 1920's (Jacobson, 1938; Jacobson, 1962). In Jacobson's practice he saw that relaxation was irreplaceable in the treatment of both circulatory and nervous disorders in his patients. Jacobson noted that some patients were unable to relax. This phenomenon he termed "residual tension." Residual tension was operationally defined as neuromuscular hypertension evidenced by hyperactivity of the reflexes, muscle excitability, spastic condition of smooth muscles, tremor accompanied by restlessness. The development of progressive relaxation was aimed at the alleviation of this residual tension.

Procedurally, progressive relaxation (Jacobson, 1938, 1963) is a therapeutic technique that consists of a substantial number of muscle exercises covering the major muscle groups in the body. Each exercise involves alternate tensing and relaxing of specific muscle groups. The tensing is done in order to discriminate tension in specific parts of the body. The goal of progressive relaxation is to acquire a

"muscle sense" whereby muscle tension, even minimal amounts, can be identified by the client and subsequently relaxed.

Since its conception, progressive relaxation has been utilized to produce deep muscle relaxation in hypertensive individuals. Abbreviated forms of progressive relaxation which involve fewer exercises and shorter periods of practice have been widely used to promote relaxation during systematic desensitization therapy (Wolpe, 1969; Migler and Wolpe, 1967).

Following several years of practical application, Jacobson discovered that the technique had several clinical applications in addition to the alleviation of tension. Progressive relaxation also tended to promote sleep and reduce restlessness and irritability. In the following years, Jacobson applied his progressive relaxation to a variety of clinical disorders ranging from chronic insomnia to cardiac disorders. Symptom reduction was commonly evidenced within one to two months following the initiation of training.

Systematic Desensitization Utilizing Relaxation Techniques

Systematic desensitization, as first presented by Wolpe (1958), was designed as a temporary treatment for fear-related disorders. Wolpe's technique utilizes relaxation procedures to reduce anxiety associated with the presentation of specific fear-producing stimuli. Central to the technique of systematic desensitization is the assumption that anxiety and relaxation are mutually exclusive; that is, a relaxed individual is unable to experience anxiety and vice versa. Recently this method has been modified to include standard hierarchies,

taped relaxation training, and finally, totally taped procedures without the presence of a therapist.

Systematic desensitization is usually composed of three steps. The individual is first taught an abbreviated form of Jacobson's progressive relaxation technique. The individual is then exposed to roughly six of these relaxation sessions. The next step involves the construction of a stimulus hierarchy. This hierarchy consists of a graded series of anxiety producing stimuli associated with the feared event (e.g. public speaking, snakes, tests). The hierarchy items are then ranked in decreasing order of aversiveness. In the final step of the desensitization process, the client is instructed to imagine the least aversive item on the stimulus hierarchy. While the client is imagining the stimulus item he is instructed to remain completely relaxed. If the client experiences any anxiety in response to the presented stimulus item, he signals the therapist. If anxiety is experienced, the therapist reintroduces the relaxation exercises and then readministers the anxiety producing stimulus item from the hierarchy. The therapist proceeds to the next stimulus item on the hierarchy when the client is able to imagine the aversive stimulus item and remain relaxed. For a complete review of the literature associated with the procedure of systematic desensitization, the reader is referred to an extensive review by Wolpe and Lazarus (1968). Wolpe and Lazarus report successful treatment outcomes in 80 percent to 90 percent of the cases.

Electromyography

Out of the wealth of recent technological advances has come the technique of electromyography (EMG). Currently utilized EMG machines use surface electrodes placed on specific muscle groups to monitor electrical activity at the localized site. Through headphones, the subject is able to hear analogue feedback. As the subject's muscle activity increases or decreases, the audio feedback heard through the headphones fluctuates up or down.

The first study to gain acceptance in the field of electromyography was reported by Inman (1944) in which he investigated the movements of the human shoulder region. Since then, Budzynski and Stoyva (1969) introduced a portable and sensitive EMG capable of providing analogue feedback to facilitate relaxation in the subject and to supply an objective measure of local muscle activity.

In the literature dealing with the use of the EMG several electrode sites have been utilized. The most widely used muscle group has been the frontalis muscle or forehead muscle. According to several investigators (Alexander, 1975), the frontalis muscle is the best single indicator of a subject's relaxation. In a study reported by Budzynski and Stoyva (1969, unpublished) subjects that received frontalis feedback decreased both frontalis and forearm muscle activity while subjects receiving forearm muscle feedback decreased forearm muscle activity only. From these data the investigators concluded that the frontalis muscle is the best indicator of relaxation in the subject and should be used over forearm or any other muscle group.

To assess the effectiveness of EMG facilitated relaxation training, Budzynski and Stoyva (1969) designed a study in which one experimental group of subjects received EMG feedback with instructions to relax while another experimental group received non-contingent feedback (feedback supplied non-contingently to physiological responses of the subject) along with the same instructions to relax. These subjects were then monitored by an electromyograph. Deeper levels of relaxation were evidenced in the experimental subjects receiving true EMG feedback than in the group receiving non-contingent EMG feedback or a control group which received no feedback. The authors reported that EMG training can, in fact, facilitate relaxation.

More recently, EMG training has been successfully applied to a variety of target behaviors including tension headaches (Wickramasekera, 1972; Budzynski, Stoyva, and Alder, 1970) & insomnia (Raskin, Johnson, and Rondesvedt, 1973).

Wickramasekera (1972) utilized relaxation training on the EMG to treat tension headaches. Tension headaches are the result of excessive tension of the muscles of the forehead, neck or shoulders (Wolgg, 1963; Ostfeld, 1962). In this study Wickramasekera trained five female subjects to reduce EMG levels. Following the treatment sessions the author reported significant reductions in both frequency and intensity of headaches. These data are supported by another study reported by Budzynski, Stoyva, and Adler (1970) in which five subjects were taught to reduce muscle tension via EMG feedback. These five subjects reportedly decreased headache activity following the treatment.

Raskin, Johnson and Rondesvedt (1973) utilized EMG training in the treatment of insomnia using six chronic insomniacs. These subjects were taught to relax specific muscle groups via the use of the electromyograph and instructed in self-induction techniques to be used in the home prior to sleep. The authors reported "moderate to marked improvement" in their subjects.

Freedman and Papsdorf (1975) in a paper presentation also reported success in treating insomnia utilizing EMG training.

Skin Temperature Training

The cardiovascular mechanisms which regulate skin temperature at the extremities are closely tied with sympathetic nervous system activity. When the sympathetic system is activitated, the smooth muscles surrounding the blood vessels near the surface of the skin are likely to contract, resulting in vasoconstriction (a decrement in the diameter of a blood vessel). The result of vasoconstriction is a reduction of blood near the surface and subsequent reduction of skin temperature. When the sympathetic system is relaxed, the blood vessels near the surface tend to dilate (vasodilatation) thus increasing skin temperature.

Skin temperature feedback is a process of monitoring and displaying ongoing skin temperature. Skin temperature is monitored by the use of a skin temperature thermistor that is usually attached to one of the extremities, normally the hand or fingers. Skin temperature training is complementary to EMG training and, as such, can and is used to teach individuals relaxation of the autonomic nervous system.

That is, as an individual relaxes, certain physiological changes occur. Muscle tension tends to decrease throughout the major muscle groups as peripheral skin temperature increases.

The use of skin temperature training has been shown to be effective in the treatment of a variety of conditions involving sympathetic overactivation. The alleviation of migraines is the most widely treated condition mentioned in the literature (Sargent, Green, and Walters, 1973; Schwartz, 1973).

The Menninger Foundation was the first to experiment with the use of skin temperature training in the treatment of migraine headaches (Blanchard & Young, 1974). Within the treatment plan was incorporated the use of autogenic training and skin temperature monitoring. Out of the 75 subjects, 32 were migraine sufferers. Out of the 32 migraine sufferers, the authors reported that 29 were rated improved on a clinical assessment measure.

Utilizing a similar treatment strategy, Peper (1973) reported that two of his three migraine subjects were "successfully treated using hand-temperature training."

Weinstock (1972) also reported a study which used a combination of EMG and skin temperature training along with psychotherapy with seven headache sufferers. Weinstock reported that all subjects were free from headaches for several months following termination of the treatment.

Two investigators reported the use of skin temperature modification in the treatment of Raynaud's disease, a disorder that is manifest in

numbness, coldness, and eventually gangrene due to peripheral vasoconstriction in the feet. Peper (1973) reported unsuccessfully treating this disorder while Schwartz (1973) reported having better results utilizing skin temperature training.

Prerecorded Relaxation Training

The therapeutic potential of prerecorded relaxation has been recently examined. Dawley, Floyd, and Smith (1974) reviewed over 35 studies pertaining to self-administered, minimal therapist contact, and automated behavior therapy and concluded that recorded relaxation training is a viable treatment approach.

One of the first studies that utilized audio-taped relaxation was reported in the literature of Migler, Bernard, and Wolpe (1967). In their case study, the client recorded his own relaxation exercises and successfully carried out his own desensitization in the absence of a therapist.

In Migler et al.'s (1967) introduction they referred to a personal communication with Lang (1966) in which the latter reported to have shown the effectiveness of audio-taped relaxation in the treatment of a snake phobia.

Relaxation is an integral part of many behavioral therapies and, as such, can be self-administered via preprecorded exercises. Denholtz (1970) reported, in another case study, the successful use of prerecorded tape relaxation exercises between treatment sessions to enhance the effectiveness of therapy. Allen (1973) found that self-administered relaxation instructions in conjunction with "study" counseling

(therapist present), was as effective as group relaxation and "study counseling" (therapist present) in the alleviation of test anxiety. Also using taped relaxation instruction, Gershman and Clouser (1974) effectively treated a group of subjects suffering from insomnia.

From the literature, it appears that audio-taped relaxation, in conjunction with other therapies, can be an effective therapeutic technique. From these data the question arises as to the relative effectiveness of audio-taped relaxation as compared to relaxation performed by a live therapist. If, in fact, audio-taped relaxation programs are as effective as live-therapist relaxation programs which may consume more time and money, such taped programs could prove to be most efficient and economic for both therapist and client. When used as an adjunct to ongoing therapy, audio-taped relaxation could also increase generalizability of the therapeutic process to extratherapeutic settings. In order to shed light on the question of the relative effectiveness of audio-taped and live-therapist relaxation, Paul and Trimble (1970) reported a study in which relaxation training tapes were evaluated against the same procedures conducted in the traditional live-therapist format. Effectiveness of the two techniques was evaluated based on physiological data (heart rate, respiratory rate, tonic muscle tension, skin conductance) and subjective self-reported data collected from the subjects. The authors concluded that recorded relaxation instructions were "significantly inferior" to the live procedure in terms of the physiological data but not in terms of the subjects' subjective reports. An inference

drawn by this writer would be that perhaps subjects are poor interpreters of their physiology. An alternative hypothesis would suggest that the specific physiological data are not indicative of depth-of relaxation.

Paul and Trimble (1970) in their discussion briefly mentioned (by way of explanation of the obtained results), a response-contingent theory of relaxation. Within the framework of this theory, audio-taped relaxation would be inferior, in physiological measures, to live-therapist relaxation because the former's presentation is not response-contingent. That is, the pace of the relaxation sequence is not keyed to the subject's behavioral cues. In the taped presentation the subject might be rused through the relaxation sequence without attention being paid to the subject's readiness for progression from one muscle group to another. Following this line, the live-therapist presentation might be more effective in producing relaxation due to the therapist's attending to the subject's behavioral cues. This theory seems quite plausible in light of the findings; unfortunately, no follow-up data have been published.

There are several methodological problems associated with Paul and Trimble's (1970) study that make a valid comparison of the two techniques (recorded vs. live-therapist relaxation) impossible. The first problem centers around the "post hoc" comparison of the data. The study (Paul and Trimble, 1970) only obtained data on relaxation procedures using audio-taped relaxation. These data were then compared to other data collected more than a year previously in

another study. Although the authors fail to view this procedure of "post hoc" comparison as inadequate, in the opinion of the writer it definitely lacks the experimental rigor that the conclusions warrant.

Paul and Trimble (1970) also failed to control for time variables that appear to be important in the acquisition of relaxation. Weiher (1975) and others have shown that relaxation instructions were not effective in terms of electromyographic data until the subjects had been exposed to the relaxation instructions for at least four sessions. Paul and Trimble (1970) exposed their subjects to only two sessions and, therefore, possibly had incorporated into their design an inability to obtain positive results.

Devine (1973) reported a study which directly compared the effectiveness of tape-recorded and live-therapist presentation of an abbreviated method of systematic desensitization with forty subjects experiencing "debilitating test anxiety." Devine utilized a group design with the following groups: a taped presentation; a live presentation; and two control groups, a pseudo-therapy group and a no-treatment control. The groups were exposed to three treatment sessions over a three week period. The author concluded that no significant differences between live and taped presentations of the desensitization procedure were evidenced in the data. Again, this study may be criticized on the basis of the minimal three treatment sessions. Although the author reported test scores as the dependent variable, objective data, in terms of physiological measures, were absent.

Another study that appears to the author to suffer from a lack

of objective data was reported in which test anxious college females were divided into three groups (Donner and Guerney, 1969). The three groups consisted of a waiting list control group and two treatment groups; a live and a recorded presentation. In terms of grade point average before and after treatment, no significant differences were found between the two treatment groups; however, a strong trend favoring the live-therapist group was noted based on verbal report of the subjects.

Summary

The data concerned with the relative effectiveness of audio-taped relaxation procedures as compared to live-therapist presentations can be summarized as follows: The literature to date is of a conflicting nature; that is, the data reported by Paul and Trimble (1970) are not in agreement with data reported by Devine (1973). Secondly, the data presented in the literature appear to lack the rigor of experimental analysis in terms of objective measures and time variables related to treatment duration and relaxation acquisition.

One plausible explanation for the obtained differences between taped and live relaxation might lie in a "response-contingent" theory of relaxation. That is, the subject will learn to relax to a greater extent when he controls the rate of progression. Unfortunately, no data have been published to shed light on this central question related to the acquisition of relaxation skills in physiological parameters.

CHAPTER III

METHODOLOGY

Introduction

This chapter will present the methods and procedures utilized in the present study including sampling procedures, experimental procedures, equipment, and finally the test of the data.

Sample

Eighty subjects were utilized in the present study. The subjects were obtained through the introductory psychology classes taught at Utah State University in the Fall and Winter of 1977-78. The study was presented as an extra credit assignment. Since the subjects were drawn from a college population, they ranged in age from 18-25 years. The 200 potential subjects were given a questionnaire designed to eliminate any subject with present ongoing health problems. (See Appendix II).

In order to obtain a sample as close to a clinically hypertensive sample as possible, all volunteers were given a pre-study monitoring for ten minutes on the EMG, skin temperature, and verbal report of tension. The subjects were then ranked on EMG levels from lowest to highest. The subjects EMG level ranged from a low of 0.3 microvolts to a high of approximately 12 microvolts. From this ranking procedure, the 80 subjects with the highest EMG levels were retained for the present study. The approximate cut-off level for inclusion in the present study was 3.0 microvolts. This range is considered relatively

tense.

Procedure

The 80 volunteer subjects were randomly assigned to one of the groups: (1) Live-therapist (male) contingent relaxation, (2) live-therapist (male) non-contingent relaxation, (3) taped contingent (male voice) relaxation, (4) taped-non contingent (male voice) relaxation, (5) live-therapist (female) contingent relaxation, (6) live-therapist (female) non-contingent relaxation, (7) taped contingent (female voice) relaxation, or (8) taped non-contingent (female voice) relaxation.

All of the treatment groups were exposed to the same sequence of relaxation instructions with the exception that the four taped relaxation groups (groups 3, 4, 7, 8) received the relaxation sequence via an audio-taped presentation while the live-therapist groups (1, 2, 5, 6) received the same sequence via one of the two therapists. Both the content and the rate of speaking were held constant in all eight groups in order to control for content and time confounding between treatment groups. The actual duration of the relaxation sequence varied somewhat in the response-contingent groups (1, 3, 5, 7) due to the response-contingent progression technique. That is, in the contingent groups the subject controlled the speed of progression from one muscle group to another. Due to this subject control procedure, the actual time could vary to some extent.

General Procedure

Experimental sessions were held Monday through Friday. The time was held constant for each of the subjects. This time was individually

selected for each of the subjects based upon their other time commitments. During each session, the subjects were seated in a reclining chair and instructed to rest with their feet apart and with their hands on the arms of the chair. The three EMG electrodes were placed on the frontalis muscle as described in the manual accompanying the EMG machine. The skin temperature thermistor was then taped in place onto the dominant hand of each subject. Following the attachment of the sensory devices, the therapist either left the room or remained, depending on the subject's assigned group (i.e., in the live-therapist groups the therapist remained, and in the taped presentations the therapist left).

All subjects (groups 1-8) were exposed to either a live or audio-taped relaxation sequence for five sessions lasting approximately ten minutes. At the completion of the relaxation sequence, all subjects were instructed to "rest quietly without going to sleep." During this ten minute period following the relaxation sequence, physiological data were collected by the Autogen 5600 inline computer in the adjoining room.

Following each session, all subjects in all groups completed a self-report evaluation of their subjective relaxation on a scale of 1-10 with 10 being the most tense that the subject has ever been.

Subjects in the taped-contingent groups (groups 3 and 7) were observed by the therapist from the adjoining room behind a one-way mirror. The therapist controlled the relaxation progression on a response-contingent basis (i.e., the relaxation progression did not

proceed from muscle group to muscle group until the subject evidenced readiness for progression in terms of a behavioral cue, in this case a raised index finger.

Relaxation Tape and Equipment

The recorded relaxation instructions were played on a reel-to-reel recorder placed in the room with the subject. The actual presentation was one suggested and used by Wolpe (1973). It is an abbreviated sequence which involves the use of the forearms, shoulders, neck and face muscle groups. The relaxation script was modified in order to eliminate suggestions to "relax" in order to avoid confounding training effects with suggestion effects. The final modification of the sequence dealt with the elimination of some muscle exercises in order to avoid relaxing the frontalis muscle directly, since this muscle was monitored in the study. (See Appendix I for a complete script).

The tape recorder was equipped with a remote on-off switch located in the adjoining room behind a one-way mirror. This device allowed the therapist, in the adjoining room, to pace the subject on a response-contingent basis (group 3).

Apparatus

The subjects were connected to an Autogen Model 1700 electromyograph in order to monitor frontalis muscle tension throughout the study. Standard gell-type electrodes were placed on the forehead of each subject as described by the manual accompanying the machine. The positive electrodes (2) were placed approximately one inch over

each eye with the ground placed between the two positive electrodes. The frontalis muscle activity was then registered on the EMG meter calibrated in microvolts (uvs).

The subjects were also monitored throughout the study by an Autogen 2000B skin temperature unit. The sensor unit was placed on the fleshy outside part of the dominate hand. The skin temperature was then registered on the temperature meter in degrees F.

Test of the Data

In order to test the data for significance, a four-way analysis of variance was employed on the three dependent variables of EMG, skin temperature, and self-reported relaxation evaluations. The pre- and post-means were computed using the first treatment session and the last, respectively. That is, session one was averaged across all subjects in any given group and then compared to the mean of session five (the last treatment session) for the same group. This comparison was done for each group on the three dependent measures.

CHAPTER IV

RESULTS

This study investigated the relative effectiveness of 1) audio-taped relaxation as compared to live-therapist presented relaxation, 2) contingent and non-contingent progressions of the relaxation sequence, and 3) male versus female therapist effects on the relaxation progression. The data resulting from the four-way analysis of variance are presented in Tables 1-3. These data are graphically presented in Figures 1-12. Each of the independent variables (mode of delivery--live or taped, type of progression--contingent or non-contingent, sex of therapist) will be discussed below with respect to each of the dependent (EMG, skin temperature, verbal report) variables. The hypotheses were: there is no pre-post difference on the variables of EMG, skin temperature, and verbal report between subjects who received 1) live-therapist presented relaxation and those subjects who received taped-therapist relaxation, 2) contingent relaxation and subjects who received non-contingent relaxation, 3) male therapist and those subjects who received a female therapist. It was also hypothesized that there were no interaction effects.

The Tables containing the ANOVA data are presented with the main effects first followed by the first and second-order interactions. The level for significance was set at .05. The main effects found in rows 2-5 of Tables 1-3 are averaged scores for each of the independent variables or the pre-post time variable. For example,

variable T (row 2) is the variable of pre-post. The main effect presented in row 2 represents all treatment groups combined and then compared on the pre-post time dimension. This main effect gives us a global view of movement from pre to post periods. The other main effects have little interpretable value.

The first-order interactions found in rows 6, 7 and 9 are the data directly concerned with the first three hypotheses above. The second-order interactions found in rows 12, 13 and 14 deal with the fourth research hypothesis outlined above. These interactions deal with the independent variables (mode of delivery, type of progression, and sex of the therapist) within the pre-post time frame designed into the present study.

EMG

All four of the research hypotheses were rejected. That is, there were differences between subjects who received: 1) live-therapist presented relaxation and subjects who received taped-therapist relaxation, 2) contingent relaxation and subjects who received non-contingent relaxation, 3) male therapist and subjects who received a female therapist. It was also hypothesized that there were no interaction effects.

The main effect related to pre-post (row 2) indicates that all groups, when averaged together, changed significantly (.05) from pre to post periods. The interaction of mode of delivery (live vs. taped) and pre-post reached a significant (.05) F value of 6.4520, thus rejecting the first hypothesis above. This indicates that

Table 1

Analysis Of Variance For Dependent Variable 1 (EMG)

SOURCE	ERROR TERM	F	DEG. OF FREEDOM	MEAN SQUARE
1 MEAN	S(ABC)	********	1	830.0121
2+ T	TS(ABC)	469.5515*	1	282.9176
3 A	S(ABC)	3.9433	1	2.872960
4 B	S(ABC)	15.2769*	1	11.13025
5 C	S(ABC)	2.3925	1	1.743063
6 TA	TS(ABC)	6.4520*	1	3.887523
7 TB	TS(ABC)	5.8855*	1	3.546203
8 AB	S(ABC)	0.3897	1	0.2839225
9 TC	TS(ABC)	11.4060*	1	6.872410
10 AC	S(ABC)	1.4055	1	1.024000
11 BC	S(ABC)	0.3470	1	0.2528100
12 TAB	TS(ABC)	3.0974	1	1.866240
13 TAC	TS(ABC)	9.8530*	1	5.936703
14 TBC	TS(ABC)	0.4275	1	0.2576025
15 ABC	S(ABC)	0.0089	1	.6502500
16 S(ABC)			72	0.7285679
17 TABC	TS(ABC)	15.2319*	1	9.177640
18 TS(ABC)			72	0.6025274

+ NOTE: Source codes are as follows:
* Significant at .05 level
T = pre-post variable
A = mode of delivery (live vs. tape)
B = sex of therapist (male vs. female)
C = type of progression (contingent vs. non-contingent)
S = subjects

there was a significant difference (.05) from pre to post periods between subjects who received live-therapist presented relaxation and subjects who received taped-therapist presented relaxation in terms of EMG data. That is, the treatment differentially affected the two groups over the pre-post period. To determine the direction and magnitude of the EMG interactions Figures 1-4 were constructed. Figure 1 illustrates the interaction of mode of delivery and pre-post.

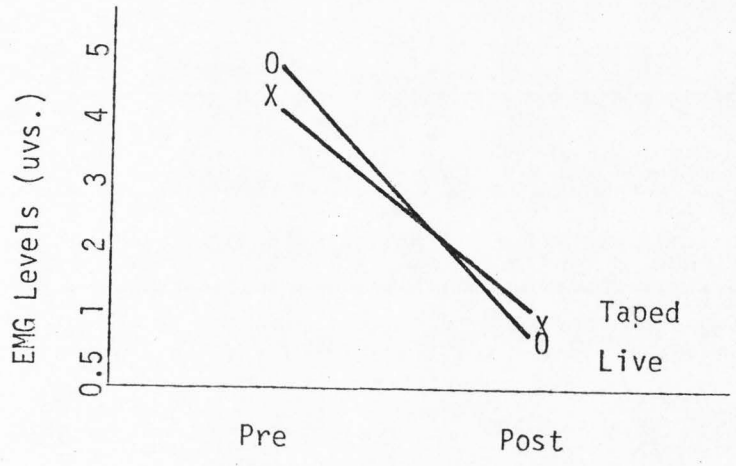

Figure 1. Mode of Delivery

The live-therapist group changed more between pre and post periods than did the taped-therapist group. The live-therapist group started with higher EMG levels and subsequently finished lower than did the taped-therapist group.

The interaction between sex of therapist and pre-post was significant at the .05 level (F=5.8855). These data indicate that there is a difference in EMG levels over time between subjects who received a male therapist and subjects who received a female therapist. Figure

2 shows the direction and magnitude of this interaction. The female therapist group decreased more than did the male therapist group although both groups did move in the desired direction.

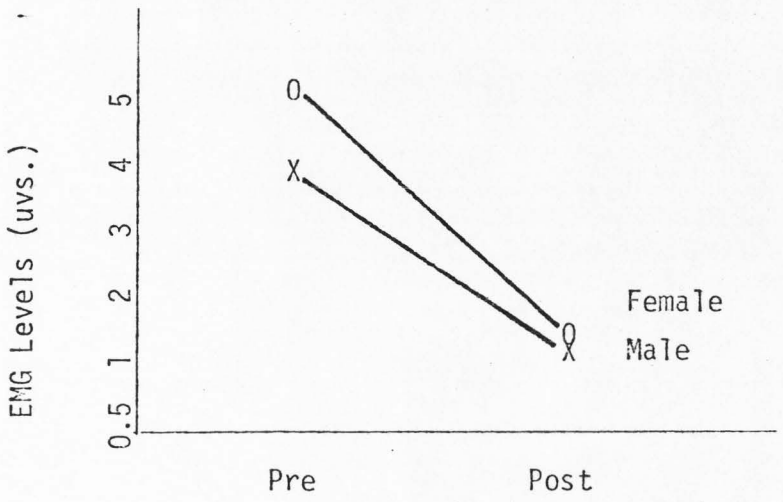

Figure 2. Sex of Therapist

The first-order interaction of type of progression and pre-post reached significance (.05) with a computed F value of 11.406. This points to the conclusion that there were differences between pre and post periods for subjects who received contingent and non-contingent relaxation. To more closely examine the nature of this interaction Figure 3 was constructed. The figure illustrates the relative effectiveness of the contingent relaxation group over the non-contingent group; the contingent group started higher on EMG levels and finished lower than did the non-contingent group.

One second-order interaction reached significance (.05) with an obtained F value of 9.8530. This interaction involves the mode of delivery, type of progression and pre-post variables. Figure 4 shows

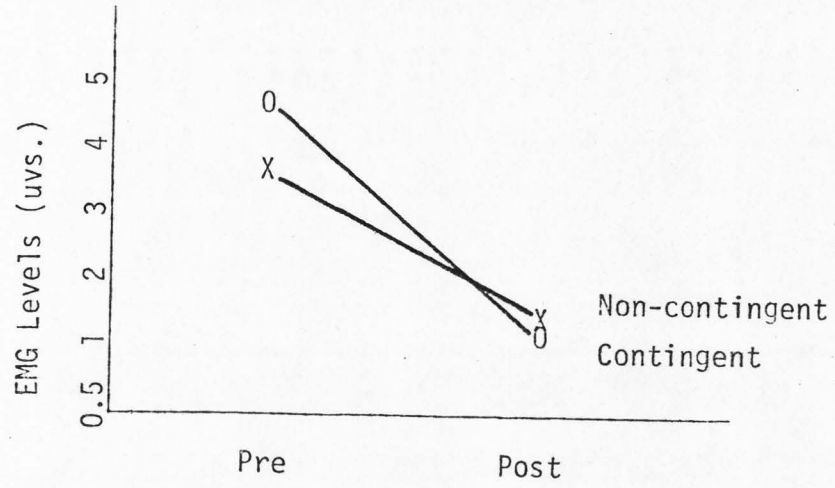

Figure 3. Type of Progression

the relative effectiveness of the live contingent group over the other three. The live contingent group started with the highest EMG

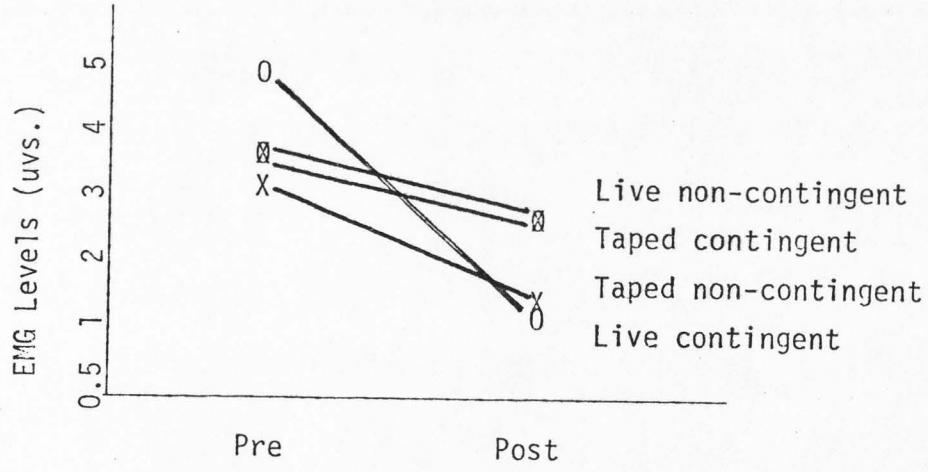

Figure 4. Mode of Delivery and Type of Progression

levels (most tense) and by the post period monitoring reached an EMG level lower than the other three groups.

Skin Temperature

The skin temperature hypotheses were that there is no pre to post difference between subjects who received: 1) live-therapist presented relaxation and those subjects who received taped-therapist presented relaxation, 2) contingent relaxation and those subjects who received non-contingent relaxation, 3) male therapist and those subjects who received a female therapist. It was also hypothesized that there were no interaction effects.

Table 2 presents the data related to skin temperature resulting from the four-way analysis of variance. The main effect of pre-post (row 2) indicates that all groups, when averaged together, changed over the treatment period. In order to further examine the data contained in Table 2 and subsequently evaluate the outlined hypotheses, the first-order interactions are presented in rows 6, 7 and 9. The first-order interaction of mode of delivery (live vs. taped) and pre-post (row 6) reached significance (.05). Figure 5 illustrates the relative effectiveness of the live-therapist group over the taped-therapist group within the pre-post time frame. Although both groups did increase in the desired direction; that is, more relaxed, the live-therapist group increased to a greater extent on the parameter of skin temperature.

Figure 6 illustrates the similarity between male and female therapist groups. Both groups changed in the desired direction. However, the non-significant F (2.0040) indicates there was no significant difference in the temperature change between the two groups.

TABLE 2

Analysis Of Variance For Dependent Variable 2 (Skin Temperature)

SOURCE	ERROR TERM	F	DEG. OF FREEDOM	MEAN SQUARE
1 MEAN	S(ABC)	********	1	1212189.
2 +T	TS(ABC)	146.9191*	1	908.2090
3 A	S(ABC)	10.4263*	1	132.1323
4 B	S(ABC)	3.2038	1	40.60225
5 C	S(ABC)	8.4117*	1	106.6023
6 TA	TS(ABC)	10.6016*	1	65.53600
7 TB	TS(ABC)	2.0040	1	.2499939
8 AB	S(ABC)	7.1254	1	90.30025
9 TC	TS(ABC)	18.3718*	1	113.5690
10 AC	S(ABC)	16.6606*	1	211.1402
11 BC	S(ABC)	4.3392*	1	54.99025
12 TAB	TS(ABC)	0.5073	1	3.136001
13 TAC	TS(ABC)	21.5515*	1	133.2250
14 TBC	TS(ABC)	0.0006	1	.4000574
15 ABC	S(ABC)	1.3029	1	16.51225
16 S(ABC)			72	12.67303
17 TABC	TS(ABC)	9.1632*	1	56.64400
18 TS(ABC)			72	6.181694

+ NOTE: Source codes are as follows:
* Significant at .05 level
T = pre-post variable
A = mode of delivery (live vs. tape)
B = sex of therapist (male vs. female)
C = type of progression (contingent vs. non-contingent)
S = subjects

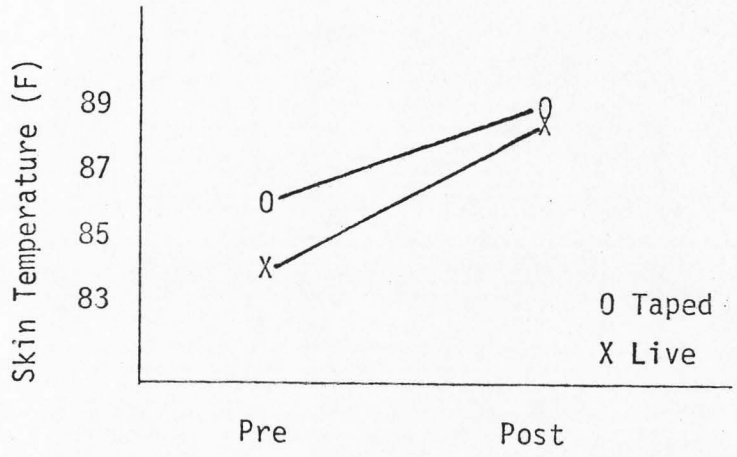

Figure 5. Mode of Delivery

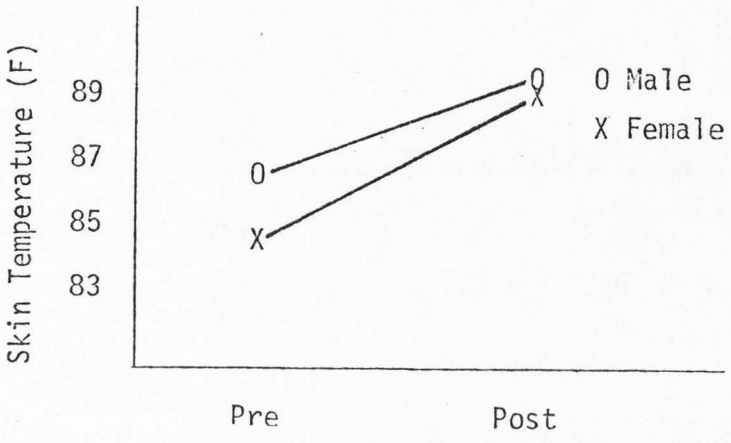

Figure 6. Sex of Therapist

The next interaction involving the pre-post dimension to reach significance (.05) was type of progression (contingent vs. non-contingent) and pre-post (row 9). This indicates that there was, in fact, a significant (.05) difference from pre to post periods between subjects receiving a contingent and non-contingent progression of the relaxation sequence. Again, the magnitude of difference between groups can be seen in figure 7. Both groups started with

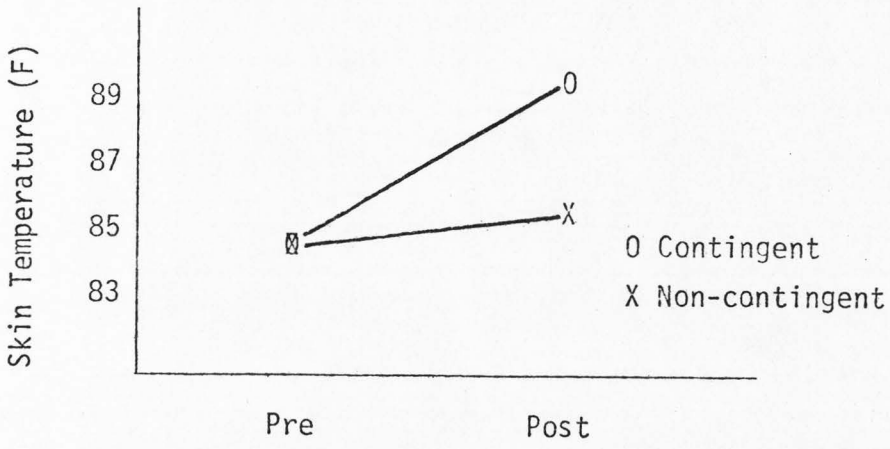

Figure 7. Type of Progression

approximately equal skin temperature levels. By the post period monitoring, the contingent group had increased skin temperature (more relaxed) more than did the non-contingent group.

The final interaction which is interpretable is a second-order interaction involving mode of delivery, type of progression, and the pre-post time frame (row 13). By viewing Figure 8, it is apparent that all groups did respond with similar increases in peripheral skin temperature over the treatment period. With the exception of the live contingent groups, all groups responded with approximately parallel lines. The live contingent group produced a greater magnitude of change than did the other three groups. These data would suggest that the live contingent format is superior to the other three groups with respect to skin temperature.

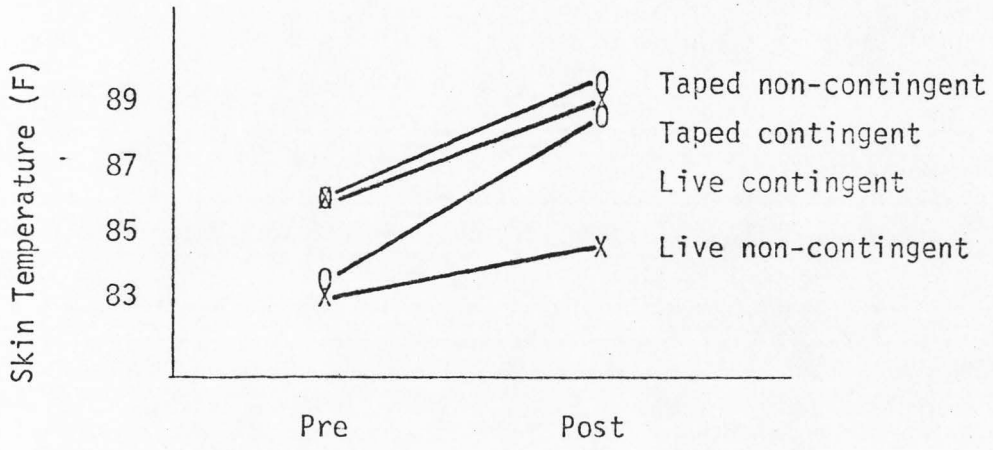

Figure 8. Mode of Delivery and Type of Progression Interaction

Verbal Report

All verbal report hypotheses were retained with the exception of the interaction hypothesis (number 4). That is, based on the data there were no differences between subjects who received live-therapist presented relaxation and subjects who received taped-therapist presented relaxation in terms of verbal report (1-10 scale, this scale was verbally administered to the subjects prior to disconnection from the biofeedback equipment). No differences eventuated from pre to post between subjects who received contingent relaxation and subjects who received non-contingent relaxation. No differences were evidenced over time between subjects receiving a male therapist and those subjects who received a female therapist. However, interaction effects did reach significance.

Table 3 presents the F values related to verbal report. The main effect found in row 2 suggests that all groups, when averaged together,

TABLE 3

Analysis Of Variance For Dependent Variable 3 (Verbal Report)

SOURCE	ERROR TERM	F	DEG. OF FREEDOM	MEAN SQUARE
1 MEAN	S(ABC)	********	1	2536.056
2* T	TS(ABC)	205.8109*	1	393.7563
3 A	S(ABC)	2.6313	1	6.006250
4 B	S(ABC)	0.9884	1	2.256250
5 C	S(ABC)	1.9960	1	4.556250
6 TA	TS(ABC)	1.1793	1	2.256250
7 TB	TS(ABC)	0.0294	1	.5625000
8 AB	S(ABC)	0.0027	1	.6250000
9 TC	TS(ABC)	0.9441	1	1.806250
10 AC	S(ABC)	2.9817	1	6.806250
11 BC	S(ABC)	0.6161	1	1.406250
12 TAB	TS(ABC)	0.3953	1	0.7562500
13 TAC	TS(ABC)	9.8820*	1	18.90625
14 TBC	TS(ABC)	0.5521	1	1.056250
15 ABC	S(ABC)	0.4627	1	1.056250
16 S(ABC)			72	2.282639
17 TABC	TS(ABC)	0.0817	1	0.1562500
18 TS(ABC)			72	1.913194

\+ NOTE: Source codes are as follows:
* Significant at .05 level

T = pre-post variable
A = mode of delivery (live vs. tape)
B = sex of therapist (male vs. female)
C = type of progression (contingent vs. non-contingent)
S = subjects

changed significantly (.05) from pre to post period monitorings. This indicates that all groups responded similarily to treatment with reductions of reported tension. The first-order interactions failed to reach significance essentially responsing similarily to treatment resulting in minimal group differences from pre to post periods. Figures 9-11 also illustrate the minimal amount of differences evidenced between groups. Figure 12 shows that all groups responded with similar magnitudes of change over the pre-post period with exception of the taped non-contingent group which decreased to a lesser extent than did the other three groups. This would suggest that when concerned with verbal report of relaxation, the taped non-contingent format would prove to be least effective.

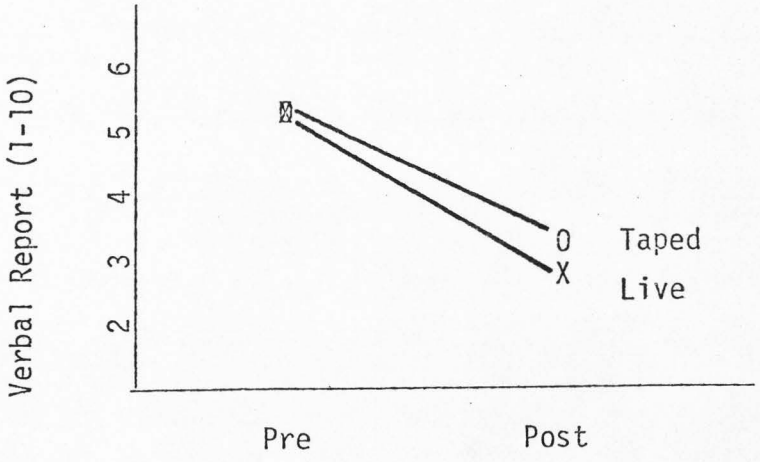

Figure 9. Mode of Delivery

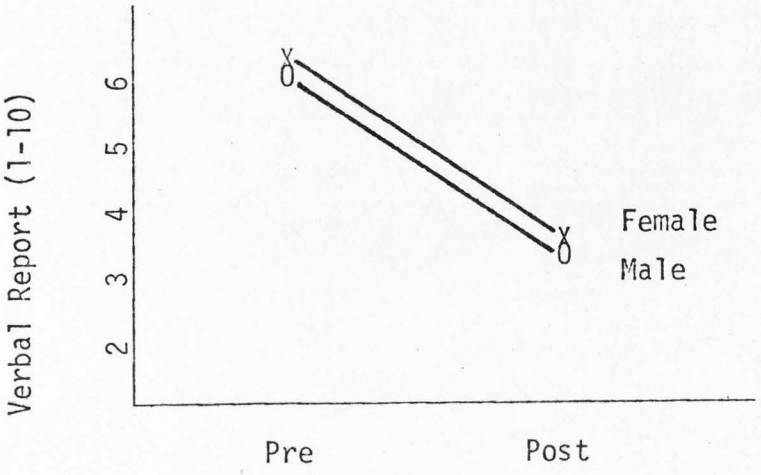

Figure 10. Sex of Therapist

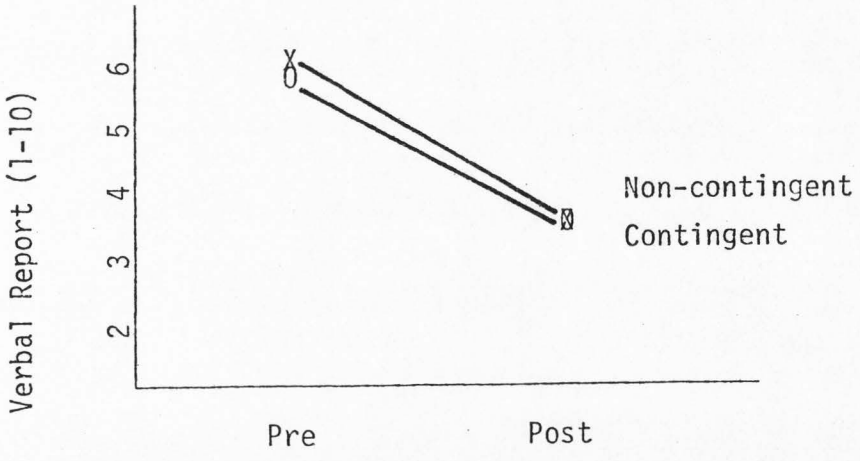

Figure 11. Type of Progression

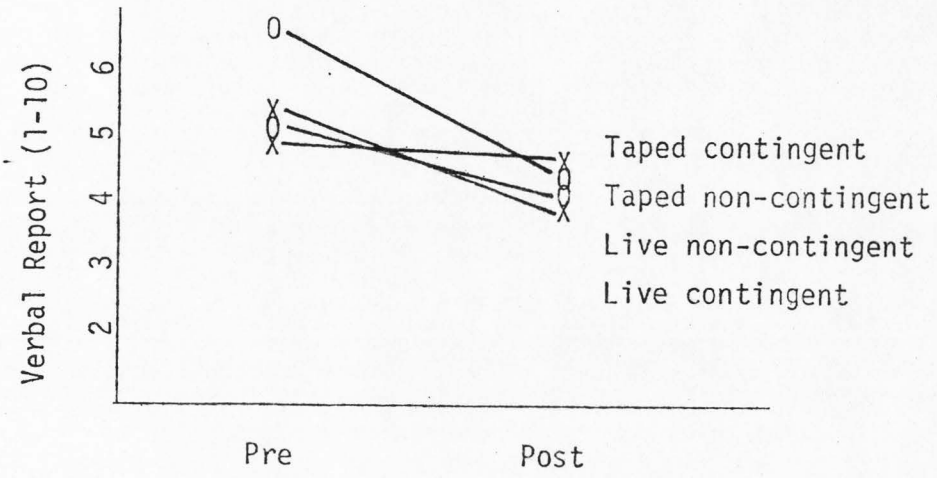

Figure 12. Mode of Delivery and Type of Progression Interaction

Summary

All groups decreased on EMG levels from pre to post monitorings. Although all decreased in the desired direction, the live-therapist group decreased significantly more (.05) than did the taped-therapist group. Subjects who were seen by a female therapist decreased significantly more (.05) than did subjects who received the male therapist. The combination of live-therapist and contingent progression produced the greatest changes from pre to post periods.

The data concerned with skin temperature can be summarized as follows: 1) contingent, non-contingent, live-therapist, and taped-therapist groups all increased on skin temperature from pre to post periods; 2) male and female therapist groups did not statistically differ in terms of recorded skin temperature; 3) the contingent group increased significantly more (.05) than did the non-contingent

group with respect to skin temperature; 4) the live-therapist group changed significantly more (.05) than the taped-therapist group by the post period monitoring; and 5) the interaction of the live, taped, contingent, and non-contingent variables illustrated the relative superiority of the live contingent group over all others.

The results concerned with verbal report can be summarized as follows: 1) all of the treatment groups when analyzed together reached significance (.05) (reduction in verbal report of tension) from pre to post monitorings; 2) all groups responded similarly to treatment; and 3) the only significant interaction was mode of delivery (live vs. taped) and type of progression (contingent vs. non-contingent) within the designed time frame. In this interaction, the live contingent group and the taped non-contingent group decreased most on the verbally reported subjective scale following each relaxation presentation.

CHAPTER V

DISCUSSION

The aim of the present chapter is to deal with the conclusions, discussion, implications, limitations, and future research generated by the present study.

Conclusions

The data indicate that all treatment approaches did reduce muscular tension as measured by the electromyograph over the treatment period. Relaxation as measured by skin temperature also increased over the five treatment sessions for all treatment approaches. Subjects verbally reported that they were more relaxed following the treatment regardless of the specific treatment group. Generally, the combination of live-therapist and contingent progression variables produced the greatest changes as measured by both the EMG and skin temperature. With respect to verbal report of tension, all groups reported approximately equal reductions in tension over the treatment period. The live-therapist group decreased significantly (.05) more than the taped-therapist group on EMG and skin temperature. The physiological data also pointed to the relative effectiveness of the contingent progression group over the non-contingent group.

Discussion

Many therapists (Allen 1973; Devine, 1973) have long adhered to the belief that taped relaxation presentations were as effective as live-therapist presentations in reducing tension. The data

generated by the present study indicate that subjects will learn to relax to a greater extent with a live-therapist than with a tape. Both groups did decrease EMG levels from pre to post periods, but the live-therapist group produced a greater magnitude of change. The live-therapist group changed more on skin temperature from pre to post periods than did the taped group. These findings are in congruence with data reported by Paul and Trimble (1970) in which "audio-taped procedures were found to be inferior to the live procedures in terms of the physiological data." Although the present study reinforces Paul and Trimble's conclusions, the magnitude of difference between the two groups is somewhat different. That is, Paul and Trimble found large differences between the taped and live-therapist groups while the present study suggests that this difference is, in fact, quite small.

One of the research hypotheses dealt specifically with the notion of "contingent progression." The data indicate that contingent formats produce greater reductions in muscle tension and greater increases in peripheral skin temperature than did the non-contingent formats. This question of effectiveness of contingent progression formats has gone, to date, unexamined in the literature. One possible explanation for the obtained results relative to the contingent progression theory, revolves around the ability of the subject to progress from one muscle group to another when he/ she has completely relaxed the first muscle group, thus preventing rushing the client through the relaxation sequence. Since the subject

would be better prepared than the therapist to evaluate his own level of relaxation, this type of explanation would appear to be credible. A supplementary explanation for the apparent superiority of the contingent group might concern the possibility that the contingent group spent more time in the relaxation sequence (due to the nature of the client-controlled progression) than did the non-contingent group.

Some pertinent comments concerning skin temperature appear to be warranted by the present data. Figures 5-8 illustrate that all groups respond similarly to the treatment with predicted increases in peripheral skin temperature. This meshes well with the obtained EMG data; that is, relaxation tends to decrease EMG levels and increase peripheral skin temperature. Second, two groups did respond with greater skin temperature increases than did the others. The live-therapist male and the live-therapist female contingent groups (Figure 8) did respond with greater temperature changes over the five treatment sessions. To restate these data, the live-therapist contingent format produced the greatest increases in peripheral skin temperature (greater relaxation) regardless of the sex of the therapist delivering the relaxation sequence.

There is an incongruency between the physiological data (EMG, skin temperature) and the subjective verbal report. When viewing the differences that eventuated between live and taped-therapist groups on EMG and skin temperature, it is important to note the lack of differences between live and taped groups with respect to verbal report.

Both live and taped-therapist groups did not change in the desired direction (decreased EMG and increased skin temperature) between pre and post monitorings, but subjects receiving the taped presentation did not significantly differ from subjects who received the live-therapist sequence on the verbal 1-10 scale. That is, physiological differences eventuated between live and taped-therapist groups but when subjects were asked verbally they reported approximately equal reductions on the 1-10 scale.

Similar trends were also seen on the contingent and non-contingent variables. While verbal report indicated no differences between the contingent and non-contingent groups, physiological data pointed to the relative effectiveness of the contingent group. This would suggest that subjects are perhaps poor interpreters of their relaxation state. One reason why this might be accentuated in the present study is related to the subjects' unfamiliarity with the discrimination of internal states like relaxation. Having had little or no previous experience with this type of discrimination process, it would not be expected that the subjects would be accurate discriminators of their own state of relaxation. With practice and physiological contingent feedback, subjects might well learn to be more accurate in predicting this type of internal state. Clinicians who utilize subject report as an indication of depth of relaxation should be cognizant of this finding. A second possibility related to the incongruency between verbal report and physiological data might be that the physiological data might not be reflective of what it purports to measure; that is,

relaxation. However, the literature tends to negate such an explanation. Leukel (1968) and Grossman (1973) in their discussions on relaxation, central nervous system and autonomic nervous system functioning, indicate that reductions in somatic muscle innervation and vasodilatation mediated by the autonomic nervous system are evidence for relaxation. The greater the reduction of EMG levels and greater the degree of vasodilatation, the greater the depth of relaxation. This type of conceptualization of the relaxation phenomenon is supported by the majority of the researchers dealing with this area (Budzynski and Stoyva, 1969; Paul and Trimble, 1970; Raskin and Rondestveldt, 1973). As such, the dependent variables of EMG and skin temperature appear to be objective indicators of relaxation.

Although many data are statistically significant, the clinical significance of the data needs to be examined. For example, the data indicate that live-therapist presentations are more effective in reducing muscle tension than audio-taped presentations. When viewing the actual differences that eventuated between live and taped-therapist groups, one must raise the question of clinical significance. That is, are the differences of a practical therapeutic magnitude which would lead a clinician to use one method over the other? The actual differences for EMG and skin temperature at the post period monitoring were approximately 0.5 microvolts and 0.5 degrees (F), respectively. The literature would suggest that this magnitude of difference would have questionable clinical value. That is not to say that the difference is to be overlooked but, instead, that the difference should be

examined in respect to other therapeutic considerations (i.e. time and location concerns of the therapist). It would appear that it would prove most efficient for therapists to utilize the most effective procedures available to them. In this case, live-therapist contingent progression formats.

The question of ceiling and floor effects needs to be discussed in relation to the present data. Ceiling and floor effects involve the restriction of range in the two physiological dependent variables. That is, as subjects reach the lower and upper limits of EMG and skin temperature, respectively, any further changes in predicted directions would be restricted by the nature of the dependent variables.

The lower functional level for EMG is approximately 0.2 uvs. (very relaxed) while the upper functional level for skin temperature is around 92 degrees (very relaxed). So the relaxation technique's effectiveness is limited in magnitude of change by the ceiling and floor affects related to the dependent variables. While some of the treatment groups appeared to reach a ceiling (skin temperature) or floor level (EMG), other groups tended to minimize this concern. For example, Figure 7 evidences the relative superiority of the contingent group over the non-contingent group. The magnitude of difference at the post period between the two groups would minimize concern over the restrictive nature of the dependent variables. Based on the functional ranges of the dependent variables it would appear that all treatment groups could have improved to a greater extent before the restrictive ceiling and floor would detract from the study's ability

to conclude that one type of presentation was more effective than another.

Implications

The data generated by the present research have several implications for therapists dealing with EMG modification. Clinicians who treat tension headaches, insomnia, test anxieties, and general relaxation problems would maximize their effectiveness by utilizing live-therapist contingent formats. These data also have implications for therapists dealing with skin temperature training. Figure 8 illustrates the relative effectiveness of the live-therapist contingent progression group over all others. Based on these results, it would appear that clinicians who treat clients with skin temperature training would do well to utilize live-therapist contingent formats of their relaxation presentations. Migraine sufferers are the primary beneficiaries whose treatment involves the modification of peripheral skin temperature.

Another implication stemming from the present study would concern the use of audio-taped relaxation presentations. The data suggest that audio-taped relaxation presentations are not as effective in producing relaxation as live-therapist formats. Although less effective, they also produce significant reductions in tension as measured by either EMG or skin temperature. As such, it might well be efficient for therapists to utilize audio-taped relaxation sequences as home practice devices. This would give clients a greater opportunity to learn relaxation and would help in generalizing the learned responses

to other situations which may require increased relaxation.

A final implication involves the use of subjective report by clients as an indication of relaxation. Many therapists utilize verbal report of tension as a research variable and/or as a therapeutic measure of relaxation. The present data would suggest that this is a questionable procedure in that the subject's verbal report is not always congruent with concurrent physiological data.

Limitations

When generalizing the present data, the following limitations must be noted. Generalization to other populations is limited by the use of volunteer college subjects residing in northern Utah. These subjects were not of a clinical population but of a normal-tensive one.

Another generalization problem revolves around the use of only two therapists as deliverers of the relaxation sequence. The possible confounding of therapist characteristics and relaxation procedure might produce differential effects if other therapists were utilized to deliver the relaxation presentation. Although the standardized nature of the relaxation script would help to control for this possible confounding, it still warrants mention.

A possible confounding of the present study deals with the absence of a therapist in the taped-therapist condition. In this condition the therapist was absent and by this absence a possible confounding was introduced. To more closely examine this interaction of variables, a taped-therapist group with a therapist in the room (but quiet) would

allow examination of this component.

Future Research

Future research is needed to clarify the following questions raised by the present study. First, the time variables related to the contingent progression hypothesis needs to be controlled and further assessed. This would allow an examination of the effect of the possible increased time in treatment as a result of the client-controlled progression.

Second, generalization problems related to population and therapist parameters need to be more closely examined. Replication of the study with different populations would clarify some of these issues. Any replication should involve the examination of the interaction of sex of therapist and sex of subject. That is, are male therapists more effective in producing relaxation in male or female subjects and vice versa? This type of data would be important in designing viable treatment strategies.

Third, a control for the therapist's absence in the taped-therapist groups needs to be explored.

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APPENDICES

APPENDIX I

Now contract the muscles of your right shoulder. Tighten the muscles of your right shoulder until you feel tension in the shoulder. When you can feel this tension, relax your shoulder. Once relaxed, tighten your shoulder muscles again. Tighten the muscles of your right shoulder until you can feel tension in those muscles. Now relax the muscles of your right shoulder, let your shoulder relax, let it relax more and still more. Attend to the sensation of relaxation in your shoulder.

Now raise your left arm at the elbow. Outstretch your fingers of your left hand and bend your hand backwards towards your shoulder. Bend your hand back until you feel tension in your left forearm. When you feel tension in it, relax your arm, returning it slowly to your side - let it relax. Now repeat this by raising your left arm again at the elbow. Outstretch your fingers and bend your hand backwards towards your shoulder. Bend your hand back until you can feel tension in your left forearm. After you can feel the tension in your left arm, slowly relax your left arm bringing it foreward to rest at your side. Let your left arm relax, let it relax more, and still more. Attend to the sensation of relaxation in your lower arm.

Now contract the muscles of your upper left arm. Tighten the muscles of your upper left arm with your arm lying at your side and tighten it until you can feel tension in those muscles. Once you are aware of tension in the muscles of your upper left arm, slowly relax them. Now repeat that by once again tensing the muscles of your upper left left arm. Let your left arm relax, let it relax more, and still more. Attend to the sensation

of relaxation in your upper arm.

Now contract the muscles of your left shoulder. Tighten the muscles of your shoulder until you can feel tension in those muscles. Then let your left shoulder relax. Now repeat this by once again tightening the muscles of your left shoulder until you can feel tension in your shoulder, and then relax it. Let your left shoulder relax, let it relax more, and more still. Attend to the sensation of relaxation in your shoulder.

Now I want you to contract the muscles of your neck. First, bend your head foreward, pressing your chin on your chest. Bend your head foreward until you feel tension in the muscles in the back of your neck. When you feel tension, relax those muscles, relax your muscles until your head is resting comfortably again. Now repeat this by again raising your head foreward and pressing your chin on your chest. As soon as you feel tension in the muscles in the back of your neck, slowly relax those muscles by letting your head rest comfortably again. Let the muscles of your neck relax, let them relax more, and still more. Attend to the sensation of relaxation in your neck.

To further relax your neck, I want you to bend your head backwards, arching your neck. Bend your head back, raising your chin in the air until you feel tension in your neck muscles. When you do, relax slowly until your head is resting comfortably again. Now repeat this by bending your head back once again until you feel tension in your neck. When you do, relax slowly until your head is resting comfortably. Let the muscles of your neck relax, let them relax more, and more still. Attend to the

sensation of relaxation in your neck.

To relax your facial muscles, begin by clenching your jaw. Put your teeth together and clench your jaw until you can feel tension in the muscles on either side of your jaw. Once you feel this tension, slowly relax your jaw, slightly parting your teeth until your jaw feels relaxed. Now once again clench your jaw together, pressing tightly until you can feel tension on either side of your jaw and then relax, once again parting your teeth until your jaw is relaxed. Let the muscles of your jaw relax, relax more, and still more. Attend to the sensation of relaxation in your jaw.

Now press your tongue against your bottom teeth until you can feel tension in your tongue. When you do, then relax the muscles of your tongue. Now repeat this by pressing your tongue against your lower teeth. Now relax your tongue, let it relax more, and still more.

Now swallow. To relax the muscles of your forehead, begin by raising your eyebrows in an upward direction. Raise your eyebrows up until you can feel tension in the muscles of your forehead. Once you do, relax your eyebrows again. Now repeat this by again raising your eyebrows upward until you can feel tension in the muscles of your forehead. Now relax your eyebrows, let your eyebrows relax more, more still, and still more. Attend to the sensation of relaxation in your forehead.

Now to further relax your forehead, wrinkle your brow by pulling your eyebrows together. Pull your eyebrows together until you feel tension in the muscles of your forehead. When you do, relax those muscles.

Now repeat this again by pulling your eyebrows together until you can feel this tension, relax your eyebrows, relax your eyebrows, relax them more, let them relax more, and more still. Attend to the sensation of relaxation in your forehead. Now squint your eyes tightly together, very tightly, until you can feel tension in the muscles around your eyes. When you feel that tension, relax your eyes. Now repeat this by once again squinting your eyes together very tightly until you can feel tension in the muscles around your eyes. Now relax those muscles, let your eye muscles relax, let them relax more, and still more. Attend to the sensation of relaxation around your eyes.

Now attend to the sensation of relaxation you can feel throughout your whole body.

Now rest quietly with eyes closed without going to sleep.

APPENDIX II

INFORMED CONSENT

I hereby consent to participate as an experimental subject in a study of relaxation techniques and biofeedback. I understand that I am expected to participate once a week for the specified five weeks (20 minute sessions).

I have been informed that my name and identifying information will remain anonymous.

Your Name_____
Phone_____
Signature_____

Please Answer the Following

Are you (or ever have been) currently under any type of medical treatment? If so, explain_____

Have you had any health problems within the past five years?____
If so, explain_____

Please Rate the Following Questions

I consider myself to be generally

Relaxed 1 2 3 4 5 6 7 8 9 10 Very tense

I would like to learn how to relax

Not much 1 2 3 4 5 6 7 8 9 10 Very much

VITA

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