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The Effects of Videotape Relaxation Training and EMG Feedback on Frontalis Muscle Activity

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THE EFFECTS OF VIDEOTAPE RELAXATION TRAINING AND EMG FEEDBACK ON FRONTALIS MUSCLE ACTIVITY

by

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Richard G. Weiher

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by

Richard G. Weiher, Doctor of Philosophy

Utah State University, 1975

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Department: Psychology

Two studies were undertaken to assess the relative effects of videotape progressive relaxation and EMG feedback. During both studies EMG levels of the frontalis muscles were recorded. Ten subjects referred by the University Counseling Center, as high anxiety individuals, were exposed to one of the above two methods. A single subject multiple baseline design, including reversals, was used. Each subject was given four or six baseline sessions, one, four or seven exposures to the videotape and three return to baseline sessions. In the second study, using the same design, each subject was given four or six baseline sessions, four or seven EMG feedback sessions and four return to baseline sessions. No relaxation in frontalis EMG occurred during the initial baseline condition for any of the subjects in either study. Only those subjects given seven exposures to either relaxation training method produced significant decreases in frontalis EMG. The videotape subjects showed decreases during both the modeling and return to baseline conditions.

The EMG feedback subjects produced systematic decreases in frontalis EMG during the feedback condition but increases occurred during the return to baseline condition. The clinical utility of both relaxation procedures might be increased by: increasing the number of training sessions, programming for generalization to real life situations, and developing other versions of the videotape relaxation program. The suitability of frontalis EMG as an overall indicator of body relaxation is questionable.

(100 pages)

CHAPTER I

Introduction

Clinicians are continually faced with the difficult task of wading through the research literature on new therapy techniques to sort out those therapies which are useful and those which are not. It is an accepted fact that research often lags behind the clinical application of many new techniques for changing behavior. One such technique is relaxation training. Relaxation for the purpose of this dissertation is defined as: a reduction of skeletal muscle contractions in the muscles from which physiological recordings are taken (Jacobson, 1962). Relaxation training has become a popular treatment among lay and professional people alike, while relatively little is known (and probably less is understood) of the principles governing its acquisition, generalization, durability, relationship with other behavior and most importantly, its usefulness.

Various relaxation techniques have been discussed in the literature. The most frequently described techniques are progressive relaxation and modifications of progressive relaxation. Most studies use face-to-face application of the relaxation technique. A few therapists use (audio) taped relaxation programs. Yet, little is known of the effectiveness of these programs since (a) most therapists rely on subjective reports from their clients rather than collecting objective data, and (b) the personal effectiveness of the therapist can often not be separated from the technique itself. Therefore, what is needed is a test of a standardized, replicable relaxation training program that is based on objective data.

The purpose and design of the first study were conceived to address this need. In addition to objectively measuring the effects of a standardized, replicable relaxation technique the study provides objective data on the effects of different numbers of relaxation training sessions and (in a limited fashion) the durability of relaxation acquired during the training.

The purpose and design of the second study was based, in part, on the data from the first study. Since the magnitude of change recorded in the first study was not as great as anticipated using the experimental technique, the second study was undertaken to establish the efficacy of electromyograph (EMG) biofeedback under the same experimental conditions. The two studies were not intended to be a comparison of treatment studies. Rather, each represents a singular effort to illuminate some understanding of the principles underlying the acquisition of relaxation.

CHAPTER II

Review of Related Literature

The review of literature which follows has been carefully delimited to give the reader only relevant, significant and hopefully representative synopses of available literature on specific relaxation techniques. It was considered out of the scope of this research to do an exhaustive search of the literature on systematic desensitization, biofeedback and modeling. The literature summarized is intended to provide information sufficient for understanding the rationale, purpose and scope of the present research. The review is limited to the techniques used.

Progressive Relaxation

Relaxation training became accepted as a professional activity as a result of the work of Edmund Jacobson in the early 20's. Jacobson, a physician, noted that prescribed rest was irreplacable in treating circulatory and nervous disorders. Yet, he found that rest did not always result in relaxation, in fact, many patients did not know how to relax. Jacobson attributed this inability to relax to "residual tension" and reported it as a condition prevalent not only among the diseased, but a concomitant to success in business and society (Jacobson, 1938). He formally described this phenomenon as neuromuscular hypertension evidenced by hyperactivity of reflexes, muscle excitability, spastic condition of smooth muscles, tremor and restlessness. It was the dissipation of residual tension that Jacobson sought in developing the progressive relaxation technique.

Jacobson's relaxation training approach involves tensing the muscles to learn to recognize tension so the individual can learn to relax by learning to "not do" whatever it is that produces tension. The client is taught to recognize tension in the various muscles of the body by being taken through successive muscle groups on cue from the therapist. Muscles are not tensed in order to relax but rather are tensed only to learn to discriminate tension. When a subject is able to recognize slight amounts of muscle tension, the therapist can instruct the subject to produce the converse sensation, i.e., muscle relaxation. The goals of the progressive relaxation technique are to acquire a "muscle sense" whereby muscle tension, no matter how slight, can be recognized by the subject himself in a variety of situations and once recognized, the tension can be reduced by "not doing" whatever produced the tension.

Jacobson described several applications for relaxation training in addition to alleviating residual tension. He discovered that relaxation training tended to induce sleep and reduce restlessness and irritability. Subsequently, he applied the technique to treat cardiac disorders, chronic insomnia, compulsion neuroses, mild phobias and neurasthenia (nervous hypertension with fatigue). He reported that he commonly found a reduction or elimination of symptoms within 1 or 2 months of relaxation treatment (Jacobson, 1938).

Relaxation in Systematic Desensitization

Joseph Wolpe is credited with popularizing relaxation training in contemporary treatment of fear-related disorders. Wolpe's technique of systematic desensitization uses relaxation to reduce anxiety associated with specific objects or events. According to Wolpe, since anxiety and relaxation are considered incompatible behaviors, an anxious response to a stimulus is inhibited if that stimulus is presented while the subject is relaxed (Wolpe, 1958).

In the systematic desensitization paradigm, the subject is first taught a brief form of Jacobson's progressive relaxation technique. Wolpe often includes a demonstration of tensing and relaxing his own muscles for the subject to observe. Usually about six relaxation training sessions are given. Next, a stimulus hierarchy is constructed. The hierarchy consists of a graded series of anxiety scenes focused around the theme feared by the client such as public speaking, snakes, test writing, etc. The hierarchy items are ranked from the one which is least anxiety evoking to that which is most anxiety evoking.

A third step is the actual desensitization, which begins by instructing the subject to imagine the least anxiety evoking item on the list. This is done while the subject is instructed to maintain a thorough condition of relaxation. When the subject experiences anxiety, he is to signal the therapist. The therapist then reinduces deep muscle relaxation and repeats the item from the list. When the subject is able to remain calm while imagining the scene, the therapist proceeds to the next item in the hierarchy and the whole procedure is repeated. The subject progresses from one item to the next until the subject is able to imagine the most anxiety evoking item while remaining calm.

Since the publication of Wolpe's Psychotherapy by Reciprocol Inhibition, systematic desensitization techniques have been used to treat countless fear or anxiety related disorders, especially phobias (Paul, 1966; Lang & Lazovik, 1963; Rachman, 1968). In reviewing the systematic desensitization literature, Wolpe and Lazarus report successful treatment outcomes in 80 to 90% of cases (Wolpe and Lazarus, 1966).

Novel Approaches to Relaxation Training

The treatment potential of relaxation training has stimulated efforts to develop new techniques to facilitate or induce relaxation. Representative of this effort is the work of Boggs, Fisher, and Flint (1973) who report inducing relaxation with what they call a "pink noise" generator. The noise generator produced an auditory signal with a band width resulting in a tone believed by the experimenters to be pleasant or relaxing. Eleven of 12 experimental subjects in an exploratory study with no control group demonstrated significant decreases in galvanic skin response after a 10 minute exposure to the signal.

In a case study, Brady (1973) reports using metronome induced relaxation to treat stutterers. An auditory metronome set at 60 beats per minute was used to induce relaxation for two adult subjects. Later, a tape was made for use in a miniature recorder thus allowing a hearing aid device to provide the metronome beats in various settings. Unfortunately Brady, like Boggs, used no control subjects or procedure to assess relaxation effects that might be possible from just the quiet experience alone, without formal training.

Miklich (1973) used operant principles in facilitating relaxation in a young boy diagnosed as hyperactive. He awarded tokens for changes in behavior. The tokens were exchanged for progressive relaxation training in which the boy participated. The boy's activity level and frequency of problem behaviors increased markedly prior to attacks of asthma. Relaxation training was provided when the onset of an asthmatic attack was observed. This procedure produced a decrease in the panic he reported allowing the implementation of other management techniques to increase on-task behavior and improve academic skills.

A variety of therapists (Friedman, 1966; Friedman & Silverstone, 1967; Reed, 1966; Brady, 1966) using systematic desensitization report in case studies substituting relaxation training for anxiety-inhibiting agents such as methahexitone sodium (trade names Brietal and Brevital). These authors, with the exception of Reed, listed the advantages of drug-induced relaxation over learned relaxation. The advantages listed were; subjects unable to relax using progressive relaxation became "calm" when given the drug and overall subjects required a fewer number of sessions of "drug relaxation" before systematic desensitization could be given than when progressive relaxation were used. Reed (1966) listed several disadvantages of methohexitone sodium; the possibility of barbiturate dependence, difficulties in controlling the level of drowsiness and the necessity of having an anesthesiologist present during its use. Mawson (1970) concluded methahexital anxiety inhibition to be superior to relaxation training. In Mawson's study, all subjects received both Brevital and relaxation training. No subjects received only one treatment nor were there control subjects receiving no treatment. Reed (1966) and Brady (1966) prescribe methahexital along with relaxation instructions, regarding it as an adjunct to therapy.

Wolpe prescribes carbon dioxide inhalation to reduce anxiety when active relaxation is insufficient or ill-suited for the subject (Wolpe, 1973). He instructed subjects to breath deeply from a mouth and nose piece that produced a carbon dioxide mixture. Although the anxiety-reducing effects of carbon dioxide mixtures are not known, Wolpe reports that 80% of neurotic subjects with pervasive anxiety respond to carbon dioxide inhalations by achieving some degree of calming or relaxation.

EMG Training

Another major thrust in relaxation training research and therapy has grown in part out of the electronic achievements in recent years. Budzynski and Stoyva (1969) introduced a portable, safe and sensitive electromyograph (EMG) capable of providing (a) analogue feedback to facilitate relaxation in the subject, and (b) objective quantification of muscle activity for therapist monitoring.

The EMG device operates through surface electrodes that detect electrical acitvity produced by a particular muscle. Through headphones, the subject can hear a series of discrete clicks. If EMG activity is high, the click rate is fast. As EMG activity decreases (as muscles relax) the rate of clicks also decreases. Various recording devices can be attached to the EMG to monitor analogue feedback during the relaxation training session.

In various EMG studies in the literature, the surface EMG electrodes are attached to the frontalis (forehead) muscles. Balshan (1962) determined that the frontalis is one of the most difficult muscles to relax so it was reasoned that once control over this hard to relax muscle was achieved, other muscle groups could follow. Further, Budzynski and Stoyva reported in an unpublished study that experimental subjects given frontalis EMG feedback decreased both frontalis and forearm muscle activity. However, subjects receiving forearm feedback decreased forearm muscle activity only. These data suggest then, that once frontalis relaxation is achieved, one might expect other muscles groups to be relaxed as well.

To test the efficacy of EMG facilitated relaxation training, Budzynski and Stoyva (1969) provided EMG feedback to a group of experimental subjects with instructions to relax. Another group was given irrelevant feedback, actually a tape recording of the first group's EMG activity, and instructions to relax. Deeper levels of relaxation were recorded in the subjects receiving true feedback than in the group receiving irrelevant or a control group receiving no feedback. The authors suggested that EMG feedback facilitated relaxation has particular application in monitoring levels of relaxation during systematic desensitization and in training subjects having difficulty relaxing or achieving what Jacobson termed a "muscle sense."

Among the recent studies to test the above hypothesis and add support to the notion that one can alter his response to stress is the research of Wickramasekera (1972). He applied relaxation training to the treatment of tension headaches. A tension headache is considered a stress-related disorder resulting from emotional conflicts or other external pressures such as meeting deadlines, facing unfinished tasks, decision-making or coping with mutually conflicting assignments. Wolff (1963) and Ostfeld (1962) established the cause of tension headache as the sustained muscle contraction in the scalp muscles of the head or neck muscles. In an experimentally controlled case study, Wickramasekera trained five female subjects diagnosed by neurologists as chronic headache cases who failed to respond to a variety of treatment (e.g., psychotherapy, medication, etc.) to relax their frontalis area with EMG feedback. Results indicated significant differences (reductions) in both intensity and frequency of headache activity between baseline and treatment with contingent EMG feedback.

Budzynski, Stoyva and Adler (1970) in a study lacking proper control procedures obtained simular results in reducing tension headaches with EMG facilitated relaxation training. A 3 month follow-up with the five subjects in this study yielded continued low level headache activity when relaxation was practiced daily. In an unpublished controlled study, Budzynski confirmed the superiority of EMG facilitated relaxation over a pseudo-feedback group in treating chronic tension headache subjects.

Raskin, Johnson and Rondesvedt (1973) achieved "moderate" improvement in three subjects and marked improvement in the fourth of six chronic insomniacs considered refractory to treatment by psychotherapy and medication. EMG feedback induced muscle relaxation was used. In the same report, Raskin et al., stated that other subjects with chronic anxiety showed improvement as well but that it was necessary for the patient to incorporate relaxation into his daily activities.

Observational Learning

A learning principle receiving increased attention in the clinical treatment of stress-related disorders is observational learning. The term observational learning is intended to include the general class of learning principles of modeling, imitation and vicarious learning. All imply that learning may occur through observation of a behavior at that time. Bandura (1962) makes no distinction between the terms, but modeling is preferred for the current study since it is the most commonly used term and more accurately describes the research paradigm that follows.

Bandura and Walters (1963) called for the revision of learning principles established by Hull (1943) and Skinner (1938, 1953) to be extended to account adequately for observational learning. Since these previously established learning principles dealt with only the role of direct reinforcement, the eliciting and maintenance of imitative behaviors by vicarious response consequences was ignored. Bandura and Walters argue that a substantial amount of our learned behavior is socially acquired, i.e., through the observation of others performing a behavior and being reinforced for that behavior.

Relating this principle to clinical problems such as fear-related disorders, Bandura and Walters (1963) cited the following evidence to demonstrate that fearful behavior can be socially transmitted. In a study by Berger (1962), a group of observers was informed that a model would receive an electric shock whenever the occurrence of a buzzer was followed by the dimming of a light. Another group of observers was told that the subject was to make a voluntary arm movement whenever the occurrence of a buzzer was followed by the dimming of a light and that the subject would receive no aversive stimulation. Observers who were instructed that the model was shocked displayed "vicariously conditioned emotional responses" as measured by changes in galvanic skin response frequency to the buzzer while the other group did not (Berger, 1962).

Jersild and Homes (1935) and Hagman (1932) wrote that modeling accounted for children showing the same fears as their mothers. The former authors concluded that such socially acquired fears could be eliminated, provided the mother exhibited non-fearful behaviors in response to the formerly fear-arousing situations in the presence of the child.

Reasoning that fearful and fearless behaviors could be socially transmitted, Bandura, Blanchard and Ritter (1969) investigated the relative efficacy of a modeling approach to reducing fearful behavior in the form of snake phobia.

In a study comparing treatments, 40 snake phobic subjects received either symbolic modeling (where the model was shown on a film), live modeling combined with guided participation, systematic desensitization, or no treatment. Results indicated that all three treatments produced generalized and enduring reductions in fear arousal and avoidance behavior. Complete extinction of phobic behavior in all subjects receiving modeling with guided participation was reported. Those subjects achieving partial improvement with other treatments achieved extinction after modeling treatment.

In a review by Rachman (1972), 17 studies were presented in which the data indicate that modeling is superior to no-treatment controls in treatment fear-related disorders. He also cited one exception. Spiegler, Lievert, McMains and Fernandex (1969) produced the one unaccounted for exception where modeling was found to be inferior to a relaxation only, no treatment control group.

Rachman concluded in reviewing the clinical application of therapeutic modeling in fear reduction that one of the two main determinants of a therapeutic modeling effect "appears to be the number of successful exposures to the model(s)" (Rachman, 1972). Successful exposures were those where the subject succeeded in performing the modeled response that had been previously avoided. Secondly, participant modeling appears to be superior to vicarious modeling, i.e., when the observer practices the model's behavior during the demonstration. Rachman's conclusions appear to be based on those findings common to several of the recent studies he reviewed.

Summary Statements

In reviewing the research literature on relaxation training, the following conclusions were drawn:

1. Relaxation training is widely used by members of the helping professions. Among the disorders treated with relaxation training are insomnia, nervous tics, tension headaches, colitis, asthma and neuroses (Jacobson, 1938; 1962), phobias and non-specific anxiety (Wolpe, 1973; Lazarus, 1971). The relaxation training technique described by Wolpe for use in his systematic desensitization procedure is a modified and abbreviated form of Jacobson's progressive relaxation technique.

2. According to Bandura (1962), the acquisition of much learned behavior is attributed to observational learning or modeling. He argues that modeling is a powerful learning principle governing the acquisition of many social behaviors including fear (Bandura, 1963).

Riddick and Meyer (1973) established the efficacy of automated instructions (audio) in inducing relaxation. The automated instructions resulted in reductions in heart rate, galvonic skin response and gross motor movement comparable to those produced by face-to-face relaxation instructions.

3. Budzynski and Stoyva (1969) report that an electromyograph (EMG) is capable of safe, accurate and reliable measurement of levels of muscle tension. Further, by providing feedback of the muscle tension to the subject, relaxation of those muscles is facilitated. However, little is known of the durability of the relaxation effects resulting from EMG feedback. There

is also a scarcity of parametric data available, i.e., Wolpe typically prescribes six sessions in progressive relaxation training to achieve relaxation, before instituting desensitization. Objective data on whether six sessions result in significant relaxation or whether six sessions are necessary to produce a significant relaxation level are not available.

Statement of the Problem

The relaxation scripts used by Jacobson and Wolpe are not fully standardized, i.e., they may vary from subject to subject. This variability in procedure results in an inability to test the efficacy of the technique as opposed to the performance of the therapist from one time period to the next or of different therapists. What is needed to determine the efficacy of the technique is a standardized replicable training approach that minimizes the influence of the therapist as a variable in determining the outcome of training.

It has not been established in the literature that the acquisition of relaxation may be facilitated through a videotape procedure including participant modeling and instructional components. If it were established that relaxation could be acquired through the use of videotape training, regardless of which of the components accounts for the change, the treatment potential would be increased in the following ways:

(a) The number of sessions required by the therapist to induce relaxation could be reduced by using paraprofessionals to supervise the relaxation therapy, (b) relaxation therapy costs could be reduced for the agency and the client, and (c) group treatment by exposing several clients simultaneously to the modeling experience could be possible. To answer the above questions two studies were designed.

Purpose: Study I

The data from Study I addressed the merits of videotape relaxation training and repeated exposures to the videotape. It was the purpose of Study I to determine:

1. What level of EMG relaxation resulted from one, four, or seven exposures to a videotaped relaxation training procedure?

2. What effect the videotaped relaxation training had on the EMG relaxation level of the subject during subsequent test sessions when no exposure to the tape was given?

One of the control techniques included which helped answer these questions was the inclusion of a baseline to determine; what level of EMG relaxation resulted from lying in a reclined position with the instructions "rest quietly without going to sleep."

Purpose: Study II

The data from Study II addressed the merits of EMG feedback relaxation training and repeated EMG training sessions. It was the purpose of Study II to determine:

1. What level of EMG relaxation resulted from four and from seven sessions of EMG feedback?

2. What effects the EMG feedback sessions had on the EMG relaxation level of the subject during subsequent test sessions when no EMG feedback was given?

CHAPTER III

Study I

Method

Subjects. The six subjects selected for this study were clients referred from the Utah State University Counseling Center. The staff at the Counseling Center identified clients for whom relaxation training would be a recommended part of their treatment. Subjects were selected on a first-come basis. Four of the subjects were female, two were male. Subjects ranged in age from 19 to 36. A brief description of each subject is located in Appendix C. See Appendixes A and B for ethical considerations, subject safeguards and the informed consent form signed by all subjects.

Instrumentation. A Biofeedback Systems Model PE-2 electromyograph was used to monitor frontalis muscle activity. Analogue EMG was recorded on a Model 288 Rustrak chart recorder. This equipment allowed monitoring and quantification suitable for making comparisons in muscle activity within and between subjects and sessions.

The study was conducted in a quiet area in the back of a vacant laboratory. A table covered with a 3 inch thick foam pad was positioned perpendicular to a wall and behind a large cabinet. The experimenter, EMG and chart recorder were located at a nearby counter, behind the subject's head. All were out of view of the subject once the subject was reclined facing the ceiling.

Videotape development. To standardize the modified progressive relaxation training experience, a videotape was used instead of a live model. Rachman (1972) refers to this use of videotapes or films as a symbolic modeling and cites its preference and frequent use in clinical research. The videotape was a 15 minute modified progressive relaxation training session with a subject receiving deep muscle relaxation instructions. Audio instructions were recorded on the videotape followed by the combined audio and video training section. The instructions were recorded to standardize the instructions each experimental subject received. Appendix D contains a script of the progressive relaxation training instructions used on the videotape.

The relaxation training script used in Study I was the script suggested by Wolpe (1973). This script is a modified progressive relaxation sequence that is cited frequently in the literature (Wolpe and Lazarus, 1966). Several modifications in the script were made for use in this study. First was the elimination of suggestions to the subject that he "was relaxed." This modification was made to avoid confounding training effects with suggestion effects. Second, only selected muscle groups were used. The muscles selected were those usually covered by Wolpe during the first few relaxation training sessions and considered to be the "easier to relax" muscle groups (Wolpe, 1973). The muscle groups included those of the forearms, upper arms, shoulders, neck and face. The third major modification was an elimination of some facial muscle exercises. These were eliminated to avoid any emphasis on relaxing the frontalis muscle group directly, since the frontalis group was the EMG measurement site.

Experimental design. A multiple baseline design with reversals and replication of stimulus conditions across subjects was used. The multiple baseline design often requires the continuous recording of the same behavior of several subjects during the baseline. In sequential fashion and at different points in time, the independent variable is present to each subject (Baer, Wolf, & Risley, 1968). If changes in behavior are due to the presentation of the experimental variable, the changes will occur sequentially as the variable is presented to each subject. Thus the design standardizes the influence of extraneous variables such as the effects of time per se or the effects of baseline conditions alone.

In the reversal design, the baseline or operant level of a behavior is recorded, experimental conditions imposed and than a return to baseline condition is instituted. This procedure is used for the following reason: If the baseline rate of behavior changes when the experimental variable is introduced, one assumes the experimental variable produced that change during that point in time. When baseline conditions are reinstituted during the reversal, the durability of any change in behavior can be assessed. The multiple baseline design alone, does not permit the assessment of the durability of changes produced by introducing the experimental variable.

In the study that follows, the behavior that was continuously recorded was frontalis EMG. The length of the EMG baseline varied so that the subjects were exposed to the videotape (experimental variable) sequentially and at different points in time (multiple baseline). After, one, four or seven exposures to the videotape the baseline conditions were reinstituted (reversal portion of the design). Thus the multiple baseline portion of the design controlled for the effects of time on the level of relaxation achieved, as well as for the effects of extraneous variables; whereas the reversal portion of the design controlled for the durability of the effects achieved.

The single subject design was chosen for its appropriateness in making generalizations to a clinical population of subjects treated individually on a repeated basis. Information about what to do or not do with an individual directly contributes to the decision making required by the clinician. The data generated by this design allows one to address the question of whether any changes found were of practical or clinical significance to the subject.

General procedure. Experimental sessions were held Monday through Friday at the same time of day for each subject. Subjects were scheduled individually for experimental sessions. During each session, the subject was reclined on the padded table, fitted with headphones and a headband holding three surface electrodes. The headband held each electrode against the subject's forehead. The electrodes were positioned approximately 1 inch apart and located 1 inch above each eye and 1 inch above the bridge of the nose.

The six subjects were combined into three pairs using the following procedure: after three baseline sessions, the subjects were rank ordered according to their mean EMG scores for the three baseline sessions. The subject with the highest mean was ranked 1, next highest 2 and so on until the subject with the lowest mean was ranked 6. The subject ranked first was paired with the subject ranked fourth, the subject ranked second was paired with the subject ranked fifth and the subject ranked third was paired with the subject ranked sixth.

Using a table of random numbers, subjects were then randomly assigned to pair 1, 2, or 3. A coin was flipped to determine which subject received the treatment condition first and second within each pair. This procedure resulted in the random assignment of three matched pairs of subjects to either one, four or seven exposures to the videotape. The three pairs of subjects were designated S_1 and S_2, S_3 and S_4, and S_5 and S_6 for one, four and seven exposures to the videotape respectively.

Baseline. During each baseline condition, each subject was provided the following taped instructions in the headphones: "Now rest quietly without going to sleep." Analogue frontalis EMG was then recorded for a 20 minute period.

No treatment conditions were given until the baseline for each subject was considered stable. The following stability criterion was set: for subjects 1, 3 and 5, the mean EMG for the fourth session could not exceed one standard deviation below the mean of the first three sessions. Where criterion was not met, initial baseline sessions were extended until stable. The same criterion applied for subjects 2, 4 and 6 but was not determined until stable. The same criterion applied for subjects 2, 4 and 6 but was not determined

until each had two more baseline sessions than the respective partner. This criterion precluded the introduction of a treatment condition during a decrement in any subject's EMG.

Videotape. During the videotape condition, the following taped (audio portion only of videotape) instructions were presented in the headphones:

> In a moment you will see a videotape of a young man receiving relaxation instructions. As you watch the young man perform the instructions, you are to observe him closely and most importantly you are to perform each of the instructions yourself as you hear the therapist give them. If you have any doubt about what the instructions call for, just do what the young man does. When the instructions are over, you will be asked to rest quietly. In just a moment, the tape will begin.

The 15 minute videotape was presented. Immediately after the videotape, the following taped instructions were presented via the headphones: "Now rest quietly without going to sleep." Analogue frontalis EMG was then recorded for a 20 minute period.

Return to baseline. During the return to baseline, the same conditions used in the initial baseline were instituted. Each subject was given at least three reversal sessions. The stability criterion set for initial baseline sessions was used to determine termination of reversal sessions.

Data recorded. The Rustrak recorder made a continuous recording of the subject's EMG by printing a mark on the chart paper each second. The paper was graduated at 1/4 inch intervals, equivalent to 37.5 seconds. A score was tabulated at each interval so that for a 20 minute session, 32 scores were tabulated. A mean EMG score was computed for each session and converted from microamps to microvolts (to conform to the convention in the research literature).

Reliability. As a reliability check, two EMG chart records from each subject were randomly selected for retabulation by an independent observer. The observer retabulated the 32 scores from graduated chart paper. A score-by-score comparison of microamp recordings were made to compute the number of agreements and disagreements. Since the chart paper was difficult to read with perfect accuracy, agreements were defined as those scores falling within plus or minus 1 microamp of each other. Disagreements were defined as scores differing more than plus or minus 1 microamp. Reliability was computed by taking the total number of agreements divided by total number of observations (32) and multiplying by 100.

Results

Figures 1, 2 and 3 show the mean session EMG level for all sessions of all conditions for the six subjects. S_1 and S_2 (Figure 1), who were exposed to the videotape only once, showed little or no reduction in EMG level as a function of the single exposure. Subject 1 produced an EMG level which was 21% (1.2 microvolts) below the mean baseline EMG after the single exposure to the videotape. This 4.5 microvolt reading falls within the range of EMG levels recorded during baseline. The mean EMG level during the return to baseline condition for S_1 was 12% (.1 microvolts) lower than the mean EMG level during the initial baseline condition. This mean EMG level was again within the range of the EMG recorded during the initial baseline.

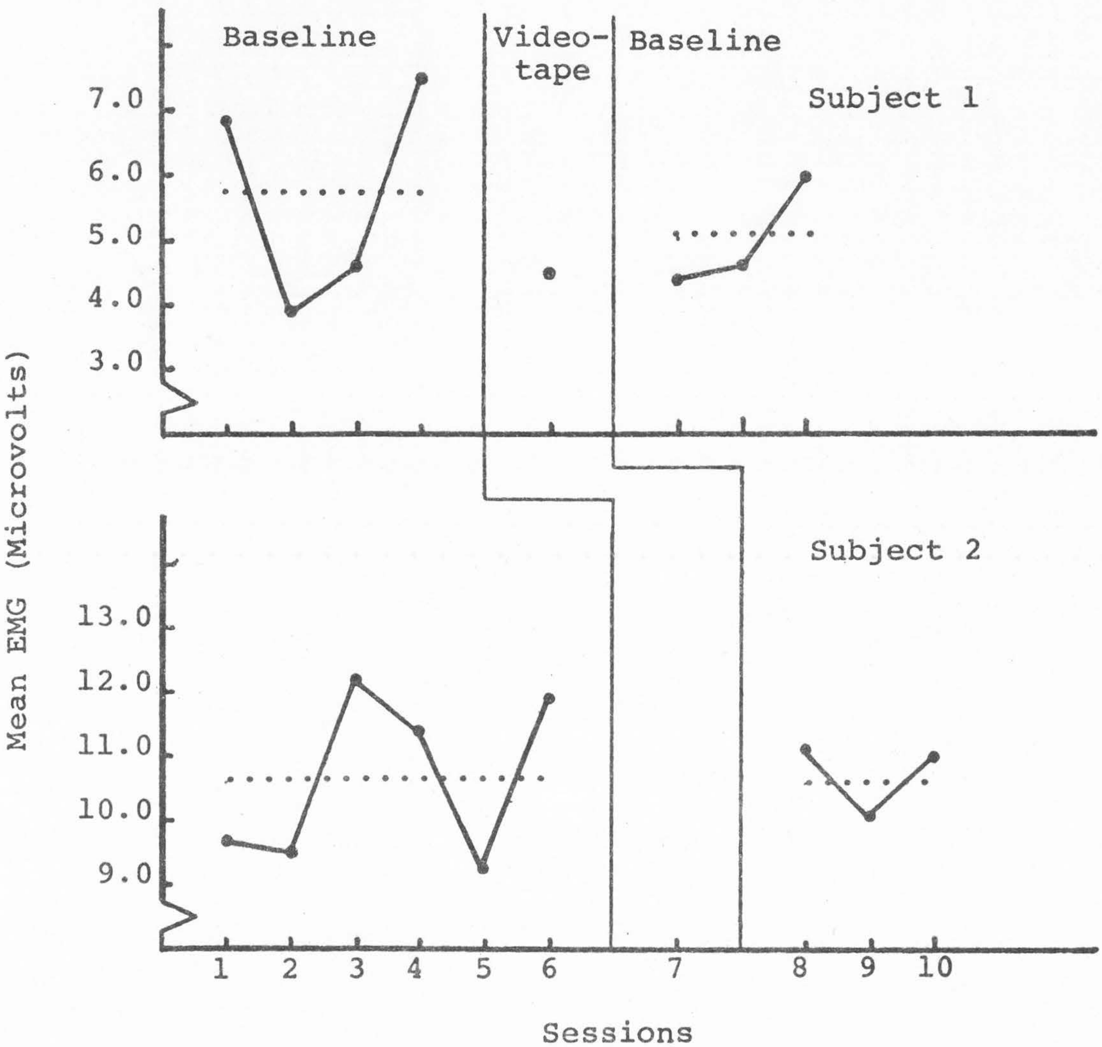

Figure 1. Mean frontalis EMG for Subjects 1 and 2 for all conditions. The dotted line is the mean EMG level of the condition. No data is available for Subject 2 during the videotape condition.

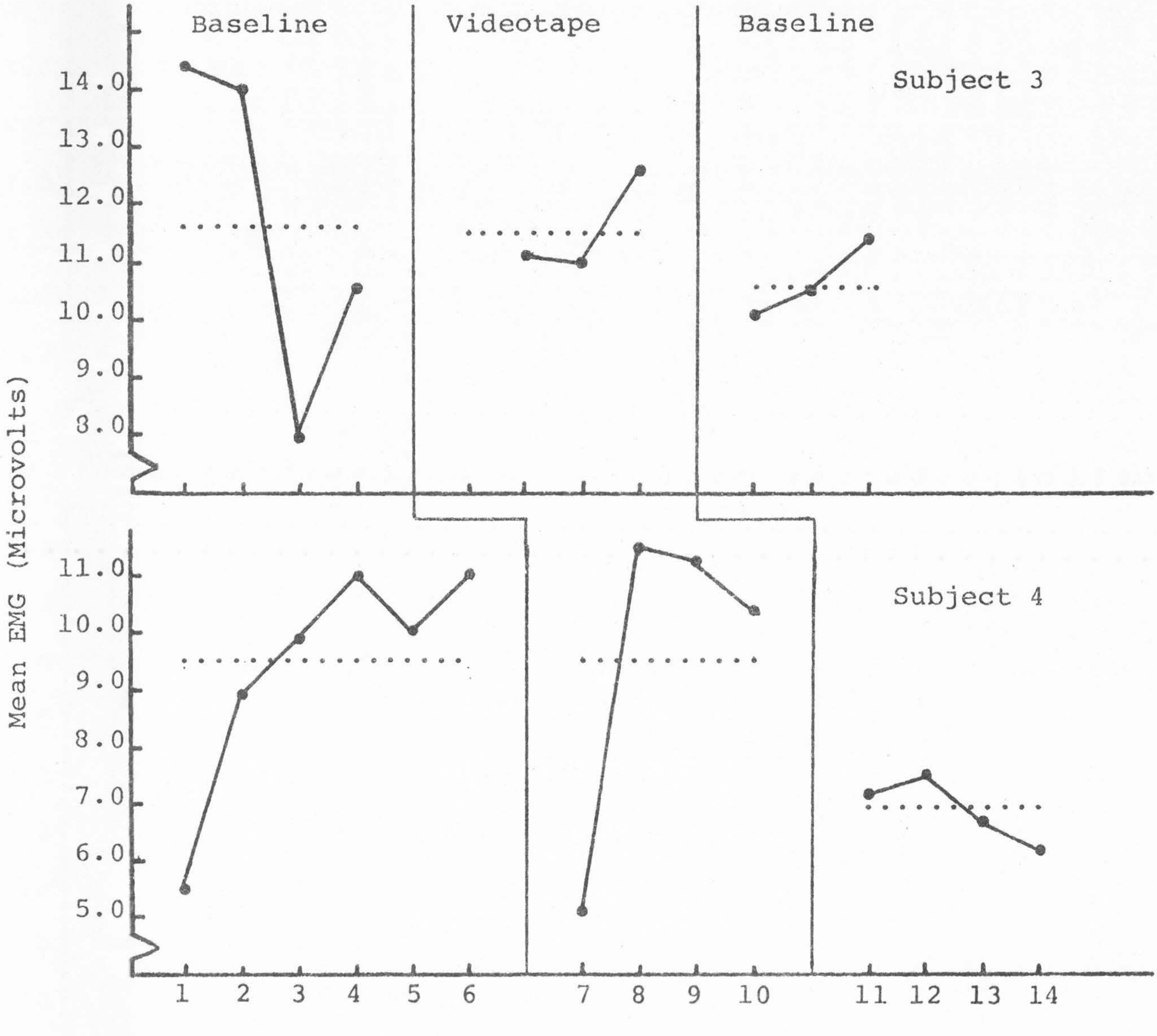

Figure 2. Mean frontalis EMG for Subjects 3 and 4 for all conditions. The dotted line is the mean EMG level of the condition. Subject 3 fell asleep during the first videotape session thus the data were excluded from analysis.

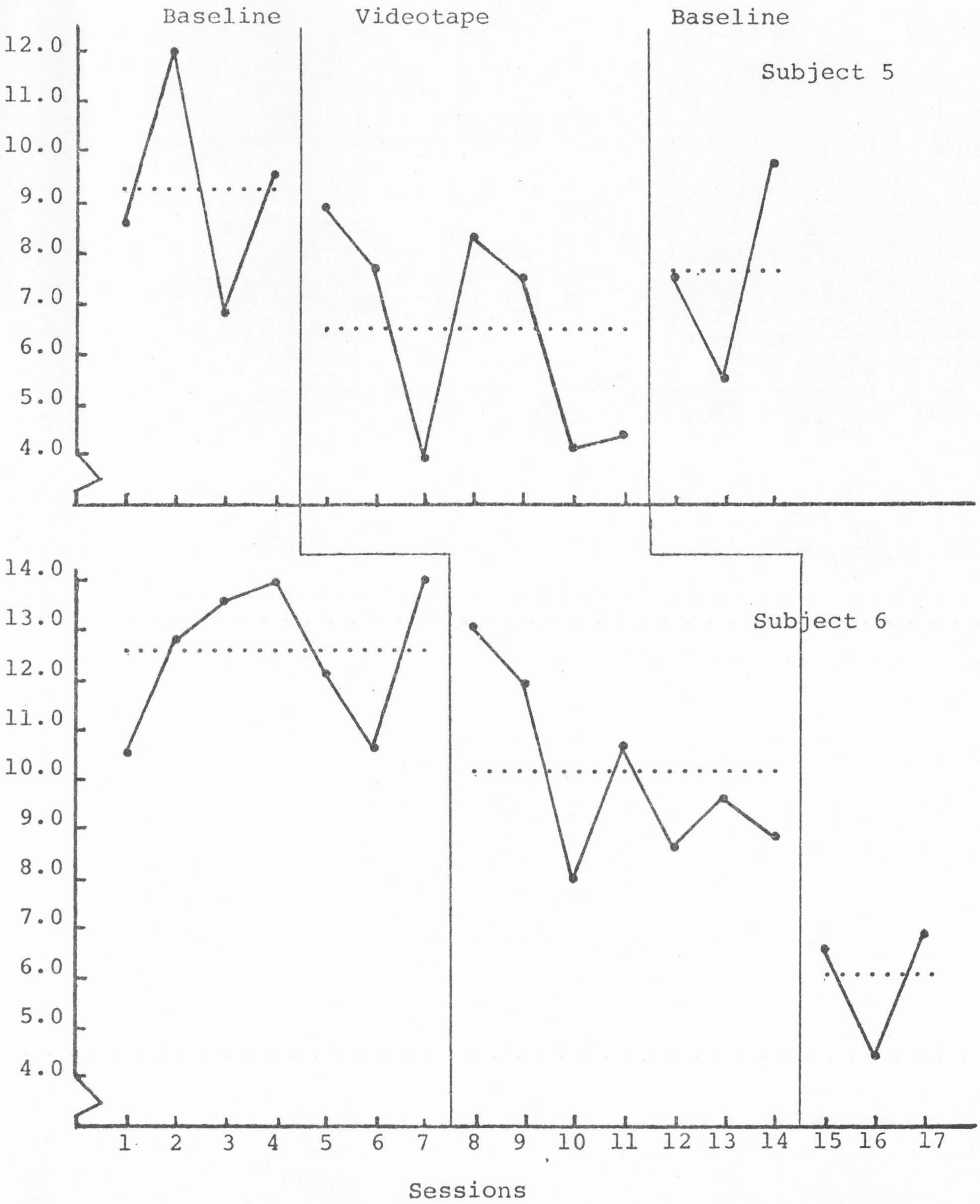

Figure 3. Mean frontalis EMG for Subjects 5 and 6 for all conditions. The dotted line is the mean EMG level of the condition.

The mean EMG level for S_2 showed no change throughout the study. No data is available from the session immediately following subject 2's exposure to the modeling tape due to a recording equipment plug being loose.

For subjects 3 and 4 (Figure 2) who were exposed to the viedotape four times, the mean EMG level during the videotape condition did not change significantly. The mean baseline EMG for S_3 was 11.7 microvolts and the mean for the videotape condition was 11.6 microvolts. For S_4 the mean baseline EMG was 9.4 microvolts and 9.6 microvolts for the videotape condition. When baseline conditions were reinstituted for this pair of subjects, S_3 registered a 9% (1.1 microvolts) decrease in mean EMG level and S_4 registered a 27% (2.5 microvolts) decrease in mean EMG compared to the initial baseline mean EMG level. Each of these subjects had previously achieved these lower levels during at least one initial baseline session, but the means were clearly different.

Subjects 5 and 6 (Figure 3), given seven exposures to the videotape, showed mean EMG decreases from the baseline to the video condition of 30% (2.8 microvolts) and 20% (2.4 microvolts) respectively. The mean EMG level of the final baseline sessions for S_5 remained 17% (1.6 microvolts) below the mean of her initial baseline sessions which was slightly higher than during the videotape condition per se. For S_6, an even larger decrease in mean EMG was produced when the baseline conditions were reimposed. Her mean EMG level for the return to baseline sessions plunged 53% (6.6 microvolts) below her mean EMG level recorded during the initial baseline sessions.

The baseline condition itself produced no consistent downward trend in mean EMG levels for any of the six subjects. Subjects given six or more baseline sessions showed no greater reduction in mean EMG scores than subjects given four baseline sessions. For three subjects the mean EMG during the videotape condition was lower than the mean EMG during the initial baseline, and for five subjects the mean EMG level during the return to baseline condition was lower than during the initial baseline or during the videotape condition.

Standard deviations and ranges (of the 32 EMG readings per session) computed for each session showed no consistent change in variability within sessions across the three conditions for the six subjects. Standard deviations of the sessions scores within each condition decreased following exposure to the videotape, i. e., less variability between scores can be seen in the videotape and return to baseline conditions than during the initial baseline condition.

Means for the first 16 EMG readings (first half) and means for the second 16 readings of each session (second half) were computed to determine whether frontalis EMG relaxation occurred within the sessions. Of the 31 baseline sessions, 64.5% showed decreases ranging from .2 to 9.1 microvolts (mean = 1.73 microvolts). Of the 22 videotape sessions, 63.6% showed decreases ranging from .1 to 2.5 microvolts (mean = .9 microvolts). Of the 18 return to baseline sessions, 66.6% showed decreases ranging from .2 to 6.9 microvolts (mean = 1.95 microvolts). It can be seen that decreases in EMG during the sessions occurred with near equal frequence across all three conditions. The videotape condition resulted in no greater changes than the baseline condition on this measure.

The EMG levels of the six subjects ranged from a low of 5.7 microvolts for subject S_1 to a high of 12.5 microvolts for subject S_6. No consistent relationship can be seen between the initial level of EMG recorded and the amount of change occurring across sessions and/or conditions.

One additional baseline session was given S_6, making a total of seven sessions before the stability criterion was met. Subjects 3 and 6 each fell asleep during one baseline session. The data was not plotted for those sessions.

For two subjects (S_1 and S_6), one baseline session each was extended to 35 minutes to determine whether a decrease in EMG occurred as a function of that length of time. Since the videotape conditions totaled 35 minutes, this comparison provided data relating to the effects of total time the subject was in a reclined position. The magnitude of the overall decrease in EMG during the 35 minute period did not exceed the decreases recorded during the 20 minute baseline sessions.

Reliability. Reliability computed for the 12 chart records sampled ranged from 94% to 100% agreement with a mean of 96.3%.

Discussion

This study was devised to determine what levels of relaxation of frontalis muscles would result from the baseline condition; one, four and seven exposures to a videotape depicting modified progressive relaxation training; and what levels of relaxation would result from a return to baseline conditions after the videotape experience. The graphed data for the six subjects indicate that only subjects (5 and 6) given seven exposures to the videotape showed reduced frontalis EMG during the videotape condition. Decreases in frontalis EMG of varying magnitude were produced by several subjects during the return to baseline condition. No systematic decrease in frontalis EMG occurred during the initial baseline condition for any of the subjects.

Such results indicate several things. First, the subjects in this study did not relax their frontalis muscles during initial baseline periods prior to videotaped relaxation training. Little, if any, habituation occurred during baseline sessions. Secondly, Rachman's contention that the number of exposures to a model is a critical variable in the vicarious acquisition of a response was supported in this study (Rachman, 1972). That is, the greater number of exposures to the videotape, the greater the resulting relaxation effect.

What levels of relaxation should be expected to result from one, four, and seven relaxation training sessions? Wolpe's use of six sessions before instituting systematic desensitization seems to have a basis in fact supported by this study in that seven sessions of exposure to the videotape resulted in decreased frontalis tension; whereas four sessions of exposure did not. More complete relaxation, may however, require extending the training sequence to include several more sessions. Luthe has written that learning relaxation "can take anywhere from several weeks to many months, depending upon the patient's ability" (Luthe, 1970). As reported earlier, Jacobson (1938) wrote that 1 to 2 months of relaxation training was necessary before deep relaxation was effected.

Subjects who were successful in achieving relaxation of frontalis muscle during the videotape condition apparently learned something about relaxation sufficient to achieve equal or deeper levels of relaxation during subsequent test periods. It is possible that the capacity to relax was due to something acquired as a function of the total number of sessions experienced. Another explanation is that subjects acquired a "muscle sense." The subjective report of the subjects at the conclusion of the study may support the "muscle sense" explanation, e.g., "concentrating on the exercises helped me relax " and "it [the videotape] helped me become aware of what to do to become relaxed." The subjects reported that they tried to apply what they learned from the videotape during the return to baseline condition. Yet, none of the subjects were observed performing any of the modified progressive relaxation exercises during the return to baseline period. All reported that they felt more relaxed during the return to baseline condition than during the two previous conditions.

The present results can be compared with other findings reported on modified progressive relaxation techniques. Staples, Coursey and Smith (1975) report a mean decrease in frontalis EMG of 15% (from 10.0 microvolts at the first session to 8.5 microvolts at the eighth session) for 13 undergraduate student subjects given eight 30 minute sessions of taped (audio) progressive relaxation instructions. Their subjects were given a single return to baseline session, during which no instructions were given. Thus, no comparisons can be made of the durability of effects.

The mean frontalis EMG level during the return to baseline session was 8.5 microvolts, or equal to the mean recorded for the eighth relaxation training session (Staples _et al._, 1975). The mean EMG decrease for the two subjects given seven modeling sessions in the present study was 25% (2.6 microvolts) during the modeling condition and an average of 35% (4.1 microvolts) during three baseline sessions following modeling. The initial EMG levels of subjects in the present study were comparable to those in the study reported by Staples _et al._

Freedman and Papsdorf (1975) monitored frontalis EMG (and other physiological measures) on six chronic insomniac subjects during six 1/2 hour sessions in progressive relaxation training as described by Paul (1966). The mean frontalis EMG recorded after one relaxation session was 21 microvolts and 20 microvolts after the six sessions. No test sessions (return to baseline) were given following the relaxation training sessions. The initial mean EMG level of the Freedman and Papsdorf subjects was 21 microvolts which was considerably higher than the initial mean EMG level of subjects 5 and 6 in the present study which was 10.8 microvolts. The initially high magnitude of EMG levels among the Freedman and Papsdorf group may, in part, explain the absence of any treatment effect measured by frontalis EMG.

In the present study, the relaxation of frontalis muscles achieved by the subjects represents only a beginning in an effort to produce deep relaxation. The present study was proposed to determine only what levels of relaxation one, four and seven relaxation sessions would produce during training and what effect after training. It is clear that relaxation occurred at substantial levels for the subjects given seven sessions. More sessions would be needed to determine the parameters of relaxation to be expected from increased exposures to the videotape. Since the graphs of the EMG levels for S_5 and S_6 show progressively lower levels of EMG, it is possible that continued decreases in EMG could be anticipated if more exposures to the videotape had been given.

Several of the subjects stated that they stopped watching the videotape after they had seen the model perform the relaxation exercises a few times. They added that the video portion of the tape was necessary to learn the exercises, but once the exercises were learned, they relied on the audio portion of the tape to relax themselves. Since the subjects modeled the relaxation exercises only during the initial exposures, the conclusion that reduction in EMG resulted from a modeling effect along is equivocal. Further, since no sessions were given where the instructions alone were presented, the precise role the instructions played in effecting the change in EMG is not known. It can only be concluded that reductions in frontalis EMG apparently resulted because the subjects relied upon both the videotape and the instructions to reduce frontalis EMG activity.

CHAPTER IV

Study II

Method

Subjects. Four subjects were selected for this study by the same means as for Study I. Two of the subjects were female, two were male. Subjects ranged in age from 19 to 38. A brief description of each subject is located in Appendix C.

Procedure. The same instrumentation, experimental design, general procedure and baseline were used as in Study I.

Since no effect was found with one exposure to the treatment condition in Study I, only four and seven exposures to the experimental conditions were used here. Subject 1 received four baseline sessions, four EMG feedback sessions and four return to baseline sessions. Subject 2 (paired with subject 1) received eight baseline sessions, four EMG feedback sessions and four return to baseline sessions. Subject 3 received four baseline sessions, seven EMG feedback sessions and four return to baseline sessions. Subject 4 (paired with subject 3) received seven baseline sessions, seven EMG feedback sessions and four return to baseline sessions.

EMG feedback condition. During the EMG feedback condition, the subjects received the following taped instructions in the headphones:

> In a moment, you will hear a series of clicks in the headphones. These clicks correspond directly to your level of relaxation. As you relax, the rate of clicks will decrease.

> Your instructions are to relax yourself to make the clicks become as slow as possible.

Analogue frontalis EMG was recorded for a 20 minute period while the subject received EMG feedback in the headphones.

Return to baseline. As in Study I, the same conditions used in baseline were instituted. Each subject were given four return to baseline sessions.

Reliability. The same reliability procedure was used as in Study I.

Results

Figures 4 and 5 show the mean session EMG level for all sessions of all conditions for the four subjects. The subjects receiving the greater number of EMG feedback sessions achieved the greatest level of frontalis relaxation. Subject 1 (Figure 4) showed no decrease in mean EMG level during the four EMG feedback sessions but produced a decrease of 16% (4.1 microvolts compared to 5.0 microvolts) below the mean baseline EMG during the return to baseline condition. Subject 2 (Figure 4) produced an EMG level 13% (6.5 microvolts compared to 7.5 microvolts) below the mean baseline EMG during the four EMG feedback sessions. The mean EMG levels during the return to baseline condition for S_2 was nearly equal to the mean EMG level recorded during the initial baseline condition.

Subjects 3 and 4 (Figure 5), produced mean EMG decreases of 24% (2.0 microvolts) and 20% (1.6 microvolts) respectively during the EMG feedback condition consisting of seven sessions. The mean EMG level during the return to baseline sessions remained at 24% below the initial baseline EMG level for subject 3. Subject 4 produced a decrease in mean EMG during the

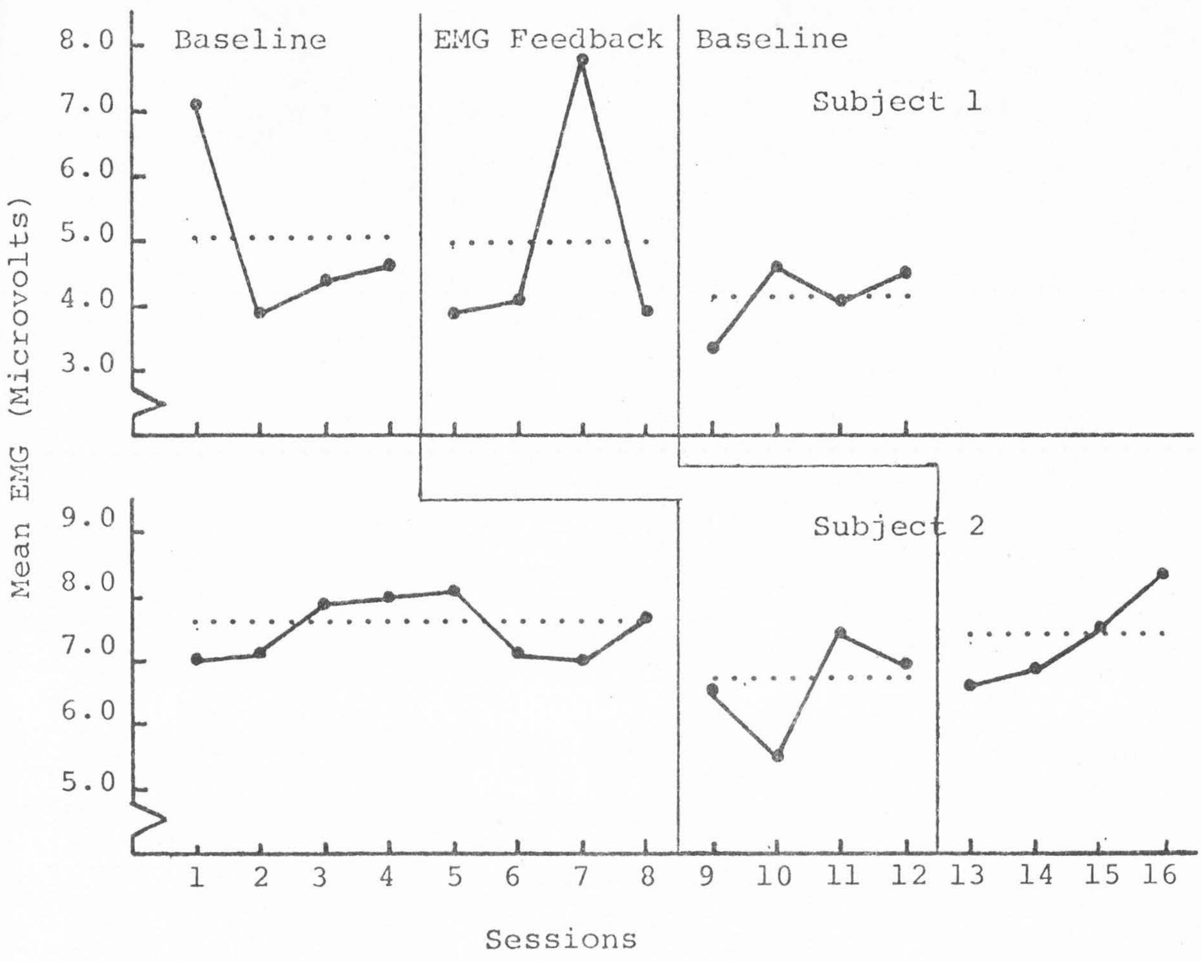

Figure 4. Mean frontalis EMG for Subjects 1 and 2 for all conditions. The dotted line is the mean EMG level for the condition.

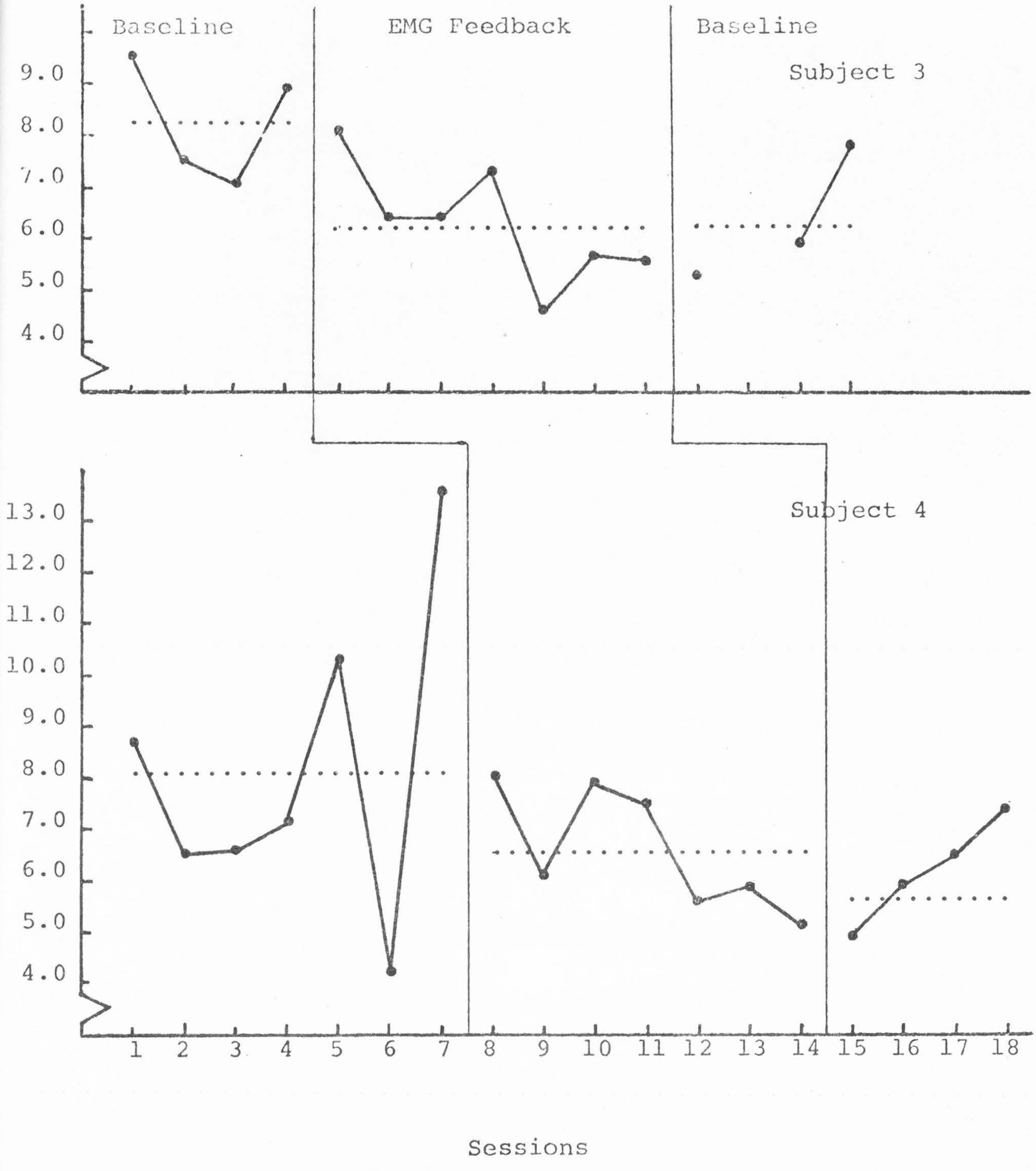

Figure 5. Mean frontalis EMG for Subjects 3 and 4 for all conditions. The dotted line is the mean EMG level of the condition. Subject 3 fell asleep during session two of the return to baseline condition thus the data were excluded from analysis.

return to baseline condition of 25% (2.0 microvolts), which was a larger decrease than during the feedback condition.

As in Study I, the baseline condition itself produced no consistent downward trend in EMG levels in any of the subjects. The baseline condition was extended from six to eight sessions for S_2 before the stability criterion was met. One additional baseline session was given S_4 before the baseline was stable. Subject 3 fell asleep during two baseline sessions and one return to baseline session. The data for those sessions was excluded from analysis.

When baseline conditions were reinstituted in the return to baseline period, each subject produced progressively higher levels of EMG on each successive session. This trend was generally the opposite of what occurred during the EMG feedback condition, i.e., subjects became progressively more relaxed when given EMG feedback and progressively less relaxed when it was withdrawn.

S_1 and S_4 showed decreases in intrasession variability from the baseline to the return to baseline condition. The standard deviations of the baseline condition sessions were 1.86 and 3.06 microvolts respectively for S_1 and S_4. The standard deviations of the return to baseline condition sessions were .59 and 1.10 microvolts for S_1 and S_4 respectively. This clustering of the scores was evident only for these two subjects while S_2 and S_3 showed no change or a slight increase in intrasession variability over the conditions.

Means for the first half (16 observations) and means for the second half (16 observations) of each session were computed, as in Study I, to determine whether frontalis EMG decreased during each session. Of the 23 baseline sessions given the four subjects, 13 showed decreases ranging from .3 to 5.2 microvolts (mean = 1.7) on the second half of the session while 10 increases ranging from .2 to 3.6 microvolts (mean = 1.1). Of the 22 EMG feedback sessions given, 17 decreased (.3 to 4.6 microvolts, mean = 1.3), and five increased (.1 to 2.0 microvolts, mean = .96). Of the 15 return to baseline sessions given, eight sessions showed decreases (.2 to 1.4 microvolts, mean = .83), six showed increases (.1 to 1.0 microvolts, mean = .56) and one remained the same. Overall, the EMG feedback session showed the greatest percentage of decreases, 80%, indicating that the subjects usually decreased frontalis activity during EMG feedback session.

In the first pair of subjects, S_1 and S_2, S_1 the low EMG subject achieved the greater level of relaxation (16%, 5.0 microvolts, mean = 4.1, reduction in EMG) during the return to baseline condition. In the second pair of subjects, S_4 the lower EMG subject achieved approximately the same magnitude of relaxation as S_3 during the return to baseline condition, i.e., 25 and 24% (2.0 microvolts each) reduction in EMG respectively. As in Study I, no relationship was found between the initial level of EMG and the amount of relaxation achieved following the treatment condition.

<u>Reliability</u>. Reliability for the eight chart records sampled ranged from 89% to 100% agreement with a mean of 96.37%.

Discussion

The graphed data for the four subjects indicate a positive relationship between the number of EMG feedback sessions given and the degree of relaxation achieved. The subjects given seven EMG feedback sessions achieved nearly twice the reduction in EMG that those given four sessions achieved.

S_3 and S_4 continued to decrease their EMG levels throughout the feedback experience. No leveling off of the treatment effect can be observed. The downward trend during the feedback condition was reversed when the baseline condition was reinstituted. All four subjects showed successive increases in EMG levels when the feedback was discontinued. However, two of the four subjects still averaged lower EMG levels during the return to baseline condition than during feedback conditions, which may well be accounted for by the limited number of sessions in the return to baseline condition.

Budzynski and Stoyva (1969) reported that after four 30 minute feedback sessions, a group of five subjects averaged a 50% decline in frontalis EMG from a baseline session to the fourth feedback session. The two subjects given four EMG feedback sessions in the present study decreased their frontalis EMG levels 16 and 13%. One of these subjects, S_1, did not register this decrease until the return to baseline condition. The five subjects used in Budzynski and Stoyva's study registered an initial mean EMG level of nearly 16 microvolts. A 50% decrease for that group reduced the mean EMG level to approximately 8 microvolts. Subjects 1 and 2 from the present study began at much lower levels of EMG, e.g., 5.0 and 7.5 microvolts respectively. Since

S_2 and S_2 began in the lower EMG quartile they were restricted in the size of EMG decreases they could achieve. While the present study drew its subjects from a clinical population, Budzynski and Stoyva used paid volunteers and awarded a bonus based on decreasing EMG levels. Further, Budzynski and Stoyva reported that subjects given no feedback (a condition comparable to the baseline in the present study) registered decreases of 24%. This occurrence points to a major methodological flaw in the Budzynski and Stoyva work in that the demand characteristics were so great that even the control subjects produced a reduction in EMG.

Since none of the subjects were able to relax themselves during the baseline condition of the present study, it is possible that they were a "hard to relax" group or a group of people with real tension. It is not known how representative these subjects were compared to other clinical subjects, but they clearly performed differently than Budzynski and Stoyva's volunteers.

Staples, Coursey and Smith (1975) report a 1.0 microvolt decrease in frontalis EMG for 13 subjects given eight EMG feedback sessions. The volunteer undergraduate college students (unpaid, but given course credit) showed a mean EMG level of 13.0 microvolts during a pretreatment test condition. Following the first EMG feedback session the group averaged 11.0 microvolts and after eight sessions reduced their frontalis EMG levels to a mean of 10.0 microvolts. The subjects in the present study given seven EMG feedback sessions reduced their frontalis EMG level an average of 22% from baseline. The initial levels 8.3 and 9.1 microvolts were somewhat lower than the initial levels of the group used by Staples et al.

Freedman and Papsdorf (1975) treated six chronic insomniacs with six sessions each of EMG feedback. The mean EMG level for the group was 19.5 microvolts during the first session and 16.0 microvolts for the sixth feedback session, resulting in an overall decrease of 15%. The initial EMG levels of this group of subjects was considerably higher than those of the subjects in the present study which ranged from 5.0 to 8.3 microvolts initially.

CHAPTER V

General Discussion

As demonstrated in Study I, levels of frontalis relaxation comparable to those produced by EMG feedback can be produced using a videotaped modified progressive relaxation program. The fully automated videotape program is replicable, economical and promising in terms of future developments in relaxation training. The magnitude of frontalis relaxation resulting from seven exposures to the videotape exceeded the levels others have documented after six and eight modified progressive relaxation sessions (Staples et al., 1975; Freedman & Popsdorf, 1975).

Several limitations in Study I are apparent. First, it is not known to what degree the reductions in frontalis EMG can be attributed directly to modeling, the instructions per se, or a combination of the two. Second, the parameters of the videotape procedure have yet to be established since only a limited number of exposures were given and EMG levels continued to decrease. Third, reduction in frontalis EMG did not always occur during the videotape condition. Curiously, for some subjects, frontalis EMG was not reduced until the return to baseline condition. It is possible that after a certain point the videotape (visual or audio portion) competes with one's ability to relax.

A follow-up study should be undertaken to determine whether the audio instruction alone would result in levels of relaxation comparable to the combination of audio and video. If comparable levels of relaxation could be achieved by giving an equal number of audio instruction sessions, then it would be known that modeling had no role in affecting the relaxation.

Finally, some questions remain regarding the videotape itself. Although none of the subjects reacted to the pacing of the instructions on the tape, other observers suggested that the instructions could be paced at a slower rate. This study, as most treatment studies, is subject to the criticism that the presence or absence of a treatment effect may be due, in part, to the experimenter's technique or program.

The 15 minute relaxation program on the videotape could be expanded to include more extensive tension and relaxation of neck, shoulders and facial muscle groups. A pause could be included near the end where instructions were given for the subject to "review" the muscle groups not included and repeat the exercises for any groups not feeling relaxed. When applied in an actual clinical setting, therapist interaction should, of course, be included to ensure that the client is performing the exercises correctly and that the client's questions are answered.

What is the treatment potential for the videotaped relaxation training developed in this study? Videotaped relaxation training has obvious practical implications. Glassford (1972) found group relaxation training beneficial in improving performance of mental health workers. The mental health staff reported a feeling of togetherness and a reduction, in anxiety after the relaxation training experience. Gruen (1972) recommends relaxation training for cardiac patients prior to surgery. Gruen reported in his exploratory study that cardiac patients given relaxation training prior to surgery reported less anxiety over the surgery and made fewer requests for pain medication during the post-operative recovery period. The videotape program should be particularly useful in these settings where small group relaxation training could be done. At the conclusion of each group viewing of the videotape, subjects could discuss for mutual benefit what efforts were successful in producing relaxation. The group interaction during and after the videotape may also serve to enhance the relaxation effect since the participants would not only model the tape, but each other as well. This remains to be demonstrated empirically.

Another important application of the videotape relaxation program is for use with deaf subjects. Heaton and Berberish (1973) reported that most relaxation training programs relied heavily upon auditory instructions. They devised a program using monotonous repetition of visual aids to induce relaxation. The relaxation was later used in the systematic desensitization of test anxiety in the deaf client. Printed instructions could be incorporated onto the videotape between the progressive relaxation exercises presented by the model.

Automated relaxation training holds great potential in education. Since relaxation produces a calming effect both physically and psychologically (Budzynski and Stoyva, 1969; Jacobson, 1938; Aiken and Heinrichs, 1971), handicapped children may be able to more efficiently use their potential following relaxation training. On-task behavior in children described as hyperkinetic, poor attenders, or distractible may be increased by acquiring a state of low arousal or relaxation. Individual or group relaxation training could be provided economically to classrooms of children using a videotaped modeling program.

The results from Study II indicate that systematic decreases in frontalis EMG occurred in proportion to the number of EMG feedback sessions given. Although subjects may have developed some internal cues to help them relax during treatment, post-treatment EMG levels showed systematic increases in muscle tension.

EMG feedback relaxation training should include a specific procedure for producing a durable relaxation effect while "weaning" the subject from the electromyograph. This could be accomplished by 30 minute sessions where for a 5 minute interval the subject received feedback, then for 5 minutes, no feedback and so on. The total amount of feedback given during each additional session could be gradually reduced until the feedback is faded out completely and in such a manner that the subject would have to learn to relax without external feedback. It might be necessary to reinforce some subjects for progress in this direction.

The EMG feedback provided the subjects with information regarding whether they were increasing or decreasing their frontalis muscle activity. It is very difficult to determine the magnitude of change from that information alone. An additional dimension, such as magnitude of change may help the individual relax more readily and serve as stronger reinforcement for change. Visual feedback from a meter could provide both dimensions, but requires that the subject keep his eyes open. The pilot data gathered prior to this study indicated that subjects relaxed more deeply when they closed their eyes. It would be possible, though, to pair visual and auditory feedback for a few initial sessions until the subject associated the "click" frequency with a meter reading. In later sessions the visual feedback could be faded out and the auditory feedback alone could be given.

The EMG feedback outcome might be enhanced and accelerated by providing the subject with specific instructions on how to reduce the "click" frequency. To standardize the instructions and avoid any experimental confounding, "how to" instructions could be given. Some electromygraphers (Budzynski and Stoyva, 1969) include relaxation instructions to augment the feedback in inducing relaxation. Data detailing the efficacy of these instructions is unknown, but the possibility exists that instructions along with EMG feedback facilitate relaxation, they should be further tested.

Next, some general qualifying statements must be made with regard to the results from both Study I and Study II. Seven training sessions, using videotape progressive relaxation or EMG feedback are only a beginning in producing very deep or complete levels of relaxation. There appears to be no current standard level of relaxation that, once achieved, is clinically significant for the individual other than a zero tension level in a given muscle. A meaningful criterion of clinical significance at present appears to be the level of relaxation at which a diminuation or elimination of symptoms occurs. Since subjects subjectively report feeling deeply relaxed after a moderate reduction or slight increase in frontalis EMG, the benefits of relaxation may be present long before frontalis EMG indicates that it is.

A determination yet to be made is the optimal length of time for videotape or EMG feedback session. Twenty and 30 minute sessions are reported by Budzynski and Stoyva (unpublished paper, 1969). Jacobson (1962) prescribed 1 hour progressive relaxation sessions during the initial phases of training where a muscle sense is trained. The current studies used sessions of 20 minutes. It would be helpful to the clinician if the optimal length of sessions for producing the greatest relaxation.

It is not known in the two studies to what degree, if any, other physiological functions were altered during the videotape or feedback conditions. Since subjects reported feeling relaxed even when their EMG levels remained in high ranges (8 to 10 microvolts), it is possible that changes in heart rate, respiration, blood pressure, or brain wave EEG activity occurred. In the Freedman and Papsdorf study cited earlier where no decreases in frontalis EMG were recorded the insomniac subjects attributed their improvement in sleep onset time to muscle relaxation. While no change in frontalis EMG occurred following the progressive relaxation training, heart rate and masseter values increased somewhat. Schwartz (1973) has cautioned against using only one physiological measure since the therapist may be unwittingly "reinforcing" increases of unmeasured functions while training an individual to decrease the measured functions. For these reasons, further parametric studies on inducing relaxation should include the monitoring of EMG levels of various muscle groups and the monitoring of various physiological activities in addition to electrical muscle activity.

Any direct comparison drawn between the results of the two present studies must be done with extreme caution. The studies were not designed as comparison studies, so only general advantages and disadvantages in each technique will be addressed.

The levels of relaxation produced by the two techniques were comparable, however, more durable results were achieved with the videotape technique.

The question of durability of effect should be of critical concern to the clinician. Any durability of the learned procedure will enhance generalization of the procedure to the client's everyday life. In the present studies, it appears as though generalization may be enhanced by the "muscle sense," if it were in fact acquired in the videotape experience. The subjects were able to maintain or further reduce their tension levels after four or seven exposures to the tape. The EMG feedback subjects did not do nearly as well when no longer receiving the feedback. Of course, the durability measure in the present studies was limited to only 3 and 4 days following treatment. More rigorous tests of durability should extend to weeks and months.

There appeared to be no differences in the subjective quality of relaxation reported by the subjects from each study. Both groups of subjects reported that when they felt relaxed, both their minds and bodies were relaxed.

A combination of the videotape program and EMG feedback training may produce the best overall results. Since each technique provides the subject with information relative to what tension is, what relaxation is, and experience in dissipating the former and increasing the later, optimal learning may occur. The videotape program provides the subject with tangible physical responses to be made. The EMG feedback details for the subject which efforts are paying off and which are not in reducing tension levels.

In conclusion, it has been empirically demonstrated that clinical subjects can begin to achieve relaxation using a videotape facilitated relaxation training program. Further, these subjects achieved comparable levels of relaxation to those subjects given an equal number of EMG feedback training sessions. The treatment potential for the two techniques is broad and seems worthy of continued early.

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APPENDIXES

Appendix A: Informed Consent

Informed Consent

I hereby consent to participate as an experimental subject in a study of relaxation training. I understand that I am expected to participate Monday to Firday daily for one half hour sessions for approximately five weeks. When that period has concluded, I may be called back for a two week follow-up session. I understand that I am free to terminate my participation at any time during the study.

I have been informed that my name and identifying information will remain anonymous in any written, oral, or taped communication of the research. I have further been informed that there is no danger of accidental electrical shock nor any negative side effects anticipated as a result of my participation.

Signature Date

Witness Date

Appendix B: Safeguard for Subjects

Ethical Considerations and Safeguards for Subjects

Subjects will not be informed "of the hypotheses" of the study. Nor will they be given any deceptive instructions (see method section). All subjects will receive relaxation training since the public bulletins solicit volunteers for that purpose. Subjects in Study I will be given training following their experimental sessions.

Subjects will be informed that they may terminate their participation if they so choose. Their identification will remain anonymous in any discussions, reports, or publication of the study.

The instrumentation used in this study was designed and constructed with built-in subject/patient safety precautions. All the equipment to be attached to the subject is DC powered. No earth grounding of the equipment is intended at any time, eliminating the potential for any accidental electric shock.

The equipment and design of the study will be reviewed by a physician to ensure that any risks or possible side effects of testing or training are minimized.

Appendix C: Description of Subjects

Study I

Subject S_1

S_1 is a 21 year old single male college senior majoring in music. He had been treated at the Utah State University Counseling Center for six weeks prior to his participation in the study. He has a history of health problems including a rheumatic heart condition. He complained of always feeling tense and being unable to relax. He stated that his tension seriously interfered with his clarinet playing and social life.

Subject S_2

S_2 is a 30 year old married school teacher. She reported a history of tension headaches for several years. She reported trying a variety of treatments over the years to eliminate her pain. The headaches occurred at a frequency of three to four per week and were reported as severe. She was taking no medication other than aspirin for the headaches throughout the study.

Study I

Subject S_3

S_3 is a 36 year old University professor and mother of two. She was separated from her husband during the study. She was referred by the Utah State University Counseling Center for what she described as chronic tension extending over several years. Two years prior to the study, she received brief psychiatric treatment for tension while her husband was treated for alcoholism.

Subject S_4

S_4 is a 28 year old male college junior and Navy veteran. He had been treated at the Utah State University Counseling Center for two weeks prior to the study for test anxiety and "nervousness". He reported that for as long as he could remember, he felt nervous and very tense most of the time. This tension became apparent to him while assigned to a submarine in the Navy, and he reported that he gets very tense when under any stress. He had received no previous treatment and was taking no medication.

Study I

Subject S_5

S_5 is a 19 year old single female college freshman. She was referred from the Utah State University Counseling Center because of reported nervousness and inability to "unwind." She reported being nervous and "hyper" since childhood. As a junior in high school, she was treated for a stomach ulcer. Tranquilizers were prescribed until she completed high school. She reported that she experienced extreme tension when speaking and during final examinations. She was taking no medication during the study.

Subject S_6

S_6 is a 24 year old single female college junior. She has been treated for petit mal seizures since age 10. She reported averaging ten to fifteen seizures daily since age 10. Six months prior to the beginning of the study, she experienced a grand mal seizure following a change in her medication. The Utah State University Counseling Center referred her because she reported increased tension and fearfulness since experiencing the grand mal seizure. She stated that the frequency of petit mal seizures increases during examination periods or other periods of stress in her life. She maintained a constant level of Dilantin and Mycilyne during the study.

Study II

Subject S_1

S_1 is a 33 year old single University instructor. He was referred by the Utah State University Counseling Center because of extreme tension, muscle spasms in his arms and neck, and dizziness. He reported experiencing these problems for over one year prior to the study. He stated that these symptoms appeared most serious when he was under stress. He had previous treatment including physical therapy, medication (muscle relaxants), and psychological treatment. He was taking no medication during the study.

Study II

Subject S_2

S_2 is a 38 year old married University administrative staff member and mother of two. She was referred by the Utah State University Counseling Center because of severe tension resulting in insomnia. She reported having medically diagnosed insomnia for 10 years. She had tried a variety of treatments including medication. Although sleeping pills did induce sleep, she chose not to use them and reported having trouble sleeping on a regular basis. She was taking no medication during her participation in the study.

Study II

Subject S_3

S_3 is a 19 year old male married college freshman. He was referred from the Utah State University Counseling Center after being treated for excessive drinking of alcohol, sleeping problems, and tension. At age 14, his right foot was severed at the ankle in a farming accident and surgically reattached. He reported constant physical discomfort and pain from his foot and pressure from school assignments. He had been treated with Darvon and Demeral following his accident, but was taking no medication during his participation in the study.

Study II

Subject S_4

S_4 is a 33 year old married female University staff member. She was referred by the Utah State University Counseling Center for tension and nervous fatigue. She reported using alcohol to excess during the six months prior to the study. She reported no previous history of tension or fatigue and has had no previous treatment.

Appendix D: Relaxation Transcript

Script for Relaxation Instructions - Study I

In a moment, you will see a videotape of a young man receiving relaxation instructions. As you watch the young man perform the instructions, you are to observe him closely and most importantly you are to perform each of the instructions yourself as you hear the therapist give them. If you have any doubts about what the instructions call for, just do what the young man does. When the instructions are over, you will be asked to rest quietly. In just a moment, the tape will begin. (Pause 15 seconds)

You should be resting comfortably with your legs uncrossed and your arms at your side (pause). Begin relaxing by raising your right arm at the elbow, outstretch your fingers, and bend your hand backward toward your shoulder. Bend your hand backward until you feel tension in your forearm muscles. When you feel this tension,slowly relax your arm, bringing it forward and lower it to your side. Now repeat this by raising your right arm at the elbow again. Outstretch your fingers and bend your hand backwards toward your shoulder. Keep bending your hand back until you can feel tension in your forearm. When you can feel this tension, begin to slowly relax your arm by lowering it to your side. Let your arm relax now, let it relax more, and still more. Attend to the sensation of relaxation you can feel in your lower arm.

Now I want you to contract the muscles of your upper right arm. Do this while keeping your arm at your side. Try only to contract the muscles of your upper right arm keeping your lower arm and hand relaxed. Tighten the muscles of your upper right arm until you feel tension in those muscles. When you feel tension in those muscles, relax your arm. Only tense one muscle group at a time. Now repeat that by tightening the muscles of your upper right arm. When you can feel the tension in your arm, relax the muscles. Let your upper 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 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 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 arm. Once you feel the tension in those muscles, relax your 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 completely relax the muscles of your neck, I want you to draw your head down between your shoulders. If necessary, hunch your shoulders a little up toward your neck. Pull your head and neck closer to your shoulders until you can feel tension in the muscles on each side of your neck. When you can feel this tension, slowly relax the muscles of your neck. Now repeat this by once again drawing your head down between your shoulders and tensing the muscles on the sides of your neck. Once you feel this tension, then once again let those muscles relax. Let your neck muscles completely relax now, 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 tension in the muscles of your forehead. Once you 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 without going to sleep.

Appendix E: Raw Data

Frontalis EMG (microvolts): Study I

Subject 1

Session Number	Session Score	Standard Deviation	Range	$\overline{X}$ Baseline Condition	$\overline{X}$ Videotape Condition	Return to $\overline{X}$ Baseline Condition
1	6.8	3.0	3.0-17.8	5.7	4.5	5.0
2	3.9	1.8	2.9-6.7			
3	4.6	2.3	2.7-14.4			
4	7.5	2.2	5.0-17.8			
5	4.5	2.7	2.5-20.6			
6	4.4	2.0	3.2-13.2			
7	4.7	2.1	2.9-12.4			
8	6.0	3.3	2.5-14.4			

Subject 2

Session Number	Session Score	Standard Deviation	Range	$\overline{X}$ Baseline Condition	$\overline{X}$ Videotape Condition	Return to $\overline{X}$ Baseline Condition
1	9.7	1.4	8.2-13.2	10.6	No Data	10.6
2	9.5	1.2	8.2-11.6			
3	12.2	1.3	10.4-20.6			
4	11.4	1.1	9.4-13.2			
5	9.3	1.3	8.2-17.8			
6	-	-	-			
7	11.9	1.2	10.4-15.8			
8	11.2	1.3	9.4-15.8			
9	10.1	1.2	8.5-12.4			
10	10.5	1.3	8.2-15.8			

Subject 3

Session Number	Session Score	Standard Deviation	Range	$\overline{X}$ Baseline Condition	$\overline{X}$ Videotape Condition	Return to $\overline{X}$ Baseline Condition
1	14.4	1.3	12.4-30.0	11.7	11.6	10.6
2	14.0	1.3	11.6-24.8			
3	7.9	3.0	2.9-13.2			
4	10.6	2.0	3.4-15.8			
5	-	-	-			
6	11.2	1.3	8.2-15.8			
7	11.0	1.7	4.2-17.8			
8	12.7	1.2	9.8-15.8			
9	10.1	2.4	3.4-14.4			
10	10.5	1.3	7.8-14.4			
11	11.4	1.6	7.0-30.0			

Subject 4

1	5.5	2.4	3.2-14.4	9.4	9.6	6.9
2	8.9	2.0	5.4-30.0+			
3	9.8	1.7	6.7-30.0+			
4	11.0	1.6	8.2-20.6			
5	10.2	1.7	7.8-24.8			
6	11.1	1.4	7.0-15.8			
7	5.2	2.4	3.2-12.4			
8	11.5	1.5	8.5-15.8			
9	11.3	1.2	9.8-15.8			
10	10.4	1.7	7.8-17.8			
11	7.2	1.6	4.8-11.6			
12	7.5	1.7	5.4-11.6			
13	5.7	2.0	4.3-9.4			
14	6.2	2.0	4.4-13.2			

Subject 5

1	8.6	2.7	3.8-24.8	9.2	6.4	7.6
2	12.0	1.3	9.8-30.0+			
3	6.8	3.2	2.7-20.6			
4	9.6	1.7	5.2-15.8			
5	8.9	2.2	5.4-30.0+			
6	7.7	2.4	4.3-20.6			
7	3.9	2.5	1.7-7.4			
8	8.3	1.9	5.8-20.6			
9	7.5	1.7	4.0-15.8			
10	4.2	2.5	1.3-7.0			
11	4.4	3.0	1.7-11.6			
12	7.5	1.3	5.4-9.4			
13	5.5	2.2	3.2-11.6			
14	9.8	1.3	8.5-30.0			

Subject 6

1	10.5	1.9	5.8-17.8	12.5	10.1	5.9
2	12.8	2.6	2.5-30.0+			
3	13.6	3.1	2.1-30.0+			
4	13.9	1.6	9.4-30.0+			
5	12.2	1.9	6.4-30.0+			
6	10.7	3.0	3.4-30.0+			
7	14.0	2.2	4.0-30.0+			
8	13.1	2.2	3.0-24.8			
9	11.9	1.7	7.8-30.0+			

10	8.0	2.2	3.8-14.4			
11	10.7	2.6	3.8-24.8			
12	8.6	3.1	3.0-24.8			
13	9.7	1.9	6.4-30.0			
14	8.8	2.9	2.7-30.0			
15	6.6	2.9	2.4-13.2			
16	4.4	2.9	1.7-13.2			
17	6.8	3.0	2.1-24.8			

Frontalis EMG (microvolts): Study II

Subject 1

1	7.1	1.4	6.0-10.4	5.0	4.9	4.1
2	3.8	2.0	2.1-6.0			
3	4.4	2.3	2.7-12.4			
4	4.7	1.9	2.9-8.2			
5	3.8	2.2	2.5-6.0			
6	4.1	2.4	1.9-7.8			
7	7.8	1.2	7.0-9.4			
8	3.9	1.8	2.9-8.2			
9	3.3	1.7	1.7-4.8			
10	4.6	1.6	3.2-5.8			
11	4.1	1.9	2.7-6.7			
12	4.5	1.9	3.2-11.6			

Subject 2

1	7.0	1.5	5.8-13.2	7.5	6.5	7.3
2	7.2	1.7	5.8-14.4			
3	7.8	1.7	6.4-30.0+			
4	8.0	1.8	5.8-15.8			
5	8.2	1.6	6.4-12.4			
6	7.1	1.3	6.0-8.9			
7	7.0	1.9	5.2-30.0+			
8	7.7	1.5	5.8-20.6			
9	6.5	1.6	5.2-12.4			
10	5.5	1.2	4.8-6.7			
11	7.4	1.4	6.4-13.2			
12	6.9	1.4	5.4-8.9			
13	6.6	1.7	5.0-20.6			
14	6.8	1.5	4.8-9.4			
15	7.5	1.2	6.0-8.9			
16	8.3	1.1	7.4-9.4			

Subject 3

1	9.6	1.2	7.8-11.6	8.3	6.3	6.3
2	7.5	1.5	6.4-12.4			
3	7.2	1.5	5.2-9.4			
4	8.9	1.7	7.0-20.6			
5	8.2	1.3	6.4-11.0			
6	6.4	1.4	5.2-9.4			
7	6.4	1.7	4.4-12.4			
8	7.3	1.4	6.0-9.4			
9	4.6	2.6	1.7-7.8			
10	5.7	1.9	2.9-8.2			
11	5.6	1.5	4.3-7.4			
12	5.3	3.0	1.5-9.4			
13	-	-	-			
14	5.9	1.7	4.2-7.8			
15	7.8	1.5	5.4-9.4			

Subject 4

1	8.7	2.3	4.2-20.6	8.1	6.5	6.1
2	6.5	2.1	4.0-17.8			
3	6.6	1.3	5.0-9.4			
4	7.2	1.3	6.4-8.5			
5	10.3	1.9	7.4-24.8			
6	4.2	1.5	2.7-5.0			
7	13.6	1.5	6.4-17.8			
8	8.0	1.4	6.7-11.0			
9	6.1	1.2	5.2-8.2			
10	7.9	1.1	7.0-8.9			
11	7.5	1.3	6.4-9.4			
12	5.6	1.3	5.0-7.0			
13	5.8	1.3	4.8-8.2			
14	5.2	1.3	4.6-7.4			
15	4.9	1.5	4.2-6.0			
16	5.9	1.3	4.8-7.4			
17	6.5	1.3	5.4-7.8			
18	7.4	1.3	6.4-8.9			

Appendix F: Summary of Subject Interview Data

Study I

1. A. Did your relaxation level typically change from the beginning to the end of each session?

   S_1: Definitely more relaxed towards end of session.

   S_2: Yes. Lowered.

   S_3: Oh yes. I think I was much more relaxed at the end.

   S_4: I'd say I got relaxed more and more.

   S_5: Yes. I relaxed more at the end.

   S_6: More relaxed at the end.

   B. From session to session?

   S_1: A general downward trend.

   S_2: Yes. Generally I found myself more relaxed.

   S_3: Yes. More relaxed.

   S_4: Yes. More so from day to day.

   S_5: Yes. More.

   S_6: I was more relaxed the further and further we got.

2. Did you watch the model being relaxed? Or just listen to the instructions?

   All subjects said yes. In addition:

   S_4: I just imagined it after a while and I got more relaxed by imagining than by watching it.

   S_5: The first two days I watched it, then I kept my eyes closed and I could do it.

   S_6: I got where I knew the things, so it was sort of a blur.

3. Rate your relaxation level during the first few sessions where you were told to "rest quietly without going to sleep," before you saw the videotape.

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Response:	S_4	S_1 S_3 S_5 S_6	S_2		

4. Rate your relaxation level during the 20 minute periods immediately following the videotape.

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Response:			S_1 S_3	S_2 S_4 S_5 S_6	

For four and seven exposure subjects, did level change over sessions? How?

S_3: I'm sure it did, more.

S_4: Yes. It increased.

S_5: Toward fourth or fifth session I was getting really relaxed.

S_6: I got a lot more relaxed and sooner.

5. Rate your relaxation level during the sessions following those where you saw the videotape.

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Response:			S_1 S_2 S_6	S_3 S_4	S_5

6. After seeing the tape were you relaxed? Body relaxed? Mind relaxed?

S_1: No.

S_2: The whole body was relaxed.

S_3: Mind and body relaxed.

S_4: Mind and body relaxed.

S_5: Yes. They both were.

S_6: Yes. Both.

Study II

1. Did your relaxation level typically change from the beginning to the end of each session?

   S_1: Felt much more relaxed toward the end than at the first.

   S_2: More relaxed throughout the session.

   S_4: I would go down and back up.

   From session to session?

   S_3: I came in jumpy, when I got up it felt like I had slept for awhile.

   S_1: It seemed to vary from day to day.

   S_2: A general trend toward more relaxation.

   S_4: I didn't feel any pattern.

   S_3: Generally down.

2. Rate your relaxation level during the first few sessions where you were told to "rest quietly without going to sleep" (efore EMG-FB sessions).

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Responses:		S_2 S_3	S_1 S_4		

3. Rate your relaxation level during the sessions where you heard the "clicks" in the headphones.

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Responses:			S_2	S_1 S_3	S_4

4. Rate your relaxation level during the sessions following those where you heard the "clicks."

	Not at all relaxed	Slightly relaxed	Relaxed	Moderately relaxed	Very relaxed
	1	2	3	4	5
Responses:			S_4	S_1 S_2 S_3	

5. Did you feel relaxed when you slowed down the "clicks?" In your mind? In your body?

S_1: Yes. More mentally than physically, but some of both.

S_2: Yes. Both, I think.

S_3: Both.

S_4: Yes. Both.

VITA

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Dissertation: The Effects of Videotape Relaxation Training and EMG Feedback on Frontalis Muscle Activity

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Winnebago State Hospital, Winnebago, Wisconsin, 1969-70.
--Research Assistant.

Fond du Lac Community Action Program, Fond du Lac, Wisconsin, 1970-71.
--Coordinator: Programs for Aged, 1970.
--Deputy Director, 1971.

Eastern Washington State College, Cheney, Washington, 1971-73.
--Hall Director, Pearce Hall (Co-ed dormitory).

Gonzaga University, Spokane, Washington, Summer of 1973.
--Instructor: Introductory Psychology and Behavior Modification.

Utah State University, Logan, Utah, 1973-74.
--Graduate Assistantship as School Psychologist in Davis County (Utah) School District.

Psychotherapy and Counseling Practicum Experience.
--Milwaukee County General Hospital, Diagnostic/Treatment Unit, 1966.
--Winnebago State Hospital, Adolescent Unit, 1969-70.
--Human Development Center, Eastern Washington State College, 1972.
--Counseling Center, Eastern Washington State College, 1972.
--Spokane Community Health Center, 1972.
--Exceptional Child Center, Logan, Utah, 1973.
--Counseling Center, Utah State University, 1973-74.

Publications:

Weiher, R. G., & Harman, R. E. The use of omission training to reduce self-injurious behavior in a retarded child. Behavior Therapy, 1974, 6(2), 261-268.

Weiher, R. G. Therapeutic relaxation training, Breakthrough, 1975, 2, 11 and 16.

Presentations: The use of omission training to reduce self-injurious behavior in a retarded child. Presented at the Washington State Psychological Association Convention, May, 1973.

Certification:

--School Psychologist, Washington State, 1973-present.
--Psychologist: Basic Professional Certificate, Utah 1973-present.

Membership in Professional Organizations:

--American Psychological Association--Student in Psychology.

--Association for the Advancement of Behavior Therapy--Student Member.

Grant Writing: Evaluation of Project Identification, Utah State Board of Education, 1974.

CREDITS

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