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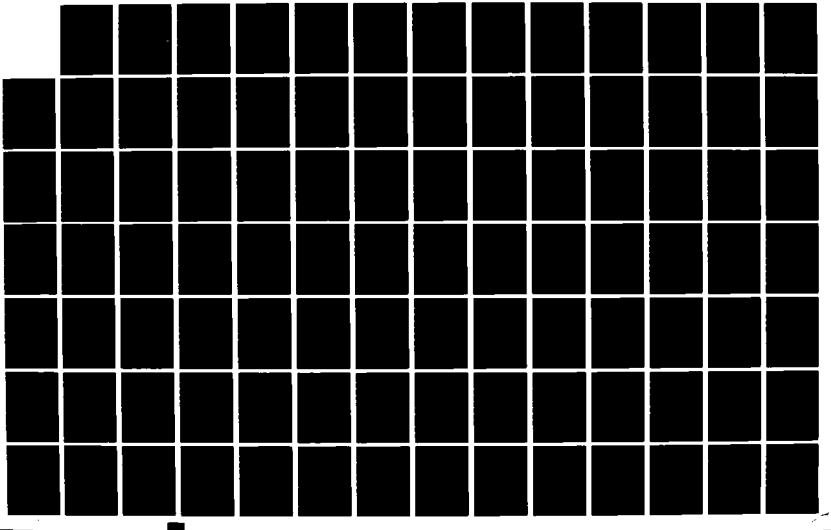

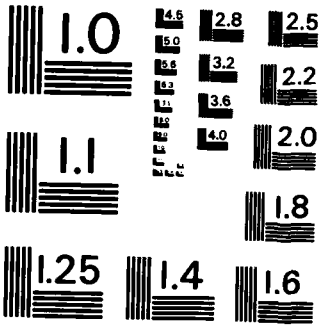

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An Abstract of

PATIENTS' PERCEIVED CONTROL, THERAPIST'S PRESENCE/ABSENCE, AND THE OPTIMIZATION OF BIOFEEDBACK LEARNING

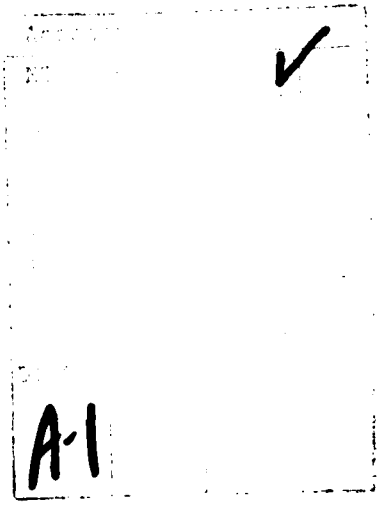
Bruce D. Dumouchel

Submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in the School
of Education, Health, Nursing, and Arts Professions
New York University
1985

ABSTRACT

This study investigated the effects of locus of control and patients' pre and post perceptions of the therapist on learning biofeedback in therapist-present (TP) and therapist-absent (TA) conditions. The all female sample ($N = 60$) consisted of active and retired military and their dependents from upstate New York with stress related disorders, primarily headache. Following a medical, psychological, and physical therapy evaluation and physiological baseline, patients were given either EMG or thermal training based on their diagnoses and clinical findings. An orientation session followed in which patients completed a series of questionnaires, including the Rotter I/E scale, were introduced to their training, and were randomly assigned to a TP or TA condition. All training was conducted by the same male therapist for ten sessions. Success was defined as being able to achieve control over the parameter in question at the monitored site during a five minute no feedback pre, 20 minute biofeedback training, and a five minute no feedback post segment. Following training, a second series of questionnaires was administered, and follow-up and debriefing appointments scheduled. There was no significant difference in the overall rate of learning between TP and TA conditions. There was no significant difference in the rate of learning based on the internality or externality of the patients and the condition to which they were assigned. There was no significant correlation between the patients' pre or post training perceptions of the therapist and their rates of learning, probably due to overall high therapist ratings. Thermal biofeedback was learned significantly faster in the TA

condition. No difference was observed in the rate of learning of EMG biofeedback in either condition, nor between thermal and EMG biofeedback in the TA condition. There was no significant shift in the patients' locus of control scores as a result of training. These results do not support the therapist's routine presence during biofeedback practice sessions. Those variables examined suggest training with the therapist absent for cost effectiveness, unless specific clinical concerns prevail.



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CHAPTER 1

INTRODUCTION

Social learning theory, in particular the concept of perceived control, has been increasingly applied to the field of self-regulation and biofeedback to better understand the ways in which these skills are best acquired (Carlson, 1982). Perceived control is a general term defined as the attribution of desirable outcomes to one's own behavior (Stern, Miller, Ewy & Grant, 1980). Locus of control, a measure of the degree to which individuals expect control of their reinforcements to come either from within themselves (internal) or from the environment (external) (Rotter, 1966) is a specific application of this concept which was predicted to provide a plausible explanation in the present investigation for the differences observed in the preferences of certain individuals for the presence or absence of the therapist during biofeedback learning.

The role of the therapist has increasingly been seen to interact with the learning of biofeedback, yet has not been systematically studied to determine how and with whom the therapist may best be utilized. Taub (1977) and others have emphasized the value of a warm, empathic, knowledgeable therapist who believes in biofeedback, to produce better results in thermal

biofeedback than one who lacks these qualities. Blanchard et al. (1983) have recently questioned this along with other "clinical lore" and have called for investigation into the particulars of successful biofeedback. Authors such as Morris and Suckerman (1974) and Wolfe (1977) have argued for adoption of an automated approach to treatment, and Borgeat, Hade, Larouche and Bedwani (1980), Hendler, Mathews, Avella, Long and Gordon (1978), and Wolfe (1977) have found the active therapist to be intrusive in electromyographic (EMG) biofeedback. This investigator has also observed a notable difference in a population of tension and migraine headache patients regarding the presence or absence of the therapist in the learning of a biofeedback task (Dumouchel, 1982). Given the considerable physiological effect found in the mere presence of another human being on an individual (Archer, Fiester, Kagan, Rate, Spierling, Van Noord, 1972; Dites, 1957; Kiritz & Moos, 1974; Lacey, 1959; Lieberman, 1981) this appeared to be a fruitful and important subject for research.

Statement of the Problem

The purpose of this study was to determine the effect of a cognitive personality variable on the acquisition of a self-regulatory process under environmental conditions which are believed to be related to the learning of this process. More specifically, the present study investigated the contribution of locus of control to the acquisition of biofeedback responses under varying therapist conditions, and the effect which the patient's perception of the therapist had upon this acquisition.

Definitions of Key Terms

Locus of control.

This concept is defined by Rotter (1966) as follows:

> When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way by an individual, we have labeled this a belief in external control. If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in internal control (p.1).

In the present investigation, locus of control was measured by Rotter's (1966) adult Internal-External Locus of Control (I-E) Scale (See Appendix A).

Biofeedback.

The technique of biofeedback has been defined as:

> The use of sensitive instruments (e.g. electronic or electromechanical devices) to measure, process and indicate (i.e., feedback) the ongoing activity of various body processes or conditions of which the person is usually unaware so that the patient, client, or student may have the opportunity to change and to develop beneficial control over these body processes (Schwartz & Fehmi, 1982, p.4).

In the present investigation, two biofeedback measures were used:

1) Electromyographic (EMG) biofeedback: the use of an instrument to monitor specific muscle groups (e.g. the frontalis) to allow the patient to learn to reduce muscle activity at the monitored site.

2) Thermal biofeedback: the use of an instrument to measure temperature at selected sites (e.g. the distal phalanx of the middle finger) in order to

allow the patient to learn to increase temperature at the monitored site.

These two measures are more fully discussed in the methodology section, with specific operational protocols provided in Appendix B.

Therapist conditions.

For purposes of this investigation, therapist conditions were two:

1) Therapist-presence.

Active assistance by the therapist for acquiring the above defined biofeedback skills. He was physically with the patient throughout all treatment sessions.

2) Therapist-absence.

No active assistance by the therapist during the treatment session. The therapist was available before the session to prepare the patient and after the session for discussion, but not during the actual training.

These two conditions are more fully discussed in the methodology section, with specific operational protocols provided in Appendix B.

Patient's perception of the therapist.

For purposes of this study, the patient's perception of the therapist was defined as a rating of the therapist's overall performance, knowledge, helpfulness, ease in talking and being with him, and warmth as perceived by the patient and measured by questions 13 - 18 of Questionnaire A (Appendix C) prior to training and questions 13 - 18 of Questionnaire B (Appendix D)

following training. Application of these measures is more fully discussed in the methodology section.

Criterion.

Success in having learned the biofeedback task was operationally defined as being able to alter the modality being learned (EMG or thermal) in the desired direction (i.e. decrease for EMG and increase for thermal) for a five minute self-control 1 (SC-1), a twenty minute training, and five minute self-control 2 (SC-2) time period. Measurements were taken at the beginning and end of each these three periods for each session. The first session at which successful change occurred in each of the three segments was defined as the number session at which criterion was achieved. This number session was then used as the dependent variable in all appropriate data analyses.

Limitations of the Study

Given that the sample was drawn from a military-affiliated population, individuals may have presented somewhat different characteristics than the population as a whole. Actual patients were used who were seeking help from an established program with a highly positive reputation, possibly giving them a higher than usual expectancy for success and greater motivation. Restriction of the sample to females only and the design utilizing only one, male therapist may have further limited the generalizibility of the results.

Overview of Remaining Chapters

Chapter 2 reviews the literature relevant to the statement of the problem, with an integrated discussion of why internals were predicted to perform better in a therapist present condition while externals were predicted to perform better in a therapist absent condition. This prediction was made, in part, because internals have been found to be less sensitive to their own proprioception (Vogt, 1975) and are more prone to attempt to solve problems through active volition rather than through the passive volitional processes required in biofeedback. Thus, they might benefit from the presence of an active therapist to assist in acquiring these unfamiliar skills, without being unduly distracted by the presence of another. Externals, on the other hand, might perform better without a therapist present due to their greater reliance on chance, luck, and fate (Carlson, 1982) which is more consistent with the nature of passive volition, their greater sensitivity to proprioceptive information (Vogt, 1975), and their greater discomfort with a potentially critical therapist present. Specific literature on perceived control, biofeedback, degree of therapist involvement and interpersonal effects on physiology are reviewed and discussed for their relevance to this prediction.

Further questions raised by this literature relate to: 1) the effect of the patient's pre and post training perception of the therapist on the outcome of training under conditions of therapist presence or absence; 2) possible differences in the rate of learning thermal and EMG biofeedback with either the therapist present or absent; and 3) the possibility of change in a patient's locus of control as a result of biofeedback training. These research

questions were addressed through appropriate analyses of data collected in this study. The hypothesis and research questions of this investigation are presented at the end of Chapter 2.

Chapter 3 discusses the research participants involved in this study, apparatus, instruments, therapist, procedures and data analyses employed.

Chapter 4 presents the results of the investigation and Chapter 5 provides a summary, discussion of these results, conclusions and recommendations for future research and treatment.

CHAPTER 2

CONCEPTUAL FOUNDATION

Perceived Control

What seems a valuable topic for exploration is to determine the optimal level of therapist involvement in biofeedback training based on some assessment of the perceived control of an individual at the outset of treatment. This could optimize the learning which takes place and most economically use the time of the trainers involved. To insist on having a trainer present with an individual who finds this intrusive is just as counterproductive as to leave someone else to figure out the task on his or her own who finds this to be threatening.

Carlson (1982) advocates the application of the concept of perceived control to the field of biofeedback and promotes research in this area as a way of further testing the concept. He uses this term to encompass a group of cognitive social learning theories including internal-external locus of control (Rotter, 1966), self-efficacy (Bandura, 1977), learned helplessness (Seligman and Maier, 1967) attribution theory (Miller and Norman, 1979) and reactance theory (Brehm, 1966; Wortman & Brehm, 1975). Of these, the locus of control construct of Rotter has received the most attention in the biofeedback literature (Carlson, 1982).

Rotter (1966) states that when an individual perceives that an event is

not entirely contingent upon his action but the result of luck, chance, fate, under the control of powerful others, or is unpredictable because of the great complexity of forces surrounding him, the event is said to be under external control. If an event is perceived as contingent upon his own behavior or permanent characteristics, the event is said to be under internal control. Rotter emphasizes certain important facts: that locus of control is a matter of perception; it is learned, and therefore can be changed; that it is on a continuum; for a given individual, it represents an admixture of varying degrees of internality/externality; and finally, there can be a considerable difference between an individual's general orientation to this dimension and his or her specific orientation to a given set of circumstances.

The above point regarding locus of control being on a continuum bears repeating. The literature tends to describe individuals as either internals or externals, suggesting the concept of dichotomous groups, and implying that such individuals actually exist. This is clearly against Rotter's intention (Rotter, 1975), and while convenient, does a disservice to his theory and sets the stage for possible misinterpretation of the published literature. While this convention will be followed in this review, it is important to understand that when a subject is referred to as either internal or external, it is really a reference to the degree of internality or externality which he or she exhibits, and is not meant to place him or her in a specific group.

Locus of control has been applied to the field of biofeedback in primarily one of two ways: 1) To determine how a person would perform on a biofeedback task based upon his or her degree of internality or externality;

and 2) Whether the learning of a biofeedback task would alter the degree of internality/externality of a given individual.

The former group of studies has attempted to predict whether internals or externals would perform better at a biofeedback task. The basic thinking underlying this research has been that internals, being more interested in controlling their environment (within and without) (Carlson, 1982) and being more self-confident (Zimet, 1979), would perform better on a biofeedback task. The findings are contradictory and inconclusive. Reinking, Morgret, and Tamayo (1976) and Carlson (1977) found internals to be better at lowering their forehead EMG than externals, while others (Modell, 1978; Stephenson, Cole, & Spann, 1979) report no significant differences between the two groups. Similarly contradictory findings have been reported with studies employing heart rate and EEG as the biofeedback task (Carlson, 1982). Zimet (1979) concluded that "contradictory evidence and methodological problems make it impossible to draw any conclusions regarding the connection between internality-externality and biofeedback performance" (p. 871).

The role of the therapist had not been taken into account in these original formulations, however, nor had the conditions of training. Interestingly, Carlson and Feld (1978), reasoning from an observation of Lefcourt (1976) that externals appear to be more responsive to social cues than internals, were able to eliminate the differences in the ability of internals and externals to lower EMG levels via biofeedback by the addition of a social reinforcer to the treatment regimen. This suggests that performance differences on a biofeedback task may be mitigated by the

proper structuring of the training environment with regard to personality characteristics. Zimet (1979) suggests that the relative success or failure of individuals in biofeedback may be dependent upon the instructional set under which they learn. He concluded that externals would do better in a highly structured framework and internals in a loosely structured one. Similarly, Carlson (1982) concluded "that the mere presence of a powerful social reinforcer in the setting, even though intended to be response-independent, may have differentially affected internals and externals" (p. 363). Thus, the controversy in the literature could be related to the failure to account for the therapist and his role in the process, and attention to the interaction between personality characteristics and the training environment as significant variables.

The second group of studies is of interest, in part, because of an association noted in the literature between external locus of control, and such negative tendencies as anxiety, hopelessness, depression, more severe psychopathology, a poor attitude toward education and poor academic performance (Zimet, 1979). Hence, an assumption was made that moving people toward greater internality would be a desirable therapeutic goal. However, as Zimet (1979) points out, it remains unclear if externality itself is the cause of these negative tendencies, or a result of them.

While not necessarily the intent of the experimenter, several studies have noted a shift from externality toward internality following biofeedback training. One of the first (Leeb, Fahrion, French, & Thommes, 1974) noted this shift following a 12-hour biofeedback training session over a two-day period. Multimodal training was employed (EMG, skin conductance, EEG, and

hand temperature) and the Rotter I -E scale was the measure employed. A small N (14) and the short duration of testing limited the finding's value to that of a suggestion for further research into the effect of biofeedback on personality characteristics. Significant shifts toward internality were reported following biofeedback, relaxation training, and placebo medication administered to a group of tension headache patients (Cox, Freundlich, & Meyer, 1975). Stern and Berrenberg (1977) observed that their subjects moved toward greater internality on the personal control subscale of the Rotter I-E scale (Mirels, 1970) as a result of true EMG biofeedback, while no-feedback and false-feedback controls showed no such change.

Carlson (1977) and Carlson and Feld (1978) both reported a significant shift toward internality among externals following frontalis EMG biofeedback, whereas their counterparts in a control condition did not show this shift. Significantly, actual changes in EMG levels were not correlated with changes in I-E scores, suggesting that the entire training environment, rather than the change in EMG levels alone was responsible (Carlson, 1982). Holliday and Munz (1978) reported that while EMG feedback did not increase internality in a group of "psychosomatic" subjects, it did so in a control group of "normal" subjects.

Cusack (1979) hypothesized and found a shift toward internality among a group of headache patients following treatment with EMG biofeedback. She also noted that a greater shift toward internality occurred in subjects who had an earlier age of headache onset. No such shift was noted among a group of controls exposed to relaxation training without biofeedback, though it is important to note that the control group was already more internal than

the experimental group at the outset of the study. She also reported that changes in locus of control did not correlate with changes in measures of symptom relief. Holroyd et al. (1984) found a substantial shift toward greater internality among their subjects in a high-success EMG biofeedback training group of tension headache patients, but little change in two moderate-success groups. They did find a significant correlation between a movement toward internality and improvement in headache symptoms in the high-success condition. Interestingly, improvements in headache activity were uncorrelated with changes in EMG. Holroyd et al. (1984) conclude that "the effectiveness of EMG biofeedback training with tension headache may be mediated by cognitive changes induced by performance feedback and not primarily by reductions in EMG activity" (p.1039).

Thus the literature appears to indicate a shift toward greater internality among a variety of populations experiencing true EMG biofeedback. It remains unclear as to the duration of this shift, as no follow-up data are reported and the period between measurements was brief. It is also unclear whether such a shift can be found in other training modalities, as Johnson and Meyer (1974) using alpha EEG training, and Tindel (1977) using skin temperature training did not report such a shift. An interesting finding of the Johnson and Meyer (1974) study was that those individuals who were not able to succeed at the biofeedback task experienced a marginally significant shift toward externality, lending some support to the focus which Holroyd et al. (1984) place upon the role of perceived success in biofeedback learning. Carlson (1982) raises the question of whether it is learning to alter EMG levels itself, or a product of the entire circumstances surrounding the

biofeedback experience that result in a shift in locus of control. Finally, even if biofeedback does produce a lasting shift in locus of control, is this shift desirable ?

Rothbaum, Weisz, and Snyder (1982) have challenged locus of control, learned helplessness and attribution theorists concerning the accuracy of defining inward behaviors (passivity, withdrawal, and submissiveness) as signs of relinquished perceived control. They persuasively argue for a two-process model of perceived control, redefining control into primary and secondary types, based, in part, on the contention that "people attempt to gain control not only by bringing the environment into line with their wishes (primary control) but also by bringing themselves into line with environmental forces (secondary control)" (p.5).

They describe four manifestations of secondary control: 1) Predictive control - "the ability to predict aversive events to avoid disappointment" (p.13). They emphasize the highly aversive nature of disappointment, and discuss the literature on task difficulty preference, noting that those individuals classically seen to be lacking in self-esteem preferred low or high difficulty tasks and could be interpreted to fear disappointment to the degree that they preferred either easy tasks or difficult tasks that they would be less likely to be criticized for failing at, thereby avoiding disappointment as well as maintaining secondary control. 2) Illusory control - aligning oneself with the force of chance in order to share in the control exerted by that powerful force. Certain individuals, often described as externals, respond to a chance-determined situation as if it were controllable, failing to distinguish adequately between a chance and skill situation. Further, externals seem to

prefer a chance over a skill situation, and internals prefer the opposite. Citing the congruence hypothesis, which states that people reserve energy for activities that match the form of control they feel best able to exercise, they quote Cherulnik and Citrin (1974): "Externals do not feel powerless, but simply pursue rewards in different avenues" (p.404). 3) *Vicarious control* - associating with powerful others in order to share in their control. They stress that this control is neither a means to an end nor a method of fulfilling others' objectives but is desired for its own sake. This kind of control appears related to identification, and the authors review the considerable literature on these concepts and how it relates to their concept of vicarious control. 4) Interpretive control - attempting to discover meaning and understanding over a situation as a means of restoring a sense of control over it. Significantly, in reviewing the literature on learned helplessness, the authors assert that helpless subjects become preoccupied with the explanation of their inability, whereas mastery-oriented subjects focus on solving the problem. This device serves the purpose of returning a sense of control to the individual in a secondary manner when it is objectively out of his control. Reflecting Lazarus' (1977) thinking, the authors note that a cognitive reinterpretation of an event frequently reduces the stress associated with it, even when the objective reality cannot be changed, and cite studies of rape victims, accident victims, and terminally ill patients in support of this.

Rothbaum et al. conclude that while inward behavior may signify an abandoning of control, it need not always do so, and they propose a model of secondary control that describes continued attempts by individuals to maintain a sense of control over themselves and the situation. Evidence for this

exists when signs of persistent inward behavior, characterized by a pervasive effort to fit in effectively with one's environment, continue in a context of objective failure. They predict from their model that secondary control is most likely to be exhibited by persons who have experienced recurring prior failures, chronic disability, external locus of control, low self-esteem, or high failure avoidance. This comes from a recurring inability to achieve primary control, a congruence with secondary control via personality characteristics, and the success of secondary control in their lives.

Perceived uncontrollability is most likely to occur in persons who rely principally upon primary control i.e. internal locus of controls, high motivation for success, or Type A's. These individuals typically face failure with renewed effort, and are less likely to have developed alternate coping strategies (secondary control mechanisms). They conclude that preference for style of control is due to both personality characteristics and situational factors. They advocate focusing research on studying the optimal balance of styles of control for a given individual in a given set of circumstances and discuss the various therapeutic implications of their position:

> It may be important to match therapeutic methods to clients along dimensions suggested by the two-process model. Therapeutic outcome research indicates for example, that individuals with an external locus of control benefit more from directive interventions whereas individuals with an internal locus of control profit more from nondirective interventions (p.31).

This theoretical formulation seems most applicable to the biofeedback treatment of chronic headache patients. As a group, headache patients have been forced to adapt to a condition for which they are often held responsible and are accused of using for secondary gain, yet for which they

feel totally out of control. Migraineurs, in particular, have been characterized as driven, compulsive, demanding individuals who are masters of whatever they attempt - except their headaches (Dumouchel,1982). Thus, there is a group of patients that both by personality and situation, have been led to either abandon a sense of primary control over their condition, or utilize secondary control to manage it.

Biofeedback is often described as a method wherein passive volition, a process of allowing the body to achieve a given condition rather than making it happen, is employed to achieve self-regulatory control (Pepper, 1979). This process appears similar to the principles of secondary control described above. This further suggests that those individuals who are familiar with secondary control processes would be more available to acquire the self-regulatory skills learned in biofeedback, than those individuals who are seen to operate predominantly under primary control. This is consistent with the current biofeedback literature (Schwartz & Fehmi, 1982) which notes the difficulty of Type A personalities in abandoning a striving mode and accepting a passive mode in order to learn self-regulation.

A reformulation of the above prediction about the type of therapeutic intervention and locus of control is necessary for the biofeedback task. The concept of passive volition entails the abandonment of a striving, achieving mode and a turning of the attentional processes inward. This allowing of things to "just happen" is seen as a more natural task for those individuals already familiar with secondary control processes (i.e. externals) and is more difficult for individuals invested in primary control processes (i.e. internals), resulting in the latter group requiring the more directive therapist assistance.

This is in part predicted because the internals, in employing their more familiar striving mode will become more readily frustrated with the task when this method fails, and require more therapist directed assistance to facilitate their learning of the task. They will be more likely to require guidance in acquiring passive volition, a secondary control parameter. Externals, on the other hand, preferring tasks of luck, chance and ambiguity, will find the amorphous instruction to "just allow the red light to come on and allow yourself to let go and relax", without any description of how to achieve this, a pull to fall back on their natural secondary control mechanisms and learn the task better without a potentially critical therapist present.

That two different modes of learning appear to be operating is suggested by Traub and May (1983) demonstrating in two experiments that learned helplessness actually facilitated learning on a biofeedback task while interfering with a cognitive performance task. They submit that passive attention, not active striving is the key to attainment of control over autonomically mediated processes such as sexual arousal, urination, and relaxation (see also Pepper, 1979). Vogt (1975) has observed that a sample of external subjects were more aware of proprioceptive feedback from their muscles during a muscle relaxation task than a matched sample of internals. This suggests that externals should have less trouble learning the task if encouraged to use their own resources without outside interference, while internals may require a greater degree of guidance to focus on their own proprioceptive information. Houston (1972) found that while internals and externals do not differ in the degree of anxiety which they report in a

stressful situation, internals evidence significantly greater physiological response than do externals. This further suggests a greater lack of awareness of proprioceptive information in internals, perhaps from defensiveness (Houston, 1972), and supports the hypothesis that the internals will require the greater degree of assistance in learning biofeedback.

Finally, Carlson (1977) observed that while internals were better able to learn to lower their EMG levels than externals, they reported feeling less relaxed than the external subjects following training. This suggests that while achieving their characteristic greater control, they did so through an active volitional mechanism that did not allow them to achieve a true state of self-regulation. No praise or verbal information of any kind was provided to the subjects relevant to their performance in the experiment. Thus, while ostensibly performing in a more successful manner than the externals, the internals actually failed to grasp the nature of the relaxation task on their own.

Biofeedback

Biofeedback has become an accepted form of treatment for such conditions as migraine (Diamond, Diamond-Falk, & Deveno, 1978; Fahrion, 1977; Sargent, Green & Walters, 1972), muscle-contraction headache (Budzynski, 1978; Hutchings & Reinking, 1976; Philips, 1977), Raynaud's phenomenon and disease (Taub & Stroebel, 1978), and numerous other conditions. Basic criteria have been established outlining essential conditions for the successful accomplishment of this treatment (Schwartz & Fehmi, 1982), although controversy continues as to its efficacy as is demonstrated by

research which continues to give conflicting results (See Blanchard & Epstein, 1978; Ray, Raczynski, Rogers & Kimball, 1979; Schwartz & Beatty, 1977; and White & Tursky, 1982, for reviews). One frequently finds the efficacy of the technique being supported by clinician-researchers in their studies, and being found non-efficacious or equivocal by laboratory based studies.

This is not surprising given the considerable differences usually found between the two settings. These differences can perhaps best be summarized as follows: Laboratory based biofeedback is often concerned with investigating whether or not a specific physiological response can be conditioned, while clinical biofeedback is often concerned with teaching a specific set of skills which can be generalized to a variety of settings, and a cognitive understanding of the relationship between the skill being learned and the condition for which the patient has sought treatment. Laboratory based biofeedback studies (cf. Segreto-Bures & Kotses, 1982) frequently attempt to minimize all extraneous variables to the point that they often remove many of the ingredients considered essential for clinical biofeedback. Instructions are usually limited to "make the tone lower" with intentional failure to give the subject any cognitive cues as to how to achieve this, or even provide an awareness between the "feedback" and the specific physiological variable being studied. This conditioning research is important, and has done much to increase our awareness of the breadth of physiological learning which can take place. But it is a considerable leap to then assert that after exposure to such limited instruction (often as little as one 20 minute trial), the subject either has or has not improved on a clinical condition as a result of biofeedback.

Much of the research questioning the clinical efficacy of biofeedback has been criticized for methodological and other weaknesses by Steiner and Dince (1981). They argue that existing biofeedback research must be reviewed with caution, particularly that which employs laboratory conditions and then attempts to make clinical generalizations from them. Simply exposing an individual to flashing lights or changing tones does not constitute biofeedback training and yet many studies, critical of biofeedback and claiming to fail to find treatment signficance, did just that. No criteria for successful biofeedback training were established, therapists were laboratory assistants rather than skilled trainers, and laboratory settings were employed using undergraduate psychology majors. In brief, Steiner and Dince argue that clinical conclusions should be drawn only from a clinical population, treated by trained therapists to a predetermined level of training in a clinical setting before conclusions can be reached about the efficacy, or lack thereof, of a particular biofeedback procedure for a given condition. These conclusions have in turn been challenged by Kewman and Roberts (1983) who argue that the literature does not support the value of training to specific criteria, nor does it support the contention that therapist's degree of training, warmth, or level of interaction is significant to treatment outcome.

What appears to some to be a desirable condition for successful training on a thermal biofeedback task is the positive attitude of the trainer or therapist, as has been noted by Taub (1977), Taub and School (1978) and others (i.e. a warm, positive, believing, therapist produces much better clinical results than a cold, aloof, mechanical experimenter). Blanchard et al. (1983), question this, however, and conclude from their research that

"there are no significant linear relationships between perceived therapist competence, helpfulness or warmth and outcome following relaxation therapy or biofeedback training" (p.213). They conclude in the same article that the experience level of the therapist and training to criterion are not significant factors in patient outcome. This is an interesting conclusion given that they acknowledge a limitation of their study being that their therapists were "perceived as extremely competent, helpful and warm" (p.214). Thus, a controversy has developed in biofeedback which needs further exploration and clarification to adequately resolve the problem of what the therapist does or does not contribute to treatment.

What may account for some of the controversy is the failure in most of these studies to address the nature of patients' individual differences and possible interaction with therapist variables. This may present a problem given two areas of related research: degree of therapist involvement; and interpersonal effects on psychophysiology. These areas suggest that the presence or absence of a therapist may significantly affect the outcome of the training in certain individuals, thus leading to erroneous conclusions regarding the efficacy of biofeedback in certain populations.

Degree of Therapist Involvement

The relationship between the therapist and client has long been seen as a significant component in the process and outcome of counseling and psychotherapy. Historically, Rogers (1961) reviewed a number of studies which support the importance of the therapist's characteristics and their effect on psychotherapy. He concluded from these studies that the attitudes

and feelings of the therapist and how they are perceived by the client are most important in the therapeutic relationship, regardless of theoretical orientation or techniques used. More recently, this issue has been discussed in the field of biofeedback (Frank, 1977; Bram Amar, 1979; Ray et al., 1979; Schwartz & Fehmi, 1982).

The Applications Standards and Guidelines for Providers of Biofeedback Services states:

> As in most other treatments, the therapeutic relationship and characteristics of the therapist and assistants are important. Among the therapist characteristics often considered essential for effective therapy are empathy, genuineness, a warm and encouraging attitude, credibility, professional demeanor, and objectivity. (Schwartz & Fehmi, 1982, p. 38)

Ray et al. (1979) have identified three categories which they call "nonspecific treatment effects" (p.7) which may influence biofeedback learning: 1) therapist variables; 2) patient variables; and 3) situational-procedural variables. Among therapist variables, they consider the therapist's belief that he can be of help to the patient and his enthusiasm for the treatment as primary. Closely related to this is the therapist's interest in, and attitude toward, the patient and how successfully this is communicated to the patient. Finally, the persuasiveness of the therapist is seen as a significant factor in achieving a successful outcome.

Patient variables include the patient's expectancy for success, previous experience with healers, confidence in the present therapist, belief in the efficacy of the treatment, importance of finding relief from his or her symptoms, and finally, suggestibility toward change.

Situational-procedural variables are considered to be: the credibility of the rationale for treatment as perceived by the patient; the therapeutic

setting and the suggestibility-enhancing aspects of the setting and procedures; direct suggestion, such as statements attesting to the efficacy of biofeedback with other patients; and finally, symbolic suggestion implied in the rituals associated with the specific treatment process (e. g. attachment of biofeedback equipment, scientific graphs, technological setting of the training, etc.). They strongly call for further study of these factors and their effects on biofeedback learning. These "non-specific treatment effects" are certainly deserving of further investigation. Perhaps it would be better to consider them as "unspecified treatment effects", in that many studies have failed to take them into account as potentially powerful variables.

In one related study, Swann and Snyder (1980) investigated the effect of an instructor's preconceived theory of learning on student ability that is relevant to the above observations of Ray et al. (1979) on the importance of therapist variables. Swann and Snyder (1980) found that regardless of the actual ability of a given student, the instructor's initial assessment of that student's ability and the instructor's theoretical bias regarding learning were the primary factors in determining the evaluation of a given student's final success. This was so even when the behavioral evidence contradicted this. (Each instructor had been taught either an intrinsic model of ability, i.e. knowledge is within the student and simply must be allowed to emerge; or an extrinsic model, i.e. that the instructor must instill knowledge into the student).

This is particularly relevant to the field of biofeedback and self-regulation where former theory held that the very physiological processes which individuals are now learning to control were involuntary and outside

conscious control. This "fact" delayed the discovery of the degree of self-control possible considerably, and could, for a given trainer with a bias against such learning, continue to do so, even if the trainee was capable of learning the process, by the very debilitating negative set which the instructor creates. Further, whether the therapist believes that the process which the individual wishes to self-regulate is already under his control randomly, and merely needs to be brought into awareness to develop mastery, or if she believes that it is a totally new skill which only she can teach, is going to significantly affect how rapidly the individual acquires self-regulation, if at all. This will also affect how well he will be able to generalize the particular skill to situations outside the training setting, and how well he will be able to generalize it to other parameters of self-regulation, e.g. thermal to EMG, EMG to GSR, etc. What is most significant is that these initial beliefs, once taught, are extremely resistant to change, even when behavioral evidence contradicts them (Swann & Snyder, 1980). This may well explain some of the disparate findings in the field of biofeedback between those who argue for its efficacy and those who argue against - you find what you're expecting to find, and learn only what you think you can learn.

Segreto-Bures and Kotses (1982) studied the effects of experimenters' expectancies on the ease of learning an EMG task by instructing three separate experimenters that learning EMG biofeedback was easy, difficult, or neutral. They then evaluated three groups of subjects for degree of learning in both a contingent and non-contingent biofeedback condition. While they found that those subjects in the contingent condition demonstrated greater

biofeedback learning than those in the non-contingent condition, they failed to demonstrate a clear relationship between experimenter expectancy and EMG learning. The authors argue for a continued investigation of this possible effect, however, and suggest that the extreme limitations which they placed on their experimenters may have prevented the results from achieving significance. This experiment is more like a conditioning study than a clinical biofeedback training, in that only one session was provided to the subjects and they were merely told to keep the tone low, and "were not informed of the contingency between frontal muscle activity and the pitch of the tone, nor were they provided with relaxation instructions or strategies" (p.468). Further, the experimenters were highly controlled in what they could say to the subjects and were only in contact wth the subjects to attach the equipment. There was not much time for expectancies to be communicated to the subjects, yet the trends they observed suggested that they were.

This study exemplifies one of the continuing problems in the biofeedback literature: Laboratory conditioning paradigms with a strictly controlled set of conditions, particularly regarding the role of the experimenter, are directly compared with clinical biofeedback training with a highly flexible therapist allowed to interact with the patient as he deems best based on his clinical judgement. The result is like comparing apples and oranges, with often disastrous consequences. One of the purposes of the present investigation is to attempt to bridge the gap between strict laboratory rigor, which often destroys the most therapeutic elements of the clinical setting,

and the looseness of the consulting room which makes relationships between input and outcome difficult to decipher.

Returning to the study by Segreto-Bures and Kotses (1982), they made it a point of the experiment not to provide any instructions to their subjects which might aid them in learning EMG relaxation. Those subjects who did achieve some control did so through trial and error learning. This is not the most efficient way to acquire self-regulation skills. Keefe (1974) demonstrated early on that an "awareness of the relationship between response and reinforcer greatly facilitates the conditioning of increases in skin temperature " (p.59). Leeb, Fahrion and French (1974) found the instructional set provided by the experimenter to have a significant effect upon the learning of a thermal biofeedback task, with those subjects being provided a positive set having the greatest increases in hand temperature. Bregman and McAllister (1981) attribute much of the confusion in the temperature feedback literature to the failure of various experimenters to standardize instructional procedures. In their own study they reported that instructions which included suggestions of warm situations greatly enhanced the learning of a hand warming task, and they called for a greater attention to the cognitive variables in hand temperature training. Holroyd et al. (1984) have gone so far as to conclude that it is primarily the perception of successful performance on the part of the subject that provides amelioration of his or her condition, not the physiological learning provided by biofeedback. Thus the expectancies of the experimenter or therapist, and the learning set under which training is conducted, along with the qualities

of the therapist, all seemingly contribute to the outcome of biofeedback learning.

What then is the proper role of the therapist or experimenter in the biofeedback setting ? The question remains to be answered, and recommendations range from a highly involved, empathic individual to a detached laboratory assistant who may not even be there during the training.

Bram Amar (1978) describes the role of the therapist in biofeedback as that of a teacher or coach who is able to take the complex process of biofeedback learning, break it down in to its component parts, and transmit this understanding to the trainee. She observes that during the course of the training, patients frequently enter a period during which they report doing better when training alone or at home, rather than when being observed. This suggests that there may be an optimal degree of therapist presence or absence during the actual biofeedback training session for a given patient.

Thus the therapist appears to be a key element in the successful aquisition of biofeedback learning. However, a body of evidence to be reviewed below argues that automated learning, i.e. learning where the individual acquires the skill essentially without trainer assistance, may be superior in certain circumstances. The appeal of an automated approach is increasing as computer operated biofeedback equipment becomes increasingly available and cost containment becomes a major concern in all areas of health care delivery.

Morris and Suckerman (1974) compared self-administered systematic desensitization of snake phobic subjects between a warm therapist automated

group and a cold therapist automated group and controls. They found a markedly greater degree of improvement in the subjects treated by the warm therapist automated group. They concluded that therapist warmth, operationalized in terms of the therapist's voice quality was the important variable involved in producing change both at completion of treatment and followup. This led them to assert, as others have done, that therapist warmth is a necessary but not sufficient condition for effecting positive change through desensitization. Further, they showed that automated systematic desensitization is a successful approach when therapist variables are accounted for and optimized. Wolfe (1977), was able to show the value of an automated, biofeedback-assisted training program for systematic desensitization of performance anxiety in a population of music students. Jurish et al. (1983) found that a home-based, minimal-therapist-contact treatment condition was at least as efficacious as the clinic-based treatment in terms of reduction of (1) headache index, (2) headache intensity, (3) headache frequency, and (4) medication usage, and was clearly more cost-effective. The group studied were 40 vascular headache sufferers who were treated with relaxation training and thermal biofeedback, under both conditions, with the principal variable being the amount of therapist contact.

The controversy continues over the impact of the therapist on treatment. A warm accepting attitude is arguably a necessary condition for successful treatment, and may be more effective than a cold impartial one. Yet, the very presence of a therapist may produce undesirable results, and in biofeedback learning may even be detrimental, as will be seen below.

Interpersonal Effects on Psychophysiology

Numerous authors have been interested in the effect one individual has on the physiological responses of another. Dites (1957), using Galvanic Skin Response (GSR) as a physiological measure of anxious or alerted responses of the subject, correlated deviations on this measure with judges' ratings of the degree of warm acceptance and permissiveness on the part of the therapist. He found that even a minute change in direction of a lesser degree of acceptance on the part of the therapist resulted in increasing GSR deviations. This suggested that a decrease in the positive aspects of the relationship is experienced at the physiological level by the patient. Lacey (1959) reviewed the psychophysiological data on a person's involvement with the environment in the context of the psychotherapeutic interview. He found a notable increase in heart rate and decrease in ecrine sweat rate when the person was inwardly attending and the opposite pattern when he was outwardly attending. Archer et al. (1972) raised the question of a variable physiological response to the presence or absence of a warm, accepting individual when a subject was asked to discuss a personally troublesome concern. They found that there was an increasing degree of relaxation experienced, as defined by a change in heart rate, and Galvanic Skin Response (GSR) in individuals who were allowed to express their concerns to another person. They also found that smaller, but notable, changes on these measures were seen in speaking into a tape recorder, or in just verbalizing the concerns aloud. Although the implications of this are many, the concern here is that verbalization and the mere presence or absence of another human being produces physiological change. Kiritz and Moos (1974) have

summarized the considerable body of literature on the effect of interpersonal influences on physiology. Most relevant for the present investigation were their observations on the effect of support/criticism, physiological covariation, and involvement with another. They reported that praise was found to decrease EMG activity while criticism increased it. Several studies cited by them report that individuals who share a common environment will covary on a variety of physiological indices, including heart rate and GSR. More importantly, this covariation is enhanced by an emotional relationship between the two individuals, and has been frequently reported to exist between therapist and patient in a psychotherapeutic setting. The greater the degree of involvement with another, the greater the degree of covariance found. Lieberman (1981), reviews both the literature on electrodermal activity, cardiovascular activity, and respiratory activity, and the literature on empathy as it applies to the therapeutic situation, and the interrelation between these variables. He finds significant changes in these physiological factors of the patient varying with the degree of therapist's empathy, as perceived by the patient and as rated by outside observers. Thus the mood, attitude, and behavior of the therapist as well as his relationship with the patient may affect the physiology of the patient, affecting, in turn, the physiological variables observed through biofeedback, and therefore, the overall learning of the biofeedback task.

Taub (1977), Taub and School (1978) and Leeb, Fahrion and French (1974) all found that in a biofeedback hand warming task, the experimenter's interaction with the subject is important in temperature self-regulation training. Taub labeled this observation the "person factor", and found it to

be "by far the largest experimental effect we have obtained by the manipulation of any single variable in our entire sequence of experiments" (Taub & School, 1978, p. 617). He cites Burch and Ray (1948) and Mittleman and Wolff (1939) as reporting that hand temperature is particularly sensitive to emotional influences. Taub concludes that autonomic self-regulation training, in general, may be more sensitive to emotionalizing stimulus conditions than other types of training:

> The autonomic nervous system is that part of the nervous system most closely associated with emotions; and if one puts too much stress into the system early in training, the resulting increase in autonomic activity may well override other effects mediated by the system. (Taub, 1977, p. 277)

Suter, Fredericson and Portuesi (1983) called upon this "person factor" as a possible explanation for their failure to replicate successfully an earlier study they had conducted. They noted considerable differences between the experimenter's positive expectations and gregariousness in the original study and that of the experimenter in the second study. They further observed that if their speculation was correct "the psychophysiological mechanisms of biofeedback must be very delicate indeed — vastly more fragile than, for example, the robust processes underlying ordinary operant conditioning" (p.581).

Wolfe (1977) found that there was little difference in outcome between music students with self-reported performance anxiety who were treated with therapist administered biofeedback assisted systematic desensitization, and those who engaged in a self-administered program. Both were equally successful in lowering EMG and in reducing self-reported measures of performance anxiety on a number of measures, despite the

therapist being described as warm and empathic. This was contrary to his original hypothesis that the therapist-assisted group would do better. He did find, however, that the self-administered group actually had lower EMG levels throughout the experiment. He explained these findings as follows: 1) The presence of the therapist was actually distracting to the individual and interfered with the acquisition of biofeedback learning; 2) The two groups had different expectancies as to the presence of the therapist and different cognitive sets regarding this; and 3) Subjects in the therapist-assisted group may have experienced some performance anxiety in the presence of the therapist. (Some habituation was observed after the third therapist-assisted session which further supported this.)

Wolfe (1977) therefore concludes that "the therapist's presence was interpreted as distracting and anxiety evoking resulting in greater difficulty decreasing muscle tension levels during the first two treatment sessions and slightly higher EMG levels throughout the experiment for the T-A group" (p.51). He further speculates that the interference of the therapist may be related to the nature of the biofeedback task (i.e. attention to a magnification of internal processes) resting primarily on the distracting nature of another's presence, and not be applicable to other forms of interactive therapy. He encourages other researchers to account and control for differences in the attentional and performance demands of various procedures. Finally, he calls for future research to better account for the role of individual differences in selecting a particular treatment approach for a given individual with respect to its being therapist-assisted or self-administered.

Hendler et al. (1978) observed what they label "the effect of person" to produce a variation (both increases and decreases) in EMG response to the presence or absence of a therapist of up to 300% within a subject and 800% between subjects. They were able to rule out the startle response as accounting for this finding, and called for the control of this powerful variable in biofeedback research.

Borgeat et al. (1980) studied the effect of a therapist's active presence on a subject's ability to lower EMG levels. The population studied was a group of tension and mixed headache patients. The researchers hypothesized that the group receiving active therapist assistance would more readily acquire skill in reducing its EMG levels. Contrary to their expectations, all EMG levels were higher in the therapist-present condition. They were unable to specify the mechanisms by which the therapist's presence produced this result, though they suggest that confusion resulting from multiple stimuli may be responsible, and recommend further research to explore this issue.

Bregman & McAllister (1983) predicted that the presence of an experimenter during training would inhibit the learning of a thermal biofeedback task and found that this was in fact the case. A complete lack of ability to control skin temperature was observed in the majority of the subjects in the experimenter-present condition. They theorized that social facilitation theory, i.e. the presence of spectators impairs the learning of new tasks but enhances the performance of well-learned tasks (Zajonc, 1965), provided the best account of this finding. In addition, they commented "It is also possible that a warm supportive experimenter/therapist will reduce and possibly overcome the negative learning effects found in the present study"

(p.546). While they do not offer a reason for this observation, the literature reviewed herein suggests that this is probably the case, and further supports the need for the present investigation.

Overall, these findings support the hypothesis that the presence of the therapist in a biofeedback learning situation, and his or her degree of involvement, affect the outcome of training. The therapist can significantly influence the outcome of treatment in a variety of direct and indirect manners, either intentionally or unintentionally, positively or negatively. This effect has been noted across a wide variety of therapeutic interventions from a broad spectrum of theoretical orientations since very early on in the history of counseling and psychotherapy. This effect has been observed at the psychophysiological level. It has produced significant results upon the acquisition of thermal and EMG biofeedback learning. Despite these findings, clinical biofeedback continues to be applied without concern for the active or passive role, or presence or absence of the therapist upon treatment outcome. The issue deserves further research and clarification.

Dumouchel (1982) observed in a clinical population of migraine and muscle contraction headache patients from 1978-1982, that once proper instruction in the operation of the equipment was given over one to two sessions most patients could accomplish subsequent training on their own. He followed Taub's (1977) guidelines and presented the task in a warm, friendly supportive manner encouraging the patient to learn the task in whatever way was easiest for him. When extreme difficulty was encountered, successful strategies that others had used were employed. For most patients this initial instruction followed by self-directed training was

successful. However, for certain patients, a distinct preference was expressed that the therapist either be present for all training sessions, or absent for all training sessions. This experience has been reported by others (E. Taub, personal communication, March, 1982; Multi-party discussion at the Biofeedback Society of America meeting on therapist effects, March, 1982, March, 1983, & April 1985; J. G. Carlson, personal communication, August 26, 1983) and has given rise to the question of what individual difference might account for this observation.

While many theoretical formulations might be used (e.g. transference, state/trait anxiety, self-image), the one which is currently receiving the most attention in the field of biofeedback is that of perceived control. This may be defined as the amount of control that an individual attributes to himself under a given set of circumstances. This relates to his general level of comfort and ability to learn.

Summary

Several authors have identified the concept of perceived control to hold much promise in its application to biofeedback learning and for biofeedback to offer an excellent focus for the further development of this theory. The literature on perceived control can aid in the understanding of how biofeedback skills are best acquired by individuals and which training conditions are best suited for them based upon an analysis of their style of perceived control. From this, it may be possible to determine whether they will acquire their skills better in a therapist-present or therapist-absent

situation, thus optimizing their learning and providing for the most efficient therapeutic approach.

The biofeedback literature, at present, has left unresolved the relation of the patient's perception of the therapist and biofeedback learning. Certain authors (e.g. Schwartz & Fehmi, 1982; Steiner & Dince, 1981; Taub, 1977) argue for, and current recommended practice calls for, the attitude of the therapist to be warm, supportive and positive in introducing the tasks to the patient. Others (e.g. Blanchard et.al. 1983; Kewman & Roberts,1983) argue that the role of the therapist and how he is perceived by the patient have not been found to be significant when these factors were evaluated following training. Still others (e.g. Borgeat et al., 1980; Hendler et al., 1978; Wolfe, 1977) have found the active participation and even the mere presence of the therapist during EMG training to be a variable that may interfere with training. Failure to measure patients' perception of the therapist prior to training, and failure to include both thermal and EMG biofeedback in the same study, have added to the lack of clarity in this area.

Finally, there exists some evidence that locus of control may shift as a result of biofeedback training (e.g. Carlson, 1982; Holroyd et al., 1984; Zimet, 1979), but this question is far from resolved due to the disparity of findings in this area, and clearly warrants further investigation of this important issue.

Hypothesis

There will be a difference in the number of trials to success in learning a biofeedback task between therapist-present and therapist-absent treatment conditions.

a. Those individuals exhibiting a greater degree of internality will learn a biofeedback task more rapidly in a therapist-present condition.

b. Those individuals exhibiting a greater degree of externality will learn a biofeedback task more rapidly in a therapist-absent condition.

Research Questions

1a. Will the patient's pre-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions?

1b. Will the patient's post-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions?

2. Will there be a difference in the rate of learning of EMG and thermal biofeedback in the therapist-present and therapist-absent conditions?

3. Will there be a change in patient's locus of control scores following completion of biofeedback training?

CHAPTER 3

METHOD

Research Participants

The sample (N = 60) used in this study was drawn from a population of female, active duty and retired military personnel and their dependents, from Griffiss Air Force Base, Rome, New York. They were patients presenting with a stress-related disorder who were seeking treatment at the Behavioral Medicine Clinic, USAF Hospital Griffiss between June 1984 and May 1985, and had no history of biofeedback training within the past two years. This program has been engaged in the treatment of these conditions since 1978, and employs biofeedback as its primary treatment modality. All patients referred underwent a medical, physical therapy, and psychological screening which has been described elsewhere ("An Air Force Approach to Behavioral Medicine," 1981; Dumouchel, 1978a; 1978b; 1981), and is presented in detail in the procedures section below. In this study, treatment followed the established protocol for this clinic (Appendix B). All patients were referred by other health care providers.

Each patient was seen by the therapist for a two-hour initial evaluation, a one-hour baseline session, a one-hour orientation session and

ten, one-hour training sessions for a total minimum contact time of fourteen hours. Each patient entered this process upon referral and continued until completion of all procedures. Data analysis was begun upon completion of the final patient.

Seventy-four patients were evaluated for entrance into the study, twelve dropping out during the evaluation phase, and two failing to pass the psychological screening (see below).

Patients who completed the study (N = 60) ranged in age from 8 to 64 years, on military paygrade from airman through colonel (and their dependents) and were ethnically varied. The majority of patients were diagnosed as having muscle contraction headache (33.3%), with the remainder as having both migraine and muscle contraction headache (26.7%), migraine (20.0%), mixed headache (13.3%), or Raynaud's phenomena (5.0%). Symptom duration ranged from 1 to 32 years. Days in the program from evaluation to completion ranged from 35 to 190. More detailed demographic data for the sample as a whole and by condition is presented in Tables 1 and 2.

Those patients who were referred but chose not to enter treatment (n = 12) were slightly younger, had their symptoms for a shorter period of time, and were more likely to have muscle contraction than migraine headaches (Tables 3 and 4).

Assignment to the therapist-present or therapist-absent condition was conducted by another psychologist after patients completed their orientation sessions. This assignment was random, and balanced for degree of internality/externality and type of biofeedback across groups. The

experimenter and patient were both blind to the conditions of assignment, and the assigning psychologist was blind to the identity of the patient.

Table 1

Demographics of Sample for Quantitative Variables

Variable	M	SD	Range
Age			
All patients (N = 60)	31.13	9.88	8-64
Therapist-absent group (n = 30)	28.57	8.94	8-46
Therapist-present group (n = 30)	33.70	10.25	15-64
Years of symptoms			
All patients	11.90	8.92	1-32
Therapist-absent group	11.73	8.58	1-32
Therapist-present group	12.07	9.39	1-32
Days in program			
All patients	82.07	31.18	35-190
Therapist-absent group	79.53	19.48	42-130
Therapist-present group	84.60	39.81	35-190

Table 2

Demographics of Sample for Qualitative Variables

	All patients (N = 60)		Therapist-absent condition (n = 30)		Therapist-present condition (n = 30)	
Group	No.	%	No.	%	No.	%
Race						
White	58	96.7	29	96.7	29	96.7
Non-white	2	3.3	1	3.3	1	3.3
Military paygrade						
01(Airman Basic)	0	0.0	0	0.0	0	0.0
02(Airman)	2	3.3	2	6.6	0	0.0
03(A1C)	5	6.3	4	13.3	1	3.3
04(SrA)	1	1.7	0	0.0	1	3.3
05(SSgt)	13	21.7	10	33.3	3	10.0
06(TSgt)	9	15.0	3	10.0	6	20.0
07(MSgt)	12	20.0	5	16.7	7	23.3
08(SMSgt)	6	10.0	2	6.6	4	13.3
09(CMSgt)	0	0.0	0	0.0	0	0.0
11(2Lt)	0	0.0	0	0.0	0	0.0
12(1Lt)	1	1.7	1	3.3	0	0.0
13(Capt)	8	13.3	2	6.6	4	13.3
14(Major)	1	1.7	1	3.3	0	0.0
15(LtCol)	1	1.7	0	0.0	1	3.3
16(Col)	1	1.7	0	0.0	1	3.3
Military status						
Active duty(AD)	12	20.0	7	23.3	5	16.7
Dependent of AD	35	56.3	16	53.3	19	63.3
Retired military(RM)	0	0.0	0	0.0	0	0.0
Dependent of RM	13	21.7	7	23.3	6	20.0

continued

Table 2 (continued)

Diagnosis						
Migraine	12	20.0	7	23.3	5	16.7
Muscle contraction	20	33.3	11	36.7	9	30.0
Both	16	26.7	6	20.0	10	33.3
Mixed	8	13.3	6	20.0	2	6.7
Raynaud's Syn.	3	5.0	0	0.0	3	10.0
Other	1	1.7	0	0.0	1	3.3
Type of biofeedback						
Thermal	33	55.0	16	53.3	17	56.7
EMG	27	45.0	14	46.7	13	43.3
Quarter of treatment						
June-Aug	5	8.3	3	10.0	2	6.7
Sep-Nov	18	30.0	7	23.3	11	36.7
Dec-Feb	20	33.3	10	33.3	10	33.3
Mar-May	17	28.3	10	33.3	7	23.3

Table 3

Demographics of Dropouts for Quantitative Variables

Variable	M	SD	Range
Age	25.91	6.59	17-37
Years of symptoms	6.18	4.71	1-14

Note. n = 11. One dropout failed to provide any information.

Table 4

Demographics of Dropouts for Qualitative Variables

Group (n = 11)	No.	%
Race		
White	10	90.9
Non-white	1	9.1
Military paygrade [a]		
03 (A1C)	3	42.9
05 (SSgt)	2	28.6
06 (TSgt)	1	14.3
07 (MSgt)	1	14.3
Military status		
Active Duty (AD)	4	36.4
Dependent of AD	6	54.5
Retired Military (RM)	0	0.0
Dependent of RM	1	9.1
Diagnosis		
Migraine	1	9.1
Muscle Contraction	7	63.6
Both	1	9.1
Mixed	2	18.2
Raynaud's Syndrome	0	0.0
Other	0	0.0

[a] Only seven dropouts reported this information. Four did not. One did not report any information.

Ethical Procedures

All treatment was administered in accord with the Application Standards and Guidelines for Providers of Biofeedback Services (Schwartz & Fehmi, 1982) of the Biofeedback Society of America. This research was conducted

in accord with the ethical standards of the American Psychological Association, the Biofeedback Society of America, the Biofeedback Certification Institute of America and the United States Air Force (AFR 169-6). (For purposes of this study, there are no essential differences between these guidelines.) This study was reviewed, approved, and monitored by the USAF Surgeon General's Clinical Investigation Committee and assigned Clinical Investigation Proposal #84-075. Funding was provided by a doctoral fellowship from the Air Force Institute of Technology (AFIT/CIMI) which also provided additional monitoring of the investigation.

Apparatus

Thermal training was conducted using an Autogen 2000b research grade thermograph with Yellow Springs Instruments' thermistors #729. Sensors were placed on the ventral surface of the distal phalanx of the middle fingers of the left and right hands. Sensors were held in place with surgical paper tape at the sensor, proximal phalanx, and wrist to prevent proximity cooling of the sensor.

Electromyographic training was conducted using an Autogen 1700 Myographic Analyzer with gold electrodes. Sensors were placed on the forehead 5.0cm either side of the midline and 2.5cm above the eyebrows, with a ground placed midway between the two active sensors. They were attached with tape disks and proper conducting gel was used.

Instruments

The Rotter I/E scale (Rotter, 1966) was chosen to measure the internal/external dimension of the patients (See Appendix A). This choice was based upon the widespread employment of this instrument in previous studies with biofeedback, and because of its focus upon general rather than specific expectancies of reinforcement. (Certain authors, e.g. Lefcourt, 1980, have argued for the greater utility of a specific locus of control instrument. However, biofeedback, which for most individuals should constitute an unknown process, appears to fall under the conditions which Rotter, 1975, described as more likely to call upon general rather than specific expectancies of reinforcement. If so, this should allow for his instrument to be the one of choice for this study, J. G. Carlson, personal communication, February 21, 1984.)

The Rotter I/E scale is a 29-item, forced choice test including six filler items intended to somewhat disguise the intent of the instrument. The test is scored by totaling the number of external responses. Instructions (Appendix A) are geared to an upper high school reading level. Means and standard deviations for several samples are included in Appendix A. Internal consistency (KR_{20}) ranges from .69 to .73, while test-retest reliability at one to two months ranges from .49 to .83 (Green, 1982). The I/E scale has neither been found to correlate highly with social desirability (compared with the Marlowe-Crowne Social Desirability Scale with correlations ranging from -.07 to -.35) nor with various intelligence tests (correlations ranging from -.09 to .03) supporting the scale's construct and discriminant validity (Rotter,1966). The I/E scale correlates satisfactorily with other methods of

assessing the same variable, such as questionnaire, Likert scale, interview assessments, and ratings from a story completion technique (Rotter, 1966; Green, 1982).

Rotter (1975) has argued that the value of the reinforcers must be known in order to make any valid attempt at predicting behavior based upon his theory. Patients entering treatment at the Behavioral Medicine Clinic, USAF Hospital Griffiss since 1978 have been seen to be highly motivated to both learn biofeedback and to achieve relief from their symptoms. This has been seen in both their willingness to endure a sometimes lengthy wait to begin treatment (up to one year) and in their positive response to treatment, seen in both objective and self-report measures. Hence, previous patients from the same population have highly valued this approach and there was no reason to believe patients in the current study would differ in this regard.

A questionnaire was employed to assess the patient's perception of the therapist. This was administered in two related forms, Form A (Appendix C) prior to actual training and Form B (Appendix D) following completion of the course of training. It consists of a number of general interest items for patients completing biofeedback training, with items 13 - 18, referring to the patient's perception of the therapist, being used for this study. Appropriate item analysis was conducted and reliability was psychometrically established for items 13-18: coefficient alpha = .88 for Form A; coefficient alpha = .83 for Form B.

A within session questionnaire (Appendix E) was utilized to record the number of patient requests for assistance and therapist initiated interventions

in both the therapist-present and therapist-absent group as a check on the amount of assistance provided by the therapist under the various conditions. These questionnaires are self-report items similar to ones frequently used in the biofeedback literature (e.g. Blanchard et al. 1982; 1983) which have been found to have adequate validity in this application.

Therapist

The same male therapist treated all patients and presented himself to each in a warm, supportive and encouraging manner. The use of one male therapist in a female population was done to both simplify the design and to control for possible gender effects in the investigation (Fisher & Kotses, 1974). Every effort was made to operate in a manner which enhanced positive expectancies and encouraged success on the part of all patients. This was done to standardize this potentially powerful variable across conditions (cf. Budzynski, 1978; Holroyd et al., 1984).

The therapist, who was also the researcher, is a psychologist in the United States Air Force with eleven years of clinical experience. He is certified in the use of biofeedback by the Biofeedback Certification Institute of America (Certificate number 0066, issued 2/11/81), and has been working with biofeedback since 1978.

Procedure

Patient evaluation.

Upon referral, patients were assigned a subject number and scheduled for an evaluation with the therapist. It was explained to them that they

would be participating in a research study approved by the USAF Surgeon General and sponsored by the Air Force Institute of Technology. It was further explained that biofeedback had been found to be successful for patients experiencing similar symptoms, and it was the purpose of this investigation to better understand how, with whom, and under what conditions it could be best applied.

Upon arrival for the evaluation, the patient was given a packet to read and fill out (Appendix F). This included an article explaining what biofeedback is (Fuller, 1977, pp. 3-11), a medication review, a pain chart to sketch in symptoms, a symptom list, a background questionnaire, and an informed consent form to read and then sign along with the therapist and a witness. While the patient was completing this packet (from one-half to one hour) the therapist reviewed the medical record.

Once this was done, the patient was interviewed, the completed materials reviewed and discussed, and the process the patient would go through explained in detail. Frequent opportunities were provided for the patient to ask questions and detailed answers were provided. Every effort was made to provide a clear and positive learning set for the patient (cf. Ray et al., 1979; Holroyd et al., 1984). During this interview, a psychological assessment was conducted, including a standard mental status examination and review of relevant material from the intake packet and medical record.

Finally, the patients were instructed in their required home record keeping, including symptom frequency, intensity and duration; medication usage, daily stressors and success at coping with these. (Forms are in

Appendix G). They were asked to record these for a two-week period prior to the inception of treatment to provide a pre-treatment symptom baseline. (This material is not part of the present investigation, but is part of the standard treatment package utilized at this clinic, and is provided here for the sake of completeness). The patient was asked to schedule an appointment with the program's medical consultant for his evaluation, who in turn referred the patient for a physical therapy evaluation. A review of all material covered was conducted to ensure comprehension on the part of the patient. Finally, the patient was asked to complete an MMPI which concluded the initial evaluation.

This test, along with the results of the psychological assessment and entire chart were then sent to another psychologist who screened the patient to rule out any Borderline, severe characterlogical or psychotic condition which would preclude participation in the study (Schwartz & Fehmi, 1982). When this data proved insufficient, a complete mental health evaluation at the Mental Health Clinic was scheduled for the patient in question. Of the 74 cases reviewed, only two were excluded from participating in the study on this basis.

The medical consultant provided an evaluation to properly diagnose the condition to be treated, determine any medical condition present which could preclude biofeedback as a treatment, and reveal any complicating medical conditions which should be concurrently managed. No patients were medically excluded.

Finally, a physical therapy evaluation was conducted, including a basic neurological and functional assessment, with consideration being given to

appropriate physical therapy referral in place of biofeedback training. No patients were excluded on the basis of this portion of the evaluation.

Baseline.

Next, a psychophysiological baseline was conducted, where frontalis and trapezius EMG, right and left hand and foot temperatures, blood pressure, respiration, pulse rate, and subjective units of discomfort (SUD) were recorded under a variety of resting and stress conditions. (Appendix H). This was done both to provide a starting point from which to measure physiological change, and to aid in selecting the most appropriate biofeedback training modality. The room where the baseline and training was conducted was free from extraneous electromagnetic interference, had controllable lighting levels and was maintained at a temperature of 75 degrees Farenheit, +/- 3 degrees.

Relaxation training was instituted at this session as well, and any effect upon the physiological parameters were recorded. The specific training taught included deep muscle relaxation training combined with imagery training and a cue stimulus technique to facilitate relaxation by pairing a cue word like "calm" to the relaxation experience (Fensterheim, 1973). These techniques were then used as daily home training by the patient via taped instructions recorded by the therapist.

Selection of biofeedback training.

The patient was assigned to either EMG or thermal biofeedback training, based primarily upon the diagnosis and history as determined by the medical consultant. Those patients diagnosed as having either migraine or Raynaud's phenomenon were assigned to thermal training. Those patients

diagnosed as having muscle contraction headaches to EMG training. Where a diagnosis of either mixed or both types of headaches was made, the baseline findings were reviewed, and assignment was based upon the physiological system which presented with the most abnormal trends. This is consistent with the existing recommendations in the biofeedback literature (Schwartz & Fehmi, 1982).

Orientation Session.

Upon arrival for her first biofeedback session, the patient was asked to complete a set of questionnaires, including the Rotter I/E scale (Appendix A) and Questionnaire A (Appendix C). This point in the study was chosen to administer these questionnaires to ensure that they were not perceived as part of the evaluation process for acceptance into the program and to provide a measure of locus of control just prior to biofeedback training. The patient was told: "The instructions are on the questionnaires. Any questions referring to the therapist refer to me. In order for you to feel free to answer them honestly, I will not see your individual responses, but only the group data following computer analysis." They were then asked to seal them in a numbered envelope and place them in a box to be collected by a research assistant. This research assistant later scored the Rotter and provided the score along with the type of biofeedback the patient would be receiving to the second psychologist who provided the group assignment of the patient prior to the first training session.

The patient was instructed in the operation of the biofeedback instrument according to the protocol in Appendix B. Once a basic understanding of the equipment was demonstrated, the therapist proceeded

through the protocol. This session was not counted as one of the ten training sessions, but considered an introduction to biofeedback.

Group assignment.

Once he received the score of the Rotter and the type of biofeedback training, the second psychologist assigned the patient to either the therapist-present or therapist-absent condition. This was done randomly, balancing for distribution of both degree of internality/externality and type of biofeedback across conditions. The therapist was blind as to conditions of assignment to the groups. He was only provided with the patient number and condition of treatment prior to the first true training session. The two groups were conducted in an identical manner except for the degree of interaction with the therapist.

Therapist-present group.

The therapist remained with the patients throughout the session, providing support, encouragement, and suggestion to employ techniques from their home training sessions at appropriate points in the biofeedback session. These occurred when the patient appeared particularly frustrated or requested assistance. The number of therapist interventions was recorded to monitor the amount of instruction provided to different patients. Specific steps followed are detailed in Appendix B.

Therapist-absent group.

Once initial readings were taken, the therapist instructed the patient as per the training protocol (Appendix B), and left the room. He returned only to take periodic instrument readings until the biofeedback training was completed.

Biofeedback sessions.

All patients were scheduled for two, 1-hour biofeedback sessions on their selected instruments (either thermal or EMG) each week regardless of the group to which they were assigned. Time of day was the same to control for diurnal physiological variations. Sessions were not normally scheduled on two consecutive days in order to better distribute training effects. The same room in which the baseline was conducted was used. Patients trained while lying on a hospital bed which they could adjust to their greatest degree of comfort. Patients were greeted by the therapist and engaged in a 10 minute discussion of their home training, symptoms, progress, problems, etc. while being attached to the biofeedback equipment. Home records were reviewed with the patients as well, and correlations were drawn between their work at the clinic, life events, and any effect on their particular symptoms. Once hookup of the equipment was completed, initial readings were recorded and training was begun. Patients were reminded to employ their home training, when appropriate, to assist their learning of the biofeedack skill. Clinical diary notes were maintained for each session. (See Appendix B for actual protocol.)

Session completion.

Once final readings were taken, patients in both groups were disconnected from the equipment and engaged in a discussion of the day's session. Progress was emphasized, and problems were discussed with recommendations provided on how to overcome them.

Length of training.

Training was conducted for ten sessions. For purposes of this study, success at having learned the biofeedback task was demonstrated by being able to either lower EMG levels or increase temperature, depending upon the modality in use, at the monitored site during a no feedback Pre (Self control 1, or SC-1), 20 minute biofeedback training segment, and a Post (Self control 2, or SC-2) testing conducted during each training session (See Protocol, Appendix B). Session number at which such ability was demonstrated was noted and used for comparison of relative success between groups. Due to the individualized nature of the treatment, patients were seen as referred, and as such, individual patients were at various phases of treatment throughout the investigation.

Completion of Training.

Following completion of the final biofeedback session, the Rotter I/E scale (Appendix A) and Questionnaire B (Appendix D) were administered according to the same instructions as those preceeding the orientation session. The patients again sealed them in a numbered envelope and placed them in a box to be collected by the research assistant. The patient was then presented with her individual training results, encouraged to continue with her home training, and asked for any questions or critique which she might have. She was encouraged to call the clinic as needed, and to call in three months to schedule her follow-up appointment.

Debriefing.

Each patient was debriefed upon completion of the study as to the nature and goals of the experiment. This delay was necessary to minimize

the risk of recently referred subjects having more information about the nature of the research question than those who were seen earlier, due to the small size of the community in which the investigation took place. Those with less than satisfactory results were offered further treatment under preferred conditions.

Data collection.

Each individual patient's chart was prepared and maintained by the research assistant. Upon completion of a given patient, her record was compiled, and relevant information transferred to a central data sheet prior to computerized data analysis. No analysis of the data was conducted until data collection was completed for all patients.

Data Analyses

The hypothesis states that there will be a difference in the number of trials to success in learning a biofeedback task between therapist-present and therapist-absent treatment conditions.

a. Those individuals exhibiting a greater degree of internality will learn a biofeedback task more rapidly in a therapist-present condition.

b. Those individuals exhibiting a greater degree of externality will learn a biofeedback task more rapidly in a therapist-absent condition.

This hypothesis was tested by using a multiple regression analysis with two predictor variables: Therapist presence/absence (a dichotomous variable) and internal/external locus of control (a continuous variable). The dependent variable was the number of trials to success in learning a biofeedback task. Multiple regression was chosen as the preferred statistical test due to its

ability to treat locus of control as a continuous rather than a dichotomous variable (Levenson, 1981, p.22; Rotter, 1975).

Research question 1a: Will the patient's pre-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions? This question was examined by conducting Pearson product-moment correlations between the patient's pre-training perception of the therapist (based on a total score derived from Questionnaire A, items 13-18) and the number of trials to success in learning a biofeedback task. Correlations were performed for both the therapist-present and therapist-absent conditions.

Research question 1b: Will the patient's post-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions? This question was examined by conducting Pearson product-moment correlations between the patient's post-training perception of the therapist (based on a total score derived from Questionnaire B, items 13-18) and the number of trials to success in learning a biofeedback task. Correlations were performed for both the therapist-present and therapist-absent conditions.

Research question 2: Will there be a difference in the rate of learning of EMG and thermal biofeedback in the therapist-present and therapist-absent conditions? This question was addressed by conducting an independent groups t-test comparing the rate of learning (number of trials to success) for EMG and thermal biofeedback. Separate t-tests were conducted for both the therapist-present and therapist-absent conditions.

Research question 3: Will there be a change in patient's locus of control scores following completion of biofeedback training? This question was answered by conducting a matched-groups *t*-test comparing pre-treatment and post-treatment locus of control scores for all subjects.

CHAPTER 4

RESULTS

Preliminary analyses of the overall equivalence of the two treatment conditions will be presented first, followed by tests of the hypothesis and research questions. Finally those supplementary analyses found to further clarify the findings will be reviewed.

Preliminary Analyses

The patients randomly assigned to each condition (n = 30), therapist-present (TP) or therapist-absent (TA), were found to be essentially equivalent on all relevant variables. Age, years of symptoms, days in the program from initial evaluation to completion of post-test (Table 1), military pay grade, military status, diagnosis, type of biofeedback, and quarter of treatment (Table 2), were compared across therapist-present and therapist-absent conditions. Race was not included in the analyses due to the presence of only two non-whites in the sample. No statistically significant differences were noted on any of the variables examined, except for age and military pay grade. Age was found to be statistically different between TP and TA, $t(58) = 2.07$, $p < .05$. However this appeared to be primarily due to the

oldest and youngest patients being assigned to opposite conditions (Table 1). Military pay grade was lower in the TA condition, $t(58) = 2.36$, $p < .05$, probably due to the younger ages of these patients (Table 2).

There were no significant differences in the pre-test scores on the Rotter between the two conditions, $t(58) < 1$. The patients' initial preferences for training alone or with a therapist present were assessed prior to the start of training (Questionnaire A, item 4, Appendix D). There was no significant difference in those patients assigned to the therapist-present condition or to the therapist-absent condition, $t(58) < 1$, on this variable. The patients' pre-training perceptions of the therapist (Questionnaire A, items 13 -18, Appendix D) were also not found to differ significantly across the two conditions, $t(58) < 1$.

As intended, the therapist did provide more assistance in the therapist-present condition, as demonstrated by the number of therapist initiated interventions (Session Questionnaire, Appendix E) during training being greater in the therapist-present condition than in the therapist-absent condition, $t(58) = 3.79$, $p < .001$. (See Table 5 for a summary of the above comparisons.)

The overall sample ($N = 60$) was examined to assess whether or not biofeedback learning took place. It was found that 78% of all patients were able to reach criterion prior to the end of training, and 98% of the patients were able to demonstrate a pre to post positive change in their training modality (EMG or Thermal) across at least one biofeedback session.

Table 5

Breakdown by Condition for Some Variables

	All patients (N = 60)			TA condition (n = 30)			TP condition (n = 30)		
Variable	M	SD	Range	M	SD	Range	M	SD	Range
First perfect session for those who learned[a]	3.66	2.85	1-9	3.26	2.58	1-9	4.08	3.09	1-9
No. therapist interventions	6.52	5.55	0-32	4.07	3.36	0-11	8.97	6.23	1-32
Preference for TA/TP[b]									
Pre	4.95	2.28	1-10	4.70	2.38	1-10	5.20	2.19	1-10
Post	5.25	3.50	1-10	2.73	2.32	1-10	7.77	2.56	1-10
Patients' perception of therapist									
Pre	55.82	5.47	35-60	55.63	5.65	35-60	56.00	5.37	38-60
Post	57.02	4.21	41-60	57.27	3.37	48-60	56.77	4.95	41-60
Rotter									
Pre	8.63	3.72	2-19	9.00	3.89	4-19	8.26	3.58	2-16
Post	8.03	4.00	1-19	8.03	4.25	1-17	8.03	3.80	1-19

Note. TA = Therapist-absent; TP = Therapist-present.

[a]All patients who learned, n = 47. TA condition, n = 23. TP condition, n = 24.
[b]Preference for TA/TP = answer to Questionnaire A or B, item no. 4, with 1 being always alone and 10 being always with the therapist.

A comparison was conducted on the information available for those patients who underwent evaluation but did not enter treatment (Tables 3 and 4) with those who did (Tables 1 and 2). Inspection of these reveals that those patients who chose not to enter treatment were slightly younger, had their symptoms for a shorter period of time, and were more likely to have muscle contraction than migraine headaches when compared with those who entered treatment.

Primary Analyses

Hypothesis

The single hypothesis in this investigation was that there would be a difference in the number of trials to success in learning a biofeedback task between therapist-present and therapist-absent treatment conditions.

a. Those individuals exhibiting a greater degree of internality would learn a biofeedback task more rapidly in a therapist-present condition.

b. Those individuals exhibiting a greater degree of externality would learn a biofeedback task more rapidly in a therapist-absent condition.

This hypothesis was tested by using a multiple regression analysis with two predictor variables: therapist presence/absence (a dichotomous variable) and internal/external locus of control (a continuous variable). The dependent variable was the number of trials to success in learning a biofeedback task. Multiple Regression was chosen as the preferred statistical test due to its ability to treat locus of control as a continuous rather than a dichotomous variable (Levenson, 1981, p.22; Rotter, 1975). This analysis showed that neither therapist presence/absence nor scores on the Rotter administered

prior to training was a successful predictor of the rate of learning of the patient, $t(44) < 1$ in both cases (Table 6). Thus, there was no statistical difference in the rate of learning between the therapist-present and therapist-absent conditions, nor was there a statistical difference between patients' rates of learning based on their locus of control as measured by the Rotter. Therefore the major hypothesis of this investigation was not supported.

Table 6

Results of Multiple Regression Using Therapist-absence/Therapist-presence (Condition) and Rotter as Predictor Variables

Variable	M	SD	coefficient	SE	Standard regression coefficient	t	p
Condition	1.51	.51	.73	.84	.129	.866	.39
Pre-Rotter	8.77	3.78	-.11	.11	-.143	-.965	.34

Multiple R = .20
Multiple R^2 = .04

Research question 1a.

Would the patient's pre-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions? This question was examined by computing Pearson product-moment correlations between the patient's pre-training perception of the therapist (based on a total score derived from Questionnaire A, items 13-18) and the number of trials to success in learning a biofeedback task. Correlations were calculated for both the therapist-present and therapist-absent conditions (Table 7). There were no significant correlations between the patient's pre-training perception of the therapist and the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions.

Research question 1b.

Would the patient's post-training perception of the therapist correlate positively with the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions? This question was examined by computing Pearson product-moment correlations between the patient's post-training perception of the therapist (based on a total score derived from Questionnaire B, items 13-18) and the number of trials to success in learning a biofeedback task. Correlations were calculated for both the therapist-present and therapist-absent conditions (Table 7). There were no significant correlations between the patient's post-training perception of the therapist and the rate of learning of the biofeedback task in the therapist-present and therapist-absent conditions.

Table 7

Correlations Between Therapist Ratings and Rate of Biofeedback Learning for Those Subjects Who Reached Criterion

Variable	n	M	SD	Range	Correlation with rate of learning[a]
Pre-treatment therapist rating					
Therapist-absent group (TA)	23	56.04	4.41	45-60	-.221
Therapist-present group (TP)	24	55.38	5.75	38-60	.159
Post-treatment therapist rating					
TA	23	57.61	2.59	53-60	-.304
TP	24	56.17	5.62	41-60	.302

[a]All correlations non-significant.

Research question 2.

Would there be a difference in the rate of learning of EMG and thermal biofeedback in the therapist-present and therapist-absent conditions? This question was addressed by conducting an independent groups t-test comparing the rate of learning between TP and TA for EMG and thermal biofeedback separately (Table 8). The absence of the therapist resulted in significantly faster learning for the thermal modality, $t(19) = 2.18$, $p < .05$, while there was no statistically significant difference between therapist presence or absence in the EMG modality, $t(23) < 1$.

Table 8

Results of t-test on Therapist-absence (TA) vs. Therapist-presence (TP) for Thermal and EMG Biofeedback Separately

	TA		TP
Thermal biofeedback			
M	3.80		6.36
SD	2.62		2.77
Range	1-8		1-9
t(19)		2.18	
p		<.05	
EMG biofeedback			
M	2.85		2.25
SD	2.58		1.81
Range	1-9		1-7
t(23)		.51	
p		ns	

Separate t-tests were also conducted for both the therapist-present and therapist-absent conditions alone with EMG and thermal biofeedback (Table 9). When examined this way, thermal biofeedback once again appears to take longer to learn only when the therapist is present. In the therapist-present condition, thermal biofeedback took significantly longer to learn than EMG biofeedback, $t(22) = 3.78$, $p < .001$. In the therapist-absent condition, thermal biofeedback did not take significantly longer to learn than EMG biofeedback, $t(21) < 1$.

Table 9

Results of t-test on EMG vs. Thermal Biofeedback for Therapist-absence (TA) and Therapist-presence (TP) Separately

	EMG		Thermal
TA			
M	2.85		3.80
SD	2.58		2.62
Range	1-9		1-8
t(21)		.87	
p		ns	
TP			
M	2.25		6.00
SD	1.82		2.92
Range	1-7		1-9
t(22)		3.78	
p		<.001	

Subsequent ANOVA of type of biofeedback x TP/TA supports this finding, with the main effect of type biofeedback and the type of biofeedback by TP/TA interaction both reaching significance. The main effect for condition failed to reach significance (Table 10).

Table 10

Results of 2x2 ANOVA: Type of Biofeedback x Condition

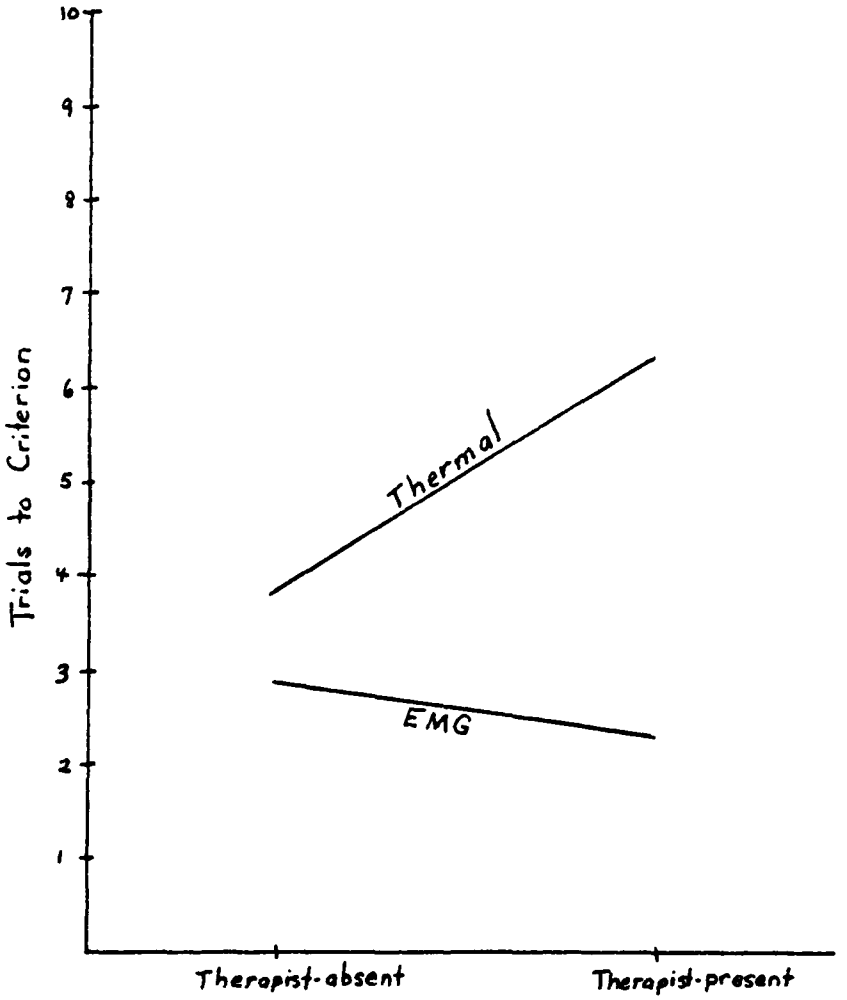
Source of variation	Sum of squares	Degrees of freedom	Mean Square	F	Tail probability
M	666.90	1	666.90	112.20	<.0001
Condition (C)	10.15	1	10.15	1.71	.198
Type of biofeedback (T)	77.33	1	77.33	13.01	.0008**
CxT	30.75	1	30.75	5.17	.028*
Error	255.53	43	5.94	-	-

*$p < .05$. **$p < .001$.

Thus, it is seen that there is a statistically significant difference in the rate of learning of thermal biofeedback between the therapist-present and therapist-absent conditions, with the rate of learning being significantly faster in the therapist-absent condition. This difference is not observed for EMG biofeedback (Figure 1).

Figure 1

Number of trials to criterion as a function of type of biofeedback and condition



Research question 3.

Would there be a change in patient's locus of control scores following completion of biofeedback training? This question was answered by conducting a matched-groups t-test comparing pre-treatment and post-treatment locus of control scores for all subjects (Table 11). There was no significant change between pre-treatment Rotter scores and post-treatment Rotter scores, $t(59) < 1$. In fact, Rotter pre and post test scores were found to significantly correlate with one another, $r = .77$, $p < .001$.

Table 11

Results of Matched Groups t-test Comparing Pre- and Post-Rotter Scores

	Pre-Rotter		Post-Rotter
M	8.63		8.03
SD	3.72		3.99
Range	2-19		1-19
t(59)		.85	
p		ns	

Supplementary Analyses

Further examination of the data was conducted to clarify some of the above findings. The following discussion refers to correlations reported in Table 12 and identified by the number in parentheses following the finding. The patients' opinions as to whether they wanted the therapist present during training changed following training as a function of the group to which they were assigned (1). Those who were in the therapist-present condition moved toward wanting the therapist present and those who were in the therapist-absent condition moved toward wanting the therapist absent, t (58) = 6.80, $p < .001$ (Table 13). The longer the patients took from time of referral through completion of their final sessions, the more help they asked for (2), the more help was offered them (3), and the greater preference they expressed for training in the therapist-present condition, both before (4) and after training (5). This initial hesitancy to begin treatment was not reflected in their overall rate of learning (6). The patients' final preference for training with the therapist present correlated positively with the number of therapist initiated interventions (7), suggesting that those patients in the therapist-present condition who felt the therapist was doing something preferred to have him there. Patients receiving thermal training both asked for (8) and were offered (9) more assistance than those patients receiving EMG training. Finally, pre-training ratings of the therapist correlated with post-training ratings of the therapist (10).

Table 12

Significant Correlations of Variables Discussed in Supplementary Analyses

Correlation between	r	p less than
1. Final preference x Condition	.72	.001
2. Patient requested interventions x Days in program	.36	.01
3. Therapist initiated interventions x Days in program	.25	.05
4. Initial preference for therapist present or absent x Days in program	.29	.05
5. Final preference for therapist present or absent x Days in program	.29	.05
6. Days in program x First session to reach criterion	.07	ns
7. Final preference for therapist present x Number therapist initiated interventions	.40	.01
8. Patient requested interventions x Type of biofeedback	.42	.001
9. Therapist initiated interventions x Type of biofeedback	.43	.001
10. Pre-perception of therapist x Post-perception of therapist	.64	.001

Table 13

Results of t-test Comparing Change in Pre- to Post-Therapist Preference for Therapist-absence (TA) and Therapist-presence (TP)

Change in therapist preference	TA		TP
M	+1.96		-2.64
SD	2.17		3.00
Range	+6 to -4		+5 to -8
t(58)		6.80	
p		$< .001$	

Note. A positive pre- to post-therapist preference score indicates movement toward a preference of being alone.

CHAPTER 5

SUMMARY, DISCUSSION, and CONCLUSIONS

This chapter will begin with a summary of the investigation, and proceed to a discussion of the results and conclusions. This will be followed by a review of the limitations of the findings and an elaboration of the implications of the study for future research and treatment.

Summary

The present study investigated the effect of locus of control on the acquisition of biofeedback responses in a therapist-present and a therapist-absent condition and the effect which the patient's perception of the therapist, both before and after training, had upon this learning. Specific literature on locus of control, biofeedback, degree of therapist involvement, and interpersonal effects on physiology were reviewed and discussed for their relevance to this prediction. This all female sample (N = 60) was drawn from a population of active and retired military and their dependents located in central New York State and presenting with a stress related disorder, primarily headache or Raynaud's phenomena. All patients underwent a medical, psychological, and physical therapy screening. Following evaluation and a physiological baseline, patients were selected for either EMG or thermal training based on their diagnoses and clinical findings. An

orientation session then followed in which patients were introduced to their training, completed a series of questionnaires, including the Rotter I/E scale, and were randomly assigned to either a therapist-present or therapist-absent treatment condition. All training was conducted by the same male therapist for ten sessions in either condition. Success was defined as being able to achieve control over the parameter in question at the monitored site during a five minute no feedback pre, 20 minute biofeedback training, and a five minute post no feedback segment. Following training, a second series of questionnaires was administered, and follow-up and debriefing appointments were scheduled.

There was no significant difference in the overall rate of learning between therapist-present and therapist-absent treatment conditions. There was no significant difference in the rate of learning based on the internality or externality of the patients and the condition to which they were assigned. There was no significant correlation between the patients' pre or post training perceptions of the therapist and their rates of learning. The overall high ratings given to the therapist both before and after training probably interfered with this assessment. Thermal biofeedback was learned significantly faster in the therapist-absent condition than in the therapist-present condition. No difference was observed in the rate of learning of EMG biofeedback in either condition, nor between thermal and EMG biofeedback in the therapist absent condition. Finally, there was no significant shift in the locus of control scores of the patients as a result of training.

Discussion

Hypothesis.

The data presented do not suppport the hypothesis that either therapist presence or absence systematically affects the overall rate of learning of biofeedback in this sample, though thermal biofeedback does appear to take longer to learn in the therapist-present condition. This later finding will be discussed in more detail under research question 2. Previous clinical observations of this investigator and the disparity of findings reported in the research literature suggested that there would be a difference between the therapist-present and therapist-absent conditions. That those few patients for whom it has been clinically noted to make a difference do not comprise a significant segment of the sample can be seen as reassuring. Out of the 60 patients seen in this study, only one voiced an objection to training in the therapist-present condition, but still managed to achieve criterion. Similarly, a few patients who were assigned to the therapist-absent condition initially would have preferred to train in the therapist-present condition, but those few quickly overcame their initial reticence once they saw how desirable the absent condition actually was. Interestingly, clinical observations and review of the data suggest that patients' preferences for the therapist-present condition probably reflected their insecurity in being able to learn biofeedback. Their performances belied their initial fears, and suggest that patients' initial preferences for having the therapist present is not a good predictor of the condition in which they should train. Overall, it appears that once the patients have been instructed in the basic operation of the instrument, there is no reason to have the therapist present for the

actual practice sessions themselves, as long as he is available before and after for consultation. This is particularly so for thermal biofeedback, during which the presence of the therapist significantly slowed down the rate of learning. The very positive perception of the therapist by most patients can be conjectured to account for the equivalence between rates of learning in the two conditions for EMG biofeedback. It is interesting that those studies in which the therapist was evaluated positively were found not to have an effect due to the therapist's rating. In both Blanchard et al. (1983) and the present study, the overall very positive ratings of the therapist likely created a ceiling effect that prevented a fuller evaluation of the effect of the therapist. While it seems logical that a negative therapist would produce negative results, it is also likely that a bland therapist may behave in such a way as to allow other non-specific factors to override his influence, though this remains to be tested. A bored, restless, therapist or one who exudes critical evaluation, disinterest, or annoyance to the patient may well have an effect in the therapist-present condition. While those studies which have found a negative effect from the therapist being present (Borgeat et al., 1980; Bregman & McAllister, 1983; Hendler et al., 1978; Wolfe, 1977) do not specify how the therapist behaved while with the patient or how he was perceived by the patient, Bregman and McAllister (1983) do suggest that a warm, empathic therapist may have achieved more successful results in the therapist-present condition than they did. This observation was supported in the present study by the ability of some thermal patients to reach criterion in the therapist-present condition while none were able to do so in the Bregman and McAllister (1983) study. Future research should clearly specify

how the therapist behaves and how he is perceived by the patient in order to further examine this question. These findings are quite relevant given the recent assertion that clinical biofeedback should usually be conducted with the therapist present for all training (Schwartz, in press). Schwartz bases his conclusions solely on clinical judgement, not research evidence, and the results presented here do not support that position. This issue becomes particularly important given the intrinsically more cost-effective nature of a therapist-absent training condition. The study by Jurish et al. (1983), which concluded that a home-based biofeedback training program was as effective as a clinic-based program, closely parallels the results of the present investigation, and presents a very thorough evaluation of the cost-effectiveness of a minimal contact program over the more traditional approach.

The high positive expectancy for success may also have contributed to the lack of an overall difference between therapist-present and -absent conditions (Holroyd et al., 1984). All patients were told that the skill which they were to learn was already in their repertoire (Swann & Snyder, 1980), and the training they underwent was merely to enhance this natural ability. This is very different from a blind conditioning study where there seems to be no relationship between the task at hand and the skill to be learned, or a perception of self-regulation as an unknown variable. This may have contributed to the overall high rate of success of patients in this study (78%) learning biofeedback. Further, great pains were taken to equate the two conditions on all variables other than therapist presence or absence, thus minimizing the intrusion of nonspecific effects (Ray et al., 1979) and allowing

this study to clearly address this factor. This attention to detail should add weight to the results of this investigation. It is hoped that other researchers will apply this concern to their work in order to further clarify the contribution of these non-specific effects to biofeedback learning.

The locus of control measure was also not related to the criterion variable. It was the theoretical relationship between locus of control and a preference for a therapist being present or absent that was predicted to be responsible for differences, if any, to occur in these two groups. Given that the therapist variable failed, the failure of locus of control is not only not significant but irrelevant. Examination of the particulars of this variable, however, may prove useful to future researchers. Each condition was well represented across the range of Rotter scores (Table 5), providing ample opportunity for an effect to appear, if it had existed. Further, by treating locus of control as a continuous variable as Rotter intended, rather than making it a categorical variable by employing a median split between internals and externals as is usually done, a more stringent test of this variable was created. This adds weight to the conclusion that the Rotter is not useful in this application.

Locus of control has had a history of mixed results when applied to biofeedback studies, as reviewed in Chapter 2. The controversy over general versus specific locus of control instruments may be applicable here. Levenson's scale (1981) incorporating the dimensions of internality, powerful others and chance, or Mirels (1970) subscale of the Rotter addressing personal versus political control may have yielded different results. One trend that is emerging from this confusion is that a more specific locus of

control measure may be of greater utility when applied to biofeedback studies. Holroyd et al. (1984) have adapted the Health Locus of Control Scale to a headache population with good results, and this approach may be the preferable one for future research.

Research questions 1a and b.

The results of the effect of the patient's pre and post perception of the therapist on the rate of biofeedback learning is most likely not significant as a result of the extremely high rating given to the therapist by nearly all of the patients regardless of the condition to which they were assigned (Table 5) creating a ceiling effect. This occurred despite a fairly wide range of scores seen in each conditon. The scale may well be at fault here and require further revision. However, Blanchard et al. (1983) also reported very high therapist ratings by their patients, and this may just reflect a tendency on the part of the patients to value and rate highly someone in whom they place a good deal of hope, time and effort. The patients' ratings of the therapist may also reflect the quality of the therapist involved. Given the limitations of this study to a single therapist, further research is clearly needed with a range of therapists before this question can be adequately addressed. The present investigator would not conclude as Blanchard et al. (1983) have done, however, that the therapist has no effect on the outcome of training. It is more likely in this study that the overall positive perception of the therapist prevented this question from being adequately addressed.

Research question 2.

The most significant finding of this investigation is that thermal biofeedback took longer to learn only in the therapist-present condition. This is particularly important since it is a common clinical assumption that thermal biofeedback is generally harder to learn than EMG biofeedback. The results of this investigation suggest that this assumption may have more to do with the presence of the therapist slowing down thermal training, while his absence allows thermal biofeedback to be learned at nearly the same rate as EMG (Figure 1). This could be interpreted to mean that the presence of a therapist may slow down the acquisition of a more complex task (thermal), but not interfere as much with a simpler task (EMG). This interpretation is consistent with that offered by Bregman and McAllister (1983) in employing *social facilitation* theory (Zajonc, 1965) to explain the differences they observed between therapist present and absent conditions in their study. In the present study, the high number of patients who were able to achieve criterion on EMG early in the course of training would then have performed better with the therapist present, while the greater time it took for patients to achieve criterion in thermal training would have their performance further impaired by the therapist being there. These results are also consistent with the prediction made by Bregman and McAllister (1983) that a warm, supportive therapist could reduce and possibly overcome the negative effects of therapist presence which they observed in their study. While thermal training took longer in the therapist-present condition, some learning did take place in the present investigation where the therapist was highly rated by

the patients, while no learning at all took place in the therapist-present condition in the study by Bregman and McAllister (1983).

Research question 3.

There was clearly no significant difference in the pre and post test Rotter scores administered to this sample. If anything, these two administrations reinforced the reliability of the Rotter as a stable test over time (r =.77, $p < .001$). This study thus adds weight to those who argue that there is no change in locus of control scores as a result of biofeedback training (Johnson & Meyer, 1974; Tindel, 1977). Comparability of all these studies is difficult due to the variety of instruments used to measure locus of control, wide range of time between administrations, variety of types of biofeedback employed, and different criteria for defining internal and external locus of control. For example, those studies which employed a median split to define their populations are not equivalent to the present investigation in its use of the Rotter as a continuous variable.

A more intriguing explanation may have inadvertently resulted from the choice of the point at which to administer the Rotter in the present investigation. To avoid the Rotter being perceived as an evaluation tool for entry into the study and to get a measure of locus of control just prior to biofeedback training, the scale was administered after the patients had already been exposed to a considerable degree of information about biofeedback and self-regulation. It is possible that this created a set for them in which they perceived that they were supposed to answer the Rotter in an internal direction. If this occurred, and the sample was slightly more

internal (Rotter pretest, M = 8.63, SD = 3.72) than the norm, the lack of change in pre and post scores may have been influenced by a prior shift toward internality as a result of this set. If this happened, it provides a backhanded support for Carlson (1982) and Holroyd et al. (1984) in their speculation that it is the entire experience surrounding biofeedback and not just the physiological training itself which accounts for a shift in locus of control. Clearly, further research is required to answer this question, but the above speculation may suggest a model for testing out this contention.

Clinical observations.

Finally, the overall treatment protocol appears to be successful in teaching EMG and thermal biofeedback to a group of headache and Raynaud's phenomena patients. Over 78% of the patients treated were able to achieve criterion within the required ten training sessions. Over 98% of the patients were able to demonstrate a pre to post positive change on their training modality, demonstrating some degree of biofeedback learning. These results are particularly impressive when compared with other biofeedback studies employing a clinical population, and most impressive when compared with the laboratory based studies. Clinical records and patient self-reports, though not part of the present investigation, were maintained as a result of the patients being cared for in a hospital setting, and show a marked degree of improvement in terms of decreased medication usage, symptom frequency and duration. Many patients report having learned to identify the onset of their symptoms and to apply their self-regulation training immediately to either abort or reduce their symptoms. This, in turn, resulted in an increased sense

of control over their symptoms. Hence, the clinical training protocol described in this study is recommended for further research and clinical applications.

Conclusions

Perhaps the most striking conclusion to be drawn from this study is that thermal and EMG biofeedback, when conducted by a competent therapist who is perceived positively by the patient in terms of knowledge, helpfulness, ease in talking and being with him, and warmth, can be taught to headache patients without regard for the presence or absence of the therapist during the actual practice sessions. It appears probable that the structuring of the overall treatment paradigm to account for frequently ignored "nonspecific treatment effects" provided for biofeedback learning to be achieved by over 78% of the patients regardless of therapist presence or absence or locus of control of the patient. This learning was demonstrated by achieving a stringent criterion of being able to manifest self-regulation of the specified variable at a given session for five minutes prior to biofeedback, twenty minutes with biofeedback, and again for five minutes without biofeedback. Over 98% of the patients demonstrated an ability to produce change in the measured parameter from pre to post session, further attesting to the success of the training protocol. These findings raise questions for earlier studies (e.g. Borgeat et al., 1980; Bregman & McAllister, 1983; Hendler et al, 1978) which found significant effects on biofeedback as a result of therapist presence or absence but which may have been due to other factors in the experimental paradigm. Furthermore, differences previously observed

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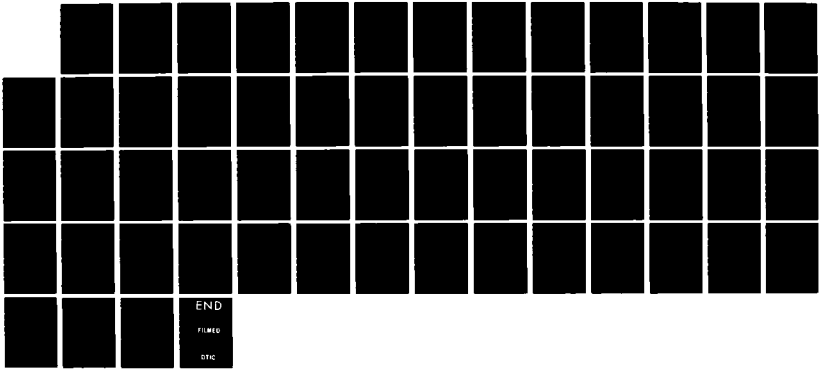

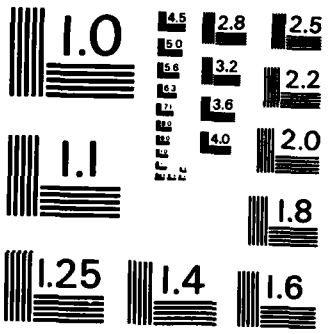

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regarding the variability exhibited by internal or external patients in the learning of biofeedback may have been mitigated by the proper structuring of expectancies, instructional set, and the use of a warm, empathic therapist in the present investigation. These conclusions may appear overdetermined given the lack of correlation seen between patients' pre and post training perceptions of the therapist and rate of learning as investigated by research questions 1a and 1b. However, the extremely high ratings given to the therapist in all conditions (pretraining therapist rating: Mean = 56, Median = 57, Mode = 60; posttraining therapist rating: Mean = 57, Median = 59, Mode = 60; Maximum score = 60) suggest a ceiling effect at work which may have prevented this relationship from appearing in the data analysis.

There was a statistically significant difference in the rate of learning of thermal biofeedback between the therapist-present and therapist-absent conditions, with the rate of learning being significantly faster in the therapist-absent condition. No statistically significant difference was observed in the rate of learning between the two conditions for EMG, nor between thermal and EMG in the therapist-absent condition. This could be interpreted to mean that the presence of a therapist may slow down the acquisition of a more complex task (thermal), but not interfere as much with a simpler task (EMG).

The most cost-effective condition is clearly therapist-absent, and from the present investigation it appears that there is no advantage to having the therapist present on a routine basis for either thermal or EMG biofeedback, and that his presence actually slowed down the acquisition of thermal biofeedback learning.

Limitations of the Findings

While large in terms of the norm for biofeedback studies, the present study employed a relatively small sample of subjects (N = 60), and as such, the conclusions discussed above must be limited in their generalizabilty. Similarly, the use of a single, male therapist in a female population, both of whom are affiliated with the military further restricts the extent to which these conclusions can be applied to the population at large. The use of an actual patient population, while enhancing certain aspects of the findings in making them more clinically relevant, also restricts their application to a non-clinical population. Similar cautions apply in extending the findings beyond the particular diagnoses of the patients involved in this investigation.

Recommendations for Future Research and Treatment

Frequent reference to the possible implications for future studies have been alluded to throughout the discussion. In addition to these, the following are offered:

1. Given the significance of therapist-presence in slowing down the acquisition of thermal biofeedback learning, further research is clearly indicated in this area. Specifically, the presence or absence of the therapist appears to differentially affect thermal and EMG biofeedback learning, and therefore future research should investigate the effect of the therapist on each biofeedback modality (EMG, GSR, EEG, Thermal) separately to explore the pervasiveness of this effect.

2. Even given the restricted nature of the present investigation, the Rotter has proven to be so unrelated to the performance of an individual in

a therapist-present or therapist-absent condition, it is recommended that this line of research not be continued with this instrument. Future research in this area may wish to employ other instruments more specific in their approach as Holroyd et al. (1984) have done, or focus on a different aspect of the locus of control concept like the powerful other, internality, and chance dimensions of Levenson (1981) or the personal control dimension of Mirels (1970).

3. Perceived control still offers promise when applied to the field of biofeedback and should continue to be studied through creative and innovative applications to better understand any role it may play in the acquisition of self-regulation. Particularly important for future studies investigating whether or not there is a change in locus of control as a result of biofeedback learning is to differentiate between the effects of biofeedback itself and the overall training environment with regard to any observed change.

4. The clinical training protocols employed in this study, particularly the attention to controlling for non-specific effects, appear to merit wider application in the research literature given the overall successful learning of biofeedback demonstrated by this investigation.

5. Therapist effects remain an important area of research, with particular attention being needed to the investigation of therapists in biofeedback who are not positively evaluated by their patients. The research studies to date, including the present investigation, have all found their therapists to be highly rated by the patients. However, they have not employed a comparison between these successful, competent, well rated

therapists, and those seen as either innocuous or negative by the patients. Without such a comparison, it is premature to conclude what the effect of the therapist is, and future research should address this important issue.

6. While this study and the one by Jurish et al. (1983) have begun to explore the optimal placement, quantity, and quality of therapist interactions in the biofeedback setting, continued exploration of this question is needed in a world where cost-effectiveness continues to be the byword in the delivery of health care. It is no longer enough to simply ask if a given procedure is cost-effective, but also to ask how it can be improved to make it more efficient, effective and qualitatively superior. Research to address these questions is urgently required.

7. The patients' initial preferences for training condition, and *apprehensions about learning* biofeedback were not born out in their actual performance. This may have been a result of subtle, unwitting, clinical re-structuring on the part of the therapist to assist the anxious patient, but this finding warrants future research to discover if this process occurred, and if so, how to utiize it to enhance patient care.

8. Investigating how to optimize biofeedback training for a given patient is strongly encouraged. The present study adds weight to the argument that it is possible to teach biofeedback to a broad spectrum of patients varying in age, diagnosis, etc. Much research has been conducted on discovering the proper way to screen patients to determine who will do best at learning biofeedback. Little of merit has emerged from this literature, and in the present investigation, only two out of 74 patients were found to be unsuitable due to psychiatric reasons, and these two patients

presented obvious difficulties. It is recommended, instead, to investigate how to best teach the various biofeedback modalities to a wide range of individuals, rather than try to select only the best learners.

9. One clinical observation provides a very intriguing area for future research. All patients were advised that the skill to be learned was naturally occurring and they could probably already do it. They were then asked to attempt to either raise their hand temperature, or lower their forehead EMG when first hooked-up to their respective instruments. Many of the patients were able to do just that, until advised that they had done so, or they attempted to do so with the biofeedback equipment. Some could then demonstrate the skill only without the biofeedback equipment, and others only with the biofeedback equipment. These observations clearly merit further investigation, for they suggest that some patients who would be classified as having failed at biofeedback training actually had their natural ability to self-regulate impaired in some way by the employment of instrumentation.

There is much yet to be learned about how self-regulation occurs, and the role biofeedback plays in this learning. The field is particularly challenging in that its knowledge base encompasses a broad spectrum of disciplines employing both experimental and clinical specialties. This marriage of applied and experimental efforts has often produced stormy debate, and widely conflicting results, but from this debate may well emerge a better understanding of the total person, comprised of both a mind and body which ultimately function as one.

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APPENDIX A

Rotter I/E Scale

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

Please answer these items carefully but do not spend too much time on any one item. Be sure to find an answer for every choice. For each numbered question make an X on the line beside either the a or b, whichever you choose as the statement most true.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item independently when making your choice; do not be influenced by your previous choices.

NAME_____

REMEMBER - Select the alternative which you personally believe to be more true.

I more strongly believe that:

1. ___a. Children get into trouble because their parents punish them too much.
   ___b. The trouble with most children nowadays is that their parents are too easy with them.

2. ___a. Many of the unhappy things in people's lives are partly due to bad luck.
   ___b. People's misfortunes result from the mistakes they make.

3. ___a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   ___b. There will always be wars, no matter how hard people try to prevent them.

4. ___a. In the long run people get the respect they deserve in this world.
   ___b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. ___a. The idea that teachers are unfair to students is nonsense.
   ___b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. ___a. Without the right breaks one cannot be an effective leader.
   ___b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. ___a. No matter how hard you try some people just don't like you.
   ___b. People who can't get others to like them don't understand how to get along with others.

8. ___a. Heredity plays the major role in determining one's personality.
   ___b. It is one's experiences in life which determine what they're like.

9. ___a. I have often found that what is going to happen will happen.
   ___b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. ___a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
    ___b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. ___a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
___b. Getting a good job depends mainly on being in the right place at the right time.

12. ___a. The average citizen can have an influence in government decisions.
___b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. ___a. When I make plans, I am almost certain that I can make them work.
___b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. ___a. There are certain people who are just no good.
___b. There is some good in everybody.

15. ___a. In my case getting what I want has little or nothing to do with luck.
___b. Many times we might just as well decide what to do by flipping a coin.

16. ___a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
___b. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.

17. ___a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
___b. By taking an active part in political and social affairs the people can control world events.

18. ___a. Most people can't realize the extent to which their lives are controlled by accidental happenings.
___b. There really is no such thing as "luck."

19. ___a. One should always be willing to admit his mistakes.
___b. It is usually best to cover up one's mistakes.

20. ___a. It is hard to know whether or not a person really likes you.
___b. How many friends you have depends upon how nice a person you are.

21. ___a. In the long run the bad things that happen to us are balanced by the good ones.
___b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. ___a. With enough effort we can wipe out political corruption.
___b. It is difficult for people to have much control over the things politicians do in office.

23. ___a. Sometimes I can't understand how teachers arrive at the grades they give.
___b. There is a direct connection between how hard I study and the grades I get.

24. ___a. A good leader expects people to decide for themselves what they should do.
___b. A good leader makes it clear to everybody what their jobs are.

25. ___a. Many times I feel that I have little influence over the things that happen to me.
___b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. ___a. People are lonely because they don't try to be friendly.
___b. There's not much use in trying too hard to please people, if they like you, they like you.

27. ___a. There is too much emphasis on athletics in high school.
___b. Team sports are an excellent way to build character.

28. ___a. What happens to me is my own doing.
___b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. ___a. Most of the time I can't understand why politicians behave the way they do.
___b. In the long run the people are responsible for bad government on a national as well as on a local level.

THANK YOU

From: Lefcourt (1976)

Norms for the Rotter Internal–External Locus of Control Scale

Scores are in the external direction, the higher the score the more external.

Subjects	*N*	Mean	*SD*
Students at a Southern Negro college involved in protest movements (Gore & Rotter, 1963)	62M 54F		
1. Attend rally for civil rights		10.3	3.1
2. Sign petition		9.2	3.4
3. Join a silent march		7.4	2.9
4. Join Freedom Riders		8.1	3.8
5. None of the above		10.0	3.9
Inmates of correctional institution (Lefcourt & Ladwig, 1965a)			
1. Negro	60	8.97	2.97
2. White	60	7.87	3.03
Negro college students–male and female (Strickland, 1965)			
1. Active–engaged in civil rights groups	53	7.49	3.49
2. Inactive	105	9.64	3.70
1. 1964 Service Corps	72F	7.92	3.84
	27M	8.00	3.97
2. 1965 Service Corps	68F	8.26	3.49
	34M	8.00	3.08
3. 1965 Control Group	46F	9.37	3.76
	49M	8.67	3.89
4. 1966 Service Corps	79F	9.54	4.20
	21M	7.38	4.73
5. 1966 Control Group (Hersch & Scheibe, 1967)	47F	8.79	3.76
	38M	8.84	3.70
(Service Corps were college students attending chronic wards of mental institutions.) (Control Groups were college students attending summer school.)			
Undergrads (Levy, 1967):	24M & 24F	9.77	4.11
Male & female smokers–mean age of 40.1; average of 13.4 years of education (Lichtenstein & Keutzer, 1967)	213 95M 118F	7.0 6.59 7.42	3.50 3.65 3.44
College males (Zytowski, 1967)	62	6.82	2.49
Undergrads in introductory psychology (Feather, 1968)	46M 88F	9.8 11.44	1.42 1.69

continued

Norms for the Rotter Scale — *Continued*

Subjects	*N*	Mean	*SD*
Undergrads (Hamsher, Geller, & Rotter, 1968)	60M 113F	10.1 11.0	3.95 3.96
Undergrads–male and female; males made up 70% of sample with no significant sex differences (Julian & Katz, 1968)	1338	8.4	4.12
High school students (Hsieh, Shybut & Lotsof, 1969)			
1. Anglo-American	131M 108F	8.58	3.89
2. American-born Chinese	38M 42F	9.79	3.07
3. Hong Kong students	241M 102F	12.07	3.96
Male addict patients–Negro and white (Berzins & Ross, 1973)	97	6.79	3.90
Female undergrads (Crego, 1970)	99	7.97	3.8
First year female undergrads unable to relate in interpersonal situations (Dua, 1970)			
1. Pretest	30	14.03	4.27
2. Posttest	30	9.66	3.59
Female student nurses (Lefcourt & Steffy, 1970)	37	7.14	3.28
Female undergrads (Strickland, 1970)	180	8.34	3.85
Undergrads enrolled in introductory psychology, male and female (Biondo & MacDonald, 1971)	198	9.56	
Male soldiers (Cone, 1971)			
1. Mental clinic outpatients–all male soldiers	102	12.64	8.33
2. Stockade prisoners–soldiers	110	12.20	7.84
3. Same as 2 but tested 2 months later	98	12.87	7.76
Administrators (Harvey, 1971)			
1–5 years	14	7.57	2.88
6–10 years	7	6.43	2.52
11 years	27	5.41	3.15
1–10 years	21	7.19	2.75
Male VA psychiatric patients (Kish, Solberg, & Uecker, 1971)	169	8.1	4.2
Male undergrads (Lefcourt & Telegdi, 1971)	90	8.16	4.38

continued

Norms for the Rotter Scale — *Continued*

Subjects	*N*	Mean	*SD*
Hospitalized male veterans (Palmer, 1971)			
1. Psychiatric	89	5.0	2.77
2. Nonpsychiatric	88	4.0	2.70
Males in introductory psychology classes (Phares, 1971)	646	9.2	3.48
Undergrads in psychology or social science classes (Schneider & Parsons, 1970)			
Males:			
United States	95	9.76	
West Germans	44	9.75	
Denmark	124	9.83	
Japan	67	13.45	
Females:			
United States	74	10.38	
West Germans	24	10.96	
Denmark	147	9.94	
Japan	41	14.40	

APPENDIX B

EMG and Thermal Protocols and Training Records

EMG PROTOCOL - AUTOGEN 1700

A - PRE-SESSION (10 min.)
1 - Greet patient
2 - Help patient settle in comfortably
3 - Review the week's events while setting up for session
4 - Query about effects of home training and encourage patient to apply what works at home during session
5 - Prepare equipment
a. Place sensors on training location
b. Plug lead in to channel A, making sure shorting plug is in channel B
6 - Record:
a. Hour and date
b. Sensor location (Frontalis)
c. Check batteries
d. Check impedance of A_1 and A_2 with sensitivity scale set to 100 and bandpass set to 100-200HZ
e. Training modes chosen by patient:
(1) Lights ?
(2) Audio ?
(3) Meter ?
f. Record pre levels with scale set to X1 and take reading averaged over 20 seconds
g. Annotate whether session is Therapist-present (TP) or Therapist-absent (TA) condition

B - SELF-CONTROL 1 (SC-1) (5 min.)
1 - Record starting EMG
2 - Request patient to attempt to reduce EMG level without biofeedback for 5 min.
3 - Set integrator to average over this period
a. Therpist observes instrument during this period in TP condition
b. Therapist leaves until B-4 in TA condition
4 - Record end EMG and integrated EMG when period is over

C - TRAINING (20 MIN.)
1 - Place instrument in front of patient and adjust for height, distance and sufficient light on face of instrument so it is legible to patient
2 - Record starting EMG
3 - Adjust audio level, lights, meter etc.
4 - Adjust threshold level to initially maintain a 50-50 feedback percentage. Readjust when patient can maintain an 80% success rate (patient will do this in TA group)
5 - Request patient to attempt to reduce EMG level with biofeedback for 20 min.
6 - Set integrator to average over this period
a. Therapist assists patient when he feels it is indicated or when requested by the patient in TP condition. These interventions are recorded on session questionnaire.
b.Therapist leaves until C-7 in TA condition
7 - Record end EMG and integrated EMG when period is over
8 - Remove instrument from in front of patient

D - SELF-CONTROL 2 (SC-2) (5 min.)
1 - Record starting EMG
2 - Request patient to attempt to reduce EMG level without biofeedback for 5 min.

3 - Set integrator to averge over this period
    a. Therapist observes instrument during this period in TP condition
    b. Therapist leaves until D-4 in TA condition
4 - Record end EMG and integrated EMG when period is over

E - POST-SESSION (10 min.)
1- Gradually bring patient out of relaxed state
2 - Inquire into the nature of this session as per session questionnaire and record required information
3 - Review home training records and troubleshoot with patient
4 - Encourage patient to continue home practice and return for next session

EMG TRAINING RECORD

NAME: SSN: CODE: THERAPIST: GROUP: TP TA

#	DATE/ HOUR	IMP. A1/A2	PRE	SC-1 (5 min.) START	SC-1 (5 min.) END	SC-1 (5 min.) AVERAGE	TRAINING (20 min.) START	TRAINING (20 min.) END	TRAINING (20 min.) AVERAGE	SC-2 (5 min.) START	SC-2 (5 min.) END	SC-2 (5 min.) AVERAGE

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THERMAL PROTOCOL - AUTOGEN 2000b

A - PRE-SESSION (10 min.)
1 - Greet patient
2 - Help patient settle in comfortably
3 - Review the week's events while setting up for session
4 - Query about effects of home training and encourage patient to apply what works at home during session
5 - Prepare equipment
a. Record ambient temperature
b. Place sensors on training location (left and right middle finger)
b. Plug leads into channels A and B
6 - Record:
a. Hour and date
b. Sensor location
c. Check batteries
d. Training modes chosen by patient:
(1) Lights ?
(2) Audio ?
(3) Meter ?
e. Record pre levels of left and right hand temperature
g. Annotate whether session is Therapist-present (TP) or Therapist-absent (TA) condition

B - SELF-CONTROL 1 (SC-1) 5 min.
1 - Record starting temp.
2 - Request patient to attempt to increase temp. level without biofeedback for 5 min.
3 -
a. Therpist observes instrument during this period in TP condition
b. Therapist leaves until B-4 in TA condition
4 - Record end temp. and peak temp. when period is over

C - TRAINING (20 MIN., 10 Left hand + 10 right hand)
1 - Place instrument in front of patient and adjust for height, distance and sufficient light on face of instrument so it is legible to patient
2 - Record starting temp.
3 - Adjust audio level, lights, meter etc.
4 - Adjust threshold level by centering meter to zero point (patient will do this in TA group)
5 - Request patient to attempt to increase temp. level with biofeedback for 10 min.
6 -
a. Therapist assists patient when he feels it is indicated or when requested by the patient in TP condition. These interventions are recorded on session questionnaire.
b.Therapist leaves until C-7 in TA condition
7 - Record end temp. and peak temp. when period is over
8 - Repeat steps 1 - 7 for opposite hand
9 - Remove instrument from in front of patient

D - SELF-CONTROL 2 (SC-2) (5 min.)
1 - Record starting temp.
2 - Request patient to attempt to increase temp. level without biofeedback for 5 min.

3 -

a. Therapist observes instrument during this period in TP condition
b. Therapist leaves until D-4 in TA condition

4 - Record end temp. and peak temp. when period is over

E - POST-SESSION (10 min.)

1- Gradually bring patient out of relaxed state
2 - Inquire into the nature of this session as per session questionnaire and record required information
3 - Review home training records and troubleshoot with patient
4 - Encourage patient to continue home practice and return for next session

THERMAL TRAINING RECORD

NAME:					SSN:			SENSOR LOCATION:	Therapist:		GROUP: TP TA		
#	TRAINING MODE:	HOUR/ DATE	AMB.	PRE	SC-1 (5 min.)			(10 min. L + 10 min. R) TRAINING			SC-2 (5 min.)		
					START	END	PEAK	START	END	PEAK	START	END	PEAK

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APPENDIX C

Questionnaire A

NAME_____ SSN_____

QUESTIONNAIRE A

INSTRUCTIONS: Please circle the number which most closely describes your opinion.

1. How much do you know about biofeedback ?

nothing 1 2 3 4 5 6 7 8 9 10 quite a bit

2. How difficult do you believe learning biofeedback will be ?

difficult 1 2 3 4 5 6 7 8 9 10 easy

3. How many training sessions will it take you to learn biofeedback ?

1 2 3 4 5 6 7 8 9 10

4. Once you have become familiar with the equipment, do you think you would prefer to train on the equipment by yourself or with the therapist present ?

always alone 1 2 3 4 5 6 7 8 9 10 always therapist

5. Would you prefer to train in a room whose lighting is

very dark 1 2 3 4 5 6 7 8 9 10 very bright

6. How important is it for you to find relief from your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

7. How effective is your medication in controlling your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

8. How much control do you have over your symptoms ?

none 1 2 3 4 5 6 7 8 9 10 very much

9. How important is it to you to learn biofeedback ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

10. How much do you believe learning biofeedback will help you to control your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

11. How important is it to you to learn how to relax ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

12. How much do you believe learning how to relax will help you to control your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

13. What do you think of your therapist ?

poor 1 2 3 4 5 6 7 8 9 10 great

14. Do you believe he is knowledgable in this area ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

15. Do you believe he will be able to help you with your problem ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

16. Do you find him easy to talk to ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

17. Do you find him easy to be with ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

18. Do you feel he is

cold 1 2 3 4 5 6 7 8 9 10 warm

19. How much do you believe your success in this program will depend upon you ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

20. How much do you believe your success in this program will depend upon your therapist ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

21. How much do you believe your success in this program will depend upon other factors ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

What are these other factors?

Please feel free to add any comments:

APPENDIX D

Questionnaire B

NAME_____ SSN_____

QUESTIONNAIRE B

INSTRUCTIONS: Please circle the number which most closely describes your opinion.

1. How much do you know about biofeedback ?

nothing 1 2 3 4 5 6 7 8 9 10 quite a bit

2. How difficult do you believe learning biofeedback was ?

difficult 1 2 3 4 5 6 7 8 9 10 easy

3. How many training sessions did it take you to learn biofeedback ?

1 2 3 4 5 6 7 8 9 10

4. Once you became familiar with the equipment, did you prefer to train on the equipment by yourself or with the therapist present ?

always alone 1 2 3 4 5 6 7 8 9 10 always therapist

5. Did you prefer to train in a room whose lighting was

very dark 1 2 3 4 5 6 7 8 9 10 very bright

6. How important is it for you to find relief from your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

7. How *effective* is your medication in controlling your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

8. How much control do you have over your symptoms ?

none 1 2 3 4 5 6 7 8 9 10 very much

9. How important is it to you to have learned biofeedback ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

10. How much do you believe having learned biofeedback helps you to control your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

11. How important is it to you to have learned how to relax ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

12. How much do you believe having learned how to relax helps you to control your symptoms ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

13. What do you think of your therapist ?

poor 1 2 3 4 5 6 7 8 9 10 great

14. Do you believe he is knowledgable in this area ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

15. Do you believe he was able to help you with your problem ?

not at all 1 2 3 4 5 6 7 8 9 10 very much

16. Do you find him easy to talk to ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

17. Do you find him easy to be with ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

18. Do you feel he is

cold 1 2 3 4 5 6 7 8 9 10 warm

19. How much do you believe your success in this program depended upon you ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

20. How much do you believe your success in this program depended upon your therapist ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

21. How much do you believe your success in this program depended upon other factors ?

not at all 1 2 3 4 5 6 7 8 9 10 totally

What are these other factors?

Please feel free to add any comments:

APPENDIX E

Session Questionnaire

NAME_____ SSN_____

SESSION QUESTIONNAIRE

NUMBER OF THERAPIST INTERVENTIONS:

	PATIENT REQUESTED							THERAPIST INITIATED						
	Time into training													
	0	5	10	15	20	25	30	0	5	10	15	20	25	30
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

1. How relaxed did you feel after today's session ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

Write in rating for each session:
1 2 3 4 5 6 7 8 9 10

2. How well did you feel you did in today's session ?

not at all 1 2 3 4 5 6 7 8 9 10 extremely

Write in rating for each session:
1 2 3 4 5 6 7 8 9 10

3. Do you feel you can now lower EMG/raise your temperature without biofeedback? (Circle session number where affirmative answer is given.)

1 2 3 4 5 6 7 8 9 10

APPENDIX F

Intake Forms

MEDICATION REVIEW

NAME: _____

The following questions have to do with medications you are presently using, as well as those you have used in the past. Please answer them as accurately and as completely as possible.

The medications I am currently using to relieve my pain are (please include over-the-counter medications):

Medication (Name)	Strength	Times a Day	When Pain was Really bad-The Most in one Day	Taken since approximate Date
1.				
2.				
3.				
4.				

Medications I have used in the past to help relieve my pain were:

Medication (Name)	Strength	Times a Day	When Pain was Really bad-The Most in one Day	Taken since approximate Date
1.				
2.				
3.				
4.				

Other medications that I am currently taking for reasons other than pain are:

Medication (Name)	Strength	Times a Day	When Pain was Really bad-The Most in one Day	Taken since approximate Date
1.				
2.				
3.				

Do you have, or have you had, any unusual reactions to any of the medications you have taken past or present? If so, please describe:

Medication	Reaction
1.	
2.	
3.	

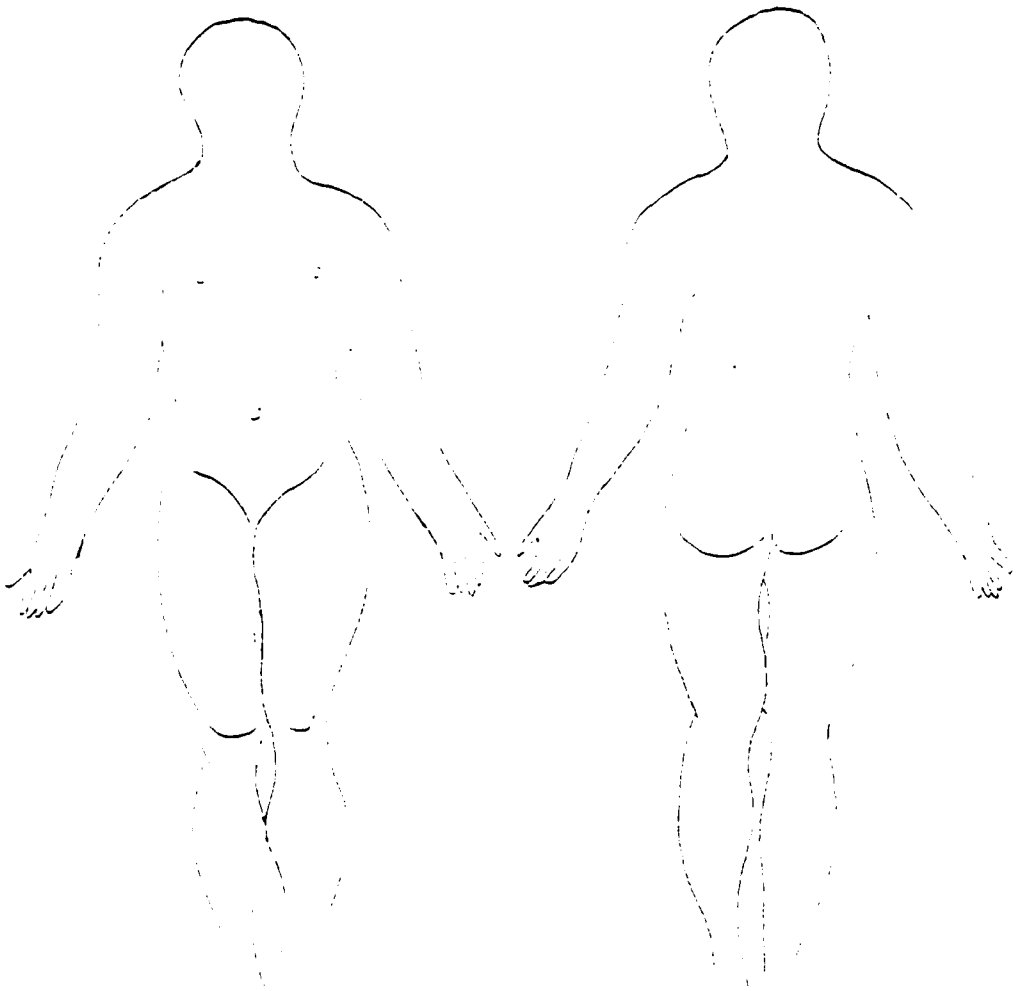
Which of your pain medication gives you the most relief? _____

NAME_____ DATE_____

Mark the areas on your body where you feel the described sensation. Use the appropriate symbol. Mark areas of radiation, include all affected areas.

	====		....		xxxx		///	ΔΔΔ	oooo
NUMBNESS	====	PINS &	....	BURNING	xxxx	STABBING	////	ACHE ΔΔΔ	OTHER oooo
	====	NEEDLES	....		xxxx		////	ΔΔΔ	oooo

Explain_____



NAME_____

Below are listed several common symptoms or bodily sensations. Most people have experienced most of them at one time or another.

On the line next to each symptom, please indicate how often you have experienced each symptom using the following code:

A	B	C	D	E
Have never or almost never experienced the symptom	**Less than 3 or 4 times per year**	**Every month or so**	**Every week or so**	**More than once every week**

For example, if your eyes tend to water once every week or two, you would circle D on the line next to # 1. Please be sure not to skip any items.

1.	Eyes water	A	B	C	D	E
2.	Itching or painful eyes	A	B	C	D	E
3.	Ringing in ears	A	B	C	D	E
4.	Temporary deafness or hard of hearing	A	B	C	D	E
5.	Lump in throat	A	B	C	D	E
6.	Choking sensations	A	B	C	D	E
7.	Sneezing spells	A	B	C	D	E
8.	Running nose	A	B	C	D	E
9.	Congested nose	A	B	C	D	E
10.	Bleeding nose	A	B	C	D	E
11.	Asthma or wheezing	A	B	C	D	E
12.	Coughing	A	B	C	D	E
13.	Out of breath	A	B	C	D	E
14.	Swollen ankles	A	B	C	D	E
15.	Chest pains	A	B	C	D	E
16.	Racing heart	A	B	C	D	E

	A Have never or almost never experienced the symptom	B Less than 3 or 4 times per year	C Every month or so	D Every week or so	E More than once every week
17. Cold hands or feet even in hot weather	A	B	C	D	E
18. Leg cramps	A	B	C	D	E
19. Insomnia	A	B	C	D	E
20. Toothaches	A	B	C	D	E
21. Upset stomach	A	B	C	D	E
22. Indigestion	A	B	C	D	E
23. Heartburn	A	B	C	D	E
24. Severe pains or cramps in stomach	A	B	C	D	E
25. Diarrhea	A	B	C	D	E
26. Constipation	A	B	C	D	E
27. Hemorrhoids	A	B	C	D	E
28. Swollen joints	A	B	C	D	E
29. Stiff muscles	A	B	C	D	E
30. Back pains	A	B	C	D	E
31. Sensitive or tender skin	A	B	C	D	E
32. Face flushes	A	B	C	D	E
33. Severe itching	A	B	C	D	E
34. Skin breaks out in rash	A	B	C	D	E
35. Acne or pimples on face	A	B	C	D	E
36. Acne or pimples other than face	A	B	C	D	E
37. Boils	A	B	C	D	E

A Have never or almost never experienced the symptom	B Less than 3 or 4 times per year	C Every month or so	D Every week or so	E More than once every week
38. Sweat even in cold weather	A	B	C	D	E
39. Strong reactions to insect bites	A	B	C	D	E
40. Headaches	A	B	C	D	E
41. Sensation of pressure in head	A	B	C	D	E
42. Hot flashes	A	B	C	D	E
43. Chills	A	B	C	D	E
44. Dizziness	A	B	C	D	E
45. Feel faint	A	B	C	D	E
46. Numbness or tingling in any part of the body	A	B	C	D	E
47. Twitching of eyelid	A	B	C	D	E
48. Twitching other than eyelid	A	B	C	D	E
49. Hands tremole or shake	A	B	C	D	E
50. Stiff joints	A	B	C	D	E
51. Sore muscles	A	B	C	D	E
52. Sore throat	A	B	C	D	E
53. Sunburn	A	B	C	D	E
54. Nausea	A	B	C	D	E

Note. Derived from The Psychology of Physical Symptoms (pp. 169-170) by J. W. Pennebaker, 1982, New York: Springer-Verlag.

THANK YOU

This form is affected by the PRIVACY ACT OF 1974. Use DD Form 2005 for (PA) Statement.

INTAKE FORM

DATE:_____

1. NAME:_____RANK:_____ SSN:_____
(Last, first, middle initial)

AGE:_____DATE OF BIRTH:_____ PLACE OF BIRTH:_____

ORGANIZATION:_____BASE:_____ DUTY PHONE:_____

JOB TITLE:_____AFSC:_____HOME PHONE:_____

LOCAL ADDRESS:_____

MILITARY STATUS: Service ( ) Active
( ) Retired
( ) Reserve

DEPENDENT STATUS: ( ) Wife
(check one) ( ) Husband
( ) Son
( ) Daughter
( ) Other _____

PERSONNEL RELIABILITY PROGRAM Qualified ( ) Yes ( ) No
NOT Qualified ( ) Yes ( ) No

EDUCATION: Years Completed:_____When Completed:_____

MARITAL STATUS: Single_____Married_____Divorced_____ Widowed_____

NAME OF SPOUSE:_____AGE:_____

SPOUSE'S OCCUPATION:_____

YOUR RELIGION:_____SPOUSE'S RELIGION:_____

How did you find out about this clinic? _____

2. Please answer the following questions as honestly as possible. If additional room is needed, please turn to the other side.

a. Please describe the present problems or situation that led to your coming to this clinic:

b. Has there been another time in your life when you have experienced similar feelings?

c. Did you ever seek out any help at that time? If so, please describe.

d. Have you ever attempted or thought about harming yourself or others? Please elaborate as to circumstances and dates.

e. Are you on any medication at present? If so, please indicate medication and dosage.

f. Have you ever lost control (e.g. temper or crying or aggression)? If so, please describe.

g. How often do you use drugs or alcohol? How much per day/week/month?

Monday_____ Saturday_____
Tuesday_____ Sunday_____
Wednesday_____
Thursday_____ Weekly_____
Friday_____ Monthly_____

h. Previous military assignments including:

Base Location	Job Title	Length of Assignment

The purpose of this questionnaire is to obtain a history of your earlier life. The information you are able to give will aid both you and us in coming to a better understanding of you and your problems. Some of these questions may not apply to you. Others may be hard to answer. You will have to think about them. Take your time. Try to answer each question as accurately as possible. Use the last page if more space is needed to answer any questions.

1. Briefly, describe those periods of your life that you feel were important to you.

2. Underline any of the following that apply to you:

Headaches	Dizziness	Fainting spells
Irregular Heart beat	Stomach trouble	Appetite problems
Bowel disturbances	Fatigue	Sleeping problems
Nightmares	Take sedatives	Alcohol problems
Feel tense	Feel panicky	Tremors
Depressed	Suicidal ideas	Take drugs
Don't like weekends and vacations	Sexual problems	Shy with people
	Overambitious	Can't make decisions
Can't make friends	Inferiority feelings	Home conditions bad
Can't keep a job	Memory problems	Unable to have a good time
Financial problems	"Suspicious"	Concentration difficulties
Unable to relax	"Restless"	

3. Underline any of the following words which apply to you:

Worthless, useless, a "nobody", "life is empty".
Inadequate, stupid, incompetent, naive, "can't do anything right."
Guilty, evil, morally wrong, horrible thoughts, hostile, full of hate.
Anxious, agitated, cowardly, unassertive, panicky, aggressive.
Ugly, deformed, unattractive, repulsive.

4. How is most of your free time occupied?

5. Ambitions:
   Past:

   Present:

6. Family Data:

(a) Father:
Living or deceased? _____
If deceased, your age at the time of his death?_____
Cause of death?_____
If alive, father's present age?_____
Occupation:_____
Health:_____
Address_____

(b) Mother:

Living or deceased?_____
If deceased, your age at the time of her death?_____
Cause of death?_____
If alive, mother's present age?_____
Occupation:_____
Address:_____

(c) Brothers and Sisters:

Number of brothers:_____Brothers' ages: _____
Number of sisters:_____Sisters' ages:_____

Relationship with brothers and sisters:

(a) Past:

(b) Present:

Give a description of your father's personality and his attitude toward you (past and present):

Give a description of your mother's personality and her attitude towards you (past and present):

Give a description of your spouse's personality and his/her attitude towards you (past and present):

Children's Name	Age	Sex

Give a description of your children's personality and their attitude towards you. (past and present)

7. Please add any information that you feel may be helpful to your evaluator in understanding and helping you (use the back side of this page if necessary).

PRIVACY ACT STATEMENT – HEALTH CARE RECORDS

THIS FORM IS NOT A CONSENT FORM TO RELEASE OR USE HEALTH CARE INFORMATION PERTAINING TO YOU

1. AUTHORITY FOR COLLECTION OF INFORMATION INCLUDING SOCIAL SECURITY NUMBER (SSN)

Sections 133, 1071-87, 2012, 5031 and 8012, title 10, United States Code and Executive Order 9397.

2. PRINCIPAL PURPOSES FOR WHICH INFORMATION IS INTENDED TO BE USED

This form provides you the advice required by The Privacy Act of 1974. The personal information will facilitate and document your health care. The Social Security Number (SSN) of member or sponsor is required to identify and retrieve health care records.

3. ROUTINE USES

The primary use of this information is to provide, plan and coordinate health care. As prior to enactment of the Privacy Act, other possible uses are to: Aid in preventive health and communicable disease control programs and report medical conditions required by law to federal, state and local agencies; compile statistical data, conduct research, teach, determine suitability of persons for service or assignments, adjudicate claims and determine benefits; other lawful purposes, including law enforcement and litigation, conduct authorized investigations, evaluate care rendered, determine professional certification and hospital accreditation; provide physical qualifications of patients to agencies of federal, state, or local government upon request in the pursuit of their official duties.

4. WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION

In the case of military personnel, the requested information is mandatory because of the need to document all active duty medical incidents in view of future rights and benefits. In the case of all other personnel/ beneficiaries, the requested information is voluntary. If the requested information is not furnished, comprehensive health care may not be possible, but CARE WILL NOT BE DENIED.

This all inclusive Privacy Act Statement will apply to all requests for personal information made by health care treatment personnel or for medical/dental treatment purposes and will become a permanent part of your health care record.

Your signature merely acknowledges that you have been advised of the foregoing. If requested, a copy of this form will be furnished to you.

SIGNATURE OF PATIENT OR SPONSOR	SSN OF MEMBER OR SPONSOR	DATE

FORM
DD 1 FEB 74 2005 PREVIOUS EDITION IS OBSOLETE

BEHAVIORAL MEDICINE CLINIC
INFORMED CONSENT FOR BIOFEEDBACK TREATMENT

It has been explained to me that biofeedback procedures have been used to treat stress-related disorders such as migraine headache, muscle contraction (tension) headache, Raynaud's disease and phenomenon, sleep-onset insomnia, hypertension, menstrual distress, G.I. difficulties, bruxism, anxiety, tinnitus and _____ (underline relevant diagnosis).

I am aware that there are alternative treatment modalities including drugs and psychotherapy. I am free to be involved with these alternative treatment modalities even though the purpose of the biofeedback training is to help alleviate my symptoms and decrease my need for medication.

While realizing that the staff will make every reasonable effort to help me, the ultimate success of such treatment is to a large degree my own responsibility. I understand that success is often achieved in between 60% and 80% of patients but requires strict adherence to the home practice and evaluation schedule outlined by my therapist. I also understand that benefits from treatment will diminish without regular practice.

I have been advised that for patients like me who have had adequate medical and psychological evaluations, no adverse effects have been observed.

I am also aware that usually two to ten training sessions are required, each lasting from one-half to one hour. I am responsible to attend all appointments unless previously cancelled.

I am free to discontinue my treatment at any time. I understand that I can contact Major Dumouchel for any questions I may have.

Signature _____ Date _____

SSN _____
(Name of patient or person authorized to consent for patient)

Signature _____ Date _____
(Advising Health Care Practioner)

Witness _____ Date _____
(To all above signatures)

APPENDIX G

Home Record Keeping Forms

Chart to Record Headache Activity and Daily Medication Intake

This chart will enable you to record the frequency of a headache and it's varying intensity with time. It will also allow you to record all medications taken. The chart represents one 24 hour period; the numbers at the bottom of the chart are the hours of the day from 6 a.m. through 5 a.m. the next day. The numbers 0 through 5 at the left of the chart indicate the intensity of the headache. The rating system is as follows:

0 represents "no headache"

1 represents a very low level headache. The type that entered awareness only at times when attention was devoted to it.

2 represents a headache pain level that could be ignored at times.

3 represents a painful headache, but one that would allow an individual to continue at the job.

4 represents a very severe headache which makes concentration difficult, but one that allows a person to perform tasks of an undemanding nature.

5 represents a very intense headache; incapacitating.

For women: Please record days of menses by placing an asterix (*) on the first line below the chart. On the first day, record the time of onset.

To follow the type and amount of medication taken, please record intake of <u>all</u> medications in this manner:

<u>EXAMPLE</u>

A Capital letter represents type of headache ie: M = Migraine
T = Tension
S = Sinus

A small letter (subscript) represents a medication ie: x = Darvon (65 mg)
y = Tylenol
z = Cafergot

A small number subscript indicates the amount of medication taken.

eg: T_{y_2} means Tension headache, took 2 Tylenol.

This information will be recorded on the chart daily and <u>all</u> medications need to be listed.

Please see attached example.

EXAMPLE

EVENTS:

06:00 a.m. Person awakens with very intense headache (grade 4). Person takes one Darvon (65 mg.).

10:00 a.m. Headache level has decreased to (3) and person takes two Tylenol.

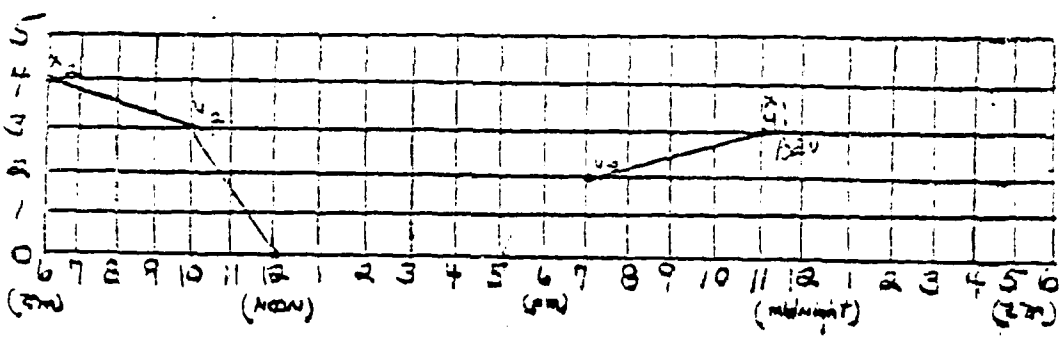
12:00 Headache is gone.

7:00 p.m. Headache has returned and is at a (3) level. Person takes another two Tylenol.

11:00 p.m. Person has had an argument with mate. Headache level is now at (3) and so person takes one Darvon and one Tylenol and goes to bed.

If the preceding events were to characterize one 24 hour period, the chart of these events would look like this:

Chart: (Example)



X= Darvon Compound 65 mgs.

Y= Tylenol

Z= Cafergot

SYMPTOM CHART

DAY DATE DAY #

5
4
3
2
1
0

6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5

A.M. NOON P.M. MIDNIGHT A.M.

DAY DATE DAY #

5
4
3
2
1
0

6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5

A.M. NOON P.M. MIDNIGHT A.M.

DAY DATE DAY #

5
4
3
2
1
0

6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5

A.M. NOON P.M. MIDNIGHT A.M.

DAY DATE DAY #

5
4
3
2
1
0

6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5

A.M. NOON P.M. MIDNIGHT A.M.

GRIF FORM NOV 82 153 REVISED

PERSONAL STRESS CONTROL LOG

NAME _____ LOG DATES _____ TO _____

This form will help you watch your progress toward self-control over stress. Set aside a few minutes each evening before bed to think about and record your experience since the previous day. Do not be discouraged if you see no dramatic improvement from one day to the next. After all, you are working to develop a valuable new, personal skill. Like any worthwhile learning program, this requires both time and careful attention.

I. GENERALLY, HOW WOULD YOU RATE YOUR STRESS LEVEL TODAY? (each day, check the appropriate box)

TODAY I FELT:

	VERY RELAXED			RATHER RELAXED			RATHER TENSE			VERY TENSE	
	1	2	3	4	5	6	7	8	9	10	EXPERIENCES WHICH MAY HAVE AFFECTED MY STRESS LEVEL TODAY
Month											
Date											
Day of Week											
Day #											

II. HOW BENEFICIAL DO YOU FEEL YOUR STRESS CONTROL EXERCISES WERE TODAY?

	VERY			SOMEWHAT			NOT AT ALL				
	1	2	3	4	5	6	7	8	9	10	SUMMARIZE ANY PARTICULAR FEELINGS YOU NOTICED DURING OR AFTER EXERCISES TODAY
Month											
Date											
Day of Week											
Day #											

PLEASE BRING THIS COMPLETED FORM WITH YOU TO YOUR NEXT INSTRUCTION SESSION

GRIF FORM SEP 80 131

APPENDIX H

Baseline Data Form

BASELINE DATA

Patient's Name and SSN _____ Date_____

Placement EMG A Frontalis

EMG B Bilateral upper traps. (2 inches to Right and Left of T2-3 space with ground just to Right of T2-3 space.)

Placement Thermal (Channel A) Bilateral volar surface of middle finger tips.

Thermal (Channel B) Bilateral plantar surface of feet, just posterior to middle metatarsal head.

Pulse rate monitor is placed on Right index finger.

Room temperature (prefeedback)		
Impedance EMG A	A1	A2
Impedance EMG B	B1	B2

Elapsed Time	1	5	10	15	20	25	30	50
	B/L Initial	B/L Post	B/L Post	#1 B/L Stress	B/L Post	#2 B/L Stress	B/L Post	20 min B/L Relaxation
Frontalis EMG A								
Traps EMG B								
Thermal L(A2) Hand A (A1) R								
Thermal L(B2) Foot B (B1) R								
S U D								
Blood Pressure								
Pulse								
Respirations per min.								
Comments								

END

FILMED

12-85

DTIC