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THE EFFECTS OF RATIONAL STAGE DIRECTED THERAPY AND
BIOFEEDBACK ON PSYCHOLOGICAL COPING AND THE MANAGEMENT OF
PAIN: AN EXPERIMENTAL STUDY

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The Effects of Rational Stage Directed Therapy and Biofeedback on Psychological Coping and the Management of Pain: An Experimental Study

Dissertation

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

By

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1985

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Chapter 1

Introduction

Cognitive therapies have shown effectiveness with many behavioral problems (Ellis, 1974; Meichenbaum, 1977; Meichenbaum and Turk, 1976; Mahoney and Arnhoff, 1978; Reardon and Tosi, 1977; Beck, 1976). There has been an increasing recognition of the cognitive factors associated with physiological processes in which pain is a primary symptom (Forman, Tosi & Rudy 1985; Turk, Meichenbaum & Genest, 1983; Howard, Reardon & Tosi, 1982; Hacket & Horran, 1980; Graham, 1972; Maultsby & Graham, 1974).

One cognitive therapy which emphasizes cognitive control over emotional, behavioral and physiological functions is Rational Stage Directed Therapy (RSDT) (Tosi, 1980). The RSDT perspective relies heavily on the social-psychological foundations of Rational Emotive Therapy (RET) (Ellis, 1962; 1974). Cognitive Restructuring is one of the techniques used to modify irrational cognitive processes in RET and RSDT integrated with imagery (RSDI) and hypnosis (RSDH). Tosi and Henderson (1984) suggest that hypnosis or imagery amplifies the effect of cognitive restructuring.

Unlike other cognitive therapies, the process of RSDT is structured within developmental stages (Tosi & Henderson, 1984). The
stages in RSDT include awareness, exploration, commitment, implementation, internalization and behavioral stabilization. Human experience is viewed within an awareness continuum, being above or below the threshold of awareness, and time continuum, allowing for attention to past, present or future events (Tosi, 1980; Howard, Reardon, & Tosi, 1982). Hypnosis and imagery (Tosi, 1980; Tosi & Baisden, 1984) are: (1) vehicles that allow for a more efficient restructuring of cognitive processes associated with emotional, physical and behavioral states relative to external or internal conditions; and, (2) maximize attentional focus to relevant, thoughts, emotions, feelings, behaviors and situations.

Cognitive restructuring has shown effectiveness in reducing symptom frequency, intensity and duration (Ellis & Abrahams, 1978). Meichenbaum and Turk (1976) found cognitive coping procedures to be effective in reducing experimentally induced pain. Maultsby and Graham (1974) used rational behavior therapy to alter beliefs associated with self-defeating behavior including learned psychosomatic attitudes. Specifically, rational stage directed hypnotherapy has shown effectiveness in modifying psychological factors associated with duodenal ulcer (Tosi, Judah & Murphy, 1985), migraine headache (Howard, Reardon and Tosi, 1982), and hypertension (Tosi, Rudy & Lewis, 1983).
Biofeedback is a recent behavioral medical technique which has shown effectiveness in managing psychosomatic or psychobiological disorders (Gaardner & Montgomery, 1981). Biofeedback, employs relaxation, imagery and passive concentration to manage autonomic physiological processes (Budzynski & Stoyva, 1984). Hilgard (1980) suggests that biofeedback teaches active awareness of physiological responses. Biofeedback and hypnosis are similar in that both increase relaxation, enhance competence, and involve cognitive regulation of autonomic functioning (Wickeramasekera, 1976).

In an experimental study, Andreychuk & Skriver (1975) found thermal biofeedback effective as hypnosis with highly suggestible subjects with migraine headache. The use of thermal biofeedback has been found effective in the treatment of migraine headache (Friar & Beatty, 1976; Blanchard, Theobold, Williams, Siver & Brown, 1978; Medina, Diamond & Franklin, 1976). Matthew, Largen, Dobbins, Meyer, Sakai and Claghorn (1980) found that thermal biofeedback facilitated hand warming and that changes in cerebral blood flow were observed suggesting a modification of vasomotor functioning.

Biederman (1983) hypothesized that the personal mastery gained over autonomic functioning learned in biofeedback may lead to the initiation of coping behaviors and enhanced self-efficacy.
Biofeedback has demonstrated effectiveness with tension headache (Cox, Freudlich & Meyer, 1975), chronic pain (Hendler, Derogatis, Avella & Long, 1977) and Raynauds syndrome (Freedman, Ianni & Wennig, 1983). Clinical trends in the data with biofeedback on chronic pain have been observed by Melzack and Perry (1975). However, much of the biofeedback research is plagued by the lack of control groups and randomization to treatments (Turk, Meichenbaum & Berman, 1979). Turk et al. further add that the mechanism underlying the reduction of pain with biofeedback treatment is not determined.

Many theories of the biological origins of pain have been advanced as well as psychological dimensions of patients suffering a variety of pain conditions. The definition of pain is often ambiguous and unclear (Sternbach, 1968). Sternbach states that pain is a subjective experience which is difficult to express and communicate. He further adds that pain is: (1) a personalized sense of hurt; (2) a stimulus which increases the current experience or likelihood of tissue damage and; (3) a pattern of responses that operates to protect the person from harm. It has been observed that pain is not always experienced after an injury (Melzack, 1961); and that psychological variables are associated with the experience of pain (Melzack & Chapman, 1973). Melzack and Wall (1982) have suggested that the experience of pain is due to variables such as previous experience,
cultural background, affective states and cognitive processes.

From a psychoanalytic perspective, Alexander (1950) suggested that physiological functioning is affected by psychological processes. Alexander formulated the specificity theory of psychosomatic conditions which suggests that the configuration of emotional states, defenses, and personality structure lead to the formation of a psychosomatic symptom. Graham (1972) and Graham, Kabler and Graham (1962) have empirically shown that attitudes and emotional states are associated with psychosomatic symptoms.

More recently Tosi, Rudy and Forman (1985) found that low-back pain, peptic ulcer, and migraine headache patients revealed attitudes of perfectionism and self-downing. The literature supports the notion that individuals experiencing a condition involving chronic pain exhibit maladaptive cognitive, affective, behavioral and physiological functioning (Howard, Reardon & Tosi, 1982; Meichenbaum & Turk, 1984; Fordyce, 1976; Melzack & Wall, 1982; Tosi, Forman, Rudy & Murphy, 1985).

Prokop, Bradley, Margolis and Gentry (1980) in a typological analysis of the Minnesota Multiphasic Personality Inventory (MMPI) examined males and females with multiple somatic complaints. Using
discriminant analysis, females were described as socially isolated, obsessional and depressed. Males were described as obsessed with somatic functioning, over ideational, and used defense mechanisms of denial and repression. Sternbach (1968) reports elevations on the neurotic triad of the MMPI with individuals who experience pain.

A critical review of the literature on the treatment of chronic pain other than headache suggests the need for controlled psychotherapy outcome studies (Linton, 1982). Linton concluded that: (1) operant techniques increase activity and reduce pain, (2) relaxation strategies decrease EMG levels and reduce pain, (3) cognitive therapies are speculative due to the limited number of investigations, and (4) multimodal treatments make therapeutic assessment complex, but have generally shown positive results. Linton further stated the need for studies that select relevant outcome variables, and assess these variables at follow-up.

Studying the combined effects of cognitive restructuring plus biofeedback, on chronic pain and the effects of these components separately along with a control group would be desirable on several grounds. First, biofeedback has become an increasingly utilized behavioral medical technique (Andrasik & Holyrod, 1983). Second, there is some evidence that biofeedback has demonstrated greater
effectiveness than hypnosis (Andreychuk & Skriver, 1975). Third, biofeedback adds a dimension to the RSDT perspective not previously investigated. Finally, there has been a lack of controlled outcome studies on chronic pain and biofeedback (Turk, Meichenbaum & Berman, 1979).

**Purpose of the Study**

In this study, the major research question addressed the relative significance and efficacy of RSDT plus biofeedback, biofeedback, cognitive restructuring and a control group on psychological coping and the management of pain. The dependent variables reflect influences from the domains of human functioning pertinent to the experience of pain. These variables include cognitive, affective and physiological responses that are significantly associated with pain. Also, under investigation was the comparison of the experimental treatments (pain) versus the control condition (pain absent) on the criterion variables.

The experimental design consisted of a 4 between and 2 within subjects factorial design with repeated measures. The factorial design with repeated measures is efficient, precise (Kidder, 1981), and internally valid (Kirk, 1968). The 4 between subjects factor
allowed for the examination of four treatments. The treatments included: (1) a waiting list control treatment, (2) cognitive restructuring, (3) biofeedback, and (4) cognitive restructuring plus biofeedback. The treatments were assessed over three time intervals (pretest, post I, and post II). The two within subjects or repeated measures consisted of gain scores involving pre minus post, and pre minus follow-up. A pain absent control group outside the experimental design added the possibility for comparison of the experimental and control samples.

It was hypothesized that the combination of cognitive restructuring plus biofeedback would significantly differ from all other treatments. Since hypnosis and imagery tend to amplify the effects of cognitive restructuring (Tosi & Henderson, 1984) biofeedback was hypothesized as having a similar effect to that of imagery and hypnosis. The pain absent control condition was hypothesized to significantly differ from the experimental pain sample. The pain absent sample was hypothesized to differ with respect to cognitive, affective and physiological dimensions related to the concept of coping.

Two instruments were employed to assess treatment outcomes. The first instrument was the Millon Behavioral Health Inventory (MBHI), a
standardized assessment tool (Millon, Green & Meagor, 1979). The second instrument was a symptom checklist which also collected data on demographic information, and symptom frequency, intensity and duration.

**Hypotheses**

The following null hypotheses were investigated:

**Treatment Effects:**

Mean gain scores for subjects experiencing pain participating in a control group, cognitive restructuring, biofeedback and cognitive restructuring plus biofeedback as measured by the Millon Behavioral Health Inventory (MBHI); three broad categories of psychogenic attitudes, psychosomatic correlates, prognostic indices; and, an average subjective daily unit of pain will not significantly differ among the treatment conditions.

**Time Effects:**

Mean gain scores representing the criterion variables of psychogenic attitudes, psychosomatic correlates, and prognostic indices and the average subjective daily unit of pain of subjects with pain, collapsed by the experimental treatments, will not significantly
differ with respect to the two gain score intervals.

**Interaction Effects: Treatment X Time**

Mean gain scores representing the criterion variables of psychogenic attitudes, psychosomatic correlates, prognostic indices and the average subjective daily unit of pain with subjects with pain will not significantly differ by time and treatment.

**Additional Hypothesis:**

Subjects defined as not experiencing pain, pain absent, and subjects who experience pain, the experimental treatments, will not significantly differ with respect to the criterion variables of psychogenic attitudes, psychosomatic correlates, prognostic indices and biofeedback temperature scores. Also, the biofeedback temperatures scores will not differ when comparing the pain absent control sample to the experimental sample of biofeedback, and cognitive restructuring plus biofeedback.
Limitations of the Study

The limitations of the study were as follows:

1) The subjects in the study were referred by physicians affiliated with Riverside Methodist Hospital, Columbus, Ohio.

2) The subjects who participated in the research were outpatients, and therefore the findings of the study are restricted to outpatient chronic pain patients.

3) The results of the study are limited to chronic pain conditions involving headache, back pain, gastrointestinal pain, rheumatoid arthritis, and multiple pain symptoms.

Definition of Terms

Pain: A subjective experience of discomfort, hurting and a physiological maladaptive response. Sternbach (1968) defines pain as: (1) a personalized sense of hurt; (2) a stimulus that increases the probability of tissue damage; and, (3) a pattern of responses that protect the person from harm.

Chronic Pain: That pain which persists for two months or longer, and medical treatment is sometimes ineffective.
Rationality: a form of thought that is firmly based on logic, reality and facts. Rational philosophy dates back to the Stoic philosophers. In general, ancient philosophers as well as more current theoreticians postulate that when people engage in rational thoughts, human functioning is more adaptive and less disturbing. Thus, when rationality is employed, a more adaptive sequence of cognitive, affective, behavioral and physiological responses is highly probable. Maultsby (1971, 1984) outlined the criteria for rational thinking. For Maultsby, rationality is:

1. More objective and reality based,
2. Minimizes maladaptive responses and personal stress,
3. Decreases situational and environmental stress,
4. Draws upon personal resources related to life preservation,
5. Tends to aid constructively in the attainment of personal goals and tasks.
Rational State Directed Therapy (RSDT):

A systematic psychotherapeutic intervention employed to restructure the cognitive, affective, behavioral and physiological domains. Rational stage directed therapy emphasizes minimizing maladaptive behaviors via cognitive restructuring; that is, considering more rational ways to consider existence. The theory emphasizes that persons may control his/her functioning by rational cognition. The individual is initially educated in the model and is taught to examine self-defeating responses or patterns more rationally and realistically. Over time, these skills are internalized into a more adaptive behavioral repertoire.

Cognitive Restructuring: A technique of RSDT in which irrational beliefs and thoughts are examined, confronted and gradually replaced with more realistic beliefs and thoughts. Cognitive restructuring postulates that people may
manage their affective, behavioral, physiological and cognitive processes with rational thinking processes (Ellis, 1962).

Biofeedback: A behavioral medical technique useful for managing and controlling an individual's physiological responses. Biofeedback primarily influences the autonomic nervous system to allow the individual to gain control over an organ system or symptom. Through passive concentration the individual is taught to monitor his/her own physiological processes via biofeedback technology. Passive concentration allows the person to manage his/her physiological processes. Biofeedback typically employs:

1. Deep breathing,
2. Cue words,
3. Imagining relaxing scenes,
4. Relaxing by counting,
5. Listening to the feedback signal.
Thermal Biofeedback: A modality which utilizes skin temperature of the dominant hand as physiological feedback. Sympathetic arousal is modified by focusing on a parasympathetic or relaxed response. The subject is taught to warm the hand and utilize other procedures to facilitate warming and relaxation. Maladaptive vasomotoric response is altered via hand warming and vasodilation.

Summary

Since pain is determined by multiple cognitive, affective, physiological and behavioral variables (Melzack & Wall, 1982), investigation of a multimodal treatment approach would be desireable. RSDT plus the added dimension of biofeedback provide a model in which the outcome with chronic pain patients may be investigated. Case studies and experimental research with RSDT, RSDH and RSDI have established the need to further test the theory with psychophysiological conditions (Tosi, Judah & Murphy, 1985; Fuller, 1980; Howard, Reardon & Tosi, 1982; Boutin & Tosi, 1983; Tosi, Rudy & Lewis, 1983).
Rational stage directed therapy (RSDT) and biofeedback were systematically investigated based on several considerations:

1. Biofeedback has been employed in practice and some case studies; however, experimental research has been neglected (Turk, Meichenbaum & Berman, 1979).

2. RSDT has shown applicability with psychosomatic conditions (Tosi & Baisden, 1984); and

3. Research investigating the added dimension of biofeedback to the RSDT perspective may provide data on the synergistic effects of these treatment components.

Theoretically, the combination of cognitive restructuring with biofeedback skills provides a multimodal model to systematically assess the criterion variables relevant to chronic pain (Linton, 1982). The experimental factorial design of the study provides a direct comparison of the treatment outcomes. The factorial design with repeated measures is efficient, precise (Kidder, 1981) and high on internal validity (Kirk, 1968).
CHAPTER 2

Review of the Literature

Descriptive Psychological Dimensions Associated With Chronic Pain Conditions

The review of the literature consists of four main sections including: (1) descriptive psychological dimensions associated with chronic pain conditions, (2) biofeedback, (3) cognitive theories, and (4) cognitive-experiential therapy. The descriptive psychological dimensions associated with chronic pain literature provides research on the cognitive affective, behavioral and physiological responses of chronic pain patients. The description of the psychological dimensions associated with chronic pain literature was examined from several perspectives with particular emphasis on typological studies. Also, specific chronic pain conditions of headache, back pain, gastrointestinal, and rheumatoid arthritis are discussed as these conditions comprised subjects for the experimental treatments. The biofeedback literature emphasizes the definition of this treatment, and the use of biofeedback with behavioral problems and psychophysiological conditions. The cognitive theories review concepts of coping, appraisal and cognitive treatment approaches to behavioral and physiological conditions. The cognitive-experiential literature describes the RSDT, RSDH and RSDI, developmental stages and
the experimental studies using this approach.

Lipowski (1977) in an overview of psychosomatic medicine provides a perspective of the research to date on psychosomatic conditions. The dualistic concepts of psychosomatic conditions appear reductionistic, and the multicausality model for all diseases appears to be a more relevant and common concept. The current state of psychosomatic medicine is influenced by concepts of object loss, cognitive appraisal, self-management and control, and coping. There has been increased research on variables which increase illness or enhances wellness. The research emphasis has taken two avenues of investigation: (1) the research on the core symbolic processes which influence organ functioning and (2) the specific pattern of cognitive, emotional, behavioral and physiological responses and their relationship to stimuli. Lipowski concluded that future research may need to examine the mechanisms which underlie physiological change.

Barsky and Klerman (1983) examined the relationship of bodily complaints and somatic styles with respect to hypochondriasis. The hypochondriacal individual is somatically preoccupied. His/her attitudes and beliefs are centered on health and somatic functioning. From a psychodynamic perspective, these individuals have difficulty channeling sexual, aggressive and oral drives. The ego defenses are
organized to fend off feelings of low self-esteem. For the hypochondriacal individual, pain is a common complaint, and perception or cognitive misinterpretation of stimuli is likely. The hypochondriacal style is a learned social behavior, and has important social and cultural determinants.

Arnold (1960) suggests that pain is not a sensation since it varies independently from somesthetic stimulation. Both pleasure and pain are mediated by the medial thalmus when of a diffuse character. The limbic system is involved when pain is differentiated and localized. Fear, pain and rage are associated with the sympathetic nervous system, and more pleasant feelings are associated with the parasympathetic system. Arnold asserts that pleasure and pain are feeling-specific reactions to the effect of somesthetic impressions. Pleasantness and unpleasantness are feeling reactions associated to sensory impressions from all modalities. Arnold concludes that physiological changes not only depend on the feelings of pain, but also on the intuitive appraisal of excessive somatic sensations mediated by the peripheral estimative system, and on the appraisal of the total situation.

Cannon (1925) views pain from a physiological perspective. He suggests that rapid changes such as an increase in blood sugar,
secretion of adrenin, and altered circulation prepare the organism for fight or flight. The rapid physiological change may serve the organism in a variety of ways. First, increased adrenin hastens coagulation if the organism experiences bodily damage and pain. Secondly, if the organism is in some form of physical confrontation, then a more rapid coagulation may decrease blood loss and enhance tissue repair.

Keefe (1982) suggests a thorough behavioral analysis of variables which may reinforce and maintain problem behaviors of chronic pain patients. Keefe suggests an assessment of several domains: (1) overt motoric behavior, (2) cognitive-verbal styles, and (3) physiological processes. In the first domain, it is important to examine operant conditioning in the maintenance of illness and pain behaviors. In the cognitive-verbal domain, the importance of cognitive distortions, coping styles and strategies are associated with pain. Assessment of the physiological domain allows for the correlation with behavior, and cognition. The behavioral analysis may suggest treatment strategies. Future research may examine the relationship of learning, cognition, physiology and behavior in the management of pain.

Parker, Doerfler, Tatten, and Hewett (1983) examined the psychological factors that contribute to the report of pain. Thirty
males of the Veterans Administration were administered the Minnesota Multiphasic Personality Inventory (MMPI), Beck Depression Inventory (BDI) and the McGill Pain Questionnaire. Multiple linear regression was used to investigate the relationship of the test measures to dimension defined by McGill as related to pain. The MMPI 7 (psychasthenia) scale was positively related to the affective motivational dimension of pain, and the 8 (schizophrenia) scale was negatively related to the motivational dimension. The 1 (hypochondriasis) scale was positively related to the miscellaneous pain dimension. Subjects who scored high on the 1 scale tended to report higher pain levels. The high score on the 7 scale suggested somatic rumination and the high score on the 8 scale suggested that the report of pain may be interpreted as a distress signal for psychological conflicts.

McCreary and Colman (1984) investigated the usage of medications, psychological distress and mobility with 126 low back subjects. Four groups of medication users were studied: (1) no medication, (2) aspirin-type, (3) narcotic, and (4) narcotic plus other medications. Group four reported high scores on the MMPI 3 and 1 scales, and reported more intense pain than the other medication groups. Group 3 revealed significantly high elevation on the 4 (psychopathic deviance) scale of the MMPI. Group 1 was able to walk, run and climb significantly more than the other groups.
Prokop, Bradley, Margolis, and Gentry (1980) examined patients with multiple somatic complaints with the MMPI. Cluster analysis procedures were employed with discriminant analysis used as a follow-up. Three female types (221 subjects) emerged with the first type showing elevations on scales 1 (hypochondriasis), 2 (depression) and 3 (hysteria). The second type showed elevation on 1 and 3 at 65T. The third type showed a 1-3/3-1 profile above 75T. A discriminant analysis showed that scales 2, 7 (psychasthenia) and 8 (schizophrenia) accounted for 81% of the variance between subgroups. This suggests that the female population of multiple pain patients may be described as socially isolated, obsessive and depressed. Four types (123 subjects) emerged in the male sample. Similar to the first type of the females, the first type for males showed elevations on scales 1, 2 and 3. The second type, showed a 3-1/1-3 profile under 60T. The third type, showed an elevation on scale 2 over 70T with all other scales falling below 60T. The fourth type showed elevations on scales 1, 2, 3 and 8 suggesting a more disturbed possibly psychotic group. A discriminant analysis between subgroups accounted for 65% of the variance on scales 1, 3, 7 and 8. This suggests that the male sample may be described as obsessive, preoccupied with somatic functions, and using fantasy, repression and denial. The results suggest that the multiple pain patients may form smaller meaningful subtypes which may respond differently to treatment, and vary with respect to treatment
Hart (1984) replicated the types of Prokop et al. (1980) finding four MMPI types. This research supports the growing body of literature that suggests the relationship of personality variables to somatic processes.

Strassburg, Reimherr, Ward, Russell, and Cole (1981) investigated the role of the MMPI as a predictor in a psychiatric and anesthesiology clinic treatment setting. A multiple linear regression (MLR) analysis was employed to predict variables relevant to treatment success. On the MMPI Strassburg et al. found no variables significant for anesthesiology patients, but showed the defensiveness (K) scale significant for the psychiatric patients. Scale 5 (masculinity-feminity) and scale 1 were found predictive of treatment outcome with the psychiatric patients. A MLR was run on sex of the patients finding females higher on the scales 3 and 10 (social introversion). A MLR was run on single versus multiple pain complaints, finding scales 1, 2, 3 and 8 higher in the multiple pain group than the single pain group. A discriminant analysis on head, back, head and back, and any other pain could be discriminated on the K, 1, 2, 3, 4 (psychopathic deviance), 5 and 7 scales. The sole use of the MMPI may not be a good discriminator or predictor of treatment outcomes.
of the MMPI may not be a good discriminator or predictor of treatment success; however, its use in a treatment assessment package would be highly desirable.

Unelevated MMPI profiles among chronic pain patients were examined in a typological study (Snyder & Power, 1981). Three of the types show a conversion V, a fourth showed elevations on 2 and 3. The fifth type was submerged with elevated k and 3 scales. Five MMPI types emerged suggesting the need to interpret the profiles from a psychological perspective.

Tosi, Forman & Rudy (1985) examined the common irrational beliefs of migraine headache, low back pain and peptic ulcer patients. Perfectionism and self-downing were significant for the psychophysiological conditions when compared to the controls. Also, age and socioeconomic status were important variables to the psychosomatic conditions.

Specific types of chronic pain representing the subject sample are reviewed next. These chronic pain conditions include: headache pain, rheumatoid arthritis, gastrointestinal pain and low back pain. The review of this literature provides specific descriptive dimensions associated with these conditions.
Headache Pain

Bakal (1975) suggested biopsychological criteria for diagnosis of headache pain and research in this area. Physiologically, migraine headache is defined as cerebral and cranial vasoconstriction, exaggerated cranial arterial responsiveness, and depletion of serotonin. Muscle contraction headache consists of decreased blood supply to the muscles, and constriction of the autonomic striate muscle system. Personality features of headache patients suggest a conversion reaction, perfectionism, obsessiveness, and repressed hostility. Anxiety, frustration and anger are frequently experienced by headache patients when stimulated by psychological stress.

Research according to Bakal should follow several lines. These recommendations include: (1) reliable epidemiological studies, (2) multivariate studies on the symptoms of headache, (3) pathophysiological investigations, (4) functional analysis of the environment, (5) investigation of the cognitive response in headache pain, and (6) a synthesis of etiological and therapeutic models for a more effective treatment regime.
Rheumatoid Arthritis

Nicholas (1981) described the rheumatoid arthritic patient as hostile, repressed and angry. The degree of functional impairment and pain may increase depression and conflicts over dependency. Psychotherapy with rheumatoid arthritic patients may focus on self-image problems, obsessive tendencies, and the management of frustration and hostility.

The personality features of female arthritics were compared to asymptomatic relatives (Solomon & Moos, 1965). Subjects who exhibited high levels of the sera factor tended to score higher on inhibited aggression, social desirability of responses, morality, shyness and ability to defend and adapt. The sera factor is an immunoglobin positively correlated with rheumatoid arthritis. The nonarthritic appeared able to cope with stressors more effectively than the arthritic subject.

Additional research by Moos and Solomon (1965; 1966) suggest nonarthritis relatives with a low sera factor showed obsessiveness, self-criticalness, anxiety, guilt, impulse control difficulty, dependency conflicts, and inner maladjustment. Moos et al. concluded that the psychological predisposition, the inability to cope with
psychological conflict, and the sera factor may have lead to the development of the rheumatiod arthritic condition.

**Gastrointestinal Pain**

Ulcerative colitis may be considered an extremely painful and discomforting condition (Karush, Daniels, Flood & O'Conner, 1977). Karush et al. described the ulcerative colitis patient's attitude toward well-being as correlated with somatic functioning of the bowel, and pleasing a dominant figure. Hostility and aggression taking the form of masochism, and fear of loss of the dominant other may create a feeling of helplessness. Attitudinal, affective, behavioral and physiological resultants of the colitis condition may lead to poor adjustment through a false sense of independence.

Fordtran (1979) considered the role of several factors related to duodenal ulcer development. Chronic long term psychological conflict, a physiological predisposition and a significant precipitating emotional event may lead to the occurrence of duodenal ulcer development. Frustration and hostile strivings for independence may precipitate the duodenal ulcer condition.
The relationship between the hypersecretion of gastric acid and anxiety has been shown by Mahl (1950). Thus, appraisal of a significant event may concommitantly influence a physiological maladaptive process that may produce gastrointestinal pain.

**Low Back Pain**

Cognitive errors and distortions were examined by Lefebvre (1981) with depressed and low back pain patients. Depressed patients, depressed with low back pain, non-depressed with low back pain and non-depressed without low back pain were investigated by administration of the Cognitive Error Questionnaire and the Low Back Pain Questionnaire. The results suggested that depressives endorsed significantly more cognitive errors. Low back pain patients endorsed three out of four errors, and this was significant compared to the depressed non-pain subjects. Lefebvre concluded that low back pain is a function of the low back syndrome and cognitive errors.

Leavitt and Garron (1982) described nonorganic low back pain patients as emotionally tense and non-expressive. This was concluded after examining Rorschach responses of organic versus nonorganic low back patients. Next, based on the significant responses of the Rorschach tested sample, another sample of low back subjects were
examined with respect to sum of the color responses (SUM C), frequency of good form responses (F%) and number of good form responses (F+), in addition to the five factors of the Low Back Pain Questionnaire. Leavitt and Garron summarize their results suggesting that nonorganic back patients are unaware of their feelings, experience excessive tension, and report chronic somatic complaints. Emotional instability and over-reactivity are more likely than a diagnosis of hysteria in low back pain.

A factor analysis of the MMPI with two back pain scales derived from the hypochondriasis scale were examined with fifty low back pain subjects (Schmidt & Wallace, 1982). Three factors were found and interpreted as follows: factor (1), severity of symptoms, factor (2), anger and aggression, and factor (3), psychogenic component. Schmidt and Wallace conclude that further research is necessary, and that the three factors have relevance for treatment planning.

Cognitive coping strategies with low back pain patients were examined for their effects on emotional and personal adjustment (Rosentiel & Keefe, 1983). Sixty-one low back subjects were administered the Coping Strategy Questionnaire (CSQ), and interviewed following a structured format. A factor analysis of the CSQ found three factors labeled: (1) cognitive coping and suppression, (2)
helplessness and (3) diversion of attention or prayer. Subjects who scored high on factor 1 showed a greater degree of functional impairment. Subjects who scored high on factor 2 showed more depression and anxiety. High scores on factor 3 were more functionally limited and reported higher pain levels.

Summary of Descriptive Psychological Dimensions Associated with Chronic Pain Conditions

Males with multiple somatic complaints were described as obsessive, preoccupied with somatic functions, and using defense mechanisms of repression and denial (Prokop et al. 1980). Females with multiple somatic complaints were described as socially isolated, depressed and obsessional (Prokop et al. 1980). Bakal (1975) suggested that individuals with headache pain were perfectionistic, obsessive and repress hostility. Nicholas described the arthritic patient as obsessive, hostile, and repressed. Low back pain subjects were described as emotionally unstable (Leavitt & Garron, 1982), exhibit cognitive errors (Lefebvre, 1981) and have difficulty expressing anger and aggression (Schmidt & Wallace, 1982). Individuals with gastrointestinal pain were described as anxious, experience chronic psychological conflict and exhibit gastric hypersecretion (Mahl, 1950; & Fordtran, 1979). Tosi, Forman and Rudy (1985) found
subjects with migraine headache, peptic ulcer and low back pain revealed a greater degree of perfectionism and blame proneness than a medical control group.

**Biofeedback Literature**

The biofeedback literature is introduced, defined and contrasted to similar approaches such as hypnosis and imagery. The effectiveness of biofeedback with behavioral problems and chronic pain conditions will be reviewed. Some studies using students as subjects are reviewed; however, specific emphasis is placed on biofeedback with clinical samples.

Biofeedback is a behavioral medical technique which focuses on the control and management of the autonomic nervous system. Miller and Banuazizi (1968) demonstrated that autonomic responses could be operantly conditioned with lab animals. At about the same time Kamiya (1969) found that the alpha electroencephalographic (EEG) rhythm was controllable via a feedback tone. Similar to systematic desensitization, alpha EEG feedback could be employed to control anxiety by posing a relaxed physiological state with a physiological aroused state. Various forms of feedback have been employed
clinically: EEG (Kamiya, 1969), electromyographic (EMG) feedback (Gaardner & Montgomery, 1981), alpha (Melzack & Perry, 1975) and thermal biofeedback (Sargent, Green & Walters, 1973).

Budzynski and Stoyva (1984) defined biofeedback as consisting of three stages: awareness, control, and transfer. In the first stage the person learns that his/her responses (affective, behavioral, and physiological) are maladaptive. During stage two, the person learns to control his/her response by passively concentrating on the feedback signal. A new more adaptive set of responses are learned in this stage. Finally, the more healthy responses are internalized and may be transferred to a new situation.

The mechanism of biofeedback involves higher cortical operations and the limbic system (Sargent, 1977). Sargent suggests that following the perception of an external event by the cortical and limbic systems, the hypothalmus is stimulated via the pituitary-hormonal axis and autonomic nervous system response (ANS). The ANS invokes a parasympathetic somatic response.

Fromm and Hurt (1980) defined altered states of conscious (ASC) techniques that modify or alter the cognitive structures. The ASC model suggest a primary process-secondary process continuum wherein
the ego may learn to master impulses drives and responses. The second criteria includes the orientation of the ego along a passive and active dimension. Defenses and critical judgement are temporarily suspended in favor of ego receptivity and passivity. Ego receptivity and passivity allows for the reorganization of cognitive structures. Biofeedback employs passive volitional control (Gaardner & Montgomery, 1981) or passive concentration (Sargent, Green & Walters, 1973). This would suggest that biofeedback fits within the ASC model.

Hilgard (1980) suggests that biofeedback teaches active awareness of physiological functions while hypnosis suppresses physiological functions. Wickeramasekera (1976) reports that the mood states of hypnosis and biofeedback are similar and require cognitive regulation of autonomic functioning. These similarities include: floating sensation, lightness, euphoria, and a feeling of competence.

Turk, Meichenbaum and Berman (1979) critically reviewed biofeedback research. Turk et al. point out many limitations of biofeedback research. The lack of randomization of subjects to treatments and not employing a suitable control, raises question about treatment effectiveness. The biofeedback treatment components are often obscure and not identifiable. Turk et al. summarize the research as follows: (1) the relationship between biofeedback and pain
is not clearly established, (2) there are individual differences between subjects to treatment, (3) biofeedback is given for a wide range of procedures, (4) active treatment components are not identified, (5) there is a lack of suitable control groups, and (6) the generalizability based on the selection of criterion measures is questionable.

Cox, Freudlich and Meyer (1975) compared the effectiveness of EMG feedback, progressive relaxation and a medical placebo with 27 tension headache subjects. Both the EMG feedback and progressive relaxation effectively modified tension headache when compared to the medical placebo. Both treatment groups demonstrated greater internal control and a reduction of psychosomatic complaints, whereas the medical placebo continued to experience headaches, and sought out additional medication. Cox et al. concluded that it would be desirable to combine relaxation with biofeedback procedures to form a more comprehensive treatment.

Alpha feedback and hypnotic training were examined for their effectiveness with chronic pain (Melzack & Perry, 1975). The treatments included alpha feedback, hypnosis and a combination of alpha feedback and hypnosis. The alpha feedback had a small effect, hypnosis had a larger but not significant effect, and the combination
treatment was most effective but not significant. While the effects were not significant, the study showed some clinical trends.

Friar and Beatty (1976) examined the effectiveness of training vasoconstrictive procedures to migraine headache patients. The experimental group consisted of operant procedures in decreasing pulse amplitude in the forehead. The control group involved operant techniques to decrease pulse amplitude at a peripheral site (index finger of dominant hand). Nineteen subjects were assigned to the treatments by matching to relevant variables. After eight sessions of feedback and one session with no feedback, the experimental group decreased medication usage, duration and frequency of migraine episodes. The control group did practice these procedures, and showed improvement in drug usage. The finding that the control group also reduced medication is perhaps related to a demand characteristic of the study. The subjects were instructed to write down the frequency, intensity and duration of pain as well as their pain medications. Subjects may have spontaneously reduced medication usage by following the experimental demands.

Reeves (1976) examined the effects of EMG biofeedback and cognitive skills training with a twenty year old female with tension headache. Following the Meichenbaum (1977) cognitive approach, the
client was educated regarding the approach, and the cognitive phase implemented. This reduced catastrophizing and some headache activity. EMG biofeedback was next implemented, and covert coping statements were integrated with the treatment. The client at six months after treatment had reduced her headache by 66% from the baseline.

Blanchard, Theobold, Williams, Silver, and Brown (1978) examined the effectiveness of relaxation training, thermal biofeedback and a control group with migraine headache patients. The relaxation therapy and biofeedback treatments were significantly different from the control at the post-test. Relaxation therapy did show reductions in headache frequency and intensity over that of biofeedback. At a one month follow-up the relaxation treatment was slightly more effective than biofeedback. The three month follow-up demonstrated that the relaxation and biofeedback treatment maintained similar improvements over the control.

Hendler, Derogatis, Avella and Long (1977) examined the effects of EMG biofeedback with chronic pain patients. The biofeedback treatment was effective in reducing 6 out of 13 patients' subjective report of pain after five sessions at post-test. The study is confounded in that a control group was not employed. Somitization, obsession, hostility and interpersonal sensitivity were reduced with
the biofeedback treatment.

Autogenic feedback with 20 patients with migraine, tension and mixed headache activity were examined (Mitch, McGrady & Iannone, 1976). Sixty-five percent of the patients were improved on two symptom measures, and 80% were improved based on one measure. The EMG-autogenic training did not appear to effectively treat the tension and mixed headaches. Again, this study is confounded by the lack of a control group.

Medina, Diamond and Franklin (1976) examined the effects of EMG and thermal biofeedback in combination with migraine headache patients. A control group was not employed. Thirteen out of 27 patients reduced their medication. Three subjects were markedly improved, six moderately improved and four mildly improved.

Adler and Adler (1976) examined the effectiveness of biofeedback in a clinical five year follow-up study. Five subjects had cluster headache, 19 had muscle contraction headache and 22 patients had migraine headache. Generally, EMG biofeedback was initially employed followed by a thermal biofeedback modality. Some individuals also were involved in group therapy. Eighty percent of the patients showed some improvement of their symptoms. Of the patients who did not
improve, most were not involved with psychotherapy.

Thermal biofeedback, relaxation training, a combination of biofeedback and relaxation, and a control group were investigated with anxious hospitalized schizophrenics (Hawkins, Doell, Lindseth, Jeffers, & Skaggs, 1980). Of the ten out of forty rated improved, only one patient was rehospitalized after a year. Thirteen out of thirty, of a one year follow-up, were rehospitalized. The results suggested that treatment effects were non-specific, and that change in anxiety was not associated with a change in temperature scores. Improved subjects showed decreased anxiety, enhanced conceptual organization, and reduced emotional withdrawal.

Mathew, Largen, Dobbins, Meyer, and Claghorn (1980) examined the relationship of thermal biofeedback and cerebral blood flow in migraine headache subjects. Vasoconstriction, a sympathetic response, was hypothesized as facilitating a migraine episode. The results suggest that hand-warming and hand-cooling yielded differing hand temperatures, and differing effects on regional cerebral blood flow. Additionally, cerebral blood flow measures with biofeedback differed from a steady state or resting level. In general, hand-warming with biofeedback increased blood flow in both hemispheres and at localized
sites. This suggests that thermal biofeedback modifies vasoconstriction and enhances vasodilation.

Six subjects who had previous experience with hypnosis were studied with respect to changes in skin temperature with thermal biofeedback (Roberts, Kewman, and MacDonald, 1978). The demonstration showed that some individuals were able to achieve a high degree of voluntary control over their autonomic nervous system. The investigation suggests that thermal biofeedback is effective with circulatory disorders such as Raynaud's syndrome, migraine headache, burns and arthritis.

Andreychuk and Skriver (1975) examined subjects high and low on hypnotic suggestibility with hypnosis, thermal biofeedback and alpha biofeedback. It was hypothesized that hypnotizability mediates biofeedback and the improvement of a psychosomatic condition. Subjects were randomly assigned to one of the treatments. Each treatment met for 45 minutes a week for 10 weeks. All treatments showed improvement, and highly suggestible subjects statistically differed in their response to treatments compared to low suggestible subjects. Andreychuck et al. conclude that high suggestibility and a high index of headache pain may increase a treatment expectation effect.
Freedman, Ianni and Wenning (1983) compared the effects of autogenic training, relaxation, thermal biofeedback and EMG biofeedback with patients with Raynaud's syndrome. Raynaud's syndrome is precipitated by emotional stressors or extreme environmental temperatures. Additionally, the presence or absence of the Meichenbaum cognitive training approach was employed in the design. Ten sessions of cognitive training were employed prior to the autogenic, relaxation and biofeedback treatments and ten sessions followed these treatments. The results suggested no significant effect for the cognitive approach. The EMG and autogenic approach showed no significant improvement. With a cold stress test the temperature biofeedback approach showed significant improvement. A one year follow-up showed the temperature biofeedback subjects as significantly different from the other treatments.

Gamble and Elder (1963) found multinodal biofeedback more effective than a progressive muscle relaxation therapy intervention with migraine patients. The multinodal treatment consisted of components of EMG, temperature and relaxation therapy. The progressive muscle relaxation group effects were similar to the no treatment control group.

Friedman, Fried & Fink and Fink 1980 evaluated the
effects of cued controlled progressive relaxation and thermal biofeedback with eleven cluster headache subjects. Cluster headaches differ from migraine headaches and are more episodic and chronic. A psychological assessment and thirty day baseline period were conducted prior to ten sessions of progressive relaxation (8 weeks) and twelve sessions of thermal biofeedback (6-9 weeks). Criterion for improvement included: (1) delay of headache onset and (2) reduction in frequency and reduction in duration of the onset. Results showed that four subjects dropped out of the treatment, three were helped but not "cured," and one subject reported an increase in headaches. Three subjects showed no improvement. Three out of seven (43%) of the subjects showed improvement. This study suggests the need for controlled biofeedback outcome studies.

Lake, Rainey and Papsdorf (1979) compared the effectiveness of brief rational emotive therapy (RET) and thermal biofeedback, thermal biofeedback, EMG biofeedback and a waiting list control group with 24 migraine headache patients. Subjects recorded daily headache activity, activities in general and medication dosage. RET was employed for three sessions (3rd, 5th and 7th) with the thermal biofeedback. The results suggest EMG biofeedback was superior to the control group. RET and thermal biofeedback was not significantly different from EMG biofeedback. Forty-six percent of the treatment
subjects improved compared to seventeen percent of the control. The study is limited with respect to generalization regarding the RET treatment as there were only three sessions. The investigators questioned the efficacy of thermal biofeedback with migraine patients.

Biederman (1983) reviewed the literature related to biofeedback and the treatment of chronic back pain. Biederman suggests that the reduction of pain is related to Bandura's (1977) self-efficacy theory. That is, personal mastery over autonomic functioning may lead to the initiation and frequency of coping behaviors. This hypothesis is supported by the fact that reduction in EMG muscle levels does not necessarily lead to a reduction in pain.

Andrasik and Holyrod (1983) evaluated the specific and non-specific effects of biofeedback on tension headache. This was a three year follow-up study of an earlier study. Thirty-nine tension headache subjects were assigned to four treatment conditions: no treatment, no change group, decreased EMG, and an increased EMG treatment. Twenty-eight subjects participated in the three year follow-up. The biofeedback treatments continued to show maintenance of symptoms at a three year follow-up. Headache sufferers failed to improve in the absence of treatment. The reduction of EMG activity was irrelevant to short-term or long-term headache pain. Finally these
results concur with Holyrod and Andrasik (1978) in that psychological changes may be indirectly mediated by the biofeedback treatment.

Friedman and Taub (1982) evaluated hypnotic susceptibility and peripheral temperature elevation in the treatment of migraine headache patients. The findings suggest that regardless of high or low hypnotic susceptibility or elevation in skin temperature subjects administered biofeedback showed improvement. A placebo effect or cognitive attribution effect is hypothesized as operating with patients who were administered biofeedback.

Schandler and Dana (1983) evaluated cognitive imagery, EMG biofeedback and a rest control group with clinically tense young adults. Cognitive imagery decreased hostility and depression. Contrary to the hypothesis, EMG biofeedback did not decrease state or trait anxiety. A synthetic model employing cognitive imagery and biofeedback is suggested.

Cognitive structures involved with EMG biofeedback and relaxation treatments were examined by Hart (1982). Three types of headache were investigated: migraine, tension and mixed. The results suggest that subjects scoring high on the cognitive structure measure responded favorably to relaxation training as it focuses on cognitive processes.
Also, subjects who received relaxation training appeared to practice these skills at home more so than subjects who received biofeedback. The relaxation skills may be more amenable to home practice than biofeedback.

Reading (1984) examined the psychophysiological reactivity of migraine headache subjects following four types of treatment. The treatments included EMG, temperature, skin conductance, and false feedback. Cognitive stressors were introduced in the session to assess change on the dependent variables. The results showed a reduction in the mean headache activity for all groups. A significant effect between groups was observed on the EMG, and skin conductance treatments. The EMG treatment more effectively coped with the cognitive stressors than the other treatments. Reading concluded that EMG is more effective as a treatment when scalp muscle tension, and physiological measures of relaxation are examined.

The reduction of performance errors related to depression and thermal biofeedback treatment was examined by Klee and Meyer (1981). Thirty student subjects were assigned based on their scores on the Beck Depression Inventory to one of three conditions: (1) depressed, (2) not depressed and (3) depressed plus receiving one session of thermal biofeedback. Subjects were then exposed to 18 aversive tone signal
presentations measuring response time, avoidance escape and no response. The results support the learned helplessness model, and demonstrate the effectiveness of biofeedback in responding to a task.

Additionally, temperature biofeedback research with normal or college students has demonstrated modification of trait anxiety (Bass, Mittenberg & Peterson, 1981), alteration of temperature with muscle activity (King & Montgomery, 1981) and effectiveness in combination with hypnosis (Piedmont, 1981).

**Summary of the Literature on Biofeedback**

Budzynski (1973) defines biofeedback as consisting of three stages: awareness, control and transfer. The mechanism of biofeedback involves higher cortical functions, the limbic system, and the hypothalmus and also invokes a parasympathetic response (Sargent, 1977). Biofeedback has gained support in the treatment of migraine and tension headache (Andreychuk & Skriver, 1975; Cox, Freudlich & Meyer, 1975; Blanchard, Theobold, Williams, Silver & Brown, 1978; Andrasik & Holyrod, 1983). Tentative support for chronic pain patients with a variety of physiological conditions has been observed.
Thermal biofeedback for the treatment of Raynaud's syndrome has gained support (Freedman, Ianni & Wenning, 1983). The role of cognitive structures in the therapeutic outcome of biofeedback treatment has gained attention (Hart, 1982; Biedermann, 1983). Experimental studies using control groups are viewed as necessary to determine the efficacy of biofeedback on pain (Turk, Meichenbaum & Berman, 1979).

_Cognitive Theories_

Cognitive theories of human functioning and self-defeating behaviors are introduced in this section. Cognitive coping strategies, appraisal, and distortions are addressed in relationship to human functioning. Cognitive therapies are next given consideration with respect to treatment of behavioral and emotional problems. Finally, research with cognitive therapies and the effectiveness of these treatments involving physiological conditions are discussed.

The role of cognition in self-defeating behaviors and affect has been advanced by Beck (1970), Lazarus (1971), Meichenbaum (1977),
Mahoney and Arnhoff (1978), Ellis (1962, 1971, 1979), and Tosi (1974, 1980). Cognitive theorists have expanded their views to encompass physiological processes. A growing body of research is directed toward the relationship of cognition (i.e., attitudes and beliefs) in psychosomatic or psychophysiological conditions (Millon, Green & Meagor, 1982). The relationship of attitudes, beliefs and cognitive coping statements have been investigated in experimentally induced pain as well as clinically manifested pain. Increasingly, treatments for psychophysiological conditions have incorporated cognitive techniques and procedures in the therapeutic intervention (Cameron, 1982).

Lazarus (1966) and in his later writings (Lazarus & Folkman, 1984; Lazarus & Launier, 1979) point to the relationship between cognitive appraisal, coping, and adaptation. Lazarus and Folkman (1984) hold cognitive intrapsychic processes as central to the appraisal of threat, harm and challenge. The perception of such stressors may lead to disturbed affect, poor emotive-behavioral reactions, alteration of physiology, and change in adequacy of cognitive functioning. Coping defined by Lazarus and Folkman (1984) may improve moral, and enhance social and somatic functioning. Modification of the cognitive appraisal system may lead to more healthy human functioning.
Beck (1970, 1984) suggests that cognitive distortions such as arbitrary inference, magnification and overgeneralization may exacerbate symptoms. In Beck's model, cognition is viewed as a mediator of other human functions. Primary cognitive structures are viewed as crude; whereas, secondary processes are viewed as more mature, refined and modifiable. Modification of the secondary structures occurs when the distortions are altered, and when desensitization to the significant event or stimuli occurs. Thus dysfunctional affect and physiological arousal may be minimized, and more reasonable constructive action demonstrated when the cognitions are strengthened and realistic.

Meichenbaum (1977) and Meichenbaum and Turk (1976) stress the importance of cognition and individual appraisal in pathogenesis. Meichenbaum and Turk (1976) posit that stress and disease are multidetermined. They further suggest that the nature of the coping response influences the disease process. Following Lazarus' (1966) coping model, Meichenbaum and Turk (1976) suggest that the coping process may be taught as a skill. Factors that contribute to the inhibition or facilitation of the skill include attributions, expectations, self-statements and self-efficacy. The coping response is taught through a series of steps: (1) attention to the needed skill, (2) learning of the coping response and, (3) gradual exposure
to the stressful experience or stress inoculation. The approach begins on an educational basis moving to rehearsal and practice of the coping skill. Miechenbaum and Turk (1976) have found this approach effective with anxiety, anger and experimentally induced pain.

An experimental study by Hacket and Horran (1980) examined stress inoculation procedures following this model with pain. The gate control theory of pain was integrated with the stress inoculation procedures. Pain was experimentally induced by the cold pressor, (submersion of the dominant hand in extremely cold water). Relaxation training attended to the sensory discrimination dimension of the gate control theory of pain. Attentional imagery techniques focus on the motivational affective dimension of pain. The cognitive evaluation dimension was addressed with coping skills training with "self talk." The subjects found the cognitive coping procedures reduced pain by 45%, and imagery procedures increased the subject's pain threshold. The cognitive "self talk" procedures and the imagery tended to decrease the pain threshold. There was a greater degree of practice for the relaxation and imagery procedures. The cognitive "self talk" procedures were helpful; however, most subjects ignored these procedures with the post-test cold pressor test.
Clinical studies with stress innoculation training (SIT) have yielded conflicting results. Tan and Poser (1982) found Meichenbaum's SIT ineffective toward decreasing knee pain prior to arthrogram surgery. Anderson, Lawrence and Olson (1981) found that the SIT treatment was effective at decreasing tension headache. They also conclude that autogenics and relaxation also showed effectiveness in reducing pain. There is a clear need for research using SIT on clinical pain samples.

Mahoney (1974) suggests that heightened levels of arousal or anxiety may follow a cyclical pattern. Cognitive labeling or attribution may exacerbate and increase anxiety. Misattribution may lead to emotional or autonomic arousal. This hypothesis is supported by Schacter's (1975) work on cognition, and physiological arousal.

Lazarus (1971) proposes the Basic-ld model as a comprehensive system which addresses human functioning. The acronym Basic-ld refers to (b) behavior, (a) affect, (s) somatic, (i) imagery, (c) cognition, (l) intrapersonal and (d) drugs. This model is a systematic intervention approach. For example, if the individual has dysfunctional somatic processes, then the intervention strategy would be directed toward this domain. Following a functional behavioral analysis, imagery, relaxation and assertiveness procedures might be
implemented to minimize somatic disturbance. It is noted that the therapeutic intervention is directed toward multiple systems. The multimodal treatment approach is intended to individualize the intervention.

From a cognitive-behavioral perspective, Goldfried and Goldfried (1975) employ a self-management strategy to enhance coping. Cognitive relabeling and relaxation may be used to facilitate coping with anxiety. Goldfried questions the use of relaxation alone or in combination with other treatments such as cognitive restructuring. Furthermore, Goldfried posits that when relaxation is presented as an active coping skill there is a greater probability for implementation and enhanced coping. Cognitive restructuring tends to be more appropriate when anxiety is pervasive or the anxiety is of a social evaluative nature.

Goldfried, Decenteceo and Weinburg (1974) suggest that rational or cognitive restructuring may be considered a self-control procedure. Goldfried et al. suggests that rational restructuring may be formulated within a learning or behavioral framework, and systematically taught to impact on the self-control of anxiety. Training in rational restructuring includes: (1) presentation of rationality and identification of anxiety, (2) overview of irrational
ideas, (3) analysis of the client's problem, and (4) education to modify internal irrational sentences in vivo. Four subjects who experienced speech anxiety were administered these procedures. At post-test, the subjects showed a decrease in anxiety and an increase in confidence as a speaker.

Wein, Nelson and Odom (1975) hypothesized that cognitive restructuring involves verbal extinction and relabeling or attribution. Wein et al. examined the contribution of reattribution and verbal extinction to the effectiveness of cognitive restructuring with forty snake phobic subjects. The treatment groups consisted of cognitive restructuring, systematic desensitization, verbal extinction, attention placebo and a no treatment control. A multivariate analysis of variance of overall treatment effect was observed. Univariate analysis found that cognitive restructuring and systematic desensitization decreased avoidant behavior. Cognitive restructuring was the most effective treatment with respect to a cognitive criterion. Overall, verbal extinction was not as effective as cognitive restructuring. Wein et al. conclude that cognitive restructuring may be more successful with highly verbal individuals whose inner speech modulates behavior.

Chaves and Barber (1974) evaluated the effects of imagined
insensitivity to pain, imagined pleasant scene, expectancy to reduce pain and a control group with experimentally induced pain. The results suggest that the imagery procedures more effectively reduced pain than the control and expectation group. Chaves and Barber conclude that the mechanism for the reduction of pain remains undefined. Suggestion is made that imagery may elicit an incompatible response to pain. Also, a placebo or expectancy effect may facilitate treatment outcome.

Spanos, Horton and Chaves (1975) examined the effects of a relevant cognitive strategy or imagery, an irrelevant cognitive strategy and a control group with experimentally induced pain. Both cognitive strategies elevated the subject's pain threshold as contrasted with the control. The relevant cognitive strategy was slightly more effective in the reduction of the pain stimulus. These results support a cognitive relationship in mediating pain.

Turning to more clinical studies with pain, the cognitive relationship with the physiological process will be discussed. In a clinical case study of a sixty-two year old male with abdominal pain, self-control procedures were employed to effectively reduce medication dependency and improve general behavioral functioning (Levendusky & Pankratz, 1975). Contingency management, relaxation, visual imagery,
cognitive relabeling and drug withdrawal with a placebo were employed as self-management techniques. The patient was admitted and treated in an inpatient psychosomatic unit. Ethical questions did arise in this study as the patient was not aware that his medication was being exchanged for a placebo pill. During treatment the subject was informed of the placebo and he became upset, but expressed an interest in continuing the self-control procedures to manage his pain. Cognitive relabeling and relaxation procedures were continued. At the post-test the subject showed a return to more healthy functioning. This case study supported the notion that cognitive factors may play a strong role in pain or physiological processes.

Mitchell and White (1976) employed self-management procedures in a case study of the treatment of headache tension. The client was taking aspirin and diazepam prior to the study, and was removed from these drugs prior to treatment administration. The self-management procedures were hypothesized as showing greater effectiveness than biofeedback since biofeedback is directed at symptom alleviation. Following a behavioral analysis of antecedent events and stressors to the client's headache a two-stage treatment approach was implemented. In the first stage, behavioral self-management consisted of cue-controlled muscle relaxation, mental and differential relaxation and self-desensitization. The second stage involved thought stopping,
time-out, experiential focusing, time restriction, imagery, blow-up, projected rehearsal, rational thinking, and in vivo desensitization. The treatment procedures show reduction of headache at three months and six months. These results are difficult to evaluate since this is a case study, and multiple treatment components were employed.

In an experimental "sequential dismantling strategy", Mitchell and White (1977) examined the effects of self-recording, self-monitoring, stage 1 self-management, and stage 2 self-management techniques with migraine headache subjects. Twelve subjects were assigned to the first treatment with successive reduction of subjects for each treatment at each 12 week interval. The results showed that the self-recording and monitoring showed no reduction of headache frequency. At the 48th week the combination of stages 1 and 2 showed greater reduction in headache frequency than stage 1. These reductions were maintained and found significant at 3 months, and 60 weeks.

Turner (1982) examined the effectiveness of progressive relaxation, cognitive-behavioral therapy and a control group with low back pain patients. Thirty-two subject were randomly assigned to the treatment condition that met for five weeks, 90 minutes per session. Progressive relaxation focused on muscular relaxation and anxiety management whereas the cognitive-behavioral approach followed a
Meichenbaum model using imagery, stress management, and coping skills training. At post-test both cognitive-behavior therapy and progressive relaxation showed decreases in depression, pain severity and sickness impact. While both treatments significantly differed from the control they did not significantly differ from one another. At follow-up, the cognitive behavioral treatment continued to show improvement on depression, pain severity and sickness impact while progressive relaxation showed no improvement. The cognitive behavioral approach significantly differed from progressive relaxation at the year and one half follow-up. The cognitive-behavioral subjects increased their normal activities, decreased anxiety, progressed towards personal goals, and minimized pain severity as measured by the visual analogue scale.

Bell, Abramowitz, Folkins, Spensley and Hutchinson (1983) examined the effects of EMG biofeedback, biofeedback and cognitive-behavior therapy, cognitive-behavior therapy, and control group with thirty-one tension headache subjects. The results suggest that pain reduction for the treatment groups significantly differed from the control; however, frequency and intensity did not significantly differ. Biofeedback and cognitive-behaviorial therapy, and biofeedback showed a greater reduction of headache pain. Both the cognitive behavior and biofeedback showed a decreased usage of
medication. Relaxation was significant for all treatment groups, and cognitive-behavioral therapy tended to reduce obsessiveness and depression. The combination treatment reduced interpersonal sensitivity, depression, hostility, anxiety and total complaints. The biofeedback treatment showed a greater degree of internality as measured by the health locus of control. Biofeedback tended to show some greater psychological improvement in some areas compared to the cognitive-behavior therapy. The combination group did, however, show greater gains than the cognitive therapy alone. It is suggested that the cognitive treatment may increase resistance, while biofeedback may facilitate the effectiveness of the cognitive-behavior therapy group.

Moleski and Tosi (1976) in a comparative psychotherapy study examined rational emotive therapy (RET) and systematic desensitization on stuttering. The treatments consisted of RET, systematic desensitization, RET with in vivo assignments, systematic desensitization in vivo, and a control group. RET was more effective than systematic desensitization in decreasing stuttering, anxiety and irrational attitudes. The addition of in vivo homework assignments did not have consistent effects across the criterion variables, but did impact on the variables in the appropriate direction.

Holyrod and Andrasik (1978) examined the effects of cognitive
coping procedures plus relaxation, a discussion group, and a symptom-monitoring control with chronic tension headache patients. Both the discussion and cognitive coping procedure showed significant change from the control at post-test and follow-up. Both groups reported a reduction in medication. The cognitive self-control group was not different from the discussion group. The cognitive coping model and relaxation were not consistent across all criterion variables. It is suggested that by engaging in a cognitive coping strategy an incompatible cognitive response is learned.

Holyrod, Andrasik and Westbrook, (1977) examined the effects of a cognitive stress coping procedure, EMG biofeedback and a waiting list control group with tension headache subjects. Treatment consisted of eight sessions biweekly for 45 minutes. The cognitive stress coping treatment revealed a greater reduction in the frequency and duration of headaches. Also, the cognitive stress coping group maintained headache reduction at a fifteen week follow-up assessment. Holyrod et al. conclude that the cognitive stress coping procedure enhanced general skill development, whereas the EMG biofeedback had a nonspecific effect.
Summary of Cognitive Theories

Cognitive theories of human functioning tend to hold thoughts, reasoning, appraisal and attribution as interrelated with feelings, behavior and physiological responses. Cognitive processes that are efficient and reality based tend to enhance coping with stressors. Cognitive responses that are ineffective may be modified or restructured to reduce emotional disturbance, enhance behavior, and modify physiological functioning (Beck, 1970, 1984; Moleski & Tosi, 1976; Lazarus, 1971; Mahoney, 1974; Goldfried, Decenteceo & Weinberg, 1974; Turner, 1982; Schacter, 1975).

Cognitive Experiential Therapy

Cognitive experiential therapy is a psychotherapeutic interaction which relies heavily on the social-psychological foundations of Rational Emotive therapy (RET) (Ellis, 1962, 1974). Rational Stage Directed Therapy (RSDT), and Rational Stage Directed Hypnosis (RSDH) or Imagery (RSDI) involve therapeutic procedures directed toward specifically modifying the cognitive domain in human functioning. Cognitive restructuring, a RET (Ellis, 1974) psychotherapy technique focuses on modifying irrational cognitions to more rational cognitions. Maultsby (1984) has delineated criteria desirable for
assessing rational thinking.

Ellis (1962) hypothesized that human functioning follows an ABC sequence where A is the situation, B is the belief about A, and C is the emotional consequence of B. Tosi and Marzella (1975) expanded the ABC model to include dimensions D behavioral and E physiological (see Table 1 for a description of the A-B-C-D-E model). Tosi (1974) expanded RET to encompass growth stages with criteria both the client and therapist may assess. Cognitive experiential therapy depicts the person in the environment following Mooney's (1963) paradigm of person-environment interaction. RSDT views man as central in the person-environment model.
THE ABCDE MODEL

A— Refers to an event or set of events \((a_1, a_2, a_3, a_4)\) occurring in the internal or external world of the person related to time occurring along an awareness continuum.

B— Refers to cognitive responses \((b_1, b_2, b_3, b_4)\) to A, internal or external, along an awareness and time continuum.

C— Refers to affective responses \((c_1, c_2, c_3, c_4)\) to B about A along the awareness and time continuum.

D— Refers to physiological concomitants \((d_1, d_2, d_3, d_4)\) related to A, B, C occurring along an awareness and time continuum.

E— Refers to a set of actions, (covert, overt) or behavioral possibilities \((e_1, e_2, e_3, e_4)\) toward A related to A, B, C and D occurring along the time and awareness continuum.

(Tosi, 1981)
The cognitive restructuring technique has been combined with hypnosis (Tosi, 1980; Tosi & Baisden, 1984) and with imagery (Reardon and Tosi, 1977). Tosi and Henderson (1984) suggest that the combination of cognitive restructuring with a hypnotic or imagery technique amplifies the effect of the restructuring technique. Thus, hypnosis or imagery, defined from a rational perspective allows for more cognitive control over affective behavioral, physiological and environmental states. While in a deep state of relaxation or hypnosis the client may selectively focus on any element in the A–B–C–D–E sequence that demands its own figural attention.

The self or ego system consists of five highly interrelated domains in the A–B–C–D–E model (Tosi, 1981). The environment A consists of the external environment or reality. The internal environment B consists of images, thoughts, ideas, attitudes and beliefs which comprise the cognitive domain. C refers to affect defined as a felt tendency or disposition for a given object (Arnold, 1960). Physiological responses are defined at point D as biochemical changes as well as activation of sympathetic action, etc. Behavior is defined at point E and involves either a covert or overt action.

The person's self system is defined as open and responsive to the environment (Figure 1). This suggest that events external have
implication internally for the person, and vice versa. The first element in the situation is "A." This is an event, condition, situation or set of events that may occur in the environment or in the person. Since the person is viewed along the time and awareness continuums, the environment may comprise events or experiences in the past, present or future. Also, the person may be conscious of the environment or the environmental stimuli or this may be perceived or appraised below the threshold of awareness. This implies that an event or situation may be out of awareness in the unconscious realm.

Thus a person may be involved with multiple events and conditions \((A_1, A_2, A_3 \ldots A_n)\). The person's cognitive domain involves a set of appraisals and responses beginning with a specific event and generalizing to the self/ego system. An event is appraised at \(B_1\) (see Table 2). This initial appraisal may be rational or irrational. At \(B_2\) the person evaluates their response to the event. The person generalizes the appraisals at \(B_1\) and \(B_2\) to the entire ego/self system at \(B_3\). \(B_4\) involves a set of learned cognitive symbolic coping strategies that are employed to minimize the disturbing or irrational aspect of the event (Table 1). Affect or emotions or feelings occur at point C.
Figure 1
Depiction of the Person - Environment Interaction

A = SITUATIONAL CONDITIONS
B = COGNITIVE FUNCTIONS
C = AFFECTIVE RESPONSES
D = PHYSIOLOGICAL RESPONSES
E = BEHAVIORAL RESPONSES

(Tosi, 1980)
Table 2

Cognitive Appraisals and the Cognitive-Symbolic Coping Strategies

- $B_1$—Appraisal of the event
- $B_2$—Appraisal of the response to the event
- $B_3$—Appraisal generalized to the entire ego/self system
- $B_4$—Cognitive-Symbolic Coping Strategies

<table>
<thead>
<tr>
<th>Cognitive-Symbolic Coping Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disassociation-Association</td>
</tr>
<tr>
<td>Denial-Regression-Supression-Projection</td>
</tr>
<tr>
<td>Logical-Critical-Divergent Thinking</td>
</tr>
<tr>
<td>Imagining</td>
</tr>
<tr>
<td>Distortions</td>
</tr>
<tr>
<td>a. Mislabelling</td>
</tr>
<tr>
<td>b. Overgeneralizing</td>
</tr>
<tr>
<td>c. Arbitrary Inference</td>
</tr>
<tr>
<td>d. Magnification/Minimalization</td>
</tr>
<tr>
<td>e. Selective Attention</td>
</tr>
<tr>
<td>f. Cognitive Polarization (Either-Or)</td>
</tr>
<tr>
<td>g. Projection</td>
</tr>
<tr>
<td>Destructive/Constructive Approach-Avoidance Tendencies</td>
</tr>
<tr>
<td>Proliferation</td>
</tr>
</tbody>
</table>

(Tosi, 1981)
Emotions are more limited and well defined. The cognitive-experiential perspective view holds emotion as a felt tendency toward an object. Emotions may be singular or multiple in nature ($C_1, C_2, C_3, C_4$). A physiological response occurs at point D related to B and C about A (Tables 3 and 4). The behavioral action tendency occurs at point E which involves some type of motoric response in the environment.

RSDT or RSDH assumes that a time and awareness continuum defines the person's perception or evaluation of the environment (Tosi and Baisden, 1984). The awareness dimension may be defined as a threshold of awareness where: (1) above the threshold is conscious awareness, and (2) below the threshold experience is out of conscious-awareness. The time continua consists of past, present or future experience. The time-awareness continua consists of four quadrants. Attention in hypnosis may be directed to a quadrant by age regression, projection, time distortion or other hypnotic techniques to focus on the A-B-C-D-E sequence be it rational or irrational.

Cognitive experiential therapy holds that human growth proceeds through six stages: awareness, exploration, commitment, implementation, internalization and behavioral stabilization. The stage theory of psychotherapy is expanded from Quarnata's (1971)
Table 3
EXAMPLE OF THE ELABORATED ABCDE IRRATIONAL SELF-DEFEATING SEQUENCE

| A. Event | Mrs. Smith asks Mr. Smith to go to a movie with her. He states that he wants to go bowling with his friends instead of going to a movie with her. |
| B. Cognitive Responses | B₁ Mrs. Smith evaluates the situation with the thought: "I can't stand to be ignored. This is a catastrophic and a horrible situation." |
| | B₂ Mrs. Smith evaluates her response to Mr. Smith's behavior with the thought: "It is terrible that I didn't speak up and assert myself." |
| | B₃ Mrs. Smith generalizes to her entire ego/self situation with the thought: "I must be an uninteresting and unworthy human being if my husband rejects my presence." |
| | B₄ Mrs. Smith engages in a cognitive symbolic coping strategy with the thought: "I refuse to assert myself and will avoid him and going out as much as possible." |
| C. Affective Responses | C₁ Anxiety |
| | C₂ Depression |
| | C₃ Hostility |
| D. Physiological Responses | D₁ Increased blood pressure |
| | D₂ Increased frontalis potential |
| | D₃ Vasoconstriction of blood vessels |
| | D₄ Headache pain |
| E. Behavioral Responses | E₁ Avoidance of Mr. Smith |
| | E₂ Hostility directed toward Mr. Smith |
| | E₃ Withdrawal from husband via isolation and because of headaches |
Table 4

Example of the Elaborated ABCDE Rational-Constructive Sequence

<table>
<thead>
<tr>
<th>Event</th>
<th>Mrs. Smith invites Mr. Smith to a movie. Mr. Smith states he is going bowling with his friends instead of going to a movie.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Mrs. Smith evaluates the situation with the thought: &quot;I don't like to be ignored by my husband and this one situation is not totally catastrophic.&quot;</td>
</tr>
<tr>
<td>B2</td>
<td>Mrs. Smith evaluates her response to the situation with the thought: &quot;It is not terrible to not have asserted myself, and inquired into when we might go to a movie together.&quot;</td>
</tr>
<tr>
<td>B3</td>
<td>Mrs. Smith generalizes to her entire ego/self system with the thought: &quot;While this is certainly a frustrating situation, this doesn't mean I am unworthy or uninteresting.&quot;</td>
</tr>
<tr>
<td>B4</td>
<td>Mrs. Smith engages in a cognitive-symbolic coping strategy with the thought: &quot;I will inquire as to when we might go to a movie, and assert when I would like to go to a movie.&quot;</td>
</tr>
<tr>
<td>C1</td>
<td>Self-doubt</td>
</tr>
<tr>
<td>C2</td>
<td>Mild Anxiety</td>
</tr>
<tr>
<td>C3</td>
<td>Frustration</td>
</tr>
<tr>
<td>D1</td>
<td>Mild sympathetic autonomic arousal</td>
</tr>
<tr>
<td>D2</td>
<td>Mild increase in frontalis potential</td>
</tr>
<tr>
<td>D3</td>
<td>Minimal increase in pressure</td>
</tr>
<tr>
<td>D4</td>
<td>Momentary tension in the head area</td>
</tr>
<tr>
<td>E1</td>
<td>Inquires into time when Mr. Smith might go to the movies.</td>
</tr>
<tr>
<td>E2</td>
<td>Expresses frustration about situations and is involved with things, people and places Mr. and Mrs. Smith find rewarding.</td>
</tr>
<tr>
<td>E3</td>
<td>Maintains involvements with people places and things Mrs. Smith finds rewarding.</td>
</tr>
</tbody>
</table>
sequence of human growth. Each stage has identifiable criteria in the
therapy and extra-therapy environment (Tosi & Henderson, 1984). The
stages coexist interdependently since this form of psychotherapy is
experiential.

The six stages are defined as follows (Tosi, 1980; Tosi &
Henderson 1984; Tosi & Baisden, 1984):

Awareness: - In the initial stage the client or participant
perceives new conditions or possibilities for growth. The client
becomes familiarized with the A-B-C-D-E sequence both from an
irrational and rational perspective. The limited or constricted
awareness of the relationship between past, present and future events
is expanded upon in this stage. Awareness is either passive-
reflective or active-subjective.

(1) Passive-reflective awareness: This state of awareness is
naturally dissociative and allows the person to be treated as an
object. Thus, the participant may observe thoughts, feelings,
behaviors and physiological processes. The participant is able
to reflect on such states, and does not personalize events as
readily.
(2) **Active-subjective awareness**: This state of awareness tends to require a greater degree of the participants involvement with the A-B-C-D-E sequence. This mode of awareness is more integrative, generalizing and potentiating for human growth. Both forms of awareness function to provide a foundation for growth and meaningful behavioral change.

**Exploration**: The participant in this stage begins to test out concepts, hypothesis and self-observations learned in the awareness stage. This is a rational hypothesis testing verification process. The therapist directs the participant's attention to selected elements of the time-awareness continua. The participant may experience the results of cognitive restructuring with imagery in context of the A-B-C-D-E sequence. The therapist may direct attention to a self-defeating irrational content area and stimulate divergent thinking (Guilford, 1967) for a rational constructive action.

**Commitment**: Following self-knowledge learned in the earlier stages, the client reaches a point of decision. The client may contrast the familiar self-defeating sequence with a unfamiliar rational constructive approach. Resistance to a more self-enhancing set of behaviors may emerge in this stage. The therapist in this stage may vigorously encourage and persuade the client to engage in a
more rational self- enhanceing manner. Once the client initiates constructive action a greater sense of mastery, competence and integration is experienced with the self. This often leads to the mobilization of internal resources, reinforcement of the constructive action and motivation to effect further growth.

**Implementation:** This stage is the behavioral resultant of the commitment stage. Behavioral consistency is demonstrated more frequently based on internal rational decisions. New learnings obtained in the earlier stages are integrated into constructive action tendencies. Generalization of the more rational sequence is applied across situations and people. The therapist may employ relaxation, imagery or hypnosis to strengthen integration, but rationality in these states must operationalize into overt constructive action.

**Internalization:** This stage is characterized by integration of thoughts, feelings, behaviors and physiological responses into the ego/self system. Rational beliefs learned in earlier stages regarding the self and environment become integrated into the personality/self structure. Cognitive evaluations, appraisals and perceptions are accurate and progressive.
Behavioral Stabilization: The participant has moved through the five preceding stages of growth and the rational sequence is demonstrated with greater frequency and resistant to extinction. The participant is more assertive, proficient and effective in coping with self and environment. The participant may be redirected to a new problem and move through the sequence with greater efficiency and less effort.

The Cognitive Experiential Therapy perspective has three variants:

1. **Rational Stage Directed Therapy (RSDT)** employs cognitive restructuring within the stage directed framework. Cognitive restructuring is implemented in the normal waking state.

2. **Rational Stage Directed Imagery (RSDI)** uses imagery and restructuring to facilitate the modification of the ABCDE sequence. The imagery allows for concentration and focus of attention on selected elements of the A-B-C-D-E model.

3. **Rational Stage Directed Hypnotherapy (RSDH)** uses the state of hypnosis to amplify the effect of cognitive restructuring. Similar to imagery, passive concentration,
and focused attention may heighten the awareness of the participant. The time and awareness dimensions may be manipulated by regression, projection, and time distortion. Selected elements of the A-B-C-D-E may be focused upon. The participant's attention may focus on the specific irrational A-B-C-D-E elements and the relevant developmental stage to facilitate greater emotional, behavioral and physiological effectiveness.

RSDT, RSDI and RSDH Literature

Research has been directed in several areas which support the validity and efficacy of the cognitive experiential perspective. Factor analysis of recently developed cognitive measures point to the relationship of cognitive factors related to affect, behavior, and physiology. Tosi and Eshbaugh (1976) using a hierarchical factor analytic technique found the Personal Beliefs Inventory (PBI) to be organized into three levels. The highest factor was interpreted as a general measure of irrationality. The second level factors were interpreted as attitudes associated with depression and dogmatism. Third order factors were achievement anxiety, delay of gratification, moral conforming, and guilt and shame.
Tosi, Forman, Rudy and Murphy (1978) used a common factor analysis to replicate Bessai's (1978) six factor low order solution. Also, Tosi, Rudy & Forman (1985) found that the beliefs of perfectionism, self-downing and blame proneness significantly related to psychosomatic conditions of migraine headache, peptic ulcer and low back pain. These instruments are frequently used in the cognitive experiential therapy studies and demonstrated the significance of the cognitive dimension in human functioning.

Marzella (1975) studied the effectiveness of RSDH, RSDI, hypnosis and a control group. RSDH, RSDI and the hypnosis group significantly reduced emotional stress in a graduate student population. Additionally, Marzella found that subjects who were highly susceptible to hypnosis responded differently to treatments as contrasted with low susceptible subjects. Therapist effects also differentially affected subject's reduction of emotional stress, i.e., depression and hostility. Multiple criterion measures were employed to assess emotional stress.

Reardon and Tosi (1977) examined the effects of RSDI, cognitive restructuring, a placebo and no treatment on self-concept and stress with delinquent females. The results suggest that RSDI subjects significantly improved with respect to the total self-concept scale of
the Tennessee Self-Concept Scale. This change was also associated with the reduction of anxiety and depression. The data showed a generalization or integration effect in the absence of treatment (post-test to follow-up).

Boutin and Tosi (1983) examined the effects of RSDH on irrational ideas and test anxiety of nursing students. Subjects were randomly assigned to RSDH, hypnosis, placebo and a no treatment condition. Multivariate Analysis of Variance (MANOVA), Component Analysis of Variance (CANOVA) and follow-up with a discriminant analysis function suggested the efficacy of RSDH over the other treatments on the criterion variables. The hypnosis group showed some effectiveness over the placebo and control group over time. Moreover, RSDH demonstrated improvement on grade point average. Also, a generalization effect occurred with RSDH from post-test to follow-up.

Tosi, Judah and Murphy (1985) examined the effects of RSDH, cognitive restructuring, hypnosis and a no treatment control with duodenal ulcer patients. MANOVA found significant time X treatment interaction, and a significant time effects. Time X treatment interaction found significant effects on frequency of gastrointestinal pain, personality coping styles of the Millon Behavioral Health Inventory (MBHI), evaluation and locus of control scores on the Common
Beliefs Survey (CBS) III (Bessai, 1977). Univariate effects for time were significant for evaluation and locus of control scores on the CBS III. RSDH was identified as significantly effecting the criterion variables as well as impacting on the subjective rating of physical status at follow-up.

Fuller (1981) evaluated the effects of RSDH, cognitive restructuring, hypnosis only and a no treatment control with depressed nursing home patients. Fuller observed that the constrictive environment appeared to have a negative impact on self-esteem and self-concept. Depression was measured by the Minnesota Multiphasic Personality Inventory (MMPI) and the Tennessee Self Concept Scale (TSCS) measured the self-concept. RSDH demonstrated efficacy over the control group and cognitive restructuring, and showed reduction in depression and a strengthening of self-concept. Again a generalization of integration effect was observed from post-test to follow-up.

Case studies have demonstrated the effectiveness of RSDH as a therapeutic approach. Howard, Reardon and Tosi (1982) explored hypnosis and RSDH in the treatment of migraine headaches. Hypnosis slightly reduced the frequency of migraines. RSDH significantly reduced the frequency of migraines from 7.5 to 1.6 per week. The
client also improved in total self-concept, and on the MMPI.

Tosi, Howard and Gwynne (1983) employed RSDH in the treatment of anxiety neurosis with a 21 year old female. The MMPI showed reductions on six of ten clinical scales at the post-test. The three month follow-up indicated that the client had gained employment and obtained her general high school equivalency degree. The case study demonstrates the efficacy of RSDH with a lower intellectual functioning (Full Scale IQ of 88).

Reardon, Tosi and Gwynne (1977) used RSDH with a depressed forty-five year old male diagnosed as schizophrenic. After four months of treatment a reduction on seven of ten clinical scales on the MMPI and a reduction on the F scale, a measure of emotional disturbance, was observed.

Gwynne, Tosi and Howard (1978) treated a nineteen year old male with pathological nonassertion. The treatment employed a combination of RSDI and behavioral rehearsal. Baseline measures showed a high level of anxiety with women. Six sessions of treatment included one half hour of RSDI followed by one half hour of behavioral rehearsal. Post-test showed a strengthening of the self-concept as measured by TSCS, and at the eight month follow-up the client was involved in
social relationships with women. This case study supports the efficacy of RSDI with a person with a full scale IQ of 85.

Gwynne, Tosi and Howard (1978) employed RSDH in the treatment of pathological nonassertion with a twenty-one year old female. The client manifested high levels of anxiety in social situations and typically withdrew or avoided social interaction. The treatment was twelve weeks, and post-test results showed a marked decrease in anxiety responses. Significant improvement in the social and personal self was observed as measured by the TSCS.

Tosi, Fuller and Gwynne (1980) used RSDH with a ten year old girl diagnosed as learning disabled with concomitant reading anxiety. RSDH was employed for fourteen weeks with biweekly sessions. The child's standard score on the Wide Range Achievement Test (WRAT) increased from 77 at pretest to 80 at post-test. Marked reduction in reading anxiety as related to her reading environment was also observed at post-test.

Falling in the class of cognitive therapies, cognitive experiential therapy shows the highest effect size with meta-analytic methods (Smith, Glass, & Miller, 1980). RSDH experimental studies are rated quite high on internal and external validity. Cognitive
experiential therapies are in the class of theories similar to Kelly, Raimy and Bandura (Smith, Glass & Miller, 1980).

SUMMARY OF RSDT, RSDI AND RSDH

The cognitive experiential perspective emphasizes cognitive control over affective, physiological and behavioral processes (Tosi, 1980). Cognitive restructuring is the principle technique of the cognitive experiential perspective. Hypnosis and imagery tend to amplify the effect of cognitive restructuring (Tosi & Henderson, 1984). RSDH and RSDT are systematic-comprehensive therapies which are stage directed. The client is taught to examine the irrational A-B-C-D-E sequence and implement more rational constructive action. Hypnosis and imagery may be employed to facilitate self-enhancing action.

RSDH has demonstrated effectiveness with depression and self-concept of adolescents (Reardon & Tosi, 1977), test anxiety (Boutin & Tosi, 1983), depression with geriatric patients (Fuller, 1981), and reduction of gastrointestinal distress (Tosi, Judah & Murphy, 1985). Case studies have supported the efficacy of the RSDH perspective with migraine headache (Howard, Reardon & Tosi, 1982),
anxiety neurosis (Tosi, Howard & Gwynne, 1983), and with a depressed schizophrenic (Reardon, Tosi & Gwynne, 1977).
Chapter 3

Methods

This chapter presents the methods implemented to conduct this research. The chapter includes six sections: (1) selection of subjects, (2) selection of instruments, (3) research design and statistical procedures, (4) treatment therapists and technicians, (5) treatments, and (6) a summary.

Selection of Subjects

The subjects for this study were referred by neurologists, family practice physicians and residents associated with Riverside Methodist Hospital, 3535 Olentangy River Road, Columbus, Ohio. The physicians were informed of the broad nature and intent of the study, and referred patients for the purpose of participating in the study. Participants in the study frequently visited their physician for treatment of pain symptoms as revealed by the medical records. Routine neurological and physical examinations typically found little physiological explanation for the symptomology. The patient population was primarily from the middle and upper-middle socioeconomic class.

Physicians at Riverside Methodist Hospital, Columbus, Ohio,
referred patients who had experienced pain for at least two months; however, most patients typically had pain symptoms for two years or more. Most patients were receiving drug treatment for their pain. This study did not control for drug treatment but did collect data on medication usage over time.

Subjects in the experimental treatments consisted of ten females and ten males with a mean age of 36.65 (SD = 13.10). The subjects' mean pain history was 10.16 years (SD = 11.80). Seven of the twenty subjects reported multiple pain complaints. (See Table 5 for descriptive characteristics of the samples on occupation, education and pain status.)

Random assignment was employed to theoretically and statistically distribute equal variance on the dependent variables across the treatment groups. Patients were randomly assigned to one of four treatment groups. Each treatment group had four to six subjects.

A pain absent control sample consisted of master level students in a counseling theories course at the Ohio State University, Columbus, Ohio. The pain absent sample primarily served as a comparison to the experimental treatments on the MBHI and for
Table 5

Descriptive Data on the Subject Samples

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* 1 = Professional; 2= trade; 3= laborer; 4= not employed, 5 = welfare.

** 1 = more than 16 years; 2 = 13 to 16 years; 3 = high school graduate; 4 = 9 to 12 years; 5 = 0 to 8 years.

*** 1 = headaches; 2 = back pain; 3 = gastrointestinal; 4 = other; 5 = multiple pain.

**** 0-4 corresponds to the quantity of medication taken.

***** Subjects are not seeking pain treatment.
comparisons on the thermal biofeedback scores at the pretest. Thirty seven students agreed to participate by taking the MBHI, and 7 students additionally received one biofeedback session. It was hypothesized that the pain sample would significantly differ from the pain absent sample on the MBHI and in the initial biofeedback session. Subjects in the pain absent control condition consisted of thirty-five females and two males with a mean age of 29.45 (SD = 6.93). Seven female subjects received one biofeedback session.

Selection of Instruments

The Millon Behavioral Health Inventory (MBHI) and a symptom checklist were employed to assess change on the dependent variables. The MBHI (Millon, Green & Meagor, 1982) was selected for use in this study for several reasons. First, the MBHI is health oriented (Millon, Green & Meagor, 1979) and tends to assess coping strategies and tendencies, rather than psychopathological tendencies. Second, the four broad scales are collapsible which allows for their use as composite dependent variables. These four broad categories include personality styles, psychogenic attitudes, psychosomatic correlates and prognostic indices. The MBHI is currently in a research development state. Three of the broad categories were used as dependent variables for analysis.
The symptom checklist was developed to assess frequency, duration and intensity of pain (Appendixes G and H). The checklist also served to collect demographic data at the assessment intervals. The duration and frequency scales were combined to form an average subjective unit of pain index. Thus, the pain index yielded one variable. Symptom checklists and pain indices have been used frequently in psychotherapy outcome research.

**Millon Behavioral Health Inventory (MBHI)**

The MBHI introduced in 1979 (Millon, Green & Meagor, 1982) is published in a research form. Millon, Green and Meagor (1979) are the instruments developers. The MBHI measures concepts relevant to behavioral medicine and concepts bearing on coping. The MBHI is undergoing research and adheres to three aspects of the construct validation process. The validation procedures include theoretical-substantive, internal-structural and external-criterion validity. The MBHI consists of 20 scales which are grouped into four broad categories. Since the patient population consisted of outpatients, the behavioral measure of the MBHI, personality coping styles, was deleted from the analysis. Inpatient treatment programs typically focus on behavioral measures for program assessment (Fordyce, 1976,
Literature has suggested the use of alternative criterion variables and treatment outcomes (Kincey & Benjamin, 1984; Cameron, 1982; Linton, 1982; Moos & Tsu, 1977). The broad categories utilized in this research consisted of:

1) Psychogenic Attitude Scales (cognitive domain)
2) Psychosomatic Correlates Scales (physiological domain)
3) Prognostic Indices Scales (affective domain)

The median Kuder-Richardson (KR) coefficient of reliability for all scales is .83, and ranges from .66 to .90 for all scales (Millon, Green & Meagor, 1982).

**Symptom Checklist**

This instrument gathered several types of data, demographic data and pain symptom ratings being the second. Data on pain were directed toward assessing frequency, intensity and duration on a daily basis. Frequency was measured by questioning the number of times during a day the subject experienced pain. Duration was measured by assessing the total hours the patient experienced pain per day during a specific week.

The symptom checklist was employed at each assessment interval, and following each weekly treatment. The frequency and duration
scales were combined to form an Average Subjective Daily Unit of Pain (ASDUP) by multiplying frequency by duration and dividing by seven. Variations of the instrument were employed at the weekly assessment intervals. However, the basic structure of the scales was consistent across the weekly assessment intervals. The weekly symptom checklist may be found in Appendix H. While medication was not controlled, medication usage was monitored at the pretest, post-test, and follow-up intervals with the symptom checklist.

**Research Design and Statistical Procedure**

A 4 between and 2 within subjects factorial design with repeated measures was employed to structure the treatments and analyze the data (Kirk, 1982). The four factors involved four treatments including cognitive restructuring (CR) treatment, biofeedback (BFB), cognitive restructuring plus biofeedback (CR X BFB), and a waiting list control group. The 2 within subjects or repeated measures involved gain score intervals of pre minus post and pre minus follow-up. Also, a pain absent control group outside the factorial design was employed. See Figure 2 for a pictorial representation of the design.
Figure 2
4 Between and 2 Within Subjects
Factorial Design with Repeated Measures
Plus a Pain Absent Control Group

<table>
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Pain Absent Control Group
A 4 X 2 multivariate analysis of variance (MANOVA) on gain scores was conducted on the data of the experimental design employing the Statistical Analysis System (SAS) program. MANOVA was followed with ANOVA for gain scores (Cox, 1957). ANOVA gain scores were used to assess change in hand temperatures within sessions and between the treatment groups.

The purpose of the study was first explained to the subjects who were subsequently randomly assigned to one of the experimental treatments. The pretest was employed prior to treatment to statistically and experimentally equalize the groups. Post-test of each subject followed the last treatment, the treatment typically lasting eight weeks. A minimum of five sessions was required during this eight week period for subject participation in the study. The mean number of sessions for each treatment were: (1) cognitive restructuring (\( \bar{X} = 6.25 \)), (2) biofeedback (\( \bar{X} = 7.33 \)), and (3) cognitive restructuring plus biofeedback (\( \bar{X} = 8.00 \)). A follow-up test occurred four weeks after the last treatment, thus allowing for the assessment of the treatment effectiveness over time.

Subjects in the pain absent control condition were administered the MBHI, and the pretest demographic questionnaire. Seven of the thirty-seven control subjects volunteered to receive one biofeedback session.
Research Design

\[
R \quad 0_1 \quad X_1 \quad 0_2 \quad 0_3
\]

\[
R \quad 0_4 \quad X_2 \quad 0_5 \quad 0_6
\]

\[
R \quad 0_7 \quad X_3 \quad 0_8 \quad 0_9
\]

\[
R \quad 0_{10} \quad X_4 \quad 0_{11} \quad 0_{12}
\]

No R \quad 0_{13} \quad X_5

\[
R = \text{Randomization}
\]

\[
X_1 = \text{Cognitive Restructuring (CR)}
\quad \text{and Biofeedback (BFB)}
\]

\[
X_2 = \text{Cognitive Restructuring (CR)}
\]

\[
X_3 = \text{Biofeedback (BFB) treatment}
\]

\[
X_4 = \text{Waiting list control group (CO)}
\]

\[
X_5 = \text{Pain Absent Control Group}
\quad \text{(Received one BFB Treatment)}
\]

\[
0 = \text{Observation}
\]

Hypothesized Results

\[X_1 \text{ (CR and BFB) will be significantly different from treatments}
\]

\[X_2 \text{(CR), } X_3 \text{(BFB) and } X_4 \text{ the no treatment condition.}\]
The mean scores on the MBH1 of the pain absent control ($X_5$) will significantly differ from the experimental treatments ($X_1$, $X_2$, $X_3$ and $X_4$). The mean BFB temperatures (baseline period, adaptation period and treatment period) of the normal condition ($X_5$) will significantly differ from $X_1$ and $X_3$. Therefore, it is hypothesized the BFB temperatures may occur in the following order $X_5 > X_1 > X_3$ for the first session of biofeedback.

Therapists and Technicians

Therapists for the RSDT consisted of nine advanced doctoral students from the counseling and school psychology program, and the counseling psychology department. The therapists were trained in the area of cognitive theory and therapy. In as much as reasonably possible, therapists were randomly assigned to treatments and patients. Every other cognitive restructuring session was taped, to serve as a reliability check, and a means for insuring ethical procedures. The tapes were grouped by session number, and one tape was randomly selected for independent evaluation. Each tape was evaluated by three raters independently using a rating form (Appendix I) and rating criterion (Appendix J). The raters favorably agreed on the use of cognitive restructuring, discussion of the A-B-C-D-E sequence, but tended to rate the use of the readings favorably. The rating of the developmental stages revealed high agreement showing
most subjects moving through the awareness and exploration stages. The raters tended to disagree on the presence of the commitment, implementation, internalization and stabilization developmental stages.

Biofeedback technicians consisted of two nurses and one social worker. The technicians administered the treatment to the patient. This included taping a thermeister to the dominant hand index finger, adjusting the reclining chair, starting the biofeedback tape, taking readings during the measurement intervals, and briefly discussing the patient's experience during the treatment session. Since all the sessions were taped, the treatments were not checked for reliability and consistency across all sessions.

**Pain Absent Control Condition**

This group consisted of students taking a master's level counseling theories course. Thirty-seven students agreed to take the MBHI and complete a demographic checklist (identical to the experimental treatments). These thirty-seven students were not seeking pain treatment. Of this group, seven females were administered one BFB treatment, the first treatment of the experimental BFB condition.
Treatments:

No Treatment Condition

The waiting list control group served as the no treatment condition. Subjects were briefed on the purpose of the study and were explained the nature of the waiting list control condition. Subjects were administered the pretest, received no treatment for eight weeks and were administered the post-test at this time. Follow-up was established at the fourth week following the post-test.

An outline of each treatment session for CR and BFB is described below. Appendix A provides the text for the BFB treatment sessions. The CR sessions are described first, then followed by a description of the BFB treatment. The CR treatments were structured, but individualized to meet the needs of the patient.

Cognitive Restructuring

Treatment sessions were administered individually.

**Treatment Structure and Objectives for each Cognitive Restructuring Session:**

**CR Session 1**

A. Build therapeutic relationship

B. Gather patient data on pain symptoms; assess belief system and attitudes

C. Discuss the RSDT model and explain the **Self-Directed Behavior Change** instrument (Appendix B) Tosi and Black (1981).

D. Summarize the session focusing on the treatment goals for RSDT such as enhancement of healthy coping and management of pain.
CR Session 2

A. Discuss and process the Self-Directed Behavior Change instrument (Appendix B).

B. Attend to and focus on patients irrational and rational beliefs.

C. Begin introducing cognitive restructuring as a skill to learn and apply as a coping technique.


E. Focus on the subject's stage of functioning with and enhancing awareness of the A-B-C-D-E model.
CR Session 3


B. Discuss beliefs, attitudes and cognitive evaluative responses that lead to the self-defeating sequence and an increase in pain.

C. Begin to teach patient to identify irrational self-defeating systems.

D. Confront irrational sequences and employ cognitive restructuring as a rational self-help coping technique.

E. Teach the patient a more rational sequence that facilitates healthy functioning and pain management.

F. Close session by assigning Chapters 4 and 5 from *A New Guide to Rational Living*.

G. Focus on exploring the possibilities and realities of a more rational sequence.
CR Session 4

A. Question if assignment was read. If read proceed to B, if not, explore patients motivation and commitment to a more rational sequence.

B. Discuss psychoeducational material learned from previous weeks' assignments.

C. Explore clients progress on cognitive restructuring for a more rational-coping sequence.

D. Confront more irrational beliefs, catastrophizing, and engaging in perfectionistic tendencies.

E. Facilitate awareness of the patient via awareness and bridging the A-B-C-D-E sequence.

F. Attend to the gains or lack of gains patient is making based on consequences of cognitive restructuring.

CR Session 5

A. Discuss chapters assigned previously with emphasis on the educational self-help nature of the material.

B. Focus on the commitment to a more rational life style, and the physiological effects of cognitive restructuring.

C. Reinforce implementation of cognitive restructuring, and that the patient is involved with people, places and things.

D. Reinforce notion of pain and self-management via coping techniques. Facilitate integration and understanding of irrational ideas of being "perfect", i.e., perfectly healthy and painless.

E. Note improvement in beliefs and attitude (decreased anxiety, tension, guilt) when cognitive restructuring is employed.

F. Obtain data on patient frequency, intensity and duration. Attend to and reinforce patient self-report of well being and more rational self-improvement.

G. Facilitate integration of frustrating hostility, anger and rage via cognitive restructuring. Explore consequences of inhibited or uncontrollable anger.

H. Assign Chapters 10 and 11 of *A New Guide to Rational Living*. 
CR Session 6

A. Review assigned reading materials.

B. Discuss implication of self-help material and self-understanding gained from readings.

C. Continue to reinforce more rational constructive action. Newly acquired skills of cognitive restructuring and other rational coping techniques may be reinforced with particular attention to the integration of the A-B-C-D-E domains.

D. Discuss internalization of new skills and self-directed efforts necessary for more healthy functioning. (Note: some patients may be in different stages and this will need to be shaped to the patient's needs.)

E. Reinforce integration of skills into the personality structure and coping style of the patient.

F. Assign Chapters 13 and 14 of A New Guide to Rational Living.
CR Session 7

A. Review chapters previously assigned in last session.

B. Reinforce patient's effort to internalize cognitive restructuring coping skills.

C. Discuss regression or lack of improvement. Pay particular attention to the stage of development the individual is in.

D. Explore fears and anxieties regarding symptoms and the possibility for a more rational coping existence. Explore fears of self honesty and awareness.

E. Begin discussing stabilization stage of more rational coping style via cognitive restructuring.

F. Assign Chapters 15, 17, 18 and 20 of A New Guide to Rational Living.
CR Session 8

A. Review materials assigned from previous session. Summarize and reflect on patients experience in reading *A New Guide to Rational Living*. Attend to and reinforce awareness and insight gained from readings with special relevance to the A-B-C-D-E domains.

B. Note patient's progress in RSDT with attention to pain minimization and more rational self-understanding.

C. Reinforce stabilization and redirection in thinking and the management of bodily and physiological states.

D. Discuss the positive personal and social consequences of a more rational coping tendencies.

E. Express the probability of applying cognitive restructuring to new situations and new pain symptoms.

F. Review progress of patients in treatment following the A-B-C-D-E paradigm.

G. Close session with any questions client has regarding treatment, participation in research, and future treatment when applicable.

H. Administer the post-test including the MBHI and the symptom checklist.

I. Schedule for the follow-up assessment.
Biofeedback Treatment

Thermal or temperature biofeedback was administered for approximately 50 minutes. The treatment was structured into three separate periods: adaptation, baseline, and the treatment phases. The adaptation phase was five minutes, allowing the individual to become comfortably adjusted for the session. The baseline period, again five minutes, was designed to obtain a baseline measure of the patient's temperature (an objective criterion of physiological reactivity prior to the treatment). The treatments consisted of eight sessions and were psychoeducational in nature. The treatment was designed to enhance physiological control and management via passive concentration, imagery, deep breathing and employing developmental growth stages.

The biofeedback treatment consisted of a series of eight tapes (See Appendix A for the transcript of each session.) An abbreviated outline of each session will follow.
Session 1

A. Adaptation Period: Suggestion is made that the patient become comfortable for the session. Suggestions made to uncross legs, arms and close eyes. Biofeedback technician takes a reading in five minutes.

B. Baseline Period: Suggest that patient continue to relax and close eyes. Technician takes reading in five minutes.

C. Treatment Period: Thirty minutes.

1) Discuss biofeedback as a technique to enhance coping and physiological management.

2) Focus on biofeedback as a learning task.

3) Stress awareness of physiological responses and passive concentration to enhance healthy functioning.

4) Discuss vasodilation and vasoconstriction and its relationship to pain and the biofeedback treatment.
5) Discuss active coping techniques such as deep breathing, imagining a relaxing scene, cue words, and passive concentration.

6) Use remaining time to practice one of these techniques (fifteen minutes).
Session Two

A) Adaptation Period: Suggest that patient become comfortably relaxed for the session. Similar instructions as to session one (five minutes).

B) Baseline Period: Continue with comfortable relaxation, and presented similar instructions as in session one (five minutes).

C) Treatment Period:

1) Discussion of gate control theory of pain.

2) Focus on awareness of the factors related to experiencing pain.

3) Suggest patient use remainder of session to practice active or passive ways learned in previous session to relax and manage their physiological responses.
Session Three

A) Adaptation Period: Suggest that patient become comfortably relaxed. Similar instructions as presented in session one (five minutes).

B) Baseline Period: Suggestion made to continue to relax. Similar instruction as presented in session one (five minutes)

C) Treatment Period:
   1) Review previous sessions.
   2) Reinforce patient's awareness and practice of biofeedback outside of the session.
   3) Focus on exploration of techniques that are helpful for the patient.
   4) Suggest commitment to practice biofeedback to enhance coping and minimizing pain.
   5) Expand awareness of bodily sensation when warmth and an increase of hand temperature is experienced. Suggest calmness and relaxation associated with warmth.

NOTE: The adaptation and baseline periods for the remaining sessions are similar in content to the previous sessions. These periods will be noted with the length of time for each. See Appendix A for the verbatim transcript of each session.
Session Four

A) Adaptation Period: (Five minutes)

B) Baseline Period: (Five minutes)

C) Treatment Period:
   1) Discuss sensation of reaching a physiological calm state
   2) Focus on implementation of biofeedback skills to maintain a physiological state of calmness and enhance coping
   3) Practice active or passive coping strategies with the remaining time.
Session Five

A) Adaptation Period: (Five minutes)

B) Baseline Period: (Five minutes)

C) Treatment Period:

1) Focus on practice and refinement of biofeedback skills and management over physiological processes.

2) Review frequency, intensity and duration of pain.

3) Reinforce biofeedback skills that facilitate stabilization, productive and an effective life.

4) Example of how biofeedback may be employed in a stressful situation.

5) Practice with the time remaining active or passive coping strategies.
Session Six

A) Adaptation Period: (Five minutes)

B) Baseline Period: (Five minutes)

C) Treatment Period:

1) Practice of biofeedback skills will lead to refinement and stabilization.

2) Suggest biofeedback skill be employed on a daily basis for fifteen minutes.

3) Practice active or passive coping strategies with the remaining time.
Session Seven

A) Adaptation Period: (Five minutes)

B) Baseline Period: (Five minutes)

C) Treatment Period:

1) Reinforce patient's effort to employ active and passive strategies.

2) Review of progress and the gate control theory of pain.

3) Practice with the remaining time active or passive coping strategies.
Session Eight

A) Adaptation Period: (Five minutes)

B) Baseline Period: (Five minutes)

C) Treatment Period:

1) Focus on the effects of practicing biofeedback, i.e., relaxation, calmness, management of pain and enhanced coping.

2) Reinforce stabilization and practice of biofeedback, and review frequency, duration and intensity of pain.

3) Practice active or passive coping strategies with the remaining time.
Cognitive Restructuring and Biofeedback

Subjects were administered both the cognitive restructuring and biofeedback treatment. Thus the treatment was approximately one hour and thirty-five minutes in length. Refer to the cognitive restructuring and biofeedback outlines for a synopsis of the treatments procedures. Refer to Appendix A for the transcript of the biofeedback session. The cognitive restructuring outline addressed earlier in this chapter was implemented with the treatment. A synergistic effect was anticipated by combining these treatments.

Summary of Methods

The experimental design, instrumentation and treatment procedures were explicated in this chapter. The experimental design used a 4 between and 2 within subjects factorial design. The 4 between factors consisted of four treatments, and the 2 within subjects or repeated measures involved two gain scores. Subjects were randomly assigned to one of the four experimental treatments. Additionally, a pain absent control group outside the experimental design served for comparison to the experimental treatments. Instrumentation included the MBHI and a symptom checklist. Four criterion variables included involving psychogenic attitudes, psychosomatic correlates, prognostic indices,
and an average daily subjective unit of pain. Biofeedback temperature scores were also examined. Nine therapists delivered the cognitive restructuring treatments, and three technicians monitored the biofeedback treatment. An outline of each treatment was detailed with reference to the appendix when necessary for further information regarding the treatment procedures.
Chapter 4

Analysis of the Data

This chapter presents a discussion of the analysis of the data based on the hypotheses stated in chapter one. The omnibus null hypothesis was tested in this study. This hypothesis states that there are no differences between treatments. Also, tested was the null hypothesis that there was no difference between the experimental pain groups and the pain absent control group.

The data were analyzed by a 4 between and 2 within subjects factorial design with repeated measures. The four between subjects factor allowed for the assessment of four treatments: cognitive restructuring, biofeedback, and a waiting list control group. The 2 within subjects variable or repeated measures consisted of two gain scores. The 4 X 2 MANOVA design was used to assess the four primary criterion variables including psychogenic attitudes, psychosomatic correlates, prognostic indices and an average subjective daily unit of pain.

A secondary 4 X 2 univariate analysis on medication, and a one way univariate analysis on biofeedback gain scores was used. A one way MANOVA was used to assess differences in the pain absent control
The results of the study are reported in three main sections: (1) the main analysis of the experimental treatments, (2) secondary analysis on medication usage and hand temperatures for the biofeedback treatments, and (3) comparison of the experimental versus the pain absent control condition. The main analysis examines the 4 X 2 multivariate and univariate findings of the experimental treatments on the criterion variables. The secondary analysis includes the examination of the 4 X 2 univariate effects of the treatments on medication usage. Additionally, univariate F tests for comparison of hand temperature ratings for the treatments which received biofeedback are reported. Thirdly, comparison of the experimental and pain absent control samples is examined from multivariate and univariate perspectives. Additionally, comparison of these samples on hand temperature ratings for subjects administered biofeedback is included within this analysis.

**Statistical Procedures**

The statistical procedures include: 1) 4 X 2 multivariate analysis of variance (MANOVA) of gains scores at two intervals (pre minus post and pre minus follow-up) on the criterion variables; (2) 4 X 2 univariate tests on the gain scores for each criterion variable;
(3) one way analysis of variance on the gain scores for the biofeedback hand scores; (4) $4 \times 2$ univariate gain score analysis on medication; (5) one way multivariate analysis of variance for the pain absent control versus the experimental treatments; (6) univariate test for the criterion variables; (7) Duncan's follow-up test to determine group differences; and (8) univariate gain score analysis for the pain absent control versus the experimental treatments combined, and the control versus biofeedback, and cognitive restructuring plus biofeedback combined.

The use of gains scores in experimental designs has been defined with recommendations by Cox (1957). A gain score defined in this study as $X =$ initial score, $Y =$ post score and $G =$ obtained score may approximate the true gain in the following formula: $X - Y = G$. McNemar (1958) has shown that in adverse situations of unequally distributed error variance, the simple gain score equation may approximate the more complex regression formulae. The simpler equation of $X - Y = G$ may be effective in a short range growth situation (McNemar, 1958).
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<th>Psychosomatic Correlates</th>
<th>Prognostic Indices</th>
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<td>89.92</td>
<td>192.67</td>
<td>34.88</td>
</tr>
<tr>
<td>Cognitive Restructure X</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>343.75</td>
<td>102.37</td>
<td>198.75</td>
<td>72.51</td>
</tr>
<tr>
<td>Post</td>
<td>285.75</td>
<td>98.80</td>
<td>170.50</td>
<td>81.09</td>
</tr>
<tr>
<td>X</td>
<td></td>
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<tr>
<td>Biofeedback</td>
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<tr>
<td>Pre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
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<td></td>
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<tr>
<td>FU</td>
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</tbody>
</table>
Criterion Variables: Name, Source and Composition

The criterion variables are described below to show the composite nature of the variables and the domain of human functioning measured.

**MBHI Psychogenic Attitudes:** This variable assessed the cognitive domain. The following six subscales when collapsed or summed compose this cognitive measure:

1) Chronic Tension
2) Recent Stress
3) Premorbid Pessimism
4) Future Despair
5) Social Alienation
6) Somatic Anxiety

**MBHI Psychosomatic Correlates:** This variable assessed the physiological domain. The following three subscales when summed or collapsed compose this physiological measure:

1) Allergic Inclination
2) Gastrointestinal Susceptibility
3) Cardiovascular Tendency
MBHI Prognostic Indicators: This variable assessed the affective domain. The following three subscales when summed or collapsed compose this affective measure:

1) Pain Treatment Responsivity
2) Life Threat Reactivity
3) Emotional Vulnerability

Average Subjective Daily Unit of Pain: Frequency of pain was multiplied by the duration of the pain symptom and then divided by seven (numbers of days per week). The formula is then:

\[
\text{Frequency} \times \frac{\text{Duration}}{7} = \text{Average subjective daily unit of pain.}
\]

Biofeedback hand temperatures ratings: Ratings of hand temperature were assessed at each phase during the session. The biofeedback technician obtained the reading from the biofeedback monitor at each of the following intervals:

1) Initial
2) Adaptation
3) Baseline
4) Treatment

Readings were taken for biofeedback and cognitive restructuring plus biofeedback, and the pain absent control condition.
MAIN ANALYSIS:

Multivariate Analysis of Variance

(MANOVA)

Gain scores were used as a way to adjust for differences at the pretest. The gain score formula were defined in the following way for the criterion variables:

\[
\text{Pre minus Post} = \text{Gain 1}
\]

\[
\text{Pre minus Follow-up} = \text{Gain 2}
\]

A 4 X 2 MANOVA was used on each set of gain scores. See Table six for the raw means and standard deviations. Figures Three through Six depicted the raw mean changes over time for the treatments on the criterion variables.

The MANOVA for treatments effects at the gain one time interval was not significant \(F(12,35) = 1.34, p < .2420\), for the Hotelling-Lawley trace test. The MANOVA for time effects was not significant \(F(4,13) = .50, p < .7339\). The MANOVA for time treatment interaction effects was not significant \(F(12,35) = .53, p < .8827\) for the Hotelling-Trace test. Thus, the null hypothesis for time, treatment and time X treatment interaction effects could not be rejected as significant differences were not observed. More specifically, the anticipated hypothesis that cognitive restructuring plus biofeedback is more effective than other treatments is not accepted. Univariate
analysis is reported out to explore hypothesis for future investigations.

Univariate Analysis of Variance (ANOVA)

The 4 X 2 univariate F values are reported out to observe the trends in the data, and to generate hypotheses for future research. The univariate F tests for time, treatment and time X treatment interaction effects for each variable are reported in tables 12 (Appendix O), 13 (Appendix P) and Table 14 (Appendix Q). Treatment effects below the .10 level were observed on psychosomatic correlates \((F(3, 16) = 2.55, p<.0924)\), and prognostic indices \((F(3,16) = 2.88, p<.0684)\). Time effects were not observed on the criterion variables below the .10 probability level. Also, no time X treatment interaction effects were observed below the .10 level.
Table 7
Means and Standard Deviations for the Gain Scores by Treatment and Criterion Variables

<table>
<thead>
<tr>
<th>Treatment Variable</th>
<th>Gain 1* Mean</th>
<th>SD</th>
<th>Gain 2 Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog</td>
<td>12.33</td>
<td>54.71</td>
<td>-12.00</td>
<td>97.69</td>
</tr>
<tr>
<td>Phys</td>
<td>-17.67</td>
<td>36.09</td>
<td>-21.33</td>
<td>24.27</td>
</tr>
<tr>
<td>Aff</td>
<td>-19.50</td>
<td>36.49</td>
<td>-33.33</td>
<td>55.38</td>
</tr>
<tr>
<td>Dist</td>
<td>-0.36</td>
<td>3.10</td>
<td>-0.38</td>
<td>3.10</td>
</tr>
<tr>
<td>Cognitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restructure Cog</td>
<td>-1.00</td>
<td>114.11</td>
<td>-5.50</td>
<td>123.71</td>
</tr>
<tr>
<td>Phys</td>
<td>-6.50</td>
<td>59.14</td>
<td>0.25</td>
<td>32.77</td>
</tr>
<tr>
<td>Aff</td>
<td>12.00</td>
<td>59.58</td>
<td>9.50</td>
<td>20.24</td>
</tr>
<tr>
<td>Dist</td>
<td>-3.68</td>
<td>5.74</td>
<td>-3.68</td>
<td>5.74</td>
</tr>
<tr>
<td>Biofeedback Cog</td>
<td>62.17</td>
<td>76.45</td>
<td>87.83</td>
<td>72.53</td>
</tr>
<tr>
<td>Phys</td>
<td>41.17</td>
<td>42.14</td>
<td>37.83</td>
<td>41.23</td>
</tr>
<tr>
<td>Aff</td>
<td>76.00</td>
<td>58.78</td>
<td>67.50</td>
<td>67.65</td>
</tr>
<tr>
<td>Dist</td>
<td>9.68</td>
<td>11.20</td>
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<tr>
<td>Cognitive</td>
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<td></td>
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</tr>
<tr>
<td>Restructure Phys</td>
<td>58.00</td>
<td>132.26</td>
<td>53.20</td>
<td>91.08</td>
</tr>
<tr>
<td>X Aff</td>
<td>28.25</td>
<td>61.49</td>
<td>40.50</td>
<td>57.20</td>
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<tr>
<td>Biofeedback Dist</td>
<td>2.93</td>
<td>3.01</td>
<td>2.93</td>
<td>3.01</td>
</tr>
</tbody>
</table>

*Gain 1 is Pre minus Post
Gain 2 equals Pre minus Follow-up

**Cog represents psychogenic attitudes
Phys is psychosomatic correlates
Aff is prognostic indices
Dist is average subjective daily unit of pain
SECONDARY ANALYSIS:

Univariate Analysis of Variance on Medication

Medication was not systematically controlled or manipulated. Data on medication usage was collected at pre, post and follow-up. A hierarchical schema was used to classify the medication (See Appendix K). A 4 X 2 univariate analysis on the medication gain scores were examined. The gain score time intervals are defined below:

Pre minus Post = Med1 Gain 1
Pre minus Follow-up = Med2 Gain 2

The 4 X 2 ANOVA on gain scores was not significant for time (F(1,16) = 1.65, p< 0.2383), treatment (F = (3,16) = .92, p< 0.4542) and time X treatment interaction (F(3,16) = 1.65 p<.2186). This suggests that subjects did not alter or decrease their medications as a result of the treatments over time.

Biofeedback Gain Score Analysis ANOVA
for First and Eighth Biofeedback Sessions.

The gain score analysis ANOVA was used to assess changes between each respective session at the first and eighth session for biofeedback and cognitive restructuring plus biofeedback. For
example, the initial difference was compared at the first and eighth session. Also, the within session differences were examined at the eighth session. Ten combinations of difference ANOVA were run for the biofeedback, and cognitive restructuring plus biofeedback treatments. The gain score ANOVA combinations were defined as follows:

- Initial First session - Initial Last session = bio 1
- Adaptation First session - Adaptation Last session = bio 2
- Baseline First session - Baseline Last session = bio 3
- Treatment First session - Treatment Last session = bio 4
- Initial Last session - Adaptation Last session = bio 5
- Initial Last session - Baseline Last session = bio 6
- Initial Last session - Treatment Last session = bio 7
- Adaptation Last session - Baseline Last session = bio 8
- Adaptation Last Session - Treatment Last session = bio 9
- Baseline Last session - Treatment Last session = bio 10

No differences were detected within the treatments at the eighth session. This suggests that the cognitive restructuring plus biofeedback did not differ with respect to hand temperature ratings at the eighth session from the biofeedback treatment. Thus, neither treatment was more effective than the other in terms of modifying hand temperature ratings at the last session.
EXPERIMENTAL TREATMENTS VERSUS THE PAIN ABSENT CONTROL:

MANOVA on the MBHI

The four experimental treatments were combined at the pretest and compared to the pain absent control condition on the MBHI variables. Thirty-seven subjects comprised the control condition while twenty subjects comprised the experimental treatments. A one way MANOVA and univariate analysis were used on the three MBHI variables: psychogenic attitudes, psychosomatic correlates and prognostic indices.

The MANOVA for the experimental versus the control condition was significant ($F(3,53) = 9.78; p<.0001$) for the MBHI variables. This suggests that from a multivariate perspective subjects without pain differ from subjects who have pain or a psychophysiological condition.

Table 8

<table>
<thead>
<tr>
<th></th>
<th>Psychogenic Attitudes</th>
<th>Psychosomatic Correlates</th>
<th>Prognostic Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>MEAN</td>
<td>SD</td>
</tr>
<tr>
<td>Experimental</td>
<td>20</td>
<td>325.35</td>
<td>114.69</td>
</tr>
<tr>
<td>Control</td>
<td>37</td>
<td>222.16</td>
<td>76.36</td>
</tr>
</tbody>
</table>
Univariate one way analysis of variance on the psychogenic attitudes variable was significant \( F(1,55) = 16.53; p<.0002 \). The univariate analysis of variance for psychosomatic correlates was found significant \( F(1,55) = 30.13; p<.0001 \). The univariate analysis of variance for the prognostic indices was also significant \( F(1,55) = 18.35; p>.0001 \). See table eight for the raw means and standard deviations of these variables.

Duncan's Multiple Range Test on the MBH1 Variables

Duncan's test used on the psychogenic attitudes found that the pain absent controls \( X = 222.16 \) differed significantly from the experiment treatment subjects \( X = 325.35 \). The Duncan's test found that the pain absent control subjects \( X = 122.03 \) differed significantly on the psychosomatic correlates from the experimental subjects \( X = 197.45 \). Duncan's test used on the prognostic indices found that the pain absent control group \( X = 88.00 \) differed from the experimental treatments \( X = 157.30 \).

Biofeedback Hand Temperature Ratings for Pain Absent Versus Pain Subjects: Biofeedback, Cognitive Restructuring plus Biofeedback and the Pain Absent Control
Gain score ANOVA was used to assess changes between the initial, adaptation, baseline and treatment phase of the biofeedback session. The combination of gain scores analyzed via ANOVA employed on the biofeedback temperature ratings are as follows:

- Initial-Adaptation = Biofeedback 1
- Initial-Baseline = Biofeedback 2
- Initial-Treatment = Biofeedback 3
- Adaptation-Baseline = Biofeedback 4
- Adaptation-Treatment = Biofeedback 5
- Baseline-Treatment = Biofeedback 6

The gain score analysis was employed on seven subjects of the pain absent control group, six of the biofeedback treatment and four of the cognitive restructuring and biofeedback treatment.

Of the six combinations of difference scores, biofeedback 1 neared the adopted level of significance ($F = 3.56; p<.0562$). The difference analysis ANOVA detected variations in the treatments from the initial measure to the end of the adaptation phase. The mean gain for each respective treatment was: pain absent control ($X = 5.17$), biofeedback ($X = 1.45$), and cognitive restructuring and biofeedback ($X = 3.70$). No other gain scores were significant.

Duncan's Multiple Range Test found the pain absent control
condition different from the biofeedback treatment, but not different from the cognitive restructuring plus biofeedback treatment. This suggests a larger mean difference in hand temperature ratings for the pain absent sample ($X = 5.17$) than the CR X BFB ($X = 3.70$) and BFB ($X = 1.45$). This suggests perhaps modest evidence for some initial difference albeit tentative in responsivity to the biofeedback between the samples.

**Biofeedback Hand Temperature Ratings for the Pain Absent (Control) Versus the Experimental Treatments Combined**

The gain score analysis ANOVA was next used on the experimental versus the pain absent sample for the biofeedback scores. The experimental sample consisted of ten subjects, and the pain absent control group of seven. The ten subjects of the experimental treatments consisted of subjects in the biofeedback group, and subjects in the cognitive restructuring and biofeedback group. Univariate analysis of the experimental vs the control groups was significant ($F = 4.89; p<.05$) for biofeedback 1. Difference analysis of the other combinations were not significant. The Duncan's used on the biofeedback 1 temperature rating found that the normal control mean difference score (5.17) was significantly different from the
experimental treatment subjects ($X = 2.35$). See Table 9 for the raw means and standard deviations for the first biofeedback session.

The biofeedback 1 (initial-adaptation) was significant when comparing the experimental versus pain absent controls. The gain score analysis on the control group revealed a higher mean gain from the initial to the adaptation period than the experimental treatments combined. Duncan's test separated the mean gains for the control versus the experimental treatments.
Table 9
Means and Standard Deviations for Hand Temperature Ratings for the Initial Biofeedback Session For the Experimental and Control Conditions

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>N</th>
<th>MEAN</th>
<th>SD</th>
<th>MEAN</th>
<th>SD</th>
<th>MEAN</th>
<th>SD</th>
<th>MEAN</th>
<th>SD</th>
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</thead>
<tbody>
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<td></td>
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<tr>
<td>INITIAL TEMPERATURE</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biofeedback</td>
<td>6</td>
<td>87.50</td>
<td>5.48</td>
<td>88.95</td>
<td>5.35</td>
<td>88.82</td>
<td>5.55</td>
<td>88.20</td>
<td>5.61</td>
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<tr>
<td>Biofeedback and Cognitive Restructuring</td>
<td>4</td>
<td>83.90</td>
<td>8.62</td>
<td>87.60</td>
<td>8.99</td>
<td>88.48</td>
<td>9.06</td>
<td>88.70</td>
<td>8.58</td>
</tr>
<tr>
<td>Control Conditions</td>
<td>7</td>
<td>82.80</td>
<td>5.64</td>
<td>87.91</td>
<td>7.33</td>
<td>87.68</td>
<td>6.57</td>
<td>87.06</td>
<td>6.50</td>
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</tbody>
</table>


Summary

The results were summarized in three sections: (1) the results of the experimental treatments, (2) the secondary analysis on medication, and (3) comparison of experimental versus the pain absent control condition.

The 4 X 2 MANOVA for time, treatment and time X treatment interaction effects were not significant. The hypotheses could not be rejected that the treatment groups differed over time on the criterion variables. Specifically, the hypothesis that cognitive restructuring plus biofeedback is more effective than cognitive restructuring, biofeedback and a control group is not accepted. Univariate F tests were reported out for future hypothesis testing.

Secondary analysis of the univariate F test for time, treatment and time X treatment interaction effects on gain scores for medication were not significant. Also, comparing cognitive restructuring plus biofeedback versus biofeedback between the first and last session was not significant for the hand temperature ratings.

The one way MANOVA on the MBHI variables for the experimental versus the control was significant. This suggests that there were differences in the experimental and the pain absent control sample on
psychogenic attitudes, psychosomatic correlates and prognostic indices. The subjects in the pain absent control condition who received biofeedback significantly differed from the experimental treatments combined at the first temperature interval.
FIGURE 3
EFFECTS OF TREATMENTS OVER TIME ON PSYCHGENIC ATTITUDES

PSYCHGENIC ATTITUDES

PRE POST FU

CONTROL = O
COGNITIVE RESTRUCTURING = □
BIOFEEDBACK = A
COGNITIVE RESTRUCTURING × BIOFEEDBACK
FIGURE 4

EFFECTS OF TREATMENTS OVER TIME ON PSYCHOSOMATIC CORRELATES

PSYCHOSOMATIC CORRELATES

PRE POST FU

CONTROL  =  o
COGNITIVE RESTRUCTURING  =  □
BIOFEEDBACK  =  △
COGNITIVE RESTRUCTURING BIOFEEDBACK  =  X
FIGURE 5
EFFECTS OF TREATMENTS OVER TIME ON PROGNOSTIC INDICES

PROGNOSTIC INDICES

CONTROL = ○
COGNITIVE RESTRUCTURING = □
BIOFEEDBACK = △
COGNITIVE RESTRUCTURING x BIOFEEDBACK = ●
FIGURE 6
EFFECTS OF TREATMENTS OVER TIME ON THE AVERAGE SUBJECTIVE DAILY UNIT OF PAIN

CONTROL = O
COGNITIVE RESTRUCTURING = □
BIOFEEDBACK = △
COGNITIVE RESTRUCTURING X BIOFEEDBACK = ¶
Chapter 5

Conclusions

This final chapter is presented in this order: (a) summary of the methodology, (b) discussion of the data and implications, (c) limitations and recommendations, and (d) a summary. The recommendations will be discussed with respect to the theoretical underpinnings of the treatments, and suggestions for future research with psychophysiological conditions.

Summary of the Methodology

This study examined the effects of four experimental treatments with patients experiencing chronic pain. A 4 between and 2 within subjects factorial design with repeated measures was employed. The 4 between factor allowed for the assessment of four treatments: cognitive restructuring plus biofeedback, cognitive restructuring, biofeedback, and a waiting list control group. The within subjects or repeated measures allowed for the analysis of gain scores consisting of pre minus post and pre minus follow-up. Additionally, this study used a pain absent control group outside the design who were administered the MBHI, demographic questionnaire and one session of biofeedback (seven subjects). The criterion variables included
psychogenic attitudes, psychosomatic correlates, prognostic indices and an average subjective daily unit of pain. The average subjective daily unit of pain consisted of frequency of the pain symptom multiplied by the duration of the pain divided by seven.

A review of the literature focused on descriptions of the psychophysiological symptoms examined, personality assessments of chronic pain patients, biofeedback, and cognitive therapies. While the literature reported studies of biofeedback, few studies have systematically studied the effects of biofeedback with a control group, or used randomization in assigning subjects to treatments (Turk, Meichenbaum & Berman, 1979; Linton, 1982). Cognitive therapies have become a major focus in experimentally induced pain, and with clinically based populations (Turk, Meichenbaum, & Genest, 1983). Additionally, the literature was seriously lacking with respect to comparisons between a pain absent control group's and a clinical sample's response to biofeedback treatment.

Subjects in the experimental treatments consisted of twenty white, upper-middle to upper-lower class adults with a mean age of 36.65. Subjects were referred from physicians associated with Riverside Methodist Hospital. The pain absent control group consisted of graduate students who participated in a counseling theories course.
The mean age for the pain absent control sample was 29.43.

The hypotheses stated in chapter one included: 1) no differences in treatment gain scores at the time intervals on the criterion variables, and no difference on medication and hand temperatures hypothesized in a secondary analysis; 2) no differences in the pain absent control versus the experimental treatments at the pretest on the criterion variables, and 3) no differences in the gain scores for hand temperatures ratings over time with the biofeedback treatments and sessions. The hypothesized results were that the integrated treatment of cognitive restructuring plus biofeedback would be more effective in reducing pain and enhancing coping. Greater mean gain scores were expected on the variables of psychogenic attitudes, psychosomatic correlates, prognostic indices and hand temperature ratings. Also, comparison of the control group versus the experimental treatment expected to find that the pain absent control subjects would show more effective coping skills than the pain sample.

**Discussion and Implications**

The MANOVA for the experimental treatment effects was not significant. It was hypothesized that cognitive restructuring plus biofeedback would show greater effectiveness on the criterion
variables than cognitive restructuring, biofeedback and a control group. This hypothesis was not accepted, and may relate to design factors, instrumentation, sample size and the manner in which the research question was addressed in this study.

Several central issues are relevant to the experimental design and operationalization of the treatments. First, the cognitive restructuring plus biofeedback treatment components were not fully integrated. In this initial investigation of cognitive restructuring plus biofeedback the treatment components were separately administered. While in many cases the treatments met from one hour to the next, the cognitive restructuring was not administered during the biofeedback session. This may have lead to some fragmentation of the treatment components. The treatments components, thus did not fully interact to have the synergistic effect on the criterion variables as anticipated. Secondly, the reading and homework assignments were designed to structure the cognitive restructuring treatments as well as provide a stimulus for therapy. Reviewing Table 10 Appendix M on the use of the reading assignments, the raters agreed that the readings were used minimally used during the session. It is possible that: (1) the subjects may have read the material, but the therapist did not question or use the material therapeutically, or (2) the subjects did not read the material. The therapists perhaps did not
attend fully to the client's effort at reading the material or perhaps did not fully explore the subject's resistance to the homework assignments.

Although randomization was employed, the small sample size accentuated the initial differences between treatments, and subjects within treatments. For example, some subjects reported pain symptoms for ten years while other subjects reported pain of a significantly reduced duration. Perhaps subjects with a less chronic history were more responsive to the treatments while the long-term pain subject showed less improvement. These variations of subjects within treatments might have resulted in the statistically insignificant results. This observation has implication for single organism case studies.

Case studies showing the efficacy of a treatment approach might bear in mind the history of pain, types of pain, reporting of symptomatology, and subject variation. The single organism design when well controlled (Hersen & Barlow, 1976) may show significant findings for selected pain cases; however, the overall efficacy of the treatment approached must be considered in light of subject variation and report of pain symptomatology.
The instrumentation of this study may not have been sensitive to subtle changes in the pain sample. The Millon Behavioral Health Inventory (MBHI) may not have been sensitive to the subtle changes in the subjects. The MBHI, still in the research stage, does not assess the test takers attitude. Some subjects appeared to over-report their symptoms reflecting an exaggerated response set, and other subjects appeared to minimize their symptoms. This leads to a dispersion of subjects toward the higher and lower ends of the scales. Some attempt to assess the validity and response set to the MBHI is necessary.

The procedures for administering the pretest might have sensitized subjects to the experimental treatments, thereby creating an experimental response artifact. This may be, in part, an explanation for the initial differences at the pretest. For ethical purposes, the subjects were explained the purpose of the study, the treatment the subject was assigned to, and then administered the pretest. This may have unconsciously led some subjects to excessively report their pathology or minimize their response to items based on the assigned treatment.

The main research question examined the efficacy of the experimental treatments on enhancing coping and managing pain. Following the RSDT model, effective coping is rational thoughts and
resultant efficient thoughts, feelings, behaviors and physiological states. This research assessed the physiological, cognitive and affective components of the coping process. Perhaps more specific indices not measured, such as personal satisfaction, increased sense of pleasure, decreased depression, better adjustment to spouse/family members, were not addressed by the criterion variables. Also, the question of pain reduction in context of overall coping and human functioning could be addressed theoretically and empirically. Treatments that focus specifically on pain reduction may be too focused on symptom alleviation. Effective coping should undergo further conceptual and empirical investigation. Exploration of attitudes and cognitive-symbolic strategies which maintain the emotional and behavioral loss of physiological functioning may be an avenue to further explore conceptually and empirically.

There were some trends in the data worthy of discussion and future hypothesis testing. Table Six in Chapter Four and Figures 3–6 reveal some clinical trends in the raw data. Overall, the control group exhibited a deterioration effect over time on the variables. The cognitive restructuring treatment on the criterion variables appears to vary only minimally over time. The cognitive restructuring treatment did not appear to impact on the criterion variables. At post-test, subjects who received cognitive restructuring tended to
show an increase in pain as measured by the average subjective daily unit of pain. Cognitive restructuring with the chronic pain patients may heighten resistance and arouse anxiety (Bell, Abramowitz, Folkins, Spensley & Hutchinson, 1983). The cognitive restructuring treatment had two dropouts: one who entered surgery for knee pain, and another who sought out pastoral counseling. Cognitive restructuring may heighten defensiveness with chronic pain patients. Future research with larger samples may gain more information about the impact of cognitive restructuring and specific criterion variables.

The biofeedback treatment appeared to show reductions on psychosomatic correlates, prognostic indices and the average subjective daily unit of pain at post-test, but tended to show slight regression effects when looking at the raw mean changes at follow-up. On the psychogenic attitudes scale biofeedback continued to show a change in the desired direction from post-test ($X = 303.00$) to follow-up ($X = 277.33$). Hart (1982) has hypothesized a relationship between biofeedback and cognitive processes and structures which might be investigated in future research. Hart suggests that subjects who score high on a cognitive structure measure may not respond favorably to biofeedback. This suggests that cognitive processes and structures may play an important role in the effectiveness of biofeedback.
RSDT plus biofeedback revealed raw score changes when examining psychosomatic correlates and prognostic indices. On both of these variables subjects in RSDT plus biofeedback showed reductions from post-test to follow-up. The psychosomatic correlates variable revealed a reduction from post-test \( (X = 170.50) \) to follow-up \( (X = 158.25) \). Also, prognostic indices showed a reduction from post-test \( (X = 144.25) \) to follow-up \( (X = 138.25) \). Future research might test hypotheses about the reductions on a rating of physical well-being, and specific affective variables.

The data from the biofeedback treatments on hand temperature ratings failed to achieve significance. It was anticipated that RSDT plus biofeedback would have more effectiveness than biofeedback alone. The increase in hand temperature may not be a reliable measure of relaxation, pain reduction or physiological efficiency. The increase in hand temperature has not been associated with reduction on anxiety (Hawkins, Doell, Lindseth, Jeffers & Skaggs, 1980).

The univariate F test on gain scores for medication was also insignificant. Medication usage was not reduced by the experimental treatments. Medication usage was examined on an exploratory basis, and future RSDT research, with appropriate medical staff, might test the relationship between RSDT or RSDH on medication usage.
The MANOVA on the MBHI scales was significant when the pain absent control was compared to the experimental treatments at the pretest. This suggests the difference in the experimental and control group on the criterion variables of psychogenic attitudes, psychosomatic correlates, and prognostic indices. Subjects who are not seeking pain treatment revealed a reduction in somatization, decreased anxiety and tension and tend to look forward to events with greater optimism. The data supports the findings of Tosi, Rudy & Forman (1985) that individuals with psychophysiological conditions tend to differ significantly from normal medical control groups.

The difference in hand temperatures suggests that the pain absent subjects may have initially responded favorably to the treatment. Differences in the samples were not significant after the initial time period. This raises questions over the significance and relevance of the hand temperature in the biofeedback treatment. Biederman (1983) hypothesizes that the efficacy of biofeedback may be related to self-efficacy (Bandura, 1977). An expectation of personal mastery may mobilize coping behaviors and decrease the constrictive style of the chronic pain patient. Andreychuk and Skriver (1975) hypothesize that highly suggestible subjects may respond favorably to biofeedback or hypnosis. The results suggest that there are few differences in hand temperatures for pain or pain absent subjects after the education
phase of the session is begun. Also, perhaps an increase in hand temperature is only a small element of the subject's response and progress in treatment.

Over the course of the research several clinical observations of pain patients are noteworthy. First, the symptoms of pain appear to have functional significance and are a frequent source of secondary gain for the patient (Fordyce, 1981). By retaining the pain symptom the individual may continue to meet needs for attention, avoidance of emotional conflicts, and withdraw from social involvements with socially acceptable reasons. Second, the underlying conflicts with dependence and ambivalence are significant for the pain patient. The pain patient seeks treatment to minimize the pain, and reveals a great deal of resistance and ambivalence in surrendering the symptom complex. Third, if the symptoms are removed a great deal of depression and anger, previously repressed may surface. The depression and anger may be unacceptable feelings, and without the repression and hysterical mechanisms the patient may be affectively overwhelmed with minimal cognitive, behavioral and physiological controls. Future treatment of patients with pain symptoms may consider these clinical observations.

In this study a variety of therapists administered the cognitive restructuring treatments. Therapists who implement cognitive
restructuring in a fairly active-directive manner may have differed from therapists who use cognitive restructuring in an indirect-suggestive style. The active-directive cognitive restructuring technique may have aroused defenses and anxiety in the patient. Therapists who modeled cognitive restructuring, suggested its use, or use analogies revealing modification of beliefs may have had a greater probability of effecting the process and outcome of treatment. Future research may investigate the relationship of therapist style on treatment outcome.

The use of biofeedback or hypnosis may be conceptualized along an active-directive or indirect-suggestive continuum. In this study, biofeedback was viewed as a skill requiring practice and rehearsal for favorable effectiveness on the pain symptoms. This is an active-directive stance and tended to elicit resistance in some patients and compliance in other cases. Additional research on the cognitive structure which mediates the response to the biofeedback is warranted (Hart, 1982). The more indirective form of hypnosis, biofeedback or cognitive restructuring may allow for a greater degree of commitment to the treatment process, allow for the self-exploration of unacceptable feelings, and a greater possibility for working through the developmental growth stages in RSDT or RSDH.
Several patient variables appear related to treatment of the pain syndrome. First, is the overall functional level of the patient. If the individual has multiple pain symptoms, treatment may be more complicated by secondary gains and commitment to the symptom complex. Individuals with a single pain condition appeared to show greater treatment gains on a clinical level. Also, the various types of pain probably have different attitudinal patterns, emotional configurations, and different behavioral styles. Thus, identification of the configurational gestalten of the A-B-C-D-E sequence is necessary for effective treatment intervention with the RSDH or RSDT model.

Treatments for pain may consider the role of symptom substitution as a therapeutic strategy. A trading down of symptoms or a lessening of the significance of the severity of symptoms may enhance the overall functioning of a particular individual. Managing of pain or cognitive reattribution of a severe aching pain to a mildly numbing pain may be a measure of progress for a patient and allow the patient to keep the symptom at a less distressing level. The cognitive reattribution may be facilitated through the RSDH model or an integrated cognitive restructuring and biofeedback model.
Limitations

This research assessed the treatments with respect to the cognitive, affective and physiological variables relevant to chronic pain. Chronic pain is complex, and longstanding personality traits were not examined in this study. The research on chronic pain suggest several personality types (Prokop, Bradley, Margolis & Gentry, 1980). In the course of this research, the personality patterns of the patients were observed to significantly vary. Some patients presented a neurotic pattern, others a depressive disorder and still others a borderline condition. This suggests that chronic pain might be viewed in the larger perspective of personality functioning, and that chronic pain may be symptomatic of ineffective personality functioning. The high degree of subject variation within and between treatments, observed at pretest, is a limitation of the study. This leads to an increase in error variance, and a lowered probability of achieving statistical significance.

The sample size of the experimental study is a major limitation. The small sample size contributed, in part, to the large initial difference between the treatment groups. The small sample size also restricted the more complex regression formula and statistical methods.
A limitation of this study was that the effects of medication were not controlled. Fordyce (1976; 1981) has observed the operant conditioning relationship between pain and medication. Patients in this study received a wide range of medications ranging from anti-depressives, antianxiety agents, and pain depressants. Future studies in this area might include medical support staff such that the effects of medication can be controlled.

The operationalization of the treatments was a major limitation. First, group treatment was planned; however the referrals and setting prohibited administering treatment by groups. Secondly, nine therapists were used which might have contributed to some confounding. Also, as indicated in the discussion section, the reading assignments appeared to be minimally integrated with the cognitive restructuring treatments. Finally, cognitive restructuring plus biofeedback treatment was not fully integrated limiting the interaction of these treatment components.

As stated earlier, the pretest administration procedures might have induced an experimental artifact. The administration of the pretest may have sensitized subjects to treatments and lead to the large initial differences. Subjects may have unconsciously responded to the test items based on the treatment to which the subject was
randomly assigned.

Recommendations

There is a growing body of literature in support of the relationship of cognition and other psychological processes to physiological conditions (Forman, 1979; Beck, 1984; Meichenbaum and Turk, 1976; Howard, Reardon and Tosi, 1982; Maultsby and Graham, 1974; Schacter, 1975). Future research with chronic pain and psychophysiological conditions might examine the efficacy of Rational Stage Directed Therapy and biofeedback with a single pain or psychophysiological condition. This would allow for a clear understanding of the impact of RSDT and biofeedback on a specific psychophysiological condition.

Most RSDT and RSDH studies have employed group treatment procedures. Experimentally, group treatment is more efficient and effective for the researcher. Additionally, practitioners particularly in pain treatment settings tend to utilize group therapies. This allows for greater efficiency of staff usage, and also allows for the manipulation of peer support, reinforcers, and environmental contingencies to alter pain symptoms and behaviors. Therefore, future research might consider implementation of RSDT and
RSDH in groups.

Implementation of RSDT and RSDH individually should build the effects of the therapists into the experimental design. The therapist variable could be blocked on similar to the other independent variables. This would allow for the assessment of therapist's effect in conjunction with subject gains. Since much of therapy is conducted individually this might add to the generalizability of the results.

Research with RSDT and biofeedback might consider a greater degree of integration of the treatments. Cognitive restructuring might be implemented in biofeedback by use of examples of an irrational and rational A-B-C-D-E sequence. The use of passive and active awareness could then be integrated into the example. The developmental stages could be integrated into the treatment over time. The interaction of the treatment components can be more fully investigated.

The deterioration effect exhibited by the waiting list control group with pain subjects suggests the use of an active control group. A no treatment control may be perceived by the subject as a denial of treatment which may lead to an intensification of pain symptomatology. An active control, or an attention placebo control group is
recommended for future research with chronic pain or other psychophysiological conditions.

Future research might specifically examine RSDT integrated with biofeedback, biofeedback, cognitive restructuring and an attention placebo control with a repeated measures design. This might more accurately evaluate the effectiveness of each treatment on a specific chronic pain or psychophysiological condition. The use of factorial design with repeated measures is recommended to evaluate the effects of treatments over time (Kirk, 1968).

Specifically, future research with pain may use a more passive-suggestive approach to minimize resistance, increase commitment to treatment and minimize anxiety. The passive-suggestive approach of RSDH or RSDT with biofeedback may be able to more effectively address ambivalence, dependence and the symptom complex. Indirect suggestions, analogies and therapeutic suggestion directed at symptom substitution or cognitive reattribution of pain would be a direction RSDT or RSDH may take experimentally.

Cognitive restructuring with pain may also take a more passive-suggestive approach. Therapist modeling of cognitive restructuring, analogies, and suggestions to use the model may more effectively deal
with the pain syndrome. The active-directive model of cognitive restructuring may tend to arouse anxiety and resistance.

Summary

The methodology, discussion of the results and implications, and limitations and recommendations were set forth in this chapter. The discussion focused on the sample size, instrumentation, and operationalization of the treatments as related to the results. The clinical findings and hypothesis for future research were explicated. The experimental control group appeared to show no improvement. Cognitive restructuring did not impact on the variables, and showed an intensification of pain at post-test. Pain symptomatology returned to the pretest level at follow-up. The hypothesized relationship between cognitive restructuring and pain warrants further investigation with larger samples. The biofeedback treatments appeared to impact on the average subject's daily unit of pain. The raw mean changes for the biofeedback treatment showed slight regression effects from post-test to follow-up; however, psychogenic attitudes continued to show reductions from post-test to follow-up. RSDT plus biofeedback did show some reductions from post-test to follow-up on psychosomatic correlates and prognostic indices. Future hypothesis testing with RSDH or RSDT may investigate the effectiveness on an overall measure
of physical well-being, and more specific affective variables.

Significant differences were observed when the experimental treatments were compared to the pain absent control group on the MBHI variables. This suggests that the pain absent control group showed more effective coping as measured by psychogenic attitudes, psychosomatic correlates and prognostic indices. Also, the pain absent sample appeared to initially respond more favorably to the biofeedback treatment than the experimental treatments. This may suggest that elevations in hand temperature may not fully account for reduction in pain or progress in treatment. Self-efficacy (Biederman, 1983) or suggestability (Andreychuk & Skriver, 1975) may be important factors for treatment effectiveness with biofeedback.
REFERENCES


Mahl, G.P. (1950). Anxiety, MCI secretion and peptic ulcer etiology. Psychosomatic Medicine, 12, 158.


SESSION ONE

ADAPTATION PERIOD

During your first thermal biofeedback session, I'd like you to become acquainted with your thermal biofeedback apparatus. Take the next five minutes to become relaxed comfortably in your chair, uncross your legs and uncross your arms. If you like, you may choose to close your eyes. In the next five minutes, the biofeedback technician will be entering the room to take a reading so during the next five minutes become comfortably relaxed in this new environment. During the next five minutes, the biofeedback technician will enter the room to take a reading. Do not become alarmed or surprised by the technician coming into the room. Over time you will become used to this familiar procedure and this will happen in several different points in your treatment.

BASELINE PERIOD

Now that you are acclimated to the thermal biofeedback apparatus and to the new environment, I'd like you to continue to relax and if you like, to continue to close your eyes and to relax comfortably. Remember to keep your legs uncrossed and your arms uncrossed. So, the next five minutes, continue to relax. The biofeedback technician will enter the room momentarily to take another reading.

TREATMENT PERIOD

I'd like to talk now about biofeedback. Biofeedback was introduced in the early 1970's. It is a relatively new behavioral medical technique which focuses on decreasing physiological
and psychological stress. Biofeedback basically focuses on your bodily and physiological processes. By receiving biofeedback and coming to your biofeedback sessions, you will learn new ways to cope and manage your pain. You will learn new strategies to relax and manage your life in a more effective manner and let me emphasize the learning part of this procedure. This is a learning task on your part in terms of focusing on some ways and concentrating on some ways that may help to reduce your pain.

By coming to your biofeedback sessions and really concentrating and focusing on relaxing and increasing your bodily temperature, you will learn over time to successfully cope with your pain.

I'd like to discuss with you how thermal biofeedback can effectively manage someone's pain in a case example. An individual who experiences headache pain may effectively cope with their pain and manage the pain and control the pain through biofeedback sessions. In the biofeedback sessions, the patient would be obtaining information about his or her own bodily and physiological processes. This information would help the individual learn how to manage their physiological processes and thereby increase their temperature. Basically the individual would relax their muscles and the forehead and head area or any other part of the body they might experience pain and by increasing the skin temperature and the bodily temperature would dilate blood vessels thereby supplying more blood to the head area or other areas that
an individual may experience pain in. By receiving biofeedback, practicing biofeedback, and attending to one's own bodily and physiological processes, one may learn how to enhance their temperature and increase their temperature and thereby decrease their experience of pain.

I'd like to outline several strategies to effectively help manage your pain while you obtain information about your own bodily processes. These strategies and techniques require practice, learning and refinement. And if you would like to discuss several of these techniques with the biofeedback technician following your treatment, please do so. Deep breathing in a very relaxed manner may help to facilitate the management of pain. Take the next several minutes to breathe deeply and calmly and relax.

Another strategy to effectively manage your pain and to help to increase your temperature is through the technique of imagery. When using imagery, an individual chooses a scene that is very relaxing and pleasant and which evokes a very pleasant sensation. For instance, an individual who likes to go to the beach in the summer and sit by the ocean or some other large body of water where the sun is out and it is very warm and is very relaxing and is very comfortable, by imaging this scene and to just take in this scene as if it were a real vacation maybe quite relaxing to many individuals. Take a few moments to think about a scene that is relaxing for you; for instance this scene on the beach where you're lying on the beach in some warm sand by the ocean, the sun out, a warm day, very pleasant, and very relaxing. Take a few moments to enjoy this scene.
Another scene which is pleasant for many other individuals is to visualize in your mind's eye a brook with a meadow nearby, basically enjoying a beautiful spring day with the water running, a gentle breeze, a warm sun, and just quietly looking over the meadow with the trickling water running through the brook. This can be a very pleasant and relaxing scene. Take a few moments to visualize this scene and to take in the pleasantness of this image. (3-5 minute silence)

I would like to continue to outline two other techniques that individuals find that they are successful at applying these techniques to help to manage their pain and to cope more effectively in their daily life. Many individuals find cue words helpful to create a warm pleasant sensation and also to basically help them to increase their thermal temperature. For instance, an individual saying to themselves to relax and concentrating on that word relax can be quite helpful. Another word might be calm. You might have your own cue word that might be relevant for you that creates a pleasant sensation for you and which with the biofeedback, helps to increase your thermal temperature and manage and modify your experience with pain. Such words might be pleasant, comfortable, or other such words that effectively manage your pain.

Another technique is to concentrate and attend to your own bodily and physiological processes and to just relax and concentrate on warming your body and attending to your own bodily needs. This maybe done by just relaxing and letting the biofeedback provide you with information about your bodily
processes and just learning to relax and attend to your own bodily needs.

The deep breathing, the imagery, the cue words, and the concentration on a warm sensation are techniques which an individual can apply with the biofeedback machine to help them successfully cope and manage their own pain. Throughout the course of your treatment, we would like you to utilize the technique that you find most effective to help create a warm sensation which utilizes the biofeedback information and increases your thermal temperature.

I would like you to with the remaining time, to focus on one of these techniques that you have found successful to manage your pain and to utilize the remainder of the time to practice, to relax and to increase your bodily temperature. The biofeedback technician will be entering the room to take the final reading in approximately fifteen minutes. So, continue to practice the technique you find most effective to cope and manage your pain.

SESSION TWO
ADAPTATION PERIOD

During the second biofeedback session, I would like you to first of all become adjusted for the session today, and to the biofeedback equipment and I would like you to uncross your legs and arms, close your eyes if you like. I'd like you to become comfortably relaxed. Remember the biofeedback technician will be entering the room at several occasions during the session.
BASELINE PERIOD
Now that you have completed the adaptation period of the biofeedback treatment, that is you are comfortably adjusted for today's session, we will now begin the baseline period. For the next five minutes I'd like you to continue to relax comfortably. Again remember that the biofeedback technician will be entering the room in approximately another five minutes.

TREATMENT PERIOD
Now that you have completed your baseline period of the biofeedback treatment, I'd like to talk to you about the Gate Control Theory of Pain developed by Melzack and Wall, 1965 and then expanded upon Melzack, 1973. The Gate Control Theory of Pain is a neurophysiological theory of pain and it describes complex phenomenon of pain and also the complex process and elements of pain. There are three dimensions of the pain that were developed and labeled by Melzack in 1973. The first dimension is the sensory discriminate dimension which implies that muscle tension magnifies the experience of pain or that intense muscle tension can magnify the experience of pain. Hence, biofeedback can effectively manage and cope with pain by increasing thermal temperature and increase the sense of relaxation and bodily relaxation. The second dimension is the motivational affective dimension and this indicates that negative feelings such as anxiety or helplessness may interact with the pain experience. Such feelings as excitement or happiness may increase or decrease one's perception of pain. The third dimension of the Gate Control Theory of Pain is the
cognitive evaluative dimension which acknowledges that expectancies and rational self-statements about painful stimuli are related to the amount of pain reported; that is expectancies and placing high demands on oneself to increase thermal temperature can have a negative impact, an expectancy, that one will not effectively increase their thermal temperature is an expectancy that may interact to decrease the experience of thermal biofeedback. A high demand such as one must decrease their pain or eliminate their pain is another example of a high expectancy that may interfere with the thermal biofeedback. A coping statement that one will attempt to improve their thermal biofeedback temperature and work at this at a realistic pace is a coping statement that may enhance the experience of the thermal biofeedback treatment.

By focusing your treatment on realistic expectations and desirable feelings and your own bodily awareness, you may begin to learn about your own response to pain and increase your thermal temperature through thermal biofeedback.

I would like you to begin as you did last week, to practice the technique that is most helpful for you in terms of increasing your thermal temperature. These techniques as I mentioned last week were deep breathing, imagery scenes, cue words such as relax, calm, pleasant or your focused attention and concentration on decreasing your own physiological arousal may help to increase your thermal temperature and your own decrease in your pain experience. Practice now the technique and method most helpful to you to increase your thermal temperature. If you like, following your session, discuss with the
thermal biofeedback technician the technique which is helpful for you or the dimensions of the pain model that were mentioned that may interact or interfere with your biofeedback session. Remember that the biofeedback technician will be entering the room following your treatment to take the final reading.

I'd like you for the rest of the session today, to focus on the technique that helps you to best increase your thermal temperature. Biofeedback is a process of learning about your own physiological processes and this may require some practicing of the technique that most helps you to reduce you own physiological arousal and subsequential your experience of pain. If you'd like, following today's session, discuss with the biofeedback technician your experience of biofeedback today; what you have learned and what technique that has most helped you to increase your thermal temperature. Again, the biofeedback technician will be entering the room at the end of the session today.

SESSION THREE
ADAPTATION PERIOD

During the adaptation period of your third session of biofeedback, I would like you to become comfortably relaxed. Uncross your legs and arms. Recline in the chair if you like. Also, you may choose to close your eyes. The adaptation period is five minutes and the biofeedback technician will enter the room at this point to take a reading. The purpose of the adaptation period is to become comfortably adjusted for the biofeedback treatment. Utilize the remainder of the five minutes to become adjusted for today's treatment.
BASELINE PERIOD
The baseline period, the next five minutes, is the time following the adaptation period to observe your base level temperature. This will allow for you to obtain information about your temperature change at the conclusion of the biofeedback treatment session. At that time you may review with the biofeedback technician the changes in your temperature over the duration of the session. The biofeedback technician will take a reading in approximately five minutes.

TREATMENT PERIOD
Through your first two biofeedback sessions, you have gained an awareness and understanding of ways to increase your temperature with thermal biofeedback. You are learning to attend to your own bodily processes, and are learning to manage those processes. Educationally, you have learned about the Gate Control Theory of Pain. Recall the three dimensions of pain: the sensory discrimination dimension, the motivational affective dimension, and the cognitive evaluative dimension. The thermal biofeedback is designed to let the patient gain an awareness of one's bodily processes or sensory discrimination of changes in body temperature and muscular tension. The thermal biofeedback helps to increase sensory discrimination awareness, and to manage these bodily processes. The motivational affective dimension of pain indicates that negative feelings such as anxiety, anger or helplessness may increase the experience of pain. Thermal biofeedback facilitates the state of relaxation, calmness, and sense of bodily warmth.
Maintaining those states outside of biofeedback may help you cope with the complexities of your life. This requires practice on your part in biofeedback and practice outside of biofeedback sessions. You may choose to explore and practice the techniques learned in biofeedback in your own daily life. Perhaps a schedule of practice times might be helpful or you may practice on occasions you desire to increase your bodily warmth and maximize the state of relaxation.

The cognitive evaluative dimensions of pain focuses on the expectations and beliefs that may interact with pain. A coping statement such as I will work realistically to increase my temperature and increase the state of bodily warmth is an appropriate statement which focuses on your efforts and practice in biofeedback sessions and outside of biofeedback sessions. Your response to the biofeedback treatment will require a commitment to realistically working and practicing on increasing your temperature in biofeedback sessions and also outside of the biofeedback treatment sessions.

Work now on increasing your bodily temperature with the time remaining. Concentrate and attend to the subtle sensations and increases in your temperature. Observe and note your own warm bodily state when you increase your temperature. Practice now using the techniques mentioned in the last biofeedback session such as deep breathing, imagining relaxation scenes, repeating cue words such as calm, warm, relaxed, and comfortable. Or, notice the subtle changes by concentrating on increasing your temperature through the information provided by the biofeedback apparatus. Concentration and attention to
your own bodily processes may effectively increase your temperature. Remember that the biofeedback technician will enter the room at the end of the session. At that time you may review your temperature changes for today's session.

SESSION FOUR

ADAPTATION PERIOD

During the adaptation period of your fourth thermal biofeedback session, I would like you to become comfortably relaxed for today's session. Recline in the chair, and you may choose to close your eyes. The goal of the adaptation period is to become adjusted for the session so that you may focus on increasing your temperature without distraction. The biofeedback technician will enter the room at the end of the adaptation period which is approximately five minutes long. Utilize the remainder of the adaptation period to become adjusted for today's session. The baseline period will follow the adaptation period.

BASELINE PERIOD

The baseline period of the biofeedback treatment, the next five minutes, allows for you and the biofeedback technician to observe your base level temperature at the conclusion of the session. Thus, the baseline period will allow you to assess your temperature prior to the treatment part of today's session. You may want to review your progress to date with the biofeedback technician at the conclusion of today's session. The biofeedback technician will take a reading in approximately five minutes.
TREATMENT PERIOD

With the biofeedback session and your own practice of skills learned in biofeedback and outside of the sessions, you are developing and demonstrating skills which facilitate coping and managing pain. In essence, you are learning to control your physiological processes and learning a self management or coping technique. Through your efforts at passive concentration that is, focused attention on your own bodily processes, you are learning to increase your temperature. Vasodilation refers to enlarging of your blood vessels and arteries to allow and increase the blood flow and supply to your hands, legs, feet, abdomen, chest, neck, and head. Thermal biofeedback provides you with information about your bodily processes so that you may learn about your own physiological processes. Redirection and change of the physiological processes increases one's bodily temperature through vasodilation. That is you become warm, relaxed and physiologically calm through biofeedback and the process of vasodilation.

It is important educationally, to describe the sensation of reaching a physiological calm state. Many people feel a warm sensation or sometimes people feel that they are floating. This sensation of floating is a very relaxed physiological state of the body and is a very normal process. Do not become alarmed or surprised by this sensation as this is a typical response many people have when they experience physiological calmness.

Vasoconstriction on the other hand, is when blood vessels decrease in size and do not let the blood circulate adequately to limbs or other important areas of the body. Vasoconstriction
results in decreasing temperature in the limbs and extremities. Concomitant is the decreased temperature that may be irregular breathing, undesirable chemical changes, and an increased heart rate. Thus, learning to manage your own physiological system, specifically to increase your temperature, is a desirable physiological state. Through passive concentration or active concentration such as imagery, cue words, and deep regular breathing in conjunction with the thermal biofeedback information you may effectively increase your temperature.

As noted in earlier sessions, pain is a complex experience. The Gate Control Theory of Pain has three dimensions. These dimensions are sensory discrimination dimension, motivational affective dimensional, and cognitive evaluative dimension. Negative emotions and feelings as well as intruding and undesirable thoughts may increase the experience of pain. Likewise, focusing on positive thoughts which are realistic and appropriate, emotions may decrease the experience of pain and generally tend to maximize pleasant, comfortable and tolerable sensations. As you learn, gain experience, and manage your pain in the thermal biofeedback sessions, you are building a skill which may help you cope and manage the complexities of your life more realistically.

You may be able to identify stress events that trigger the experience of pain. You may be able to identify these situations and understand your sensory responses, your motivation and affect as well as thoughts you have about the experience.
These situations may be cues for you to employ thermal biofeedback coping techniques such as passive concentration or active strategies such as deep breathing, imagery, or cue words. By employing these strategies, you may manage your pain and experiences more realistically. Some individuals find practicing these techniques on a regular basis helpful to maintain the physiological state of calmness and thus cope better. The practice of this skill outside of the biofeedback sessions implies a commitment to achieve a desirable physiological state of calmness and relaxation which may diminish the experience of pain. This will require practice and effort on your part.

With the remainder of the time for today's treatment, practice active strategies such as cue words, deep breathing, imagery scenes or a passive concentration to increase your temperature. Observe your own physiological sensations as you effectively monitor and increase your temperature through the biofeedback treatment. The biofeedback technician will enter the room at the end of the session to take a final reading. You may go over today's session and your temperature changes with the therapist at the conclusion of today's treatment.

SESSION FIVE
ADAPTATION PERIOD
For the fifth session of your thermal biofeedback treatment, I would like you to sit down and relax. Become adjusted, acclimated and comfortable for today's session. Close your eyes if you wish and recline in the chair. The adaptation period is designed to help you focus your attention on the thermal biofeedback treatment, decrease the significance and importance of distracting events, experiences, thoughts, and feelings so that
you may begin to increase your temperature through thermal biofeedback treatment. The biofeedback technician will take a reading in approximately five minutes. Utilize the remainder of the adaptation period to become adjusted for today's session. Following the adaptation period will be the baseline period then the treatment phase of the biofeedback session.

BASELINE PERIOD
The baseline period, the next five minutes, allows for you to assess your bodily temperature prior to treatment and at the conclusion of today's treatment. The baseline period provides you with information about your temperature in the absence of the thermal biofeedback. Review your temperature changes with the thermal biofeedback technician at the conclusion of the treatment today. The biofeedback technician will be taking another reading in about five minutes.

TREATMENT PERIOD
Through your experience in the biofeedback therapy and by practicing your skills outside of the biofeedback session, you are demonstrating strategies to cope with your pain. Many people find the degree of control over their physiological processes is increased through practice and continual refinement of the skills and strategies. Practicing the biofeedback may help you cope more effectively and manage your pain more effectively. Perhaps this is a good session to review the frequency, the intensity, and duration of your pain. You may note at the conclusion of your treatment the subtle or important changes in the experience of your pain. You may even have observed a decrease in your pain without actually observing the difference
in the rating of pain that you have completed at the end of your treatments. Through your efforts at passive concentration, focused attention, and active concentration you may increase your thermal temperature. By increasing your temperature, you are engaging in the process of vasodilation. Recall that this is when your blood flow increases in your hands, and body and allows you to minimize the experience of pain. As you begin to increase your temperature, you may feel warm and relaxed with a sensation some people describe as floating. This is a good state to be in and this tells you that you are physiologically calm and relaxed.

Outside of the biofeedback treatment, you may want to practice skills which you utilize in the biofeedback treatment and help cope effectively with your life situations and your pain. Such skills as deep breathing, imagining relaxing scenes, cue words you say to your self such as calm, relax or comfortable may help to decrease your pain and increase your physiological sense of calm. Perhaps taking time each day for example, fifteen minutes in the morning, fifteen minutes of practice in the afternoon may help you to refine your development of managing your bodily responses to stress, and through this practice, you may effectively cope with your pain. Through practicing the biofeedback skills you may begin to stabilize and maintain productive and relatively effective life. Importantly, this means that you are managing or decreasing your pain and maximizing other areas of your life you find rewarding. Coping with situations, people, events or your own thoughts, feeling and pain implies that
...you are successfully struggling and directing your life in
the direction that is most desirable for you. Coping implies
that you are minimizing the negative effects of situations,
feelings, thoughts, behaviors, and your own bodily responses
to situations in which you are focusing on realistic strategies
and alternatives that maximize the probability of reaching your
goal. An example of coping and managing pain will illustrate
the aspects of practicing biofeedback skills and enhancement
of coping in a situation. For instance, a person bought
a sweater at a store. After several wearings of the
sweater, the material is falling apart. The receipt for the
merchandise was lost. The person feels anxious about returning
the sweater and began to worry about the sweater and return­
ing this to the store. The person begins to develop a
headache, and is afraid that the clerk at the store may not
allow the person to return the sweater. The person is worried,
afraid of disapproval from the clerk, that is, the clerk will
not accept the sweater for a return or money. The person's
headache is becoming intense. To cope with the situation the
individual applies biofeedback skills of passive concentration,
deep breathing, and repeating of cue words such as calm and
relax to help manage the headache and relieve the tension to
feel relaxed and minimize the headache pain. The individual
practices for fifteen minutes and finds that the headache
pain is reduced significantly. The individual takes the
sweater back to the clerk at the store, and before dealing with
this stressful situation, as perceived by the individual,
the person takes a few deep breathes, and repeats a cue word
such as relax or calm. The person asks the clerk to exchange the sweater, and the clerk asks for a receipt. The individual becomes relatively tense and pressed about the clerk's request. The person breathes deeply and states that the receipt was lost, but the sweater was bought recently and would like to exchange the sweater for another. The clerk agrees with this and allows the individual to pick out a similar sweater. Thus, in this example, the individual applied biofeedback coping strategies to a stressful situation, as perceived by the individual. The individual was able to successfully manage the headache pain and utilize skills that would minimize the possibility of experiencing another intense headache, and maximized the possibility of achieving desired goals.

With the remainder of the time for today's treatment, practice coping strategies such as cue words, deep breathing, imagery scenes or passive concentration to increase your temperature. Observe your own physiological sensations and responses as you effectively increase your temperature through biofeedback treatment. The biofeedback technician will enter the room at the end of the session to take the final reading. You may desire to go over your progress at that time. That is, you may review your temperature from the adaptational period to the conclusion of today's treatment session.

SESSION SIX
ADAPTATION PERIOD

During the sixth session of your thermal biofeedback treatment, I would like you to sit down and relax. Become adjusted, acclimated, and comfortable for today's session. Close your eyes and if you like, recline in the chair. The adaptation
period is designed to help you focus your attention on the thermal biofeedback treatment, decrease the significance and importance of distracting events, experiences, thoughts, and feelings and so that you may begin to increase your temperature through thermal biofeedback. The biofeedback technician will take a reading in approximately five minutes. Utilize the remainder of the adaptation period to become adjusted for today's session. Following the adaptation period will be the baseline period and then the treatment phase of today's session.

BASELINE PERIOD
The baseline period, the next five minutes, allows for you to assess your baseline temperature prior to treatment and following the treatment. The baseline period provides you with information about your temperature in the absence of thermal biofeedback. Review your temperature changes with the thermal biofeedback technician at the conclusion of today's treatment session. The biofeedback technician will take another reading in about five minutes.

TREATMENT PERIOD
Managing your pain and coping may be providing you with a sense of success. That is, you are learning and coping with stressful situations and you are able to manage your bodily and physiological processes, provide an outlet for tension and anxiety, and critically evaluate for yourself desirable solutions to problems and methods to achieve your goals. The biofeedback and your efforts at increasing your temperature may provide you with a physiological state of calmness and relaxation. By achieving this state and increasing your temperature in the treatment, you are effectively intervening and managing your own
bodily processes. Learning to increase your temperature and reaching a physiological state of calm and relaxation is a coping strategy and technique. Importantly, your manner of increasing your temperature may vary to other individual's manner of increasing their temperature. That is, many individuals utilize the techniques of passive concentration while others use active strategies. Passive concentration allows the individuals to focus attention and interest at increasing their temperature. This is a natural way to increase their temperature. Other individuals may employ some active strategies such as deep breathing, imagination of a relaxation scene, or repeating cue words such as calm, relax, comfortable. Additionally, individuals may combine both passive and active strategies to effectively cope and manage their pain.

These skills and strategies may be employed outside of the biofeedback treatment when you desire to utilize the skill and practice the skill. Practicing of these skills will lead to refinement and eventually stabilization. While you may not be gaining numerical information about your temperature outside of the biofeedback treatment, you may begin to note subtle changes in the positive direction in your body and physiological processes when you practice these skills. Observe and note these changes when you practice these skills outside of the biofeedback treatment session as well as inside of the biofeedback treatment sessions. You may practice the biofeedback skills when you feel that they are appropriate or you may choose not to practice at all. Many people find that a set time of fifteen minutes in the morning, mid-afternoon and night is effective at improving coping and facilitates the
management of pain. Other individuals find that directly applying the coping strategies effectively help cope and manage pain. This means that in a situation as mentioned in the last session of the biofeedback treatment that the person apply the biofeedback techniques directly so as to manage pain, not to alleviate pain, but to cope through a healthy set of behaviors and minimize pain. Applying the biofeedback techniques facilitates the management of anxiety, worrisomeness, fear and depression. The strategies allow the individual to realistically cope with complex situations and their own lives.

In essence, you may enhance your coping and minimize your pain by applying the techniques in your own daily life. As for the remainder of the session today, please focus your attention and interest on increasing your temperature through passive or active strategies. Active techniques you may apply include deep regular breathing, vivid imagery of relaxing scenes, and by repeating of cue words intermittantly such as calm, relax, comfortable, warm. Utilize the techniques which most effectively help you to increase your temperature. The biofeedback technician will enter the room at the conclusion of today's session to take the final reading of your temperature. Again, please review your temperature with the biofeedback technician at the conclusion of the biofeedback session today.

SESSION SEVEN

ADAPTATION PERIOD

For the seventh biofeedback session, I'd like you to sit back and relax comfortably in the reclining chair. If you like you may close your eyes and recline in the chair. During the first
five minutes of today's session, I would like you to become ad-
justed and acclimated for today's session. The adaptation period
is your time to attend to, focus and concentrate on today's
thermal biofeedback session. For the remainder of the five
minutes, relax, breathe deeply if you like or just passively con-
centrated on increasing your temperature. The biofeedback
technician will enter the room at the end of the adaptation
period, this is in about five minutes.

BASELINE PERIOD
The next five minutes is the baseline period, a time for you
to assess your base level temperature at the conclusion of
today's session. At that time review with the biofeedback
technician your temperature during the adaptation period, the
baseline period and the treatment period. You may notice
changes in your temperature over the course of the treatment
session. During the baseline period you can see your tempera-
ture when you are not distracted by other events, activities,
and situations. By focusing your attention on increasing your
temperature and minimizing your pain, you may feel a stronger
sense of calm and relaxed. Again review with the biofeedback
technician your progress at the end of today's session. The
biofeedback technician will enter the room in approximately
five minutes.

TREATMENT PERIOD
I'd like to begin the session with a review of your treatment
program with thermal biofeedback which focuses on increasing your
temperature to cope and manage your pain. Your attention, concen-
tration and focusing on increasing your temperature and managing
your pain has been the direct result of your effort through passive or active coping strategies. At this time I would like you to concentrate on increasing your temperature passively through the biofeedback machine and also to listen to this brief review.

First you have learned the Gate Control Theory of Pain. That is, there are several important factors in the experience of pain. The first factor, the sensory discriminative dimension allows the individual to observe and note the intensity, the frequency, and the length of time the pain is experienced. Thermal biofeedback as well as other techniques such as relaxation training, autogenics training and hypnosis are geared at allowing the person to focus on managing and decreasing the pain a person has and also provide coping strategies which the person can utilize outside of the therapy session and apply in daily life situations. The second dimension, the affective dimension states that negative feelings such as guilt, fear, anxiety, depression, and anger are negative feelings and that these feelings may increase or intensify the experience of pain. For example, when somebody hits their hand on an object such as a door that wasn't expected to be there the person's anger and frustration at hitting the door intensifies the experience of pain. On the other hand, there are cases when persons have been involved in sport events or other activities and they have been injured and do not feel the pain intensively during the game or the activity. In fact, they are able to cope and manage the pain so that they may continue the sport or the activity and perform the activity with the minimal amount of pain.
Thus, emotions such as excitement, hopefulness, and tolerable frustration may help to decrease the experience of pain. You may have observed that your own emotions, that is how you feel before your biofeedback session, that this influences your temperature changes and your overall feelings of relaxation and calmness. Cognitive evaluation is the third dimension of the pain theory. This refers to ones attitudes and beliefs a person has about events and their pain. An example of this is when one believes that one shouldn't have pain and blames himself or herself for having this pain or the person blames the doctor for not helping alleviate pain as this is what the doctor should do. Basically, realistic rational thoughts about the experience of pain and other events help to cope and manage pain appropriately and effectively. Thus, coping and managing of your pain involves many important factors. At this time, passively observe your current emotions, thoughts, attitudes, beliefs, and sense of pain or relaxation that you are currently experiencing. Passively allow yourself to focus on appropriate emotions, and attitudes, thoughts, and beliefs. You may observe and notice that by just passively focusing on positive feelings, sensations, and thoughts that you are able to increase your temperature, and minimize your pain experience and also have a heightened sense of relaxation and calmness and warmthness. Recall that passive concentration may also help you to increase your temperature so that you may feel calm and relaxed.
We have talked about practicing the skills that you have learned in your biofeedback session. Skills such as passive concentration and active skills such as deep regular breathing, cognitive imagery, repeating cue words such as calm, relax and warm may help to increase your temperature in the biofeedback session and are also valuable skills you may utilize outside of the biofeedback sessions to help refine your skills and to cope and manage your pain. If you would like to assess your practicing of biofeedback skills outside of the session, talk with your thermal biofeedback technician at the end of today's session. Importantly, you are learning skills and learning involves practice inside of the biofeedback session as well as outside of the biofeedback session.

For the rest of the session today, focus your attention on increasing your temperature through passive concentration, that is passively relaxing, or through active strategies such as cognitive imagery that is in your mind's eye visualizing a relaxing scene that is one by the beach, gentle breeze, rhythmic waves rolling in, a warm sunny day, and pleasant warm sand. Or repeat cue words such as warm, relax, calm. Talk with your thermal biofeedback technician regarding your temperature changes, and note your progress in biofeedback session and how practicing of skills outside of the session are helping to manage and cope with your life and with your pain.

SESSION EIGHT
ADAPTATION PERIOD
For the eighth biofeedback session, I'd like you to sit back and relax comfortably in the reclining chair. If you like
you may choose to close your eyes and recline in the chair if you like. During the first five minutes of today's session, I'd like you to become adjusted and acclimated for today's session. The adaptation period is your time to tend to, focus and concentrate on today's thermal biofeedback session. The rest of the five minutes, relax, breathe deeply if you like or just passively concentrate on increasing your temperature. Importantly, the adaptation period allows you to focus on today's session. The biofeedback technician will enter the room at the end of the adaptation period, that is, in about five minutes.

BASELINE PERIOD
During the baseline period you can see your temperature when you are not distracted by events, activities, and situations. By focusing your attention on increasing your temperature and minimizing pain, you may feel calm and relaxed. Again review with the biofeedback technician your progress at the end of today's session. The biofeedback technician will be entering the room in approximately five minutes.

TREATMENT PERIOD
I would like you to focus and concentrate your attention on increasing your temperature. You have learned over the course of your treatment that as you increase your temperature, you engage in vasodilation. This allows for an increase in the blood supply to your hands, abdomen, legs and face area. Increased blood supply to your body is important. Increased blood flow and supply and an increase in your temperature leads to a bodily sense of warm, relaxation and physiological state of calmness. To achieve this state of warm, relaxation and calmness, is the goal of thermal biofeedback while in session. The goal of
thermal biofeedback outside of the session is to practice and utilize the skills learned in your own daily life. That is, you may desire to utilize deep breathing in a regular manner to relieve tension, stress and anxiety. You may apply cognitive imagery, that is if you imagine a relaxing scene such as lying on a beach, a warm day, a warm breeze, warm sand and gentle waves that roll in rhythmically and if you practice this, this will help to decrease your pain and will allow you to feel a sense of relaxation. You may choose to use cognitive imagery on a scheduled basis or in conjunction with the deep breathing so that you may feel relaxed and calm and minimize your stress and pain. Additionally, you may repeat cue words in a slow rhythmic manner. Such cue words include warm, relaxed and calm. In situations that you desire to cope more effectively and manage your stress and pain. Individuals have found that practicing these skills has increased coping and helped to manage pain. It is important to be aware and identify situations you find stressful and which cause you pain. These situations may increase your pain by making you anxious, angry, fearful or depressed. You may think that these situations are horrible or terrible; that these things shouldn't happen to you. You have bodily responses to your situations which you include as physical tension, vasoconstriction, which means to decrease blood flow to your hands, legs, neck, abdomen and face and you may experience pain. I think this is important for you to look at, at your feelings, your thoughts about these situations, your bodily response to these events as well as how you cope and manage your pain. So a person may avoid these situations which are stressful or the person can realistically become involved, cope rationally
and reasonably well and manage their pain. This doesn't mean that there is absence of pain or an absence of anxiety about yourself or situation. However, it means that you may minimize your pain and increase your coping successfully as you can with the complexities of your life. If you apply these skills and practice them, you will find a rewarding way to increase your satisfaction with people, yourself and goals you find interesting. You may find the active and passive coping strategies helpful with the following experiences and problems. One, with stressful workdays and situations. Take fifteen minutes to apply active skills or passive concentration to feel relaxed, calm, comfortable. Two, with worrying or anticipating situations you find difficult and a problem to deal with. Take time to interrupt this cycle of worrying and practice imagery; imagining a relaxing scene, a beach scene or another scene you find relatively relaxing. You may also utilize deep breathing and imagery to cope with the worrying. When you feel pain that is uncomfortable and debilitating, I think that this would be a good time to apply deep breathing, imagery, or cue words which help you to cope with the complexities of your experiences and decrease and manage your pain. You may be thinking of situations now that you may be able to focus your attention and concentration and your efforts at applying these skills that are active as well as passive so that you may cope better and manage your pain. It is important to be aware of your own bodily responses and signals as your body is telling you that you need to focus on decreasing and managing your pain. By concentrating and
focusing your attention on warmth, relaxation and calmness, you may be able to cope with your complex life and manage your pain. Managing your pain implies that you are decreasing the frequency, the length of time that you feel pain, and the severity of your pain. So observe and assess your pain. You may note that when you apply the skills, the severity of the pain may change with perhaps little change in the length of time you experience pain and the frequency of the pain may remain the same as well. You may note changes, the different aspects of your pain, as you increase your coping, your practicing and self management skills such as we have been discussing. Noting changes similar to this is progress in the positive direction. As your skills refine and you continue to practice, you may continue to notice positive progress in your coping and management of pain.

With the remaining time of the session, I would like you to focus your attention on increasing your hand temperature and focus on self relaxation, sense of warmth, comfort, and calmness. Use passive concentration or active coping strategies such as deep breathing, cognitive imagery, and cue words and the biofeedback session today. At the end of today's session, review with the thermal biofeedback technician your temperature changes during the adaptation period, baseline period and the treatment period.
Appendix B

SELF-DIRECTED BEHAVIOR CHANGE
IN THE COGNITIVE, AFFECTIVE,
PHYSIOLOGICAL AND BEHAVIORAL DOMAINS

AN EXPANDED
COGNITIVE-EXPERIENTIAL
PERSPECTIVE
BASED ON
RATIONAL EMOTIVE THEORY

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INTRODUCTION

The purpose of this instrument is to provide a structured exercise in self-directed behavioral change that focuses on the cognitive, affective, physiological, and behavioral functioning of a person. The exercise is especially valuable because it can be performed by using the actual instrument as well as through imagery. This self-directed intervention is an extension and revision of rational emotive theory that emphasizes the ABC model of human emotions and behavior.

Rational-emotive theory, developed by Albert Ellis, holds that most sustained negative emotions that interfere with effective behavior (problem solving, self-assertiveness, decision making, etc.) are the result of irrational ideas which take the form of biased, prejudiced, internalized sentences. Rarely do events external to us cause our discomfort; instead, it is our own perceptions, attitudes, or internalized sentences about those events that affect us most, especially when they are of an irrational nature.

Specifically, this exercise should (1) enable a person to explicate his thinking about significant events that are associated with areas of ineffective functioning, and (2) help that person to generate more reasonable thoughts that would ultimately result in more effective and constructive behavior.

Thought and behaviors tend to be irrational when they (1) lead to distortion of reality, (2) interfere with the accomplishment of goals, (3) are not life preserving and (4) lead to significant personal and environmental stress. On the contrary, thought and behaviors are more rational when they (1) tend to consider objective reality, (2) facilitate the accomplishment of personal goals, (3) are life preserving and (4) reduce significant personal and environmental stress.

An elaborated ABCDE model of human functioning is presented next.
AN EXPANDED ABCDE MODEL OF HUMAN FUNCTIONING

A - Represents real or imagined events or situational conditions that are meaningful to individuals. These events may have occurred in the past, may be happening in the present, or may be about to occur in the future.

B - Represents the manner in which people perceive, appraise, or evaluate events, their responses to events, and themselves as human beings. B also signifies the internal dialogue people have with themselves—that is—how they talk to themselves. This internal dialogue or self talk may often escape one's awareness. B may be of a rational or irrational nature.

C - Represents the full range of emotional experiences people have in response to how they deal with significant events at point B. Sometimes people are unaware of their feelings and how they may relate to A and B. Emotional responses may be appropriate or inappropriate, constructive or destructive.

D - Represents the full range of physiological or bodily responses that result from emotional experiences or that go along with emotional experiences. D develops significantly with C and B. Physiological responses may be of a life enhancing or life inhibiting nature.

E - Represents the way individuals translate their thoughts, feelings, and bodily responses into behavior that impacts on the self and the environment. Behavior may be constructive or destructive, appropriate, inappropriate, rational, irrational.

Some persons report that their physiological responses (D), behaviors (E), and feelings (C) are caused by external events (A). They appear to be unaware of how their thoughts give rise to their feelings and influence their behavior. Other people may report that their physiological responses (D), and behaviors (E) are the result of their thoughts (B) but are unaware of their emotions (C). Moreover, because of our social conditioning it is very easy not to make appropriate and meaningful connections between events (A), thoughts (B), feelings (C), physiological responses (D) and behavior (E).

Thus, appropriate psychological interventions assist persons initially to become fully aware of the entire ABCDE sequence. Once a person becomes fully aware of the sequence, the counselor or therapist can introduce the more sophis-
icated concept of "the proliferation effect," i.e., an irrational belief can become so integrated and ingrained into a person's conceptual system that a (A), (C), (D) or (E) can emerge as an event (A). For example, there is an (A) event:

A - Your mother tells you that you are a lazy, troublesome child.
B - You tell yourself, "My mother is an intelligent, powerful adult. She must be right. I'm worthless.
C - You feel angry and depressed.
D - You experience stomachaches, headaches, or bowel problems.
E - You withdraw from your mother or other critical people in a sullen way.

The aforementioned is a primary sequence. Once the pattern is set you may experience a proliferation of events initiated by any component of the ABCDE sequence. For example, (B) I'm worthless becomes an event at some moment that you are sitting in a group of people and unfavorably comparing yourself to them, which activates a (C) angry or depressed feeling, resulting in (D) headaches, stomachaches, etc., (E) sullen withdrawal. This may create another event (A), that is, critical evaluation by others who perceive you as unfriendly, setting off the whole primary ABCDE sequence again.
ACTIVATING EVENTS

Each one of us has experienced some unhappiness in our daily life in the context of school, work, home, and recreational environments. The unhappy event may have occurred in an interaction with family, strangers or acquaintances or when we were by ourselves. Interactions with others would include such events as marital arguments, unreasonable demands by a boss, harassment by unruly students, separation from a loved one through work or divorce, etc. Unhappy events or situations which focus on the individual’s interaction with self may include taking exams, deciding on a career, struggling with dieting, alcohol consumption, drug abuse or simply procrastination with tasks.

Take a couple of minutes to try to think of several events that represent psychological discomfort to you. These may be events that occurred in the past, ones that you are involved in at present, or even ones that you expect to occur in the future. As you think of them, list each of them twice -- once in the blocks under activating events on Form A and again in the blocks under Activating Events on Form B.

ACTIVATING EVENT EXAMPLES

1. You drink too much at an important social event, and have to sleep it off for several hours on the host’s porch.

2. A student harasses you, the teacher, daily during the class period that you instruct the student and during the period she/he is in your study hall.

3. A driver cuts in front of your car unsafely, you blow the horn and get a very obscene gesture in return. You don’t do anything because the other person looks tough and is driving a battered car.

4. You are a new employee and it is obvious that there are several cliques in the office. Furthermore, no one is making an effort to get acquainted with you.

5. You are a university student and an important exam has been returned to you. Unfortunately, the grade on the exam is much lower than you expected.

6. An important report, which you worked overtime to produce, has just sat on your boss’s desk for several weeks. He barely acknowledged that you produced it.
PART I — THE IRRATIONAL SEQUENCE

UNDERSTANDING IRRATIONAL AND SELF-DEFEATING HUMAN TENDENCIES

Part I of this exercise shows how to become aware of and analyze self-defeating thoughts, emotions, physiological responses, and behaviors. This will be accomplished through the ABCDE model of human functioning just described.
THE IRRATIONAL BELIEFS OR IDEAS

The following are commonly held irrational ideas or beliefs that are direct sources of emotional disturbances. From the list, choose those irrational ideas that occur between the Activating Events and the negative emotions you generally experience. At first this may prove to be difficult because such thinking generally occurs in symbolic or shorthand form and may not be in one's awareness. The idea here is to bring into awareness those implied beliefs associated with situations or events and to focus on them. You may wish to translate the following ideas into words that are more familiar to you. Record those irrational beliefs you select under implied beliefs on Form A.

(1) I must be loved or approved by everyone for virtually everything I do. Or, if not by everyone, by persons I deem significant to me.

(2) I believe that certain acts are sinful, wicked, or villainous and that people who perform such acts should be severely punished and blamed.

(3) I can't stand it when things are not the way I would like them to be.

(4) When I am unhappy it is because something external to me such as persons or events causes me to be that way.

(5) I should be terribly concerned about things that may be dangerous or fearsome to me.

(6) Although I want to face difficult situations and self responsibilities, it is easier for me to avoid them.

(7) I need someone stronger or greater than myself on whom to rely.

(8) In order to have a feeling of worth, I should and must be thoroughly competent, adequate, intelligent, and achieving in all possible respects.

(9) If something once strongly affects me, it will always affect me.

(10) I don't have much control over my emotions or thoughts.

(11) I should never be angry or express my anger because such expression is bad and a sign of personal weakness.
(12) I should rarely confront other people or assert my own thoughts or feelings about another person because people are fragile and are hurt easily.

(13) Most of the time I must please other people even if I have to forego my own pleasure because it is the nice or right way to behave.

(14) I am happiest when I just remain inactive and passive.

(15) In order to be perfectly fulfilled as a human being I must have a close, personal, involved, and intimate relationship with another person.
The following list depicts emotional reactions that can be self-defeating when inappropriately associated with real or anticipated events. Identify those emotional reactions that accompany the activating events you already listed on Form A. Record the reactions in the space provided for Undesirable Emotions. Refer to page 3 for an example if necessary.

**UNDESIRABLE EMOTIONS**

| 1. Anger or great irritability | 14. Stubbornness |
| 2. Anxiety | 15. Laziness |
| 4. Worry | 17. Self-hate |
| 5. Boredom or dullness | 18. Excessive shyness |
| 6. Frustration | 19. Hate towards others |
| 7. Guilt or self-condemnation | 20. Vulnerability |
| 8. Hopelessness or depression | 21. Dependency |
| 9. Great loneliness | 22. Mistrust |
| 13. Worthlessness or inferiority | 26. Other (Specify) |
UNDESIRABLE BEHAVIORS, ACTIONS, OR HABITS

This is a list of behaviors generally considered to be self-defeating or undesirable, especially when they are of a high frequency, intensity, and duration. From the list below, choose those behaviors that are most often associated with the activating event(s) you specified and the undesirable emotional or affective states you have already determined for yourself. Record these on Form A. You may need to be more specific than suggested by the below behaviors.

UNDESIRABLE BEHAVIORS

1. Avoiding responsibility
2. Acting unfairly to others
3. Being late to appointments
4. Demanding attention
5. Physically attacking others
6. Procrastinating
7. Telling people off harshly
8. Whining or crying
9. Withdrawing from activity
10. Excessive drinking of alcohol
11. Overeating
12. Undersleeping
13. Oversmoking
14. Excessively manipulating
15. Taking too many drugs or pills
16. Being sarcastic
17. Lying
18. Cheating
19. Overprotecting
20. Ruminating about failure
21. Other (Specify)
UNDESIRABLE PHYSIOLOGICAL RESPONSES

While people vary in their physiological response to negative situations, some develop back trouble while others may develop headaches, fatigue, or rapid heart beat, there are symptoms that tend to cluster around particular emotional states. (This is not to say that a physical symptom is only indicative of an emotional state. There may be an organic cause.) Below is a list of responses or symptoms and associated emotional states. Record the appropriate one for you under physiological response on Form A.

<table>
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<tr>
<th>1. Thirst or hunger</th>
<th>17. Menstrual discomfort</th>
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<tr>
<td>2. Loss of touch in fingers</td>
<td>18. Dry mouth</td>
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<td>6. Dizziness</td>
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<td>7. Fatigue</td>
<td>23. Hair raising</td>
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<td>8. Heaviness in arms or legs</td>
<td>24. Ringing in ears</td>
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<tr>
<td>10. Loss of memory</td>
<td>26. Hands trembling</td>
</tr>
<tr>
<td>11. Burning in stomach</td>
<td>27. Elevated blood pressure</td>
</tr>
<tr>
<td>13. Nausea</td>
<td>29. Pimples</td>
</tr>
<tr>
<td>14. Belching</td>
<td>30. Skin rashes</td>
</tr>
<tr>
<td>15. Diarrhea</td>
<td>31. Frequent urination</td>
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<tr>
<td>16. Loss of weight</td>
<td>32. Other (Specify)</td>
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</table>
PART II — THE RATIONAL SEQUENCE
RESTRUCTURING IRRATIONAL AND SELF-DEFEATING HUMAN TENDENCIES

Part II of this exercise introduces you to the basis of cognitive restructuring. In this section you will learn how to challenge logically those irrational ideas you determined to be of personal significance in Part I. Additionally, you will see how more rational thinking can lead to more positive emotional, physiological and behavioral responses.
RATIONAL IDEAS OR BELIEFS

The following ideas are contrasted to those irrational ideas presented in the last section. When people substitute these ideas for their previously-held irrational ideas, they eventually experience more desirable emotional, physiological, and behavioral functioning.

This part of the exercise has two purposes: (1) to introduce persons to more rational ways of thinking about events associated with emotional, physiological, and behavioral disturbance and (2) to assist persons in the contradicting and challenging of those self-defeating ideas that support those negative behavioral states.

The following rational ideas or beliefs correspond to the irrational ideas or beliefs in the preceding section. Record the preferred rational belief in the designated column on Form B. While recording the rational belief, try to imagine yourself using them in real life settings which have become a personal source of disturbance.

1. While it is desirable to be approved and accepted by others, it is not an absolute necessity. My life doesn't really depend upon such acceptance, nor can I really control the minds and behavior of other persons.

2. Many persons do commit acts that are inappropriate, self-defeating, or antisocial, but needless blame and punishment rarely stops such persons who are usually ignorant, emotionally disturbed, or stupid from committing such acts. Demanding that persons should not commit stupid acts oftentimes is nothing more than a demand that reality be different.

3. When things don't go the way I want them to go, it is too bad or inconvenient — but not catastrophic. And, it may be in my best interest to change them or arrange conditions so that they may become more satisfactory. But, if I can't change or modify situations to my liking, I would be better off accepting their existence rather than telling myself how awful they are.

4. Human unhappiness is usually caused by one's thoughts, appraisals, evaluations, or perceptions of events. That is, I create my own disturbance. Since I am human, I can expect to disturb myself often. But, that doesn't mean I have to continually disturb myself forever.
(5) If something is or may be dangerous or fearsome, it is probably in my best interest to face it and try to render it less dangerous. I may even discover that most of the danger was imaginary.

(6) While it is humanly normal to want to take the easy way out of such things as avoiding life's difficulties and self-responsibilities, in the long run I would probably be better off confronting openly such difficulties, facing them squarely, and trying to solve them.

(7) Although the socio-cultural system teaches and reinforces one's tendencies to be dependent on others and things, I would be better off standing on my own two feet in facing life.

(8) Since I am a human being with biological, sociological, and psychological limitations, I cannot reasonably expect to be perfect in any endeavor. But, I certainly can strive to perform well in those tasks I deem as significantly contributing to my self-development. In those areas where I am deficient, I certainly can strive to improve those areas. If I fail, though — too bad.

(9) Although I have been influenced greatly by my past experiences and believe that specific instances of the past greatly affect me today, I can profit by such experiences but not be overly prejudiced or biassed by them. Nor do I need to be dominated by them in the future.

(10) Human beings, including myself, are happiest when they are actively involved in creative pursuits or when they devote themselves to people or projects outside of themselves. Long term withdrawal from the world or inaction rarely are associated with happiness. Therefore, it would be in my best interest to force myself into productive or creative activity.

(11) I could probably develop the skills necessary to control enormously my own emotions or feelings if I decide to commit myself to that process. And, it would be in my best interest if I would take the necessary risks in order to achieve a greater control over my own destiny. Of course, I don't really expect to develop these skills overnight.

(12) Anger is a normal human emotion and its expression is not a sign of personal worthlessness. Moreover, being aware of my anger and expressing it as a communication of current feelings without indiscriminately attacking the personal worth of others may be in my best interest.

(13) If I share most of my thoughts and feelings (negative or positive) honestly and openly, it will probably help me communicate more effectively with others in the long run — even though in the short run I might experience some temporary discomfort.

(14) Striving to know and to accept others for their humanness is a reasonable goal. Moreover, it is in my best interest to try to act fairly with others so I may receive the full benefit of their
humanness. However, trying to please others at the expense of my own well-being is not personally growth-enhancing. Therefore, I can only do my best in trying to please others. If I fail -- tough!

It is desirable for me to be able to develop meaningful and intimate relationships with other people. However, if I demand intimate and satisfying relationships with others, I will tend to focus on the outcome of such interpersonal relationships rather than the process of getting to know and accept another person. Therefore, I would be better off not demanding but trying to be spontaneous, responsive, and accepting towards significant persons.
DESIRABLE EMOTIONS

This list consists of emotions that are generally positive or desirable. Although persons do not experience these always, these emotions are experienced under a variety of conditions with varying degrees of frequency, intensity, and duration. From this list, choose those emotional responses that would be more desirably associated with those activating events and rational ideas you have already listed. Also, it is important that you imagine these more positive feelings as emotional responses to those activating events and rational beliefs. Record your choices under C on Form B.

DESIRABLE EMOTIONAL STATES

1. Relaxed
2. Joyful
3. Worthwhile
4. Loving
5. Hopeful
6. Warmth
7. Guiltless
8. Shameless
9. Elation
10. Gentle
11. Energetic
12. Merry
13. Cheerful
14. Confident
15. Self-Accepting
16. Dependable
17. Caring
18. Able
19. Lively
20. Happy
21. Patient
22. Trusting
23. Satisfied
24. Stable
25. Pleasant
26. Other (Specify)
DESIRABLE PHYSIOLOGICAL RESPONSES

Below are some examples of desirable physiological responses that suggest a decrease in the frequency, intensity, and duration of those undesirable physiological responses listed and reported in Part I. Record the appropriate physiological response on Form B.

1. Normal thirst and hunger
2. Less dizziness
3. Fewer pains
4. Fewer headaches
5. Less menstrual discomfort
6. Fewer skin problems
7. Normal bowel and bladder functions
8. Normal heart rate
9. Lowered blood pressure
10. Normal vision
11. Normal breathing
12. Fewer stomach symptoms
13. Desirable weight
14. Other (Specify)
DESIRABLE BEHAVIORS, ACTIONS, OR HABITS

The following behaviors are generally considered desirable or self-enhancing. Choose those behaviors that are associated with more reasonable ways of thinking and feeling. You may need to be more specific than suggested below. Again, try to imagine yourself utilizing these more self-enhancing behaviors as a response to those (?) you have already determined: Record them on Form B.

<table>
<thead>
<tr>
<th>DESIRABLE BEHAVIORS</th>
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<tbody>
<tr>
<td>1. Taking responsibility</td>
<td>13. Developing a responsive style of communication</td>
</tr>
<tr>
<td>2. Acting fairly</td>
<td>14. Being frank with others</td>
</tr>
<tr>
<td>3. Being punctual</td>
<td>15. Eating normally</td>
</tr>
<tr>
<td>4. Asserting myself</td>
<td>16. Sleeping normally</td>
</tr>
<tr>
<td>5. Behaving spontaneously</td>
<td>17. Cultivating patience</td>
</tr>
<tr>
<td>6. Drinking alcohol in moderation</td>
<td>18. Minimizing dependence on people, drugs, etc.</td>
</tr>
<tr>
<td>8. Performing in an honest manner</td>
<td>20. Efficiently managing responsibilities</td>
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<td>9. Being considerate</td>
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<tr>
<td>10. Helping others</td>
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<tr>
<td>11. Being reliable</td>
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<tr>
<td>12. Expressing tenderness</td>
<td>21. Other (Specify)</td>
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<tr>
<td>Activating Event</td>
<td>Irrational Belief</td>
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**FORM B**

**THE RATIONAL SEQUENCE**

<table>
<thead>
<tr>
<th>Activating Event</th>
<th>Rational Belief</th>
<th>Desirable Emotions</th>
<th>Desirable Physiological Response</th>
<th>Desirable Behavior</th>
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ADDITIONAL COMMENTS

Thoughts, emotions, physiological responses, and behaviors you would like to change as a result of completing this exercise:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Strategies or solutions you might develop and use in achieving desirable cognitive behavioral outcomes.

________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________

Appendix C

Patient #: 

PATIENT

BIOFEEDBACK

TECHNICIAN

THERMAL BIOFEEDBACK DATA SHEET

<table>
<thead>
<tr>
<th>Date</th>
<th>Session No.</th>
<th>Session Length</th>
<th>Adaptation Period</th>
<th>Baseline Period</th>
<th>Biofeedback Thermal Treatment Period</th>
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Notes and Comments

Session No.
1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________
6. ________________________________
7. ________________________________
8. ________________________________
CONSENT TO SPECIAL TREATMENT OR PROCEDURES

I hereby consent to the performance upon (myself or name of patient) the following treatment or procedures:

cognitive therapy, biofeedback, biofeedback and cognitive therapy, biofeedback and relaxation training and a waiting list control group

as part of an investigation entitled: "Effects of Cognitive Therapy and Biofeedback on Psychological Coping and the Management of Pain."

a portion of which is an investigational (product/procedure).

This treatment or procedure is to be performed by, or under the direction of: Dr. Donald Tosi, Dr. Roslyn Pariser and Michael Murphy who are authorized to use the services of others in the performance of this treatment or procedure.

1. Nature and purpose of the procedure or treatment:

The treatments are broadly designed to educate the patient about pain, and to develop skills to cope with pain. Biofeedback will help the patient learn about pain management and acquire skills to cope with pain. Cognitive therapy is designed to increase self understanding, to learn skills for coping, and to educate the client regarding experiences relevant to the experiencing of pain. Biofeedback and cognitive therapy will focus on coping and managing pain. Biofeedback and relaxing will help the individual manage pain and learn relaxation skills. The waiting list control group will receive a treatment with the best results at a later date. The treatments are one hour long and will be held for eight weeks. Participants will take two tests at the beginning, the end, and at a one month follow-up.
2. Possible alternative method of treatment:  
Psychotherapy with Roslyn Pariser, M.D., or biofeedback (various modalities) with relaxation training.

3. Discomforts and risks - known and reasonably to be expected:  
Subjects may be uncomfortable with the biofeedback machine or the experience of cognitive therapy. However, a biofeedback technician will educate the patient regarding the experience. The cognitive experiential therapy will also be educational as reading assignments will be given at the end of each session. The participants in the waiting list control treatment will receive the treatment with the best results at the completion of the study.

4. Benefits which may be expected: Participants in the study may learn more about their coping skills, develop appropriate coping skills and learn techniques to manage their pain. Participants may be educated about the experience of pain and learn skills to cope with their own experience of pain.

The above items have been reasonably explained to me and I fully understand them. I understand that any further questions I may have will be answered and that I am free to withdraw from this project at any time without prejudice to me. No guarantee or assurances have been implied or otherwise given to me by anyone as to the results of this procedure. Finally, I understand that medical treatment for injuries or illness resulting from the research procedure is available at this hospital.

DATE: __________________ SIGNED: __________________ (Patient or person authorized to consent for patient)

DATE: __________________

WITNESS: __________________

WITNESS: __________________ (investigator)
CONSENT TO SPECIAL TREATMENT OR PROCEDURES

I hereby consent to the performance upon ___________________________ (myself or name of patient) the following treatment or procedures: receive one session of biofeedback and completion of the Millon Behavioral Health Inventory (MBHI) and a symptom check list. as part of an investigation entitled: "Effects of Cognitive Experiential Therapy on the Psychological Coping and the Management of Pain." a portion of which is an investigational (product/procedure).

This treatment or procedure is to be performed by, or under the direction of:

Dr. Roslyn Pariser ___________________________ and Dr. ___________________________ who are authorized to use the services of others in the performance of this treatment or procedure.

1. Nature and purpose of the procedure or treatment:

In general, the purpose of this experiment is to learn more about the effectiveness of various treatments. Participation in the study will provide a greater understanding of the subjective experience of pain. Subjects in this part of the study will be administered the Millon Behavioral Health Inventory and a symptom check list. Additionally, subjects will receive one session of thermal biofeedback.

---continued on reverse side
2. Possible alternative method of treatment:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

3. Discomforts and risks - known and reasonably to be expected:

Subjects who receive biofeedback for one session may desire further sessions.
Completion of the MBHI and the symptom check list may be anxiety provoking for
some individuals.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

4. Benefits which may be expected:

Subjects may gain a further understanding of self from the interpretation of
MBHI, and may learn coping skills via biofeedback.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

The above items have been reasonably explained to me and I fully understand them. I
understand that any further questions I may have will be answered and that I am free to
withdraw from this project at any time without prejudice to me. No guarantee or assurances
have been implied or otherwise given to me by anyone as to the results of this procedure.
Finally, I understand that medical treatment for injuries or illness resulting from the
research procedure is available at this hospital.

DATE: ________________________  SIGNED: ________________________

DATE: ________________________  (patient or person authorized to
consent for patient)

WITNESS: ________________________

WITNESS: ________________________

(investigator)
Appendix F

Summary of Conversation to be Held with the Patient or the Authorized Representative

My name is Michael Murphy and I am conducting research in conjunction with Riverside Methodist Hospital. The research is aimed at learning more about various treatments to help patients cope effectively with their pain. We would like to know a little more about you so that we can help meet your needs more efficiently in the future (wait for response).

Included in this packet is an inventory and a symptom checklist that I'd like you to answer as honestly and openly as possible. It is important that you respond to each item or question. If for any reason an item or question is upsetting, you may leave it blank. Your name will be removed from the inventories, checklist and questionnaires once all the needed data are in. Neither your name nor your identifying information will be revealed in any publication or computer storage.

When you are finished with the packet you may return it to the receptionist. You will be receiving one of four treatments. You will be in (the name of the treatment) and you will meet with (name of contact person, time and location). If you have further questions, tell the receptionist that you wish to talk with me again.

Do you have any questions?
Appendix G

Please answer all questions after you have completed the Millon Behavioral Health Inventory. All answers will remain strictly confidential.

1. Name ____________________
2. Male _____ Female _____
3. Age _____ Date of Birth _________
4. Single _____ Married _____ Divorced _____
   Separated _____ Widow _____
5. Occupation:
   _____ professional
   _____ grade
   _____ laborer
   _____ not presently employed--housewife, student
   _____ welfare
6. Educational level:
   _____ more than 16 years (graduate school)
   _____ 13 to 16 years (college)
   _____ High School Graduate
   _____ 9-12 years (some high school)
   _____ 0-8 years
7. Presenting problem:
   _____ headaches
   _____ back pain
   _____ stomach pain
   _____ other (explain)
8. Your current medication(s) (type and quantity)

________________________  ______________________

________________________  ______________________

9. In patient   Outpatient   

10. How old were you when you first noticed your pain?  

11. For how long have you experienced pain?  

12. Describe your pain?  

We would like you to tell us about your pain for the past two months.

13. How many times during the first week of  (month) did you experience pain?  

About how long did the pain usually last?  

Rate the severity of your pain to the first week of  

Mark an (X) along this line:

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</table>

14. How many times during the second week of  did you experience pain?  

About how long did the pain usually last?  
Rate the severity of your pain for the second week of ________________.

How many times during the third week of __________ did you experience pain? ____________________________

About how long did the pain usually last? __________

Rate the severity of your pain for the third week of ________________.

How many times during the fourth week of __________ did you experience pain? ____________________________

About how long did the pain usually last? __________

Rate the severity of your pain for the fourth week of ________________.

How many times during the first week of __________ did you experience pain? ____________________________

About how long did the pain usually last? __________
Rate the severity of your pain for the first week of

Mark an (X) along this line:

0 1 2 3 4 5 6 7 8 9 10
Pain Absent Moderately Painful Severely Painful

18. How many times during the second week of _________ did you experience pain? ____________________________
About how long did the pain usually last? __________
Rate the severity of your pain for the second week of _________.

0 1 2 3 4 5 6 7 8 9 10
Pain Absent Moderately Painful Severely Painful

19. How many times during the third week of _________ did you experience pain? ____________________________
About how long did the pain usually last? __________
Rate the severity of your pain for the third week of _________.

0 1 2 3 4 5 6 7 8 9 10
Pain Absent Moderately Painful Severely Painful

20. How many times during the fourth week of _________ did you experience pain? ____________________________
About how long did the pain usually last? 
Rate the severity of your pain for the fourth week of 
Please answer all items after you have completed your treatment.

All answers will remain strictly confidential.

1.) Name________________________

2.) Your current medication (s) (type and quantity)

3.) Describe your pain?________________________

4.) How often did you feel pain this week?________________________

5.) How long does the pain usually last?________________________

6.) Rate the severity of your pain this past week?

Make an (X) along this line:

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<td>Severely Painful</td>
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</table>

7.) Did you do the reading between sessions? (If in group)________________________

8.) Did you practice between sessions? (If receiving biofeedback)________________________
Appendix I

TAPE RATING FORM

PATIENT INITIALS ________________________________________

SESSION NUMBER _________________________________________

RATER NAME ______________________________________________

USE FOR EACH TAPE

Therapist used cognitive restructuring during the session?

Patient or therapist discussed irrational or rational beliefs (or sequence) in context of the patient's pain?

Patient or therapist discussed chapters of A New Guide To Rational Living?

Therapist expanding awareness of patient by using cognitive restructuring, and bridging cognitive, affective, physiological and behavioral domains.

Therapist and patient explore more rational or constructive action.

Therapist directs, persuades, and encourages the patient to become more committed to rational tendencies, ie use of cognitive restructuring in some personal situation.

Therapist and patient discuss ways to implement (use cognitive restructuring) in various personal situations or the patient has implemented cognitive restructuring and the therapist is reinforcing this.

Therapist and patient focus on the internalization of cognitive restructuring. For example, patient discusses use of cognitive restructuring on consistent basis at work, home, etc.

Therapist and patient discuss patient stabilization of pain condition and cognitive restructuring is integrated with self system.

Patient or therapist discussed assignment of the Self-directed Behavior Change Instrument.
Appendix J

CRITERION FOR TAPE RATING

RATERS

H - High amount of cognitive restructuring (CR) used.
   - For example, if the therapist uses CR on three situations of the patient, or the therapist uses or demonstrates CR in a highly active way with one example.

M - Moderate amount of cognitive restructuring (CR) used.
   - For example, the therapist used CR on two examples of the patient, or the therapist used or demonstrated CR in a mildly active way.

L - Low amount of cognitive restructuring (CR) used.
   - For example, the therapist uses CR on one situation of the patient. The therapist uses CR in an inactive way with the patient.

A - The therapist failed to employ cognitive restructuring (CR) during the session.

Additionally, uses these H, M, L, and A criteria for rating stages. For example, the therapist highly and vigorously focused patients' awareness (stage) on elements of the:

A - (Situational),
B - (Cognitive Functions),
C - (Affective Response),
D - (Physiological Response) and
E - (Behavioral Response) related to the patients' pain. That is the therapist pointed to bridges in thinking and feeling and this added to the clients' awareness.

M - The therapist mildly focused on the awareness of the clients' functioning.

L - The therapist only lightly focused on the awareness of the client.

A - The therapist ignored or did not attempt to focus attention on relevant aspect of the clients' functioning.

With respect to the readings: (From A New Guide ...., Self Directed Change Instrument)

H - Homework assignments were discussed for about 10-15 minutes and was integrated into the therapy session.

M - 6-10 minutes of the dialogue was focused on the reading.

L - 1-5 minutes of the dialogue was focused on the reading.

A - Not discussed.
0 = No medication
1 = Aspirin (Acetaminophen/phenylbutazone)
2 = Analgesics/Pyretics
3 = Hypnotics/Sedatives
4 = Antianxiety agents/Histamines
5 = Antidepressants (including Lithium)
6 = Antipain
7 = Opioids (Codeine/Meperidine)
Appendix L

Please answer all questions after you have completed the Millon Behavioral Health Inventory. All answers will remain strictly confidential.

1.) Name _______________________

2.) Male___ Female ___

3.) Age ___ Date of Birth _____________

4.) Single___ Married___ Divorced ___ Separated  ___ Widow ___

5.) Occupation:
___ professional
___ trade
___ laborer
___ not presently employed—housewife, student
___ welfare

6.) Educational level:
___ more than 16 years (graduate school)
___ 13 to 16 years (college)
___ High School Graduate
___ 9-12 years (some high school)
___ 0-8 years

7.) Presenting problem:
___ headaches
___ back pain
___ stomach pain
___ other (explain)

8.) Your current medication(s) (type and quantity)
9.) Describe your pain?

10.) We would like you to tell us about your pain for the past month.

11.) How many times during the _____ week of ___________(month) did you experience pain? ______________________________________

How long did the pain usually last? ______________________________________

Rate the severity of your pain for this week.

Mark an (X) along this line:

0 1 2 3 4 5 6 7 8 9 10

Pain Absent

moderately painful

Severely painful

12.) How many times during the _____ week of ___________(month) did you experience pain? ______________________________________

How long did the pain usually last? ______________________________________

Rate the severity of your pain for this week.

0 1 2 3 4 5 6 7 8 9 10

13.) How many times during the _____ week of __________(month) did you experience pain? ______________________________________

Rate the severity of pain for this week.

0 1 2 3 4 5 6 7 8 9 10

14.) How many times during the _____ week of ___________(month) did you experience pain? ______________________________________

How long did the pain usually last? ______________________________________

Rate the severity of your pain for this week.

0 1 2 3 4 5 6 7 8 9 10
## Appendix M

### Table 10

**Frequency Data on the Cognitive Restructuring Treatments**

<table>
<thead>
<tr>
<th>Session Number</th>
<th>Presence of Cognitive Restructuring</th>
<th>Use of A New Guide</th>
<th>Use of Self-directed Change</th>
<th>Evaluation of Rational or Irrational Beliefs</th>
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<tr>
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</tr>
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<td>1 2 - -</td>
<td>- - - 3</td>
<td>- 1 1 1</td>
</tr>
<tr>
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<td>- - 1 2</td>
<td>- - - 3</td>
<td>- 1 2 -</td>
</tr>
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<td>- - 1 2</td>
<td>- - - 3</td>
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*H = High
M = Moderate
L = Low
A = Absent
Table 11
Ratings of the Developmental Stages in RSDT

<table>
<thead>
<tr>
<th>Session Number</th>
<th>Awareness</th>
<th>Exploration</th>
<th>Commitment</th>
<th>Implementation</th>
<th>Internalization</th>
<th>Stabilization</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1 - 2</td>
<td>1 - 2</td>
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<td>2 1 - -</td>
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<td>1 1 1 1</td>
<td>1 - 1 1</td>
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<td>- - 3</td>
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<tr>
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<td>1 2 - -</td>
<td>2 1 - 1 2</td>
<td>1 1 1 -</td>
<td>- 1 1 1</td>
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<tr>
<td>7</td>
<td>- 2 1 -</td>
<td>- 2 1 -</td>
<td>1 - 1 1</td>
<td>1 1 1 -</td>
<td>1 - 1 1</td>
<td></td>
</tr>
</tbody>
</table>

*H = High
M = Moderate
L = Low
A = Absent
Appendix 0

Table 12

UNIVARIATE F TESTS OF OVERALL TREATMENT EFFECTS

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>SS</th>
<th>F</th>
<th>P Less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychogenic Attitudes</td>
<td>48711.93</td>
<td>1.09</td>
<td>0.3801</td>
</tr>
<tr>
<td>Psychosomatic Correlates</td>
<td>26814.75</td>
<td>2.55</td>
<td>0.0924</td>
</tr>
<tr>
<td>Prognostic Indices</td>
<td>48693.23</td>
<td>2.88</td>
<td>0.0684</td>
</tr>
<tr>
<td>Average Subjective Daily Unit of Pain</td>
<td>748.98</td>
<td>2.20</td>
<td>0.1282</td>
</tr>
</tbody>
</table>

df = (3, 16)
### UNIVARIATE F TESTS OF TIME EFFECTS

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>SS</th>
<th>F</th>
<th>P Less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychogenic Attitudes</td>
<td>21.02</td>
<td>0.01</td>
<td>0.9074</td>
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<tr>
<td>Psychosomatic Correlates</td>
<td>28.90</td>
<td>0.08</td>
<td>0.7801</td>
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<td>Prognostic Indices</td>
<td>360.00</td>
<td>0.68</td>
<td>0.4207</td>
</tr>
<tr>
<td>Average Subjective Daily Unit of Pain</td>
<td>1.67</td>
<td>0.30</td>
<td>0.5941</td>
</tr>
</tbody>
</table>

\( df = (1, 16) \)
Appendix Q

Table 14

UNIVARIATE F TESTS FOR TIME X TREATMENT INTERACTION EFFECTS

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>SS</th>
<th>F</th>
<th>P Less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychogenic Attitudes</td>
<td>3817.27</td>
<td>0.47</td>
<td>0.7060</td>
</tr>
<tr>
<td>Psychosomatic Correlates</td>
<td>436.02</td>
<td>0.41</td>
<td>0.7512</td>
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<tr>
<td>Prognostic Indices</td>
<td>515.33</td>
<td>0.33</td>
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<td>Average Subjective Daily Unit of Pain</td>
<td>21.77</td>
<td>1.28</td>
<td>0.3142</td>
</tr>
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</table>

df = (3, 16)