

THE DIFFERENTIAL EFFECTS OF HYPNOSIS, RATIONALE,  
AND SELF-TALK IN COPING WITH PAIN ON THE  
COLD PRESSOR TEST

by Douglas R. Wood

Thesis presented to the School of  
Graduate Studies of the University  
of Ottawa as partial fulfillment  
of the requirements for the degree  
of Doctor of Philosophy



Ottawa, Canada, 1975

UMI Number: DC53570

### INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI<sup>®</sup>

---

UMI Microform DC53570  
Copyright 2011 by ProQuest LLC  
All rights reserved. This microform edition is protected against  
unauthorized copying under Title 17, United States Code.

---

ProQuest LLC  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

## ACKNOWLEDGMENTS

This thesis was prepared under the supervision, guidance, and perseverance of Associate Professor Michel Girodo, Ph.D., of the Faculty of Psychology, University of Ottawa. His resourcefulness and availability when needed were the boosters needed for the completion of this work.

Further thanks are reserved for a couple of fellow dissertation writers, one much more attractive than the other, who have given me support and motivated me by their efforts, far beyond their realization.

Strongly deserving of acknowledgment is the typist of this thesis, Mrs. Ruby Zimmerman, whose efforts were truly beyond the call of duty.

In conclusion, because of many unforeseen occurrences these last three-and-one-half years, a special debt of gratitude needs to be acknowledged to my mother and father; they could not have been more supportive.

## CURRICULUM STUDIORUM

Douglas R. Wood was born February 28, 1939, in Tonkawa, Oklahoma. He received the Bachelor of Science degree from Phillips University, Enid, Oklahoma, in 1962, and the Master of Arts degree in Psychology from Sacramento State College, Sacramento, California, in 1969. The title of his thesis was The Process Reactive Continuum of Schizophrenia as a Predictor of Length of Hospitalization.

## ABSTRACT

This study investigated the effects of Self-statement Training, Hypnosis, and a Rationale in coping with the pain of Cold Pressor Tests on a pretest-posttest, 2 x 2 x 2 factorial design. High hypnotic susceptibility subjects were assigned to seven experimental conditions. Analysis of the results showed that there were differential treatment effects on the report of initial pain intensity, but not on the duration of the hand in icewater. Subjects exposed to Self-statement Training followed by Hypnosis and subjects exposed to Self-statement Training followed by Rationale were found to be equally effective in alleviating initial pain, compared to the subjects who received a combination of these components (i.e., Self-statement Training, Hypnosis and Rationale) and those subjects who received Hypnosis and Self-statement Training singly. Task motivational instructions were found to be effective in increasing the duration of the hand in icewater but not in reducing the subjective report of pain. The role of Self-statements as distractors and methodological issues were discussed.

## TABLE OF CONTENTS

	page
LIST OF TABLES	viii
LIST OF FIGURES	ix
Chapter	
I. INTRODUCTION	1
Stress	1
Pain	3
Self-Control	13
Cognitive Behavior Modification	15
Cognitive Therapies	17
Stress Inoculation Training	20
Hypnosis and the Control of Pain	24
II. METHOD	33
Subjects	33
Apparatus	35
Dependent Measures	36
Procedure	39
III. RESULTS	43
Cold Pressor Test - Duration	43
Subjective Reports of Pain	49
Analysis of Use of Self-Statements	58
Analysis of Motivational Factors	59
Correlational Analyses	66

IV. DISCUSSION	70
Motivational Variables	70
Effects of Treatments on Pain Intensity Reports	71
The Importance of Self-Statements	75
Methodological Issues	79
Implications for Future Research	80
REFERENCES	81

#### Appendix

1. Pretest Instructions	87
2. Questionnaire (CPI)	89
3. Self-statement Procedure	91
4. Sample List of Self-statements	96
5. List of Self-statements	97
6. Recollections of Self-statements	98
7. Hypnotic Induction Procedure	99
8. Stress Inoculation Rationale	105
9. Heart Rate Apparatus Presentation	108
10. Cold Pressor Test 2	110
11. Cold Pressor (TMI) Test 2	111
12. Questionnaire (CP2)	113
13. Raw Data	117

LIST OF TABLES

Table	page
1. <u>t</u> Test of Means of Correlated Sample on Cold Pressor Test 1 to Cold Pressor Test 2 Scores (Duration in Seconds) . . . . .	46
2. Fisher Exact Tests on Cold Pressor Percent Increases . . . . .	48
3. Summary of One-way Analysis of Variance for Pain Report Change Scores . . . . .	51
4. Summary of Two-way Analysis of Variance (Hypnosis X Rationale) for Pain Report Change Scores . . . . .	52
5. Summary of Two-way Analysis of Variance (Hypnosis X Self-statements) for Pain Report Change Scores . . . . .	53
6. Summary of Two-way Analysis of Variance (Hypnosis X Rationale) for Self-statement Information . . . . .	60
7. Summary of One-way Analysis of Variance for Motivational Factors. . . . .	62
8. Summary of Two-way Analysis of Variance (Hypnosis X Rationale) for Motivational Factors . . . . .	63
9. Pearson Product Moment Correlation Coefficients . .	68

LIST OF FIGURES

Figure	page
1. Illustration of the Incomplete Factorial Design. . . . .	34
2. Parts and Approximate Times of Experiment . . . . .	38
3. Mean Pain Ratings on Four Subjective Reports of Pain for Subjects in the Six Treatment Manipulations . . . . .	54
4. Mean Pain Ratings on Four Subjective Reports for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale vs. No Rationale. . . . .	55
5. Mean Pain Ratings on Four Subjective Reports for Subjects under Conditions of Hypnosis vs. No Hypnosis and Self-Statement vs. No Self-Statement . . . . .	57
6. Mean Ratings of Percent of Time Self-Talk was Positive for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale vs. No Rationale. . . . .	61
7. Mean Ratings on Three Subjective Reports of Motivation for Subjects in the Six Treatment Manipulations . . . . .	64
8. Mean Rating Scores on Three Subjective Reports of Motivation for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale vs. No Rationale. . . . .	65

## INTRODUCTION

### Stress

Stress is a term found in both the psychological and physiological literature. Hans Selye (1956), an endocrinologist, was the first to introduce the term to the life sciences (Appley & Thumbrull, 1967). Selye's original definition concerned the reaction to extreme disturbances such as traumatic shock of various sources (e.g., burns and blood loss). Later, Selye developed the concept of the General Adaptation Syndrome where stress was seen as the result of almost any outside or environmental disturbance which could have implications for the biological integrity of the organism.

Today, the term stress has many surplus meanings and it is often used interchangeably with terms such as fear, anxiety, or threat. A major difficulty in dealing with the term is that it can be defined in terms of a stimulus, of an intervening process, or in terms of a response (R. Lazarus, 1966).

An example of a stimulus definition is "any physical or psychological environment pressure, which if continued for a sufficient period at a sufficient intensity, would disrupt the functioning of the individual" (Orne, 1965, p. 287). A

problem with a stimulus definition is that a stressful stimulus for one individual may not be a stressful stimulus for someone else.

Stress can also be seen as an intervening process. Investigators such as R. Lazarus (1966) and Spielberger (1972) prefer to use the term "threat" in this context. Threat is then defined as "the anticipation by the individual of a harmful occurrence" (R. Lazarus, 1966, p. 33). Spielberger's (1972) definition is similar, "threat refers to an individual's idiosyncratic perception of a particular situation as physically or psychologically dangerous" (p. 30). Kelly (1955) discussed a similar idea when he wrote, "A person's processes are psychologically channelized by the way in which he anticipates events" (p. 46).

Stress can also be defined in terms of a response. Selye's (1956) previously cited definition is an example of a response definition. In order to understand stress responses more fully, R. Lazarus (1966) suggests using a four-class breakdown to index stress reactions. These include: (a) reports of disturbed affects, (b) motor behavioral reactions, (c) changes in the adequacy of cognitive functioning, and (d) physiological changes.

For the purposes of this discussion, then, the stimulus will be referred to as a stressor; the intervening process will be referred to as a threat. The responses will include physical reactions such as increased autonomic and adrenal

activity. The psychological reactions can include emotions such as fear, anger, or anxiety.

As far as the concept of stress is concerned, the major emphasis of this study is with the threat or intervening process of stress. In this study, however, there will indeed be: a stimulus portion, the pain of the ice water; a threat portion, the anticipation that the hand will freeze or be damaged; and a response portion of the stress, the tingling and/or numbness of the fingers as a result of the exposure to ice water.

### Pain

The anticipation and experiencing of pain can both be threatening to an individual. The concept of pain has been a controversial and difficult issue throughout the life sciences. It is controversial in that numerous theories have been put forth and none received full support of the scientific community. It is a difficult issue because there can be ethical considerations involved in both laboratory and clinical situations when pain and even suffering may be involved.

Pain is difficult to define, but Sternbach (1968) has attempted to do so and his definition will be considered for this study.

Pain is an abstract concept which refers to (1) a personal, private sensation of hurt; (2) a harmful stimulus which signals current or impending tissue damage; (3) a pattern of responses which operate to protect the organism from harm. These responses can be described in terms which reflect certain concepts, i.e., in neurological, physiological, behavioral, and affective "languages." (p. 13)

It is interesting to note number (2) above. This definition has much in common with the definition of threat that has been adopted for this study. Sternbach's definition implies that pain may result from both an anticipated event or a current one. Also what is a "harmful stimulus" is an interpretation of the individual. What an individual sees as a signal for a current or impending aversive event would depend on his prior experience. It is in this similarity with threat (i.e., that pain does have a threat or cognitive component) that pain tolerance will be used as a dependent variable in this study. The fact that interpretation is involved in determining a threat suggests care in choosing a laboratory source of pain in an experiment.

The controversy as to the theoretical nature of pain has been in existence since the early 1900s. Different attempts were made to describe the phenomenon, but the majority of the attempts could be placed in two general areas of pain theory: (1) specificity theory, and (2) pattern theory.

In simple terms, specificity theory states that there are specific receptors for pain located throughout the body tissues. When these receptors are stimulated the impulses are then carried to a specific portion of the brain called the pain center. Melzack & Wall (1965), in criticizing specificity theories, make the following statements:

To say that a receptor responds only to intense, noxious stimulation of the skin is a physiological statement of fact. . . . To call a receptor a "pain receptor," however, is a psychological assumption. . . . The facts of physiological specialization provide the power of specificity theory. Its psychological assumption is its weakness. (p. 971)

Pattern theories are a general group of theories that arose as a reaction against specificity theories. These theories are primarily concerned with what they consider to be the weakness of specificity theories' assumptions in the psychological realm. Some pattern theories fail because they ignore observed physiological specializations. Others accept the concept of physiological specialization; however, although they explain a great deal of the observation regarding pain, they are not at all inclusive in their description of the phenomenon (Melzack & Wall, 1965).

As a result of the inadequacies found in the two theories of pain discussed, the Gate Control Theory of Pain was proposed (Melzack & Wall, 1965; Melzack, 1974). Briefly, this theory accepts the concept of physiological specificity of pain receptors. It differs from the other

theories in that it proposes that a gate control system exists in the spinal cord.

Stimulation of the skin evokes nerve impulses that are transmitted to three spinal cord systems: the cells of the substantia gelatinosa in the dorsal horn, the dorsal column fibres that project toward the brain, and the first central transmission (T) cells in the dorsal horn. We propose that (i) the substantia gelatinosa functions as a gate control system that modulates the afferent patterns before they influence the T cells; (ii) the afferent patterns in the dorsal column act, in part at least, as a central control trigger which activates selective brain processes that influence the modulating properties of the gate control system; and (iii) the T cells activate neural mechanisms which comprise the action system responsible for response and perception. Our theory proposes that pain phenomena are determined by interactions among these three systems. (Melzack & Wall, 1965, p. 974)

The particular portion of this theory that is most important for this study is related to the importance of cognitions.

Thus, it is possible for central nervous system activities subserving attention, emotion, and memories of prior experience to exert control over sensory input.

We propose that the presence or absence of pain is determined by the balance between the sensory and the central inputs to the gate control system. . . . The model suggests that psychological factors such as past experience, attention, and emotion influence pain response and perception by acting on the gate control system. (p. 978)

Clinical and laboratory evidence support the notion that there is a central control, perhaps a cognitive element, in the pain process. Barber (1963), in discussing pain, cites numerous studies which support the notion that pain perception is influenced by cognitive

activities. Barber (1963) mentions that "pain" is a multi-dimensional concept.

First, "pain" refers to an unpleasant sensation which varies not only in intensity (from "mild" to "excruciating") but also in quality (from the lancinating sensation associated with trigeminal neuralgia, to the burning sensation found in causalgia, to the deep, aching sensation of abdominal cramps). Secondly, the term "pain" subsumes not only these various "sensations of pain" but also a "reaction pattern" which is generally categorized by such terms as "anxiety" or "concern over pain." Although these two components of the "pain experience"--"sensation of pain" and "anxiety or reaction to pain"--are normally intimately related, a series of studies . . . suggests that they can be partly dissociated under certain conditions. (p. 304)

Beecher (1959) refers to clinical evidence of how pain varies when he reports his findings from a large group of seriously wounded combat soldiers. He found that a majority of the troops did not suffer but were in good spirits and did not want to take drugs. Beecher stated that the men were not in shock as they complained of pain from other sources such as the way they were handled and from injections into the veins. When this was compared to a group of civilian males who had less serious operations for trauma, the amount of suffering and requests for medication were significantly greater. An interpretation offered was that, to the soldier, the wound was not a bad thing but a good event in the sense that he was not killed and he would now come off the front lines. The civilian saw his surgery in a much more negative manner with increased anxiety present.

Other studies (e.g., Hill, Kornetsky, Flanary & Wikler, 1952; Kornetsky, 1954) suggest that morphine causes pain relief, not because it stops the pain sensation, but because anxiety in general and/or the fear of the pain is lessened. Barber (1963), in his review of the concept of pain and the effects of hypnosis, makes a comment that, while specific to hypnosis, is quite relevant for the study in general.

It may be more relevant to focus on the "reaction" component of the "pain experience" rather than on "pain sensation per se." If "hypnotically suggested analgesia" relieves "anxiety" or "concern over pain" but does not affect pain as a sensation or exerts only an indirect effect or a minor effect on pain sensation, it can be said that it (1) affects a major component of the "pain experience" and (2) it may be exerting as much effect on "pain experience" as powerful analgesics such as morphine. (p. 305)

These studies support the suggestion that there is a major cognitive component in pain perception. It would appear, then, that a cognitive training procedure would be useful in effecting pain tolerance.

Problems do exist in the experimental investigations concerning pain. For example, when investigating a clinical population there is difficulty in maintaining adequate control as far as scientific procedures are concerned. Also, the observer has no control over the pain intensity or duration and the settings may vary considerably from room to room in a hospital.

As a result of the difficulties involved in investigating pain in clinical settings, most studies deal with pain generated in a laboratory setting using such sources of pain stimuli as the Cold Pressor Test, electric shock, ischemia, and pressure on a finger. There are difficulties in using laboratory settings and non-clinical populations, too. Beecher (1959) has pointed out major difficulties of laboratory pain inductions (e.g., the problem of generalization) but the approach is still a useful one.

Numerous studies using pain tolerance as a measure have examined various cognitive strategies to tolerate pain and/or to decrease the reactive component of pain. Two basic categories of cognitive strategies can be seen: (1) distraction--the subject is required to attend to another stimulus (e.g., white noise, Melzack, Weisz & Sprague, 1963); and (2) active coping techniques--the subject is not only not attending to the stressor but is performing some task such as issuing positive self-statements (Meichenbaum & Turk, 1975). (While it might be argued that both (1) and (2) above are both, in actuality, distractions, a discussion of this issue is beyond the scope of this study.)

Melzack et al. (1963) performed a study that used distraction as a cognitive method of coping with pain, the Cold Pressor Test being used as a measure of pain tolerance. The design of the study was a pretest-posttest design in which three groups participated: one group was told to

focus on a combination of music and white noise (all subjects wore headphones); another group was told stimulating the hearing function was effective in controlling pain and it was also exposed to the music and white noise; and a third group was told that they would be exposed to ultrasonic sound which was beyond their range of hearing but would affect their pain tolerance (there was no sound produced over the headphones). The only group that showed a significant increase in tolerance time was the group that was told of the effectiveness of the music and white noise in removing pain. This study supports the idea of the importance of having a belief in a technique and a technique to employ in the coping process.

A study performed by Kanfer and Goldfoot (1966) yielded interesting results. This study consisted of five groups in a posttest only design: (1) Control--subjects were told that they would find the experience uncomfortable, but were asked to keep their hand in the water as long as they could; (All subjects received these instructions.) (2) Verbal, negative--subjects were also told that most people have severe pain and cramping and that the pain would be intense; (3) Verbal, talk--subjects were requested to describe aloud their sensations into a tape recorder as they came; (4) External distraction (passive), clock--subjects were told to observe the clock and to set goals for various periods of time; and (5) External distraction (active),

slide--subjects were shown slides of Europe. They were asked to describe aloud each slide as they observed it, and were able to change the slides by a button whenever they desired.

The group that had the highest mean tolerance time was the group that watched the slides, with the group that used the clock having the second highest mean tolerance time. (A one-way analysis of variance on tolerance times was significant.) Interestingly, the control group had a higher mean tolerance time than the verbal-talk group. One possible difference could be that the control group was able to use their own unique self-control techniques. In any case, distraction was effective in increasing duration time.

Barber and Cooper (1972) used attention-diversion techniques of listening to a story, adding sevens verbally, and counting out loud from one to four repeatedly. The 14 subjects in each group (a control was also included) were exposed to pressure on the finger for two separate two-minute periods. This pretest-posttest design supported the effectiveness of listening to a story and adding sevens aloud, but only for the first minute of pressure stimulation.

Kanfer and Sidner (1973) used the Cold Pressor Test on a pain stimulus in a complicated study consisting of two experiments involving distractions and various reinforcement contingencies. The results of the study suggest that

when the subjects had control of their distractors they were more successful in coping with the ice water than when the experimenter had control. It also showed that distraction techniques were effective in reducing pain reports.

Numerous other studies (e.g., Bobey & Davidson, 1970; Blitz & Dinnerstein, 1971; Knox, 1972; Spanos, Barber & Lang, 1974) have reported the effectiveness of distraction techniques.

Meichenbaum and Turk (1975) critically review many of these studies and point out the difficulties in interpreting the results (e.g., there are many types of attention diversion). "Such factors as whether the subject is employing his self-generated strategy or whether the strategy is under the subject's own control will influence the efficiency of the coping device" (p. 16). Meichenbaum and Turk also discuss methodological problems often found in studies concerning the treating of pain. These problems include whether or not the subject uses his own strategies, the nature of the pain stimulus, the instructions used in the experiment, the demand characteristics of the experimental situation, and the type of design employed (e.g., whether or not a pretest-posttest design is used).

### Self-Control

The concept of self-control is an important one for this discussion. Self-control (Skinner, 1953), self-management (Mahoney, 1972), self-regulation (Kanfer, 1970), and personal control (Averill, 1973) are some of the terms used to consider the importance of the individual's ability to effect a change in a response action (controlled response) by another action of the same individual (controlling response). This could involve a physical action such as biting one's tongue to prevent laughter or a cognitive procedure such as counting to 10 to keep from losing one's temper. Studies discussed earlier (e.g., Kanfer & Goldfoot, 1966) suggest improved performance when the individual does have some control over the stimulus properties (e.g., when the stimulus occurs, and its duration).

An interesting aspect of the self-control area is the concept of perceived control. Studies by such investigators as Bowers (1968), Corah and Boffa (1970) support the importance of perceived control even if it is only a choice to be able to avoid a situation and the choice is not actually taken. Geer, Davison, and Gatchel (1970) have shown that a false sense of self-control can significantly affect responses to aversive stimuli. Although this is a cursory look at the topic of self-control (for a thorough discussion of the topic, see Averill, 1973; Skinner, 1953; Mahoney,

1972), it is sufficient to suggest that the belief of the subject (i.e., whether he believes he can affect the stressful situation or not) is extremely important in coping with stress. An important question that may be asked, then, is: is it important to help subjects believe the effectiveness of a procedure they are presented with in an experimental situation? Melzack et al. (1963) found that the subjects who were told that auditory stimulation was effective in controlling pain and received auditory stimulation, were the only subjects who showed a significant increase in pain tolerance. The importance of this belief seems even more important when the other two groups consisted of either one or the other of the two treatments. The question of why belief is important is a difficult one to answer. It appears that there are at least three possible explanations of how a belief in a coping procedure enhances performance: (1) it makes the approach qualitatively better; (2) it increases the frequency of the use of the approach, thus increasing the overall effect; and (3) an interaction of the qualitative-increase frequency effect. If the benefit is due to the second or third explanation it remains difficult if not impossible to tell how much, if any, of the effect is due to distraction and how much is due to the interaction effect of other factors (e.g., motivation).

There are two major areas in a cognitive approach to behavior change: (1) cognitive behavior modification, and

(2) cognitive or semantic therapies. Both of these categories have several subclasses. The major concern of this study is the cognitive therapies.

### Cognitive Behavior Modification (CBM)

The CBM approaches have developed from the area of behavior modification. Historically behavior modification has involved dealing with overt stimuli and responses. There has been disagreement in the field about whether to accept a mediational (S-O-R) or non-mediational theory of learning (S-R). In any case, the behavior modification practitioners have dealt with observable behaviors. To accept CBM it is necessary to accept a mediational approach. There are disagreements within the CBM field, however. One major area of disagreement is whether cognitions are viewed as behavior or not. This is an important concern as cognitions as "behavior" would be affected by the "laws of learning" or social learning principles. Advocates of this continuity assumption include such investigators as Homme (1965), Bandura (1969), and Cautela (1969). Examples of CBM based on this assumption include: systematic desensitization and anxiety-relief (Wolpe & A. Lazarus, 1966); covert sensitization (e.g., pairing, imaging oneself becoming violently sick with taking a drink of alcohol, [Cautela, 1971]); and covert reinforcement (pairing an imaginary event with a covert reinforcer, e.g., ice cream [Cautela, 1971]).

Researchers such as Meichenbaum and Cameron (1973) and McConagly (1971) have presented results that challenge the continuity assumption. Using an experimental approach on the Wolpe and Lazarus (1966) anxiety-relief procedure for treatment of a simple phobia, Meichenbaum and Cameron found that an inverted anxiety-relief group (i.e., a group that received a shock when they were issuing coping self-statements and had the shock terminated when they made fearful statements) was as effective in reducing fear of snakes as the group that received the anxiety-relief treatment in the proper order (i.e., shocking the fearful statements and terminating shock when coping self-statements were made). McConagly performed an experiment using three groups of homosexuals. The three treatments were: classical conditioning (pictures of males followed by shock), backward conditioning (shock termination followed by pictures of males), and avoidance learning (pictures of males followed by shock in eight seconds but subjects could change slides and prevent the shock). All groups showed improvement as measured by changes in penile volume and self-report. The results of these two studies are difficult to explain if cognitions are seen as behaviors which respond to the principles of learning theory. It is also felt by authors such as Mahoney (1974) and Meichenbaum

(1975) that these approaches are too problem specific, and do not consider the individual's overall functioning.

### Cognitive Therapies

Mahoney (1974) lists several categories of cognitive therapies. These include: (1) cognitive restructuring; (2) self-instruction; (3) coping skills training; (4) problem solving; and (5) attribution. These categories are often found in combination and are not distinct entities. This study is concerned with the first three types of cognitive therapy.

The most obvious example of a cognitive restructuring therapy is the Rational Emotive Therapy (RET) of Albert Ellis. In discussing RET, which was first formulated in 1955, Ellis (1962) states:

The central theme of RET is that man is uniquely rational, as well as a uniquely irrational, animal; that his emotional or psychological disturbances are largely a result of his thinking illogically or irrationally; and that he can rid himself of most of his emotional or mental unhappiness, ineffectuality and disturbance if he learns to maximize his rational and minimize his irrational thinking. (p. 36)

Ellis argues that the form of thought that he is concerned with is the individual's covert verbalizations or self-talk. Ellis deals with the self-talk on two bases: (1) discovering and attacking the basic irrational and illogical belief systems or philosophy of the individual that produce the self-statements (e.g., "I should not fail,"

"I should be perfect," etc.), and (2) focusing on the actual statements made in situations of anxiety and seeing if they are, indeed, valid statements (e.g., "I can't live without her."). An important therapeutic aid is the ABCs of RET. By learning to apply the ABC procedure when a person feels negative emotions, the individual is often able to change the invalid self-statements that, according to Ellis, either caused the emotion in the first place or which maintain the emotion. The ABCs are defined as follows: (1) A--the stimulus or activating event; (2) B--beliefs or attitudes of the person toward the event; (3) C--emotional consequences (i.e., anger, depression, etc.); (4) D--dispute, ask why of beliefs and self-statements at B; and (5) E--the new emotional consequence or effect (e.g., upset instead of depressed).

A difficulty with people is that, over a period of time and usage, self-statements tend to become automatic or outside of awareness; therefore, people often believe that A (the event) causes C (the emotional consequence) when it is actually B (the beliefs and self-statements) that cause C. A major part of RET's approach involves getting people to become aware of their self-talk and then to use techniques like the ABCs to change the irrational beliefs and, hence, the resulting self-talk.

Other cognitive therapists include Kelly (1955), Beck (1970), and A. Lazarus (1971). In Mahoney's (1974)

presentation of cognitive therapies, he separates self-instruction from the restructuring therapists. An excellent example of a self-instruction approach to therapy is Meichenbaum (1973, 1974). (Meichenbaum has several approaches and his stress inoculation procedure, a special type of self-instruction, will be discussed in detail in the next section of this chapter.) The self-instruction approach is quite similar to restructuring approaches but, as Mahoney (1974) states in referring to the differences between self-instruction and restructuring approaches,

Their procedural [sic] distinctions appear to center around the relative emphasis placed on formal logical analysis (e.g., isolation and evaluation of premises), the concomitant presentation of a value system (unconditional self-acceptance), and the authoritarian directiveness with which the therapeutic rationale and procedures are presented. (p. 191)

It is interesting to note that some of the above therapists have started at different extremes (e.g., Ellis & A. Lazarus) but they have both adopted procedures originally used by each and have become similar in their therapeutic approach.

### Stress Inoculation Training

Meichenbaum (1975) and his colleagues (Meichenbaum & Cameron, 1973; Meichenbaum & Turk, 1975) have developed and experimented with a special type of self-instruction called Self-Inoculation Training (SIT). Basically, the purpose of SIT is to train an individual through a multi-step process to develop coping skills that he will be able to use in everyday life. As Meichenbaum (1974) states, in referring to SIT,

The skills-training treatment approach was designed to translate the client's sense of "learned helplessness" into a feeling of "learned resourcefulness" so that he could cope with any stress-inducing situation. (p. 16)

SIT is a three-phase process. The first phase is the educational phase. In this phase the individual is presented a theoretical framework (rationale) to help him understand the nature of reactions to stress. Thus, Meichenbaum and his colleagues have used two main frameworks, depending on the type of stress they were concerned with--the theory of emotion proposed by Schachter (1966) and the theory of pain proposed by Melzack and Wall (1965). The conceptual framework, then, becomes the basis for the particular coping procedures, both of a behavioral and cognitive nature, to be proposed to the subject or client. The scientific validity of the framework is not as important as the face validity and the theory should be as simple and plausible as possible (Meichenbaum & Turk, 1975).

The major importance of the educational phase, then, is to present to the individual a rationale that he can believe, the importance of belief being previously discussed. Once a rationale has been presented, the coping procedure that the rationale suggests is outlined and discussed. In the case of SIT procedures for dealing with a phobia, for example, Schachter's (1966) theory suggests two basic reactions, a physiological one (e.g., a rapid pulse), and a cognitive one (e.g., I'm losing control, I'm in a panic). The theory also suggests the labeling of the physiological reaction by the cognitive one would produce the feelings of fear, anger, etc. Using Schacter's theory a two-pronged approach is applied: (1) the teaching of direct actions to effect the physiological state (e.g., relaxation), and (2) the teaching of coping self-statements and imagery rather than the negative ones that engender anxiety.

To aid in the development and appropriate use of self-statements, Meichenbaum and Cameron (1973) divided the coping process into four phases: (1) preparing for a stressor, (2) confronting and handling the stressor, (3) coping with feelings of being overwhelmed, and (4) reinforcing self-statements. (Examples of the particular self-statements used in this study can be seen in Appendix 4.)

The third phase of the coping process, "coping with feelings of being overwhelmed," is an interesting one. It is an example of a coping approach rather than a mastery approach. In a mastery approach the subject is expected to be able to perform a task, such as approaching a snake, with no anxiety. In the coping approach the subject is taught to approach a snake, for example, feeling somewhat anxious but coping with the feelings by using his coping procedures. Meichenbaum (1971) and Kazdin (1974) have both performed studies with snake phobia subjects. Both studies demonstrated significantly better performance by subjects exposed to a coping model approaching a snake than to a mastery model. The importance of using the physiological state as cues to issue coping self-statements, rather than as a sign of possible failure, is considered as one possible explanation for the superiority of coping models in these studies.

The rehearsal phase is the second phase of SIT and consists of more active participation by the subject. As SIT involves direct action approaches to deal with the physiological arousal, relaxation is commonly used. (It is important to add that SIT is a tailor-made procedure for each individual.) Relaxation training may take several sessions depending on the client and the type of relaxation procedure used. Other types of direct action approaches deal with presenting as much factual information about the

stressful stimulus or event as possible. The major area of concern in this study, however, is the cognitive coping procedures. This type of coping involves such procedures as realistic coping self-statements and imagery.

The kind of self-statements to be used are determined by the client with the aid of the therapist or experimenter, depending on the situation. As mentioned in the description of the education phase, a four-phase coping process was presented and in the rehearsal phase appropriate self-statements are chosen for each of the phases. The manner in which this is accomplished is important, according to Meichenbaum and Cameron (1973). The subject should be actively involved for best results. The types of self-statements used may be concerned with the reality of the situation, preventing negative thoughts, presenting calming thoughts, or preparing oneself to "handle" stress. After the client has determined his self-statements and has had a chance to learn them, the next phase of SIT is begun.

The third phase of SIT consists of applying the coping procedures to laboratory stressors. If a client has a phobia, for example, he would not be exposed to the phobic object at this time but to laboratory stressors such as shock or the Cold Pressor Test. After the subject has practised his coping skills under different stress conditions he is then free to try to deal with other stresses outside of the laboratory. (The subject may be exposed to

models showing coping procedures and asked to imagine himself going through the procedure before he is actually exposed to a laboratory stressor.) Successes of this approach have been reported in such areas as in cases of individuals with more than one phobia (Meichenbaum & Cameron, 1973), test anxiety (Meichenbaum, 1972), and pain control (Turk, 1975).

While the majority of the studies performed using SIT have focused on the effectiveness of SIT compared to other treatments, no study has attempted to look in a systematic way at the importance of various components of the procedure.

#### Hypnosis and the Control of Pain

The area of hypnosis is one of considerable controversy. Some theorists see hypnosis as a special state (e.g., Weitzenhoffer, 1953; Hilgard, 1965) and others see it as a completely unnecessary term (e.g., Barber, 1970; Barber, Spanos & Chaves, 1974).

An example of a state definition would be Warren's (1934) definition used by Weitzenhoffer (1953):

An artificially induced state, usually (though not always) resembling sleep, but physiologically distinct from it, which is characterized by heightened suggestibility, and as a result of which sensory, motor, and memory abnormalities may be induced more readily than in the normal state. (p. 3)

Barber and his colleagues (e.g., Barber, 1969, 1970; Barber, Spanos & Chaves, 1974) are non-state theorists. In reacting to hypnosis as a state, Barber et al. (1974) propose an alternative view to the traditional explanation of hypnosis which they call:

the cognitive-behavioral viewpoint. This approach proceeds to account for so-called "hypnotic" experiences and behaviors without postulating that the subjects are in a special state of "hypnotic trance." In fact, from the cognitive-behavioral viewpoint, the concept of hypnotic trance and related concepts--hypnotized, hypnosis, and hypnotic state--are not only unnecessary but also misleading in explaining the phenomena. From the cognitive-behavioral viewpoint, subjects carry out so-called "hypnotic" behaviors when they have positive attitudes, motivations, and expectations toward the test situation which lead to a willingness to think and imagine with the themes that are suggested. (p. 5)

In any case, individuals who score high on tests of hypnotic susceptibility (e.g., Harvard Group Scale of Hypnotic Susceptibility, Shor & Orne, 1962; Barber Suggestibility Scale, Barber, 1969) do perform many tasks better after a hypnotic induction (Hilgard, 1965; Barber et al., 1974). Using Barber's conceptualization of hypnosis, it would seem that those who score high in susceptibility have good motivation, expectancy, and attitudes about hypnosis and the hypnotic situation. It would follow, then, that those in this category who are exposed to an induction procedure would further increase in some or all of these three areas (i.e., if an individual feels hypnosis works and he is hypnotized, his motivation to perform certain

tasks will be enhanced.) Barber (1969) refers to numerous studies, however, that show similar enhancement of performance as a result of task motivation instructions (TMI). TMI are aimed at producing increased motivation, expectancies, and more favorable attitudes (Barber, 1969). TMI often implore the subjects to really try hard, inform them that other people have succeeded in the tasks previously and that the subjects' lack of cooperation may lead to the failure of the experiment. A further advantage of TMI over a formal induction procedure is that TMI are often effective in increasing performances with low susceptibles, while hypnotic inductions are not.

In any case, state or non-state theorists would both agree that high susceptible subjects would be more suggestible after having received a hypnotic induction procedure. It would then appear likely that a rationale that was simple and plausible would be more readily acceptable to highly susceptible individuals after receiving an induction procedure, than to those high susceptibles who received a rationale without having received an induction procedure.

Another consideration that appears overlooked in most studies is the general area of increased motivational variables (i.e., motivation, attitude, and expectancy) as a result of treatment manipulations. For example, if an individual receives a pretest for pain and then receives a plausible treatment procedure, it seems likely that his

motivations, expectancies, and attitudes will be positively influenced. If this is the case and there is improvement in the posttest, one cannot say if the improvement is due to the treatment per se, the increase in motivational variables, or a combination of both. For this reason, two important considerations would appear pertinent in studies involving treatment manipulations: (1) self-report ratings of an individual's motivation after exposure to a pretest, if used, and a posttest, and (2) the inclusion of TMI in the posttest instructions as an attempt to optimize motivational level in all subjects so that group differences due to treatment alone can be observed. A pretest-posttest design was used in this study to control for wide individual differences in pain tolerance with TMI included for the posttest in order to control for motivational levels.

The Cold Pressor Test (CP) was chosen to be administered as the aversive stimulus. The CP is a widely used method of pain induction employed in the experimental setting. The equipment used in the CP varies from experiment to experiment but basically it consists of a tub or a large pan of ice water in which ice cubes are periodically added to ensure the proper temperature range. Depending on the particular experiment, the water is usually maintained between  $0^{\circ}$ - $2^{\circ}$ C or  $0^{\circ}$ - $3^{\circ}$ C.

Although equipment similar to the preceding description is often used (e.g., Brown, Fader & Barber, 1973; Kanfer & Goldfoot, 1966; Kanfer & Seidner, 1973), other studies used elaborate devices where the ice cubes were kept away from the

subject's hand/or the water was kept circulating by a pump, etc. (Anderson, Jamieson & Man, 1974; Hilgard, Macdonald, Marshall & Morgan, 1974; Johnson, 1974).

The CP has had varied uses in the past. For example, some have used time in icewater, pain tolerance, as a measure of the analgesic effects of hypnosis (e.g., Barber & Hahn, 1962; Evans & Paul, 1970; Hilgard et al., 1974). One study used the CP as a dependent variable for the effect of the use of acupuncture as an analgesic (Anderson et al., 1974). Some studies have attempted to see if there was a relationship between personality types and pain tolerance (e.g., Brown et al., 1973; Lynn & Eysenck, 1961). Still other studies have attempted to look at different methods of coping with the pain of exposure to icewater (e.g., Blitz & Dinnerstein, 1968, 1971; Kanfer & Goldfoot, 1968; Melzack, Weisz & Sprague, 1963).

In some studies, both a pretest and at least one posttest are used with gain scores serving as the dependent measure (e.g., Blitz & Dinnerstein, 1971; Evans & Paul, 1970; Kanfer & Seidner, 1973).

Other differences in the application of the CP involve whether or not time in the icewater (duration) is used as a behavioral measure for a dependent variable. Some researchers have subjects keep their hands in the water for a predetermined time, often one or two minutes (e.g., Evans & Paul, 1970; Hilgard et al., 1974; Johnson, 1974). In these cases, the dependent variables are either self-report (verbal or in the form of

a questionnaire reply) and/or a physiological measure. In other studies, the duration times are not predetermined but the subject is left at his own discretion as to when he can remove his hand (Blitz & Dinnerstein, 1971; Kanfer & Goldfoot, 1966; Kanfer & Seidner, 1973).

In reviewing several studies he and his colleagues had performed using Cold Pressor Tests with self-reports of pain intensity as dependent measures, Hilgard (1969) states:

Pain reported verbally on a simple numerical scale yields not only orderly results, but valid results, in the sense that the pain reported bears a systematic relationship to the temperature of the water and to the time of exposure to the noxious stimulus. The lawfulness is supported by the fit of the power function which holds within so many other perceptual modalities.

I emphasize these findings as a reply to those who would degrade the subjects' statements as being "merely" verbal reports, as though some sort of physiological response would be sounder. I wish to assert flatly that there is no physiological measure of pain which is either as discriminating of fine differences in stimulus conditions, as reliable upon repetition, or as lawfully related to changed conditions, as the subject's verbal report. (p. 107)

The dependent variables in the present experiment were: (1) a behavioral measure, duration of time in icewater, and (2) self-report measures, four subjective measures of pain intensity (Barber & Chaves, 1974). The purpose of this study was to observe the effectiveness of at least two components of a SIT procedure, Self-statements and Rationale. The SIT used in this study was based on the procedure used by Meichenbaum and Cameron (1973) and differed from the standard SIT procedure

in two ways. Firstly, instead of considering the "various" coping procedures available, this study dealt only with the use of appropriate "positive" self-statements. Secondly, the self-statement training (rehearsal phase) was presented prior to the conceptual rationale (educational phase).

As the SIT procedure was not being compared with other treatment approaches but its components were being compared with each other, both individually and in combination, a singular coping procedure was deemed necessary. While normally the conceptual basis or rationale is presented first and is then followed by self-statement training, in the present study self-statement training occurred prior to the presentation of the rationale. This was done because of the concern about the effects of the motivational variables (i.e., the rationale would affect the learning of the self-statements and the quality of the participation in the task). A similar problem was avoided concerning the influence of self-statement training on the presentation of the rationale by only utilizing the rationale in cases where there had been self-statement training. This was also done because subjects who were presented the rationale would surely use self-statements even though they were not trained in their use. Conversely, it would seem more likely that subjects could use self-statements as a result of being instructed to do so without necessarily creating a conceptual framework for them.

A further intent of this study was to observe the effects on the SIT by presenting the rationale under a "hypnosis"

procedure. It was hypothesized that hypnosis would increase the subjects' belief in the truth value of the conceptual framework provided, or increase their motivation to accept the rationale and/or increase their motivation to comply with the demands of the task.

It was hypothesized that subjects who received the rationale under conditions of hypnosis would come to believe in the effectiveness of the technique and would (a) keep their hand in icewater longer, and (b) report lower pain intensities, compared with subjects who were not given the rationale under hypnosis.

It was hypothesized that subjects who received self-statement training plus the rationale would perform better on the behavioral and subjective report measures compared with subjects who were not given the rationale but were only instructed to use self-statements.

It was also hypothesized that subjects who received self-statements only would perform better on the behavioral and subjective report measures compared with subjects who were not given any specific technique. As a corollary to the above, it was hypothesized that subjects given the rationale under conditions of hypnosis would report greater effectiveness in the utilization of self-statements in coping with pain compared with subjects not receiving hypnosis. Similar predictions were made with respect to subjects given the rationale for making self-statements compared with subjects not receiving the rationale.

Furthermore, it was hypothesized that subjects who received task motivational instructions would have increased duration times on the Cold Pressor Test compared with subjects who were not administered task motivational instructions.

## CHAPTER II

### METHOD

This study involved having university students participate in an experiment designed to test procedures for coping with stress. The design was an incomplete 2 X 2 X 2 factorial design, six of the eight groups being represented. The three treatment factors were self-statement training (SS), hypnotic induction (H), and a presentation of the rationale for using self-statements (R). The cold pressor test (CP) was used as both a pre-test and a posttest measure of stress tolerance (duration in ice water). A seventh group was also included in the study. As all the six groups in the incomplete factorial design received task motivational instructions (TMI) on the second CP, the seventh group was added as a control group to test for the effects of TMI (this group did not receive TMI in the second CP). Figure 1 illustrates the design of the experiment.

#### Subjects

The subjects were chosen from students enrolled in day classes of introductory psychology at the University of Ottawa. A total of 304 students, 158 females and 146 males,

		Rationale (R)			No Rationale		
		Hypnosis (H)		No Hypnosis	Hypnosis (H)		No Hypnosis
Self- statements (SS)		SS	H TMI	R	SS	TMI	R
					SS	H TMI	SS TMI
No self- statements						H TMI	TMI

Non-TMI  
Control

Figure 1.- Illustration of the Incomplete Factorial Design.

were administered a modified version of the Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962). Eighty-four of the students or 27.6% had scores of seven or higher. These students served as the subject pool for the experiment.

The seventy students who served as subjects were then selected from a randomized list of the 84-member pool. The subjects' ages ranged from 18 to 25 years, the mean age being 19.8 years. The subjects did not receive payment for their participation in the experiment.

#### Apparatus

The apparatus containing the ice water was a metal Cola container 36 cm deep by 38 cm long by 26 cm wide. The container was well insulated and was kept covered with its insulated lid while not in actual use. Ice was periodically added to the container to keep the temperature under 2°C. An aquarium vibrator air pump delivered air to the bottom of the cooler. This was designed to keep the water circulating.

Heart rate was recorded by means of three Nihon Kohden silverplated EKG electrodes, 5 cm by 3 cm. These were attached to the right arm, the left arm (ground), and the left leg. The electrode leads led to a battery-powered differential amplifier with a Schmitt triggered output. The signal then passed to a Vetter FM tape recorder (700

series) with eight-channel capability. (Five channels were actually used. Also leading to the Vetter were leads from a battery-powered three-channel pulse generator. A Telequipment two-channel oscilloscope was also included in the system.<sup>1</sup>

### Dependent Measures

There were two types of dependent measures used in this study. As a behavioral measure, length of time the hand was kept in ice water (duration) for both cold pressor tests was obtained. Self-report measures consisted of two similar questionnaires (Appendices 2 & 12). (See below)

(1) Cold Pressor Test Duration.- Time in ice water was recorded by a stopwatch. The subject was instructed to place his hand in the ice water via a tape recording. At the moment the hand touched the water the stopwatch was started and also a switch on the pulse generator was engaged. This caused a signal to be recorded on Channel 4 of the FM tape recording. The pulse generated switch was turned off when the subject took his hand from the water. The stopwatch was stopped also and the time was recorded. The tape recording served as a backup for the measurement of time. The procedure was the same for the second cold pressor test.

---

<sup>1</sup>The heart rate was recorded as part of other research interests of the author unrelated to the present concerns of this study.

(2) CP1 Questionnaire (Appendix 2).- This questionnaire was designed to obtain information from the subject regarding his exposure to the CP1. The questionnaire consisted of a pain rating portion similar to those used by Brown, Fader and Barber (1973). Four subjective measures of pain intensity using an eleven-point scale were used. These were: (1) pain intensity when first felt, (2) maximum pain intensity, (3) pain intensity immediately before removal, and (4) average pain intensity. Questions were also asked regarding the use of techniques, the percent of the time techniques were used, and the percent effectiveness of the techniques.

(3) CP2 Questionnaire (Appendix 12).- This questionnaire was similar to the CP1 questionnaire. It asked the pain intensity rating questions a second time and included additional items that were not included on the first test because of their possible reactive effects. These items included specific questions regarding the use of self-statements (i.e., the percent of the time the self-talk was positive, the percent of time the self-talk was negative, and the percent of time the self-talk was effective in controlling pain). The subjects were also requested to list the self-statements they used. Questions were asked regarding the use of other techniques, their effectiveness and the percent of time these techniques were used. Subjects were also requested to rate their motivation levels on both tests and to rate the importance

<u>Component</u>	<u>Approximate Time</u>
1. Introduction (Appendix 1)	5 min.
2. Baseline - waiting period	10 "
3. CP1	5 "
4. CP1 Questionnaire	10 "
5. Self-statement training or sitting quietly reading	20 "
6. Hypnotic induction recording or sitting quietly reading	15 "
7. Rationale presentation or heart rate apparatus presentation	8 "
8. CP2	5 "
9. CP2 Questionnaire	12 "
10. Debriefing	5 "
	95 "

Figure 2.- Parts and Approximate Times of Experiment.

of pride, instructions, desire to comply and self-talk, in helping to keep the hand in the water. They were also given the opportunity to explain motivation levels and the reasons for differences, if any.

### Procedure

The subjects were contacted by telephone and a time for their participation was scheduled. When the subjects arrived for their appointment, they were greeted by the experimenter and taken to the room where the experiment was performed (see Figure 2 for schematic of experiment). The subjects were seated and the tape recorded instructions were then presented. Each subject received identical instructions from the same tape cassette until the completion of the CPI questionnaire. The entire instructions are found in the appendices. The subjects were asked to address to themselves an envelope given to them by the experimenter. The handedness of the subject was determined by the experimenter and the subject was seated according to whether he was left- or right-handed. The subjects were then given approximately 10 minutes time in which the heart rate electrodes were attached and a baseline was established. The subject was asked to look to the side and to the rear of his seating position and was shown his or her heart beat on the oscilloscope. After the subject observed the oscilloscope presentation, he was requested to sit back in his chair and not to look at the equipment again until the experiment was completed. (All of the subjects complied with this

request.) After the subjects were seated comfortably, a two-minute heart rate was taken and then the instructions continued by the tape recorder. The subjects then received the instructions for the first CP. After the subject had complied with the instructions and had removed his hand from the icewater, he was given a towel and a few minutes to ready himself for the remainder of the experiment. The next step in the experiment was the administration of the CPI questionnaire. A demand for honesty was made to each subject with the instructions. (The tape recordings were identical for each subject through this portion of the experiment.)

At this point, the start of part five of the experiment, specific cassettes were used depending on the group to which the subject had been previously randomly assigned.

At this point, 40 of the 70 subjects were administered self-statement training (Appendix 3). After the self-statement training, 20 subjects received a taped hypnotic induction (Appendix 7). No suggestions were given in the induction regarding expected behavior. Ten of these 20 subjects were given the theoretical rationale for the use of self-statements (Appendix 8) and the remaining ten were presented with a description of the heart rate recording apparatus (Appendix 9). The remaining 20 subjects who received self-statement training were not exposed to "hypnosis". In order to make subjects' time in the experiment equitable, these 20 subjects were simply

asked to sit quietly and read for approximately 15 minutes. Ten of these subjects were then given the theoretical rationale while the other 10 subjects received a description of the heart rate apparatus. After receiving either the rationale or the heart rate apparatus description, the 40 subjects who received self-statement training were then asked to undergo the Cold Pressor Test a second time after having been given task motivational instructions prior to the attempt.

Of the 70 subjects, 30 did not receive self-statement training and were given magazines to read for 20 minutes. After this, 10 of these subjects received a hypnotic induction procedure followed by a presentation of the description of the heart rate apparatus. After this, they were asked to undergo the Cold Pressor Test a second time after having been given task motivational instructions prior to the attempt. Another 10 of these subjects continued reading for an additional 15 minutes and then received a presentation of the description of the heart rate apparatus. After this, they were asked to undergo the Cold Pressor Test a second time after having been given task motivational instructions prior to the attempt. The final 10 subjects who did not receive self-statement training also continued to read for an additional 15 minutes and then received a presentation of the description of the heart rate apparatus. After this, they were asked to undergo the Cold Pressor Test a second time. These subjects did not receive TMI prior to the attempt.

Following the second Cold Pressor Test, all 70 subjects were given the CP2 questionnaire and, after completion, they were debriefed. The subjects were then given the opportunity to discuss the experiment. They were requested not to discuss the experiment with other students for a period of five weeks, until the experiment was completed.

## CHAPTER III

### RESULTS

In terms of assessing the effects of the independent treatments and combined manipulations, the present experiment relied on two major measures: (1) time (duration) in cold water, and (2) subjective report of pain felt assessed through four scales. These four scales were designed to determine the amount of pain when (1) the pain was first felt, (2) the maximum pain felt, (3) the intensity of pain felt just before the hand was withdrawn, and (4) the average amount of pain reported by the subject throughout the period of the cold pressor test. Other dependent measures in the experiment were designed to assess the effectiveness of the manipulation, and to check on motivational factors inherent in the demands of the task.

#### Cold Pressor Test - Duration

A one-way analysis of variance of pretest scores for duration failed to yield a significant difference between the seven groups in the experiment,  $F(6, 63) = 0.83, n.s.$  For the purpose of further analyses, change (gain) scores were obtained by subtracting the posttest duration scores from the pretest duration scores. (In view of the wide

individual differences in pretest duration scores, this change score analysis yields a much more sensitive index of the effects of the independent manipulations singly and in combination.) A one-way analysis of variance considering change scores of the seven groups in the experiment failed to yield significant differences between groups,  $F(6, 63) = 1.28, n.s.$ ;  $F(6, 63) = 1.28, n.s.$  Upon examining the distribution of the change scores, however, the assumption of normal distribution of the data was questioned (skewness = 0.38; kurtosis = 0.59). Square root, reciprocal, and percent transformations performed on the pretest and posttest scores and change scores failed to affect the nature of the  $F$  values significantly from what had been found using the untransformed differences.

A 2 X 2 analysis of variance (untransformed scores) considering the Hypnosis variable (hypnosis vs. no hypnosis) and the Self-statement variable (self-statements vs. no self-statements) failed to yield a significant  $F$  on any of the sources of variance. Similarly, a 2 X 2 analysis of variance considering the Hypnosis variable and the Rationale variable (rationale vs. no rationale) also failed to produce significant differences in the sources of variance. (These analyses were performed in view of the possibility that the one-way analysis of variance contained an inflated error term; the possibility of "pulling out" interaction sources of variance thereby decreasing the error term and the

subsequent denominator value to test the significance of the  $F$  served as a rationale for these two additional 2 X 2 analysis of variance.) Additionally, similar absence of significant effects was obtained when the analysis contained the transformed data mentioned above. Thus, on the basis of these overall analyses, the results of the present experiment failed to demonstrate any differential increase in duration of hand in cold water from pretest to posttest across the seven treatment manipulations.

Since the assumption of interval data may not have been met in the case of examining duration scores, non-parametric statistics were applied. A Kruskal-Wallis One-Way Analysis of Variance by Ranks was performed on the change scores. This analysis failed to reveal any differences between groups,  $H(6) = 4.24$ , n.s., suggesting that there were no differential changes in duration across groups.

Another way of considering the duration scores is to examine the extent to which subjects in each group individually increased or decreased from pretest to posttest. When correlated  $t$  tests were performed on each group individually for duration scores an interesting pattern of results emerged. Table 1 presents the mean pretest and posttest scores for all groups and summarizes the analysis for the correlated  $t$  tests. As can be seen, all groups in the experiment except one, the non-TMI group, increased their duration scores significantly from pretest to posttest.<sup>1</sup>

---

<sup>1</sup> A strength of association estimate was determined for the significant  $t$  scores. The lowest estimate was .20 with .31 being the highest. This supports the interpretation that the significances were not of a trivial nature.

Table 1

t Test of Means of Correlated Sample on Cold Pressor Test 1 to Cold Pressor Test 2 Scores (Duration in Seconds)

Group <sup>a</sup>	Pretest $\bar{X}$	Posttest $\bar{X}$	<u>t</u> <sup>b</sup>
SS-H-R	62.5	132.0	-3.12**
SS-R	58.0	165.0	-3.58***
SS-H	110.1	200.5	-2.97**
SS	122.8	185.6	-3.05**
H	121.3	174.7	-3.29***
TMI Control	108.9	183.4	-2.51*
Non-TMI Control	117.8	132.9	-0.42

\*p < .05

\*\*p < .02

\*\*\*p < .01

(two-tailed)

<sup>a</sup>10 subjects in each group. (Some subjects were requested to remove their hand after 300 seconds (c.f. Appendix 13). The results of the statistical analyses using either all subjects or selected subjects (various combinations of subjects affected by the 300 second limit on either test) were similar.

<sup>b</sup>df 9

A closer analysis of individual and subject scores in terms of number of subjects in each group who either decreased or increased on posttest scores by less than 30% of pretest scores, less than 50% of pretest scores, and more than 100% of pretest scores, yields interesting information. Table 2 summarizes the results of these analyses for the Fisher Exact Probability Tests. As can be seen, comparing the non-TMI subjects with subjects in every other treatment manipulation shows that significantly fewer non-TMI subjects managed to increase their duration scores by at least 30%, and significantly fewer non-TMI subjects managed to increase their scores by at least 50% of their pretest scores.

It is interesting to note that among all the 70 subjects who took part in the experiment, only three subjects obtained worse posttest duration scores on the cold pressor test. These three subjects all were members of the non-TMI group. One subject decreased his duration score on posttest by 39%, another subject by 74%, and a third subject by 78%.

In summary, when we examine duration scores as a dependent measure of pain tolerance on the cold pressor test, the various treatment manipulations singly or in combination failed to produce differential increases in length of time of hand in cold water. While there was a tendency for all groups to increase their duration scores from pretest to posttest, only the non-TMI subjects failed to significantly

Table 2

## Fisher Exact Tests on Cold Pressor Percent Increases

Group	<u>Less than 30% Improvement</u>			<u>Less than 50% Improvement</u>			<u>More than 100% Improvement</u>		
	No. of Subjects	No. of Non-TMI Subjects	p	No. of Subjects	No. of Non-TMI Subjects	p	No. of Subjects	No. of Non-TMI Subjects	p
SS-H-R	0	6	.01	0	6	.01	6	2	n.s.
SS-R	0	6	.01	1	6	.05	8	2	.01
SS-H	0	6	.01	1	6	.05	7	2	.05
SS	1	6	.05	1	6	.05	4	2	n.s.
H	2	6	n.s.	2	6	n.s.	3	2	n.s.
TMI	1	6	.05	1	6	.05	4	2	n.s.

All tests: one-tailed.

<sup>a</sup>Subjects were excluded from tests who reached 300-second duration on second CP and were unable to improve by at least 30% due to their performance on the first test.

increase their duration scores from pretest to posttest as a group; whereas, subjects in all other treatment manipulations significantly increased their pretest to posttest scores.

### Subjective Reports of Pain

A one-way analysis of variance on the six treatment manipulations was performed on the subjective report of pain scores.<sup>1</sup> These included separate analyses for: (1) intensity of pain when first felt, (2) maximum pain intensity, (3) pain intensity immediately before the hand was removed, and (4) the subject's estimate of the average pain intensity throughout his trial. In order to take into account variance that may have been contributed by interaction effects, two 2 X 2 analyses of variance on each of these subjective report dependent measures were also calculated. These two 2 X 2 analyses of variance of change scores considered (1) Hypnosis (hypnosis vs. no hypnosis) and Rationale (rationale vs. no rationale) and (2) Hypnosis and Self-statement (self-statement vs. no self-statement). No significant differences in change scores were obtained on any of the three ANOVAs for the measure of "maximum pain felt," "pain intensity just before the hand was withdrawn," and the "average pain felt." "Pain first felt," however, yielded significant  $F$ s on the overall one-way analysis of variance for the six groups, and on both 2 X 2

---

<sup>1</sup>The non-TMI control group was excluded from this analysis.

analyses of variance. Tables 3, 4, and 5 summarize the one-way, the Hypnosis X Rationale, and the Hypnosis X Self-statements analyses of variance. As can be seen, the one-way analysis of variance was significant,  $F(5, 54) = 3.11, p < .05$ . Post hoc analyses, using Duncan's Multiple Range Test (Duncan, 1955), were performed to assess where these differences originated. (Figure 3 plots the means of the four pain ratings for the six groups with the significant Duncan's Multiple Range Test results listed.) The results show that those subjects in the SS-H group and those subjects in the SS-R group reported significantly less pain on the "pain first felt" measure than did the other four groups.

A two-way analysis of variance considering Hypnosis and Rationale variables produced a significant treatment interaction effect,  $F(1, 36) = 9.62, p < .01$ . Duncan's Multiple Range Test showed that this interaction effect arises as a result of significant differences in the change scores between what Hypnosis by itself contributed and what the Rationale by itself contributed. (Figure 4 plots the means of the four pain ratings for the four groups with the significant Duncan's Multiple Range Test results listed.) Subjects who were exposed to a condition of hypnosis but no rationale experienced significantly less pain when the pain was first felt compared with subjects who received no hypnosis and no rationale. Also, subjects who received no

Table 3  
 Summary of One-way Analysis of Variance for Pain Report  
 Change Scores

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Pain intensity rating when pain first felt	Between	5	8.11	3.10*
	Within	54	2.61	
	Total	59		
Maximum pain intensity	Between	5	1.79	0.63
	Within	54	2.86	
	Total	59		
Pain intensity immedi- ately before removal	Between	5	0.91	0.12
	Within	54	5.39	
	Total	59		
Average pain intensity	Between	5	4.38	0.98
	Within	54	4.49	
	Total	59		

p < .05

Table 4

Summary of Two-way Analysis of Variance (Hypnosis X Rationale)  
for Pain Report Change Scores

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Pain intensity rating when pain first felt	Hypnosis (A)	1	1.60	0.68
	Rationale (B)	1	0.10	0.04
	A X B	1	22.50	9.62*
	Within	36	2.34	
Pain intensity rating at the most intense point	Hypnosis (A)	1	0.10	0.03
	Rationale (B)	1	0.90	0.27
	A X B	1	0.00	0.00
	Within	36		
Pain intensity rating immediately before the hand was withdrawn	Hypnosis (A)	1	0.40	0.07
	Rationale (B)	1	0.40	0.07
	A X B	1	0.10	0.02
	Within	36	5.74	
Average pain intensity (as determined by subject)	Hypnosis (A)	1	4.90	0.98
	Rationale (B)	1	0.00	0.00
	A X B	1	2.50	0.50
	Within	36	5.01	

p < .01

Table 5

Summary of Two-way Analysis of Variance (Hypnosis X Self-statements) for Pain Report Change Scores

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Pain intensity rating when pain first felt	Hypnosis (A)	1	11.03	4.38*
	Self-state. (B)	1	11.03	4.38*
	A X B	1	7.22	2.87
	Within	36	2.51	
Pain intensity rating at the most intense point	Hypnosis (A)	1	0.40	0.19
	Self-state. (B)	1	3.60	1.71
	A X B	1	0.10	0.05
	Within	36	2.10	
Pain intensity rating immediately before the hand was withdrawn	Hypnosis (A)	1	0.90	0.17
	Self-state. (B)	1	0.40	0.08
	A X B	1	1.60	0.30
	Within	36	5.30	
Average pain intensity (as determined by subject)	Hypnosis (A)	1	9.03	2.65
	Self-state. (B)	1	9.03	2.65
	A X B	1	0.62	0.18
	Within	36	3.41	

\*p < .05

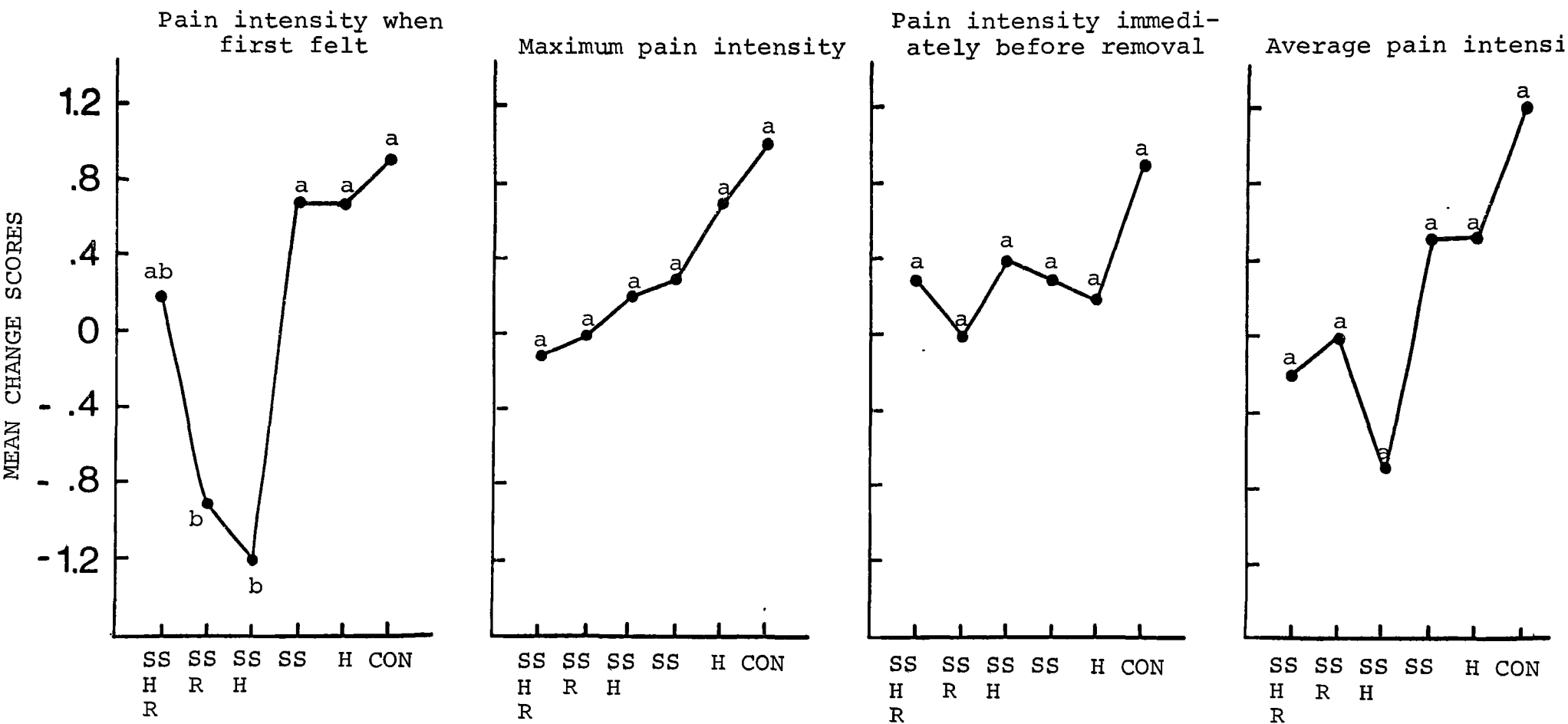


Figure 3. Mean Pain Ratings on Four Subjective Reports of Pain for Subjects in the Six Treatment Manipulations.\*

\*Mean points with different subscripts are significantly different on the Duncan's Multiple Range Test ( $p < .05$ ).

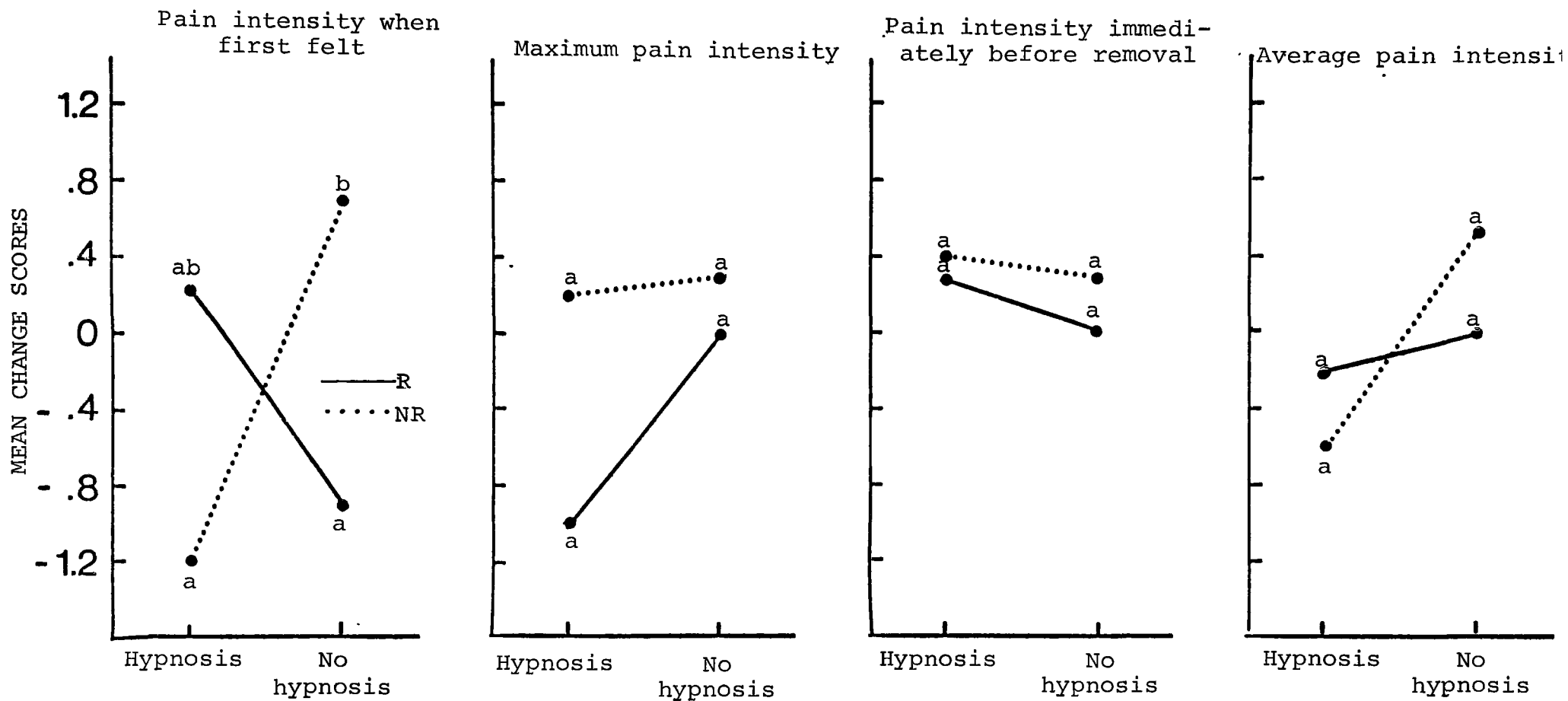


Figure 4. Mean Pain Ratings on Four Subjective Reports for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale (R) vs. No Rationale (NR).\*

\*Mean points with different subscripts are significantly different on the Duncan's Multiple Range Test ( $p < .05$ ).

hypnosis but received the rationale experienced less pain when the pain was first felt compared with subjects who received no hypnosis and no rationale.

The second two-way analysis of variance (Hypnosis X Self-statements) on a measure of "pain first felt" yielded a significant main effect for hypnosis,  $F(1, 36) = 4.38, p < .05$ ; and a significant main effect for Self-statements,  $F(1, 36) = 4.38, p < .05$ . Generally, subjects who were given hypnosis experienced less pain when the "pain was first felt" at posttesting compared with pretest pain estimates; similarly, subjects who were given self-statements experienced less pain when the "pain was first felt" at posttesting in relation to their pretest scores, compared with subjects who were not given self-statements. Figure 5 plots means for the four pain ratings for the four groups and illustrates this effect.<sup>1</sup>

Interesting results can be seen when the TMI control group is compared with the non-TMI control group, which has been omitted from the previously mentioned analyses. While the TMI control group showed a significant increase in time of hand in cold water from pretest to posttest, subjects in this group also showed a significant increase in "intensity of maximum pain felt,"  $t(9) = 3.00, p < .05$ ; and a significant increase in rating at posttest compared with pretest on "average pain intensity,"  $t(9) = 2.25, p < .05$ . Parenthetically, the non-TMI control group showed no

---

<sup>1</sup> An Analysis of Covariance with duration as a covariate calculated for the four measures of pain intensity yielded differences between groups which were fundamentally of the same  $F$  and Duncan's values as the Analysis of Variance reported on the pain intensity measures. This suggests that duration did not significantly affect the pain intensity ratings differentially for subjects in various groups.

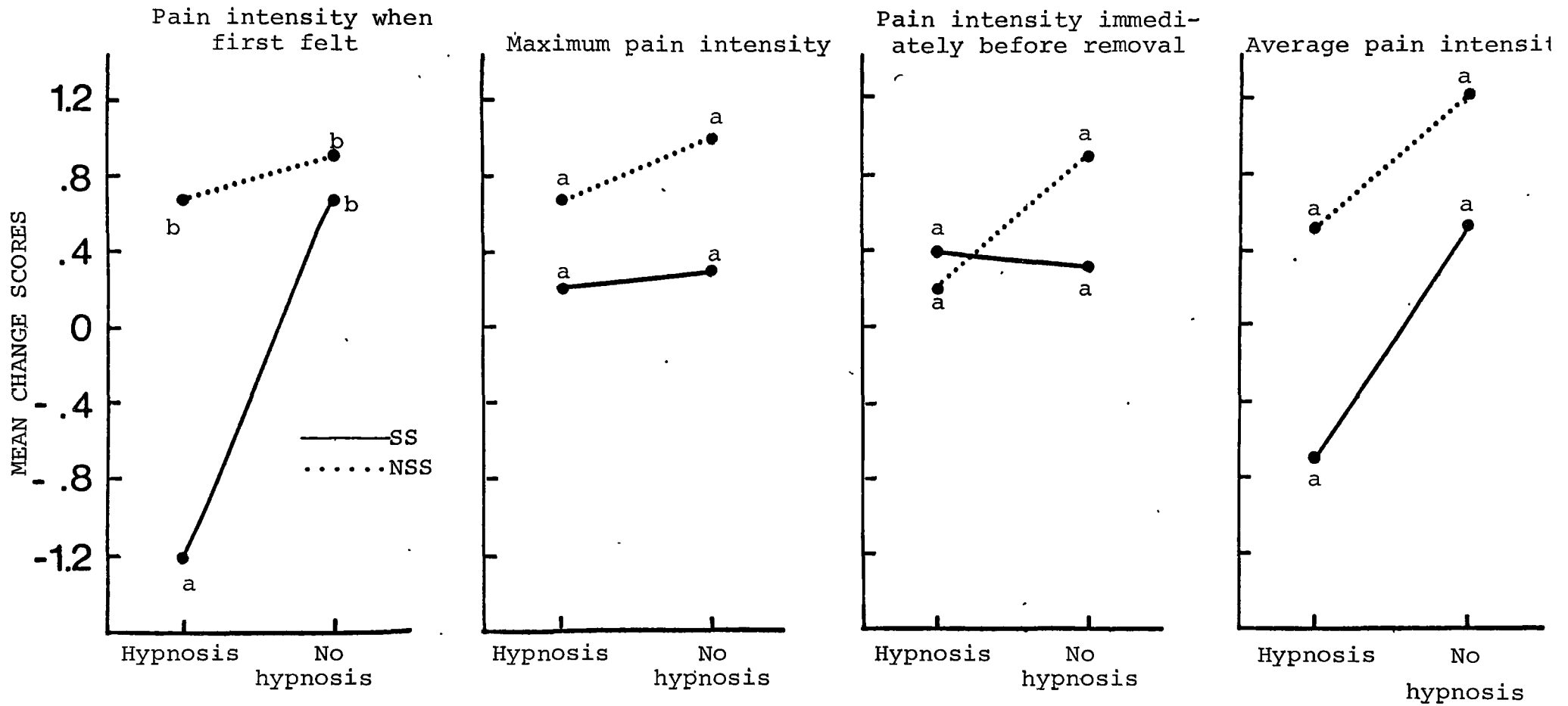


Figure 5. Mean Pain Ratings on Four Subjective Reports for Subjects under Conditions of Hypnosis vs. No Hypnosis and Self-Statement(SS) vs. No Self-Statement(NSS).\*

\*Mean points with different subscripts are significantly different on the Duncan's Multiple Range Test ( $p < .05$ ).

significant differences between pretest and posttest on any of the correlated  $t$  comparisons when considering the four dependent measures of subject report.

#### Analysis of Use of Self-Statements

When we consider the 40 subjects who were given self-statements to use as part of their coping strategy, recall that 10 of these subjects were given the rationale under hypnosis, 10 were given the rationale not under hypnosis ("waking"), 10 subjects were simply hypnotized (and given an irrelevant piece of information), and 10 other subjects received the same irrelevant information and were not hypnotized. After the posttest cold pressor test had been completed, subjects were asked to list the positive statements they made, the percentage of time their self-talk was positive, the percentage of time their self-talk was negative, and the percentage of time they felt the self-statements were effective in controlling the pain. A two-way analysis of variance considering the Hypnosis and the Rationale variables for the four groups that were given self-statements failed to yield significant main effects on the total number of positive self-statements listed, on the measure of the perceived effectiveness of using self-statements, and on the percentage of time self-statements were negative. A significant Hypnosis by Rationale interaction effect was obtained on the measure of percentage of

time the subjects' self-talk was positive. Table 6 summarizes the analysis of variance ( $F(1, 36) = 5.99, p < .05$ ). Figure 6 illustrates this effect. As can be seen, subjects who were not given the rationale and who were not exposed to a hypnosis session indicated that they spent less of their time making positive self-statements compared with subjects who had either the hypnosis alone or the subjects who had been given the rationale in the "waking" state. Since the subjects in the H group reported that they used positive self-statements 74% of the time (cf. Table 8A), a  $t$  test was calculated between this group and the non-TMI control group. No significant differences were obtained ( $t(18) = 0.90, n.s.$ ).

#### Analysis of Motivational Factors

Three separate analyses of variance were calculated for the motivational factors of pride, instruction, and desire to comply. The summary tables for the one-way and the Hypnosis X Rationale 2 X 2 analyses of variance are found in Tables 7 and 8. Figures 7 and 8 depict the mean plots with the significant Duncan's Multiple Range Test results listed. The Hypnosis and Self-statement analyses yielded no significant results.

"Importance of pride" in keeping the hand in the ice water was significant in both the one-way and the Hypnosis X Rationale analyses. Result of the one-way analysis of variance was  $F(5, 54) = 2.34, p < .05$ . Duncan's Multiple Range Test showed that SS-R subjects and the SS subjects rated pride as significantly more important than did the SS-H-R subjects. The Hypnosis X Rationale analysis of variance for "pride" showed a main effect for Hypnosis,

Table 6

Summary of Two-way Analysis of Variance (Hypnosis X Rationale)  
for Self-statement Information

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Number of self- statements listed	Hypnosis (A)	1	0.40	0.19
	Rationale (B)	1	0.90	0.43
	A X B	1	0.10	0.04
	Within	36	2.08	
Percent of time self- talk was positive	Hypnosis (A)	1	2.03	0.67
	Rationale (B)	1	3.03	0.99
	A X B	1	18.22	5.99*
	Within	36	3.04	
Percent of time self- talk was negative	Hypnosis (A)	1	0.03	0.02
	Rationale (B)	1	1.22	0.96
	A X B	1	4.22	3.31
	Within	36	1.27	
Percent of time self- talk was effective in controlling pain	Hypnosis (A)	1	0.00	0.00
	Rationale (B)	1	0.10	0.04
	A X B	1	8.09	3.10
	Within	36	2.62	

p < .05

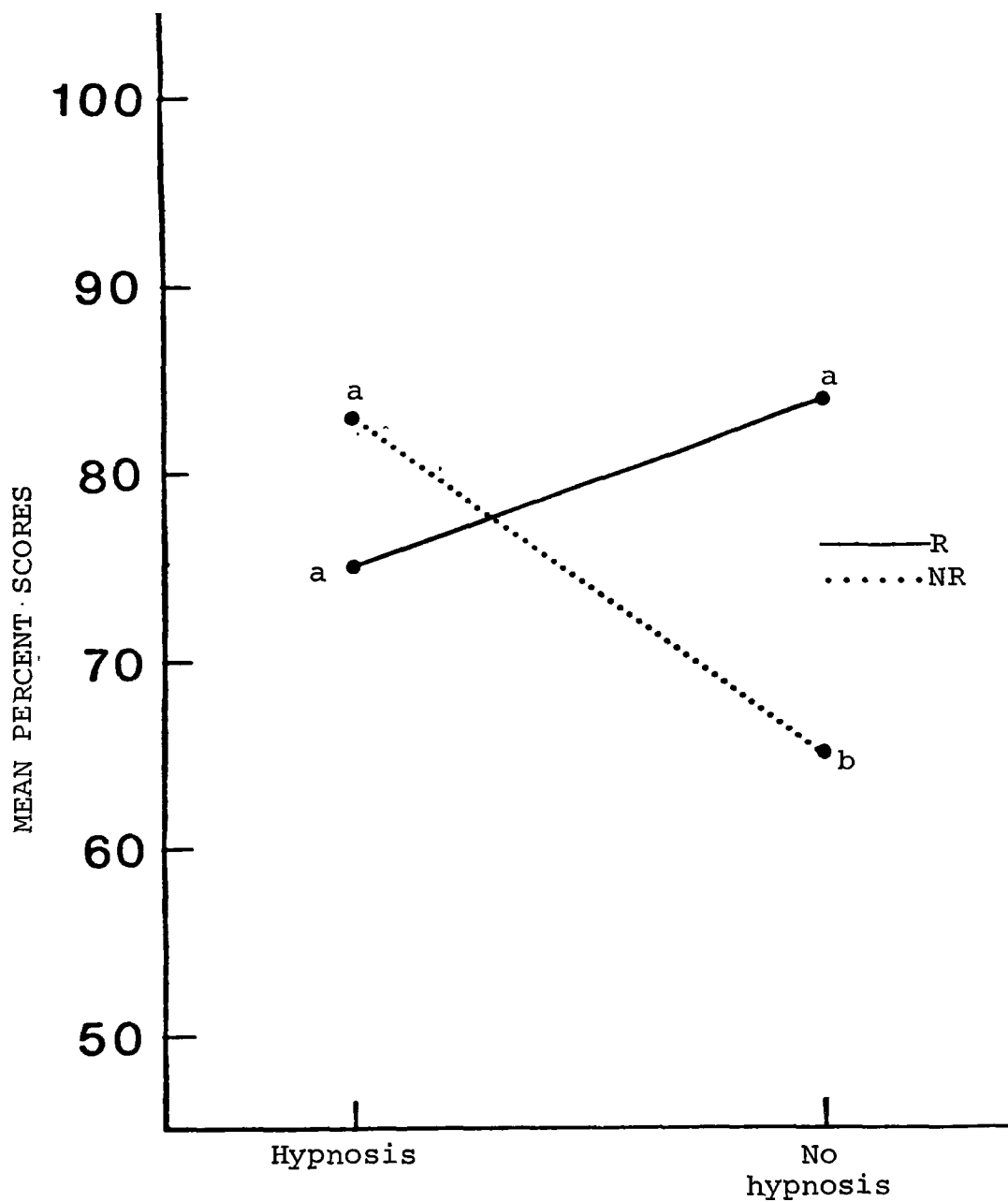


Figure 6. Mean Ratings of Percent of Time Self-Talk was Positive for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale (R) vs. No Rationale (NR).\*

\*Mean points with different subscripts are significantly different on the Duncan's Multiple Range Test ( $p < .05$ ).

Table 7  
 Summary of One-way Analysis of Variance for Motivational  
 Factors

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Importance of pride	Between	5	14.14	2.34*
	Within	54	6.04	
	Total	59		
Importance of instructions	Between	5	6.35	1.76 <sup>a</sup>
	Within	54	3.61	
	Total	59		
Importance of desire to comply	Between	5	5.11	1.17 <sup>a</sup>
	Within	54	4.38	
	Total	59		

\*p < .05

<sup>a</sup>p > .05, but significance obtained on Duncan's Multiple  
 Range Test

Table 8

Summary of Two-way Analysis of Variance (Hypnosis X Rationale)  
for Motivational Factors

	Source	<u>df</u>	<u>MS</u>	<u>F</u>
Importance of pride	Hypnosis (A)	1	36.10	9.95**
	Rationale (B)	1	6.40	1.76
	A X B	1	22.50	6.20*
	Within	36	3.63	
Importance of instructions	Hypnosis (A)	1	14.40	4.94*
	Rationale (B)	1	0.10	0.03
	A X B	1	10.00	3.43
	Within	36	2.92	
Importance of desire to comply	Hypnosis (A)	1	10.00	3.61
	Rationale (B)	1	0.40	0.14
	A X B	1	14.40	5.20*
	Within	36	2.77	

\*p < .05

\*\*p < .01

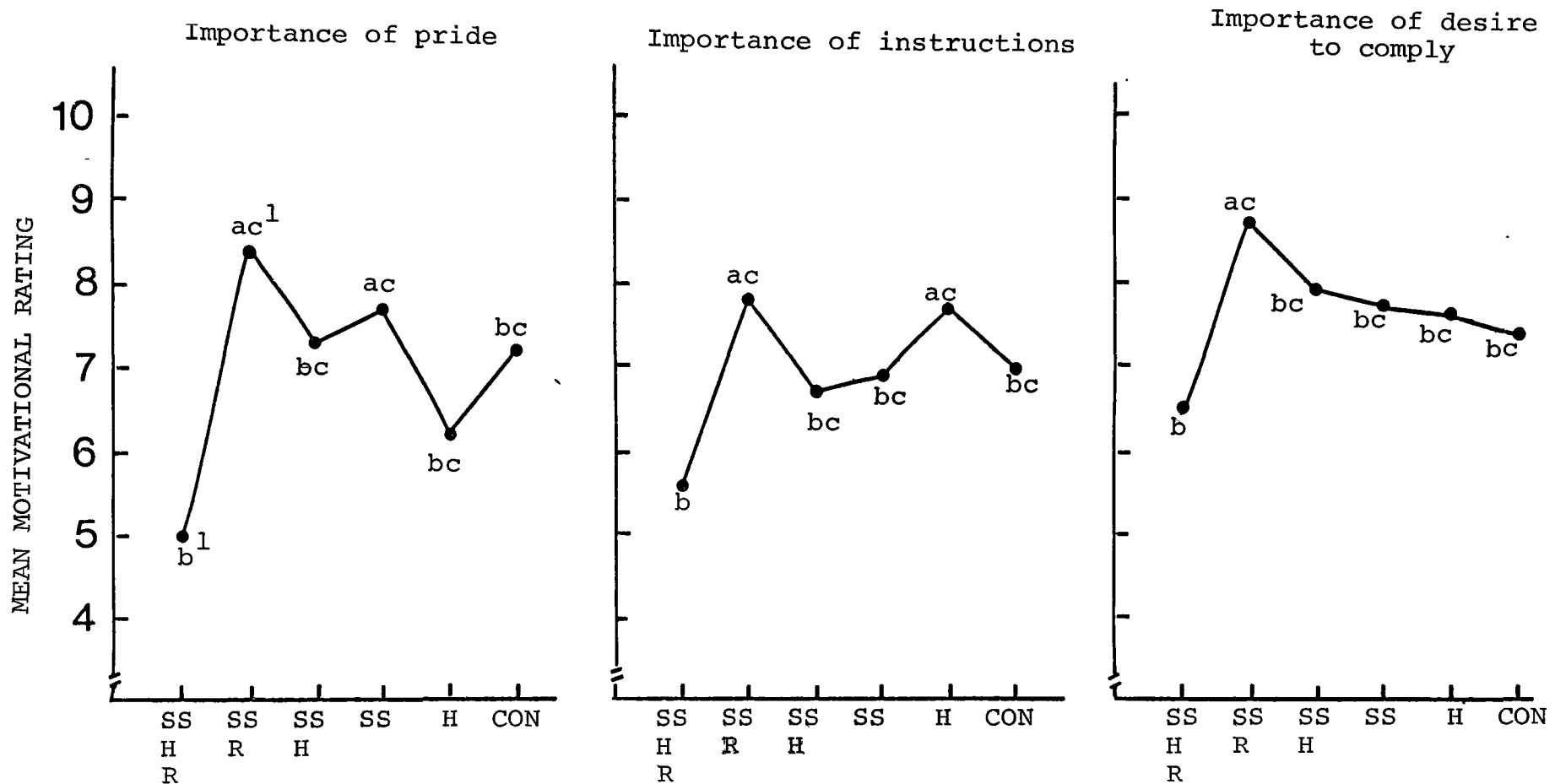


Figure 7. Mean Ratings on Three Subjective Reports of Motivation for Subjects in the Six Treatment Manipulations.\*

\*Mean points with different subscripts are significantly different on the Duncan's Multiple Range Test ( $p < .05$ ). When two items have (1) they are significantly different at the .01 level.

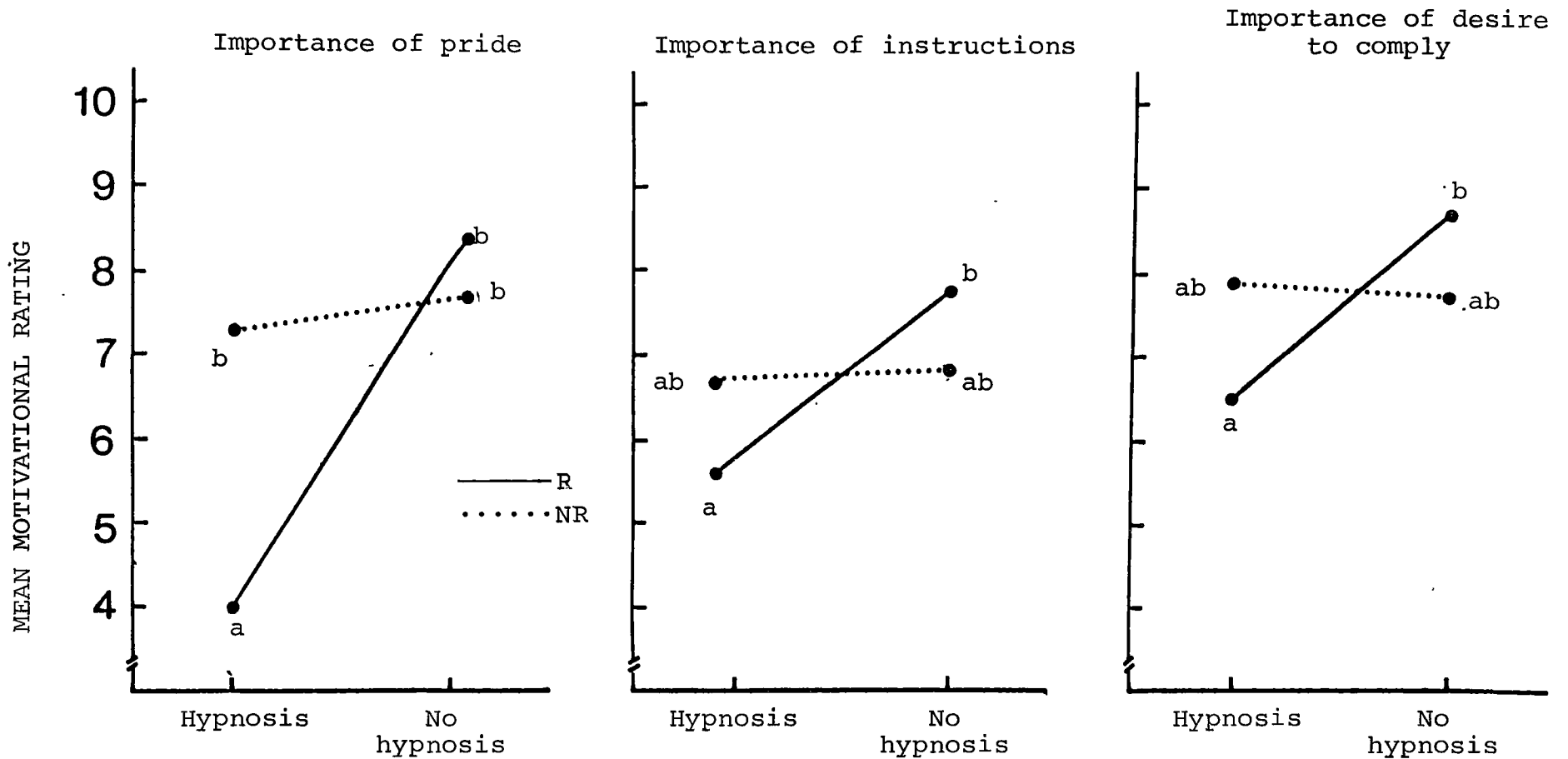


Figure 8. Mean Rating Scores on Three Subjective Reports of Motivation for Subjects under Conditions of Hypnosis vs. No Hypnosis and Rationale(R) vs No Rationale(NR).\*

\*Mean points with different subscripts are significantly different on the Cuncan's Multiple Range Test ( $p < .01$ ).

Table 8A

Means and Standard Deviations of Relevant Variables

Grp	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
SS	69.5	-20	-1	-3	-2	3.1	4.1	3.1	7.8	7.5	2.1	6.8	2.8	3.2	5.0	5.4	6.5	8.5
H																		
R	66.81	1.62	2.23	2.95	2.90	1.60	3.41	2.92	2.97	1.90	1.45	2.04	0.84	2.86	2.58	2.07	1.96	1.43
SS	107.0	-90	0	0	0	3.3	5.4	4.1	8.4	8.4	1.5	9.7	3.3	5.0	8.4	7.8	8.7	8.4
R	89.74	1.73	1.94	1.56	2.21	1.77	3.89	3.35	3.10	0.97	1.18	1.34	2.71	3.23	1.71	1.63	1.63	1.51
SS	90.4	-1.2	.2	.4	-.7	2.2	5.5	6.1	7.2	8.3	1.1	7.6	3.7	6.1	9.3	6.9	7.9	8.3
H																		
R	91.16	1.62	1.81	3.27	1.75	.79	1.84	2.13	2.10	1.34	0.57	0.70	2.45	2.23	1.89	1.42	1.42	1.06
SS	62.8	.7	.3	.3	.5	1.9	5.0	4.8	6.2	6.5	1.8	6.7	3.3	4.5	7.7	6.9	7.7	8.0
H																		
R	61.85	1.06	.95	1.66	2.28	.57	2.83	3.16	2.40	2.42	1.14	2.00	2.36	2.64	1.16	1.66	1.83	1.70
SS	53.4	-.7	.7	.2	.5	2.9	6.9	4.4	2.1	7.4	1.9	6.7	2.4	3.8	6.3	7.7	7.6	8.1
H																		
R	48.63	1.70	1.07	2.53	2.01	2.13	2.18	2.01	1.20	2.17	1.37	2.63	2.32	3.43	3.50	1.41	2.46	1.80
TMI	74.5	-.9	1.0	-.9	1.2	2.2	6.3	5.1	3.3	7.0	2.5	6.7	5.3	5.1	7.2	7.0	7.4	7.8
con	88.91	1.85	1.05	1.73	1.69	2.04	3.16	2.56	2.99	1.94	1.96	2.11	2.41	2.56	3.08	2.83	3.03	1.32
non	15.1	-.7	.8	.2	.2	-.3	5.8	6.1	1.9	6.6	2.0	5.9	4.1	5.5	5.5	4.7	6.4	7.1
TMI	34.22	1.57	1.32	1.40	1.62	2.75	2.20	2.03	2.73	1.78	1.05	2.08	2.28	2.07	2.51	2.98	2.27	1.20
con																		

\* Gold Pressor Test  
 a Pn. 1st felt  
 b Max.pn. intensity  
 c Pn. inte. imed.  
 d before removal  
 e Average pain  
 f Motivation  
 g % time tech. used  
 h % time tech. eff.  
 i Number SS  
 j % time +SS  
 k % time -SS  
 l % time SS eff.  
 m % tm. oth. tech.  
 n % tm. oth. tech.  
 o effective  
 p Imp. Pride  
 q Imp. Instr.  
 r Imp. Desir.  
 S Tlk.

\* a-f refer to posttest minus pretest scores.

$F(1, 36) = 9.95, p < .01$ , and an interaction effect,  $F(1, 36) = 6.20, p < .05$ . H-R subjects felt that "pride" was less important than did the subjects in the other three conditions.

"Importance of instructions" was not significant for the one-way analysis of variance,  $F(5, 54) = 1.76, n.s.$ , but a Duncan's Multiple Range Test showed significant differences ( $p < .05$ ). The SS-R subjects and the H subjects rated "instructions" higher than the SS-H-R group. The results of the Hypnosis X Rationale analysis produced a significant main effect for Hypnosis,  $F(1, 36) = 4.94, p < .05$ .

"Importance of desire to comply" also had a nonsignificant  $F$  on the one-way analysis of variance,  $F(5, 54) = 1.17, n.s.$ , but Duncan's Multiple Range Test showed significant differences ( $p < .05$ ). Here, the SS-R group rated "desire to comply" more important than did the SS-H-R subjects. The Hypnosis X Rationale analysis of variance showed a significant interaction,  $F(1, 36) = 5.20, p < .05$ . The SS-R group rated "desire to comply" significantly higher than did the SS-H-R group (Duncan's Multiple Range Test,  $p < .01$ ). This concludes the within-group and the between-group comparison for the dependent measures.

### Correlational Analyses

Pearson product moment correlations, using all 70 subjects, were calculated for the relevant combination of

variables. Duration on the first CP was correlated with the four pain ratings on the CP1 questionnaire. Duration on the second CP was correlated with the four pain ratings and the motivational variables on the CP2 questionnaire. There were five significant correlations (two-tailed). CP1 duration correlated negatively with "pain intensity immediately prior to removal" ( $\underline{r} = -.30, \underline{p} < .01$ ). This suggests that those subjects who kept their hand in the longest reported less pain intensity just before they removed their hand, than those subjects who had shorter durations on the CP1. A similar negative correlation was obtained on CP2 using the posttest rating of pain immediately before removal ( $\underline{r} = -.35, \underline{p} < .01$ ). There was also a positive correlation between motivation on both tests and the CP duration. (For the pretest  $r = .29, \underline{p} < .05$ , and  $\underline{r} = .25, \underline{p} < .05$  for the posttest.) This indicates that those subjects who kept their hands in the ice water the longest tended to report a higher motivational level. CP2 duration was also positively correlated with the "importance of pride" ( $\underline{r} = .25, \underline{p} < .05$ ).

Correlation coefficients were also obtained using the 40 subjects in the four groups who received self-statement training (see Table 9).

The correlations were calculated using only the post-test questionnaire results, as subjects were not exposed to self-statement training until after the pretest manipulations.

Table 9  
 Pearson Product Moment Correlation Coefficients<sup>a</sup>

Correlations		<u>r</u>
Percent of time self-statements positive	Pain intensity when first felt <sup>b</sup>	-.44**
	Pain intensity immediately prior to removal	-.37*
	Average pain intensity	-.42**
	Motivation	.33*
	CP2 duration	.33*
Percent of time self-statements negative	Pain intensity when first felt	.37*
	Pain intensity at maximum point	.31*
	Pain intensity immediately prior to removal	.46**
	Average pain intensity	.39*
Percent of time self-statements effective	CP2 duration	.39*

\*p < .05

\*\*p < .01

<sup>a</sup>Those subjects who received self-statement training.

<sup>b</sup>All pain reports refer to posttest ratings.

df = 38

All tests: two-tailed

As can be seen, three of the four pain ratings were negatively combined with "percent of time that self-talk was positive" (pain intensity when pain first felt,  $\underline{r} = -.44$ ,  $\underline{p} < .01$ ; pain intensity immediately before removal,  $\underline{r} = -.37$ ,  $\underline{p} < .05$ ; and average pain intensity,  $\underline{r} = -.42$ ,  $\underline{p} < .01$ ). Subjects who reported lower pain intensity tended to report a higher percentage of positive self-talk. There were also significant positive correlations between percent of time self-talk was positive and CP2 duration ( $\underline{r} = .33$ ,  $\underline{p} < .05$ ) and motivation ( $\underline{r} = .33$ ,  $\underline{p} < .05$ ).

Finally, "percent of the time self-talk was negative" was significantly correlated with "pain intensity when first felt" ( $\underline{r} = .37$ ,  $\underline{p} < .05$ ; "maximum pain intensity" ( $\underline{r} = .31$ ,  $\underline{p} < .05$ ; "pain intensity immediately prior to removal" ( $\underline{r} = .46$ ,  $\underline{p} < .01$ ); and "average pain intensity" ( $\underline{r} = .37$ ,  $\underline{p} < .05$ ). There was a tendency for those subjects who reported a greater percent of negative self-talk to rate pain intensities as higher on all four ratings.

## CHAPTER IV

### DISCUSSION

The primary purpose of this study was to examine various components of a SIT procedure, to observe the effects of hypnosis on inducing greater belief in the rationale, and to assess the role of motivation in pain tolerance.

#### Motivational Variables

The results of this study demonstrated that TMI significantly increased subjects' duration time for tolerating pain, whereas the subjects who were not given TMI did not increase their duration time significantly. (Three of the 10 subjects actually decreased their duration time.) Furthermore, significant positive correlations were obtained between the motivational reports of the subjects and the CP durations. These findings are similar to those of Barber (1969, 1970) and his colleagues (Barber, Spanos & Chaves, 1974) where they found TMI did increase performance. The hypothesis that TMI would increase CP duration time is supported.

In the present investigation the TMI control subjects reported significantly more pain intensity on the second Cold Pressor Test than on the first Cold Pressor Test,

whereas the non-TMI subjects did not. These results would suggest that the TMI subjects reported more pain, quite possibly because they chose to endure more pain due to their increased motivation. It is interesting to note that the TMI control subjects were the only TMI subjects to show a significant increase in pain report. This would suggest that, in spite of increased duration due to TMI, there was differential treatment effectiveness.

#### Effects of Treatments on Pain Intensity Reports

As a result of the examination of the pain report results, two interesting questions arise. Why were significant results obtained only when "pain was first felt" and why were the SS-R group and the SS-H group more effective in reducing pain than the SS group, the H group, and the SS-H-R group?

In an attempt to answer the first question, a statement from Barber and Cooper's (1972) study, in which they examined the effects of various types of distraction on pain, is useful.

Distractions such as Listening to a Story or Adding Aloud may be effective in reducing pain produced by the Forgione-Barber pain stimulator only if the stimulus is applied for 1 min. or less. If the stimulation continues for more than 1 min. Ss tend to find the pain intolerable and distractions appear to be ineffective in reducing it. (p. 650)

The Barber-Cooper study differed in one important aspect from the present study in that their subjects did not receive a rationale or any attempt to convince them of the utility of the approaches. The implications do seem relevant, however, for the explanation of why the initial report of pain was the only pain report measure that showed significant differences among the treatment groups.

The importance of the individual's belief is germane in discussing why significant differences were only found in the initial pain report. It appears that subjects in an experiment will attempt to use a procedure taught to them. This is true only if the procedure sounds plausible to the individual, is justified to the individual by the presentation of a rationale, or is demanded by the experimental situation. The proposed reasons why the individual uses the procedure do not answer the questions as to differential treatment effects, though. It is suggested that what does occur is that subjects abandon their technique. It is further suggested that a major reason that the techniques are abandoned is due to the differing degree of belief in the efficacy of the rationale. The belief in the effectiveness of a technique might affect the individual's perception of the feedback cues of the stressful situation. For example, if an individual believes in a technique and he is using it and yet feels increasing pain, he may take the opportunity to see this pain as his failure

to implement the technique correctly. He might therefore be more determined to try harder with the implementation of these self-statements. An individual with a minimal belief in the procedure may see the first feelings of pain as a sign of the inadequacy of the technique and therefore he will abandon it.

Another possible explanation is that "pain first felt" was the only constant measure of self-report of pain intensity which was free of possible effects brought on by increased duration. The TMI may have served to increase duration scores; however, this increase in tolerance may have been induced equally across subjects in all groups, thereby possibly producing a ceiling effect on the remaining three pain intensity measures. The "pain first felt" measure was free of the TMI and duration effects.

The second question as to why the SS-R and the SS-H combination of components were most effective in producing a decrease in initial pain reports is a difficult one to answer. The answer proposed is that the subjects in these two groups believed in their approach and/or were more motivated to employ them. The difficult is, of course, to explain the why of the difference in belief and/or motivation to employ the technique.

In attempting to answer the question why was the SS-R group successful in lowering their initial pain intensity, certain facts need to be reiterated. One of these facts deals with self-statement utilization. While the SS-R subjects spent a greater percent of their time making positive self-statements, as compared with SS subjects, the SS-R subjects did not report that the self-talk was more effective in controlling pain than the SS subjects.

Thus while all subjects tended to find the self-talk equally effective in controlling pain, only the SS subjects spent less time making positive self-statements, possibly because they were less motivated. It may be that while the rationale does not automatically make the technique more effective in controlling pain, the belief in the effectiveness of the technique, induced by the rationale, may be sufficient to persuade subjects to spend more time making their positive coping self-statements and to do so more diligently.

The fact that the SS-H subjects also reported less initial pain intensity is a more difficult task to explain. Two possible explanations are proposed. One is that exposure to a hypnotic induction after self-statement training produced an increased motivation to employ self-statements, and a greater expectancy for the technique to work. It is suggested that the increased motivation and expectancy caused the individual to ask the question, "Why should I use the self-statements?" Based on this, the subject recalled his own past uses of self-statements (e.g., giving himself a "pep talk" before participating in a sport, etc.). This recollection of using self-statements supported the subject's desire to use the technique. This individually created rationale then gave the subject a greater belief in the approach and hence the technique was used and not quickly abandoned, thus a lower initial pain intensity rating resulted. A second explanation is that due to increased expectancy and motivation, as a result of the hypnotic induction, more effort in the application of the self-statements was

made, belief in the rationale not being necessary. (Sufficient information is not available to suggest a preferential explanation.) The results do show that the SS-H subjects did state that they spent a greater percent of the time in positive self-talk compared with the SS subjects. In any case, SS subjects reported higher initial pain intensity compared with the SS-H subjects.

While it was expected that the SS-H-R subjects would be the most effective in controlling pain, they were not, and the fact deserves consideration. It is proposed that the SS-H-R subjects tended to discount the rationale given them after the hypnotic induction. It is hypothesized that this occurred as a result of the individual asking such questions as, "Why do they need to hypnotize me before they tell me why this procedure is valid?" "Is it because it isn't valid and they are trying to dupe me?" "Perhaps so." In any case, what is suggested is that, as a result of these questions, the belief in the rationale was questioned, hence the validity of it is discounted much sooner when presented with pain than for those who did not receive the rationale under hypnosis.

#### The Importance of Self-Statements

The results of this study are consistent with the hypothesis that self-statements do produce significantly better results in coping with pain. There are numerous questions that need to be asked, however, (e.g., Why do coping

self-statements work? What is the role of belief in the effectiveness of self-statements?)

It is proposed here that self-statements work because of their ability to distract the individual from concentrating on the negative aspects of an event. For self-statements to work as a distraction they have to be employed even as the stimulus event becomes more and more intense and the desire for attending to that event increases.

An important issue through this paper has been that of the importance of belief. It is especially pertinent in this discussion. It is suggested that subjects in this experiment who received only self-statement training did not believe in the procedure. They attempted the approach but abandoned it as soon as the pain intensity started to rise. As suggested earlier, it is possible that they took the increased pain as evidence of the failure of the technique, whereas those subjects who believed in the technique used these cues as stimuli for a more intense application of the relevant self-statements. The belief in the procedure is enhanced by a rationale for the technique. It is also enhanced by giving the subject a sense of control over the technique. In this case, the individual has an active part in the formation of the self-statements and when to use them. The literature discussed has shown evidence of the importance of

this self-control and even perceived control when in actuality there is none.

For a distractor to work, then, it has to be believed or it will be soon abandoned. In the case of counting ceiling tiles, for example, the individual thinks that he can avoid pain by distraction, but he has little faith and no explanation as to why this technique would work. Issuing self-statements designed for four different phases of dealing with a stressor has a great deal more face validity. What is suggested here, then, is that counting ceiling tiles could be as effective a distractor as self-statements if an individual believed in the technique.

The issue of relevant versus irrelevant self-statements is related to this theory. Relevant self-statements are specific to a stressor (e.g., the water is cold, but I can handle it) and because they are specific they have plausibility and the belief in the procedure is enhanced. Some self-statements are relevant but more general and are still plausible (e.g., I feel afraid but I can handle the feeling by using my coping procedures). By teaching both specific and general, relevant self-statements, the individual is prepared for various stressors. (Of course, in therapy, part of the training procedure is for the individual to create relevant self-statements for a particular stressful situation.)

Irrelevant self-statements are general techniques in that they can be used to distract in almost any situation. The difficulty with these types of statements is that they are not related to either a stressor or a feeling and, therefore, are not easily believed. Examples of irrelevant self-statements include counting objects, making statements about how great one feels, when one may have reason not to feel great. For the above reasons, self-statements should be relevant to be most effective.

We can <sup>tentatively</sup> conclude from the results of the present experiment that the Self-Statement Training procedure, and its use in tolerating the pain of the Cold Pressor Test, may be an effective method for controlling subjective pain. This procedure, however, has its effect primarily during early stages in coping with pain. Whether or not self-statements serve as distractors or induce the subject to "self-persuade" himself as to his coping capacity, it would appear that giving a plausible rationale for using these self-statements enhances their effects. It would also appear that giving the rationale under conditions of hypnosis may mitigate against a greater belief in the rationale.

It is conceivable that the rationale did provide a greater feeling of personal control; however, if this perceived control did exist, it was short-lived, for once subjects tested reality (i.e., were exposed to icewater) they may have discovered the inadequacy of the technique and abandoned it.

In the same way that information about a stressor can be anxiety reducing and can help one cope with pain, it may be as Averill (1973) points out "the validation by experience may be necessary before information [rationale] can represent [support] an effective control device, at least in terms of pain tolerance" (p. 295).

#### Methodological Issues

Since there are wide individual differences in coping with pain, unless one is prepared to consider a large N in experimental investigation of pain, the use of a pretest-posttest design ought to be considered. However, there are motivational factors inherent in pre- posttest designs. Some subjects will try to better their times at posttesting and this could inflate time measurements. These self-motivated subjects, due to the increased duration, might therefore have inflated pain reports on the posttest also.

One way of controlling for posttest motivational factors is by attempting to ensure that, at posttesting, all subjects are equally motivated. One way of doing this is by administering task motivational instructions at posttesting or by providing monetary incentives for attaining a certain percentage increase time. This study used a pretest-posttest design with task motivational instructions in an attempt to control for the possibilities of these difficulties.

Other methodological concerns that were considered in the formulation of questionnaires and instructions for answering the questionnaires were the possibility of reactive effects of certain questions and the possibility that "good" subjects might either inflate their responses or answer the questions the way they felt a "good" subject "should." For the above considerations, the first Cold Pressor questionnaire did not ask questions regarding motivation and the use of self-statements per se. Also, demands for honesty were included in the questionnaire instructions.

#### Implications for Future Research

One important yet difficult concept that has been mentioned throughout this study is that of belief. Belief is an important area of concern in psychology and its effect on the use of techniques should be further explored. In the same vein, different methods for effecting belief (e.g., hypnosis, persuasion) would also be a worthwhile area of study.

Averill (1973) has commented on a statement by Geer et al. (1970) who examined control defined in terms of "the belief in the subject that he can effect favorably the amount of stress to which he is subjected" (p. 731). To extend these observations further, we may ask and design studies to explore: to what extent can a person's belief

in the efficacy of a cognitive self-control strategy influence (a) the extent to which such a strategy will be utilized, and (b) the actual response or reaction to the stress.

An inherent problem in the use of self-report instruments is that of reactivity. By asking an individual to make certain pain ratings on a pretest measure, a set may be created on the subsequent manipulation. The areas of reactivity and set in experimental research need to be explored in more detail, especially in attempts to obtain pain reports. Is it better to obtain pain reports at specific intervals during the stressor, or to ask the subjects to reflect on his reaction once the stressor is terminated? These are questions worthy of future research consideration.

In conclusion, SIT, whether it be designed to cope with pain, anxiety, or other stress, or whether it is used in connection with other therapeutic problems, is certainly a fascinating and potentially fruitful research area.

The role of cognitions in mediating responses following a stress is receiving greater and greater attention in the literature. Perhaps a most interesting area of inquiry should focus on the kind of self-statements which subjects ought to be induced to emit in attempting to cope with a stressor. Very often the simple act of emitting a self-statement is enough to divert one's attention from a stressor, and it would be most interesting to partition out the contribution made by attention diversion from other self-persuasion effects which follow the belief in such self-statements.

## REFERENCES

- Anderson, D. G., Jameson, J. L., & Man, S.C. Analgesic effects of acupuncture on the pain of ice water: A double-blind study. Canadian Journal of Psychology, 1974, 28, 239-244.
- Appley, M. H., & Thumbrull, R. Psychological stress. New York: Appleton-Century-Crofts, 1967.
- Averill, J. R. Personal control over aversive stimuli and its relationship to stress. Psychological Bulletin, 1973, 80, 286-303.
- Bandura, A. Principles of behavior modification. New York: Rinehart & Winston, 1969.
- Barber, T. X. The effect of hypnosis on pain: A critical review of experimental and clinical findings. Psychosomatic Medicine, 1963, 25, 303-333.
- Barber, T. X. Hypnosis: A scientific approach. New York: Van Nostrand Reinhold, 1969.
- Barber, T. X. Suggested ('hypnotic') behavior: The trance paradigm versus an alternative paradigm. Harding, Mass.: Medfield Foundation, 1970.
- Barber, T. X., & Cooper, B. Effects on pain of experimentally induced and spontaneous distraction. Psychological Reports, 1972, 31, 647-651.
- Barber, T. X., & Hahn, K. W. Physiological and subjective responses to pain producing stimulation under hypnotically suggested and waking imaginal analgesia. Journal of Abnormal and Social Psychology, 1962, 65, 411-418.
- Barber, T. X., Spanos, N. P., & Chaves, J. F. Hypnosis, imagination and human potentialities. New York: Pergamon Press, 1974.
- Beck, A. T. Cognitive therapy: Nature and relation to behavior therapy. Behavior Therapy, 1970, 1, 184-200.
- Beecher, H. K. Measurement of subjective responses. New York: Oxford University Press, 1959.

- Blitz, B., & Dinnerstein, A. J. Effects of different types of instructions on pain parameters. Journal of Abnormal Psychology, 1968, 73, 276-280.
- Blitz, B., & Dinnerstein, A. J. Role of attention focus in pain perception: Manipulation of response to noxious stimulation by instructions. Journal of Abnormal Psychology, 1971, 77, 42-45.
- Bobey, M. J., & Davidson, P. O. Psychological factors affecting pain tolerance. Journal of Psychosomatic Research, 1970, 14, 371-376.
- Bowers, K. S. Pain, anxiety and perceived control. Journal of Consulting and Clinical Psychology, 1968, 32, 596-602.
- Brown, R. A., Fader, K., & Barber, T. X. Responsiveness to pain: Stimulus specificity versus generality. Psychological Record, 1973, 23, 1-7.
- Cahtela, J. R. Behavior therapy and self-control: Techniques and implications. In C. M. Franks (Ed.), Behavior therapy: Assessment and status. New York: McGraw-Hill, 1969.
- Cahtela, J. R. Covert conditioning. In A. Jacobs & L. B. Sachs (Eds.), The psychology of private events: Perspectives on covert response systems. New York: Academic Press, 1971.
- Chaves, J. F., & Barber, T. X. Cognitive strategies, experimenter modeling, and expectation in the attenuation of pain. Journal of Abnormal Psychology, 1974, 83, 356-363.
- Corah, N., & Boffa, J. Perceived control, self-observation and response to aversive stimulation. Journal of Personality and Social Psychology, 1970, 16, 1-4.
- Duncan, D. B. Multiple range and multiple F tests. Biometrics, 1955, 11, 1-42.
- Ellis, A. Reason and emotion in psychotherapy. New York: Stuart, 1962.
- Evans, M. B., & Paul, G. L. Effects of hypnotically suggested analgesia on physiological and subjective responses to cold stress. Journal of Consulting and Clinical Psychology, 1970, 35, 362-371.

- Geer, J. H., Davison, G. C., & Gatchel, R. I. Reduction of stress in humans through nonveridical perceived control of aversive stimulation. Journal of Personality and Social Psychology, 1970, 16, 731-738.
- Hilgard, E. R. Hypnotic susceptibility. New York: Harcourt Brace Jovanovich, 1965.
- Hilgard, E. R. Pain as a puzzle for psychology and physiology. American Psychologist, 1969, 24, 103-113.
- Hilgard, E. R., Macdonald, H., Marshall, G., & Morgan, A. H. Anticipation of pain and pain control under hypnosis: Heart rate and blood pressure responses in the cold pressor test. Journal of Abnormal Psychology, 1974, 38, 561-568.
- Hill, H. E., Kornetsky, C. H., Flanary, H. G., & Wikler, A. Effects of anxiety and morphine on discrimination of intensities of painful stimuli. Journal of Clinical Investigation, 1952, 31, 473-480.
- Homme, L. E. Perspectives in psychology: XXIV. Control of coverants, the operants of the mind. Psychological Record, 1965, 15, 501-511.
- Johnson, R. F. Suggestions for pain reduction and response to cold-induced pain. Psychological Record, 1974, 24, 161-169.
- Kanfer, F. H. Self-regulation: Research, issues and speculation. In C. Neuringer & J. L. Michael (Eds.), Behavior modification in clinical psychology. New York: Appleton-Century-Crofts, 1970.
- Kanfer, F. H., & Goldfoot, D. A. Self-control and tolerance of noxious stimulation. Psychological Reports, 1966, 18, 79-85.
- Kanfer, F. H., & Seidner, M. L. Self-control: Factors enhancing tolerance of noxious stimulation. Journal of Personality and Social Psychology, 1973, 25, 381-389.
- Kazdin, A. E. The effect of model identity and fear relevant similarity on covert modeling. Behavior Therapy, 1974, 5, 624-636.

- Kelly, G. The psychology of personal constructs (Vol. 2). New York: Norton, 1955.
- Knox, V. I. Cognitive strategies for coping with pain: Ignoring versus acknowledging. Unpublished dissertation, University of Waterloo, 1972.
- Kornetsky, C. Effects of anxiety and morphine in the anticipation and perception of painful radiant heat stimuli. Journal of Physiological Psychology, 1954, 47, 130-132.
- Lazarus, A. A. Behavior therapy and beyond. New York: McGraw-Hill, 1971.
- Lazarus, R. S. Psychological stress and the coping process. New York: McGraw-Hill, 1966.
- Lynn, R., & Eysenck, H. J. Tolerance for pain, extraversion, and neuroticism. Perceptual and Motor Skills, 1961, 12, 161-162.
- Mahoney, M. J. Research issues in self-management. Behavior Therapy, 1972, 3, 45-63.
- Mahoney, M. J. Cognition and behavior modification. New York: Ballinger, 1974.
- McConagly, N. Aversive therapy of homosexuality: Measures of efficacy. American Journal of Psychiatry, 1971, 127, 1221-1223.
- Melzack, R. The puzzle of pain. New York: Basic Books, 1973.
- Melzack, R., & Wall, P. P. Pain mechanisms: A new theory. Science, 1965, 150, 971-979.
- Melzack, R., Weisz, A. Z., & Sprague, L. T. Strategems for controlling pain: Contributions of auditory stimulation and suggestion. Experimental Neurology, 1963, 8, 239-247.
- Meichenbaum, D. Examination of model characteristics in reducing avoidance behavior. Journal of Personality and Social Psychology, 1971, 17, 298-307.
- Meichenbaum, D. Cognitive modification of test anxious college students. Journal of Consulting and Clinical Psychology, 1972, 39, 370-380.

- Meichenbaum, D. Cognitive factors in behavior modification: Modifying what clients say to themselves. In C. Franks & G. Wilson (Eds.), Annual review of behavior therapy. New York: Bruner/Mazel, 1973.
- Meichenbaum, D. Cognitive behavior modification. Morristown, N.J.: General Learning Press, 1974.
- Meichenbaum, D. Cognitive-behavior modification newsletter, 1975, 1, University of Waterloo.
- Meichenbaum, D., & Cameron, R. Stress inoculation: A skills training approach to anxiety management. Unpublished manuscript, University of Waterloo, 1973.
- Meichenbaum, D., & Turk, D. The cognitive-behavioral management of anxiety, anger, and pain. Paper presented at the seventh Banff International Conference on Behavior Modification, 1975. (Paper reproduced in a book of the proceedings. Research Press, 1975.)
- Orne, M. T. Psychological factors maximizing resistance to stress: With special reference to hypnosis. In S. Z. Klausner (Ed.), The quest for self control. New York: Free Press, 1965.
- Schachter, S. The interaction of cognitive and physiological determinants of emotional state. In C. Spielberger (Ed.), Anxiety and behavior. New York: Academic Press, 1966.
- Selye, H. The stress of life. New York: McGraw-Hill, 1956.
- Shor, R. E., & Orne, E. C. Harvard group scale of hypnotic susceptibility. Palo Alto, Calif.: Consulting Psychologists Press, 1962.
- Skinner, B. F. Science and human behavior. New York: Macmillan, 1963.
- Spanos, N. P., Barber, T. X., & Lang, C. Effects of hypnotic induction, suggestions of analgesia, and demands for honesty on subjective reports of pain. In H. London & R. E. Nisbett (Eds.), Thought and feeling: Cognitive alteration of feeling states. Chicago: Aldine, 1974.
- Spielberger, C. Anxiety: Current trends in theory and research (Vols. 1 & 2). New York: Academic Press, 1972.

- Sternbach, R. A. Pain: A psychophysiological analysis. New York: Academic Press, 1968.
- Turk, D. Cognitive control of pain: A skills training approach. Unpublished manuscript, University of Waterloo, 1975.
- Warren, H. C. (Ed.). Dictionary of psychology. Boston: Houghton Mifflin Co., 1934.
- Weitzenhoffer, A. M. Hypnotism: An objective study in suggestibility. New York: Wiley, 19-3.
- Wolpe, J., & Lazarus, A. A. Behavior therapy techniques. New York: Pergamon, 1966.

## Appendix 1

### PRETEST INSTRUCTIONS

Thank you for coming to participate in this experiment. This experiment is designed to investigate stress tolerance. The experiment has different parts and the necessary information and instructions will be presented to you via tape recording. Be assured that we will not ask you to do anything that will be harmful or embarrassing; we do ask that you listen carefully to this recording.

The first part of this experiment involves the answering of a questionnaire which will now be given to you. Please read the instructions carefully and answer the questionnaire completely on the sheet provided...

Thank you. The next part of this experiment involves the attaching of sensors to each arm and a leg. Please roll up your sleeves and take off any watch, bracelet or rings that you are wearing. Please sit quietly for approximately 5 minutes as the experimenter attaches the sensors, calibrates the equipment, and takes a reading...

Fine. The next part of this experiment involves testing your stress tolerance. In this case, the stressor is ice water. The experimenter will now place the container of water so that it is easily available for your nondominant hand... In a moment, you will be requested to place your hand in the water. Please try to keep your hand in the water as long as possible. Do not clench your fist or use the muscles of your hand; just let your hand hang limp. Do not touch the sides or the bottom of the container. Only remove your hand when you feel that you cannot keep your hand in the water any longer. In 30 seconds, I will say "NOW". Please place your hand in the ice water up to

your wrist when I say "NOW"... (30 seconds) NOW! Place your hand in the water now...

That's great! The next component of the experiment involves the answering of a second questionnaire which the experimenter will now place in front of you. The answers you give are an extremely important source of information in this experiment. It is absolutely crucial that you be as honest and straightforward as you can. Please read the instructions carefully and answer the questionnaire completely.

NAME \_\_\_\_\_

APPENDIX 2

QUESTIONNAIRE

A. For questions 1-3, rate the intensity of the pain by circling the number that best corresponds to how you felt.

1. When the pain was first felt.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

2. At the most intense point.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

3. Immediately before your hand was withdrawn.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

4. On the average, how painful did you find the ice water?

0      1      2      3      4      5      6      7      8      9      10  
not ..... very  
painful ..... painful

## B.

1. Sometimes people use certain techniques or procedures to help them deal with pain. If you did so, please indicate what those were. (Be as specific as you can)

2. How much of the time did you use these techniques? (Circle to the nearest ten percent.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

3. How effective do you feel your techniques were in controlling pain?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

- - - - -

## APPENDIX 3

### SELF-STATEMENT PROCEDURE

Fine. The next component of this experiment consists of presenting to you a procedure for using positive, coping self-statements or verbal thoughts. Self-statements refer to specific things we think or silently say to ourselves. The things we say to ourselves often affect the way in which we evaluate a situation. Positive, coping self-statements can be quite useful in dealing with stress of any type. Most stressful situations consist of four phases. The best procedure is to use appropriate self-statements during each of the four phases. The four phases of stressful situations are: (1) preparing for the stressor, (2) confronting and handling the stressor, (3) coping with feelings of being overwhelmed, and (4) rewarding oneself for having coped.

What I would like for you to do, in a moment, is to stop and think, and see how you use self-statements. We all do talk to ourselves and make self-statements. Self-statements can be specific to a particular stressful situation or general in that they can apply to various situations. I am now going to give you an example of a use of self-statements. Follow along with me and the use of this procedure will become more clear.

A person who uses positive self-statements is going to a physician to get an injection of penicillin. For phase I, preparing for the painful stressor, he says: "Don't worry, worry won't help anything." For phase II, confronting and

## APPENDIX 3

handling the stressor, he says: "One step at a time, I can handle the situation. I've had shots before." For phase III, coping with feelings of being overwhelmed, he says: "I knew I would be apprehensive about this, but I can control my fears." For phase IV, rewarding oneself for having coped, he says: "Good. I knew I could handle the unpleasant situation and I did. Positive self-statements really work."

The experimenter will now give you a list of sample self-statements. This list has some statements that deal specifically with cold, and some statements that have a more general use. Please read over the list and notify the experimenter when you have done so. Now, I want you to decide upon two positive, coping self-statements for each of the four phases. These self-statements may be ones you already use; they may be ones that you have just now created and would like to use; they may be statements selected from the sample list. Your list doesn't have to be exclusively from the sample list or your own self-statements. The self-statements may be specific or general; the specific stress that you will be exposed to is ice water. Please determine your eight self-statements. Work on this task carefully and diligently and write them down on the sheet of paper that the experimenter will now give to you. Please notify the experimenter when you have completed the list. ...

Fine. Now, I would like for you to learn the self-statements well enough so that you will be able to repeat them from memory when you are asked to do so in a few minutes. Please notify the experimenter when you have learned your eight self-statements. ... (5 min. maximum) (Once the subjected stated that he had learned his eight statements, he was given a sheet (Appendix 6) and asked to list them from memory.)

Good. Now, I would like for you to become familiar with the actual use of self-statements in their proper sequence. Close your eyes and follow along with this scene. ...

Really use your imagination to the best of your ability! A middle-aged man is sitting in an airplane that is taxiing toward the end of the runway for take-off. This man has a strong fear of flying but has recently learned the use of positive, coping self-statements. In this situation, the man is preparing himself for the stress of the take-off. As the man starts to become aware of his fear, he says to himself: "I can develop a strategy to deal with this fear." Later, as the plane is speeding down the runway, and the man is feeling his fear start to rise, he says to himself: "I can handle this fear, it's only a take-off; there is nothing to worry about." Later, as the plane is actually leaving the ground and the man starts to feel like he is going to lose control of his fear, he says to himself:

"No matter how fearful I become, I can cope with the situation. I knew that this would be the worst part. I can control these feelings. I won't let it get the better of me. I'm in charge." After the take-off has been completed, as the man starts to relax and enjoy his flight, he says to himself: "Good, I did it. It wasn't that bad. My positive self-statements really helped me cope, and I know I can use them whenever I have to." ... Please open your eyes now. ... Thank you for following along with this scene. Obviously, we only followed this man during a small part of his behavior on the airplane. It is important to understand that you do not have to use only two positive self-statements for each phase. Also, statements that you have chosen to use for a particular phase do not necessarily have to be used only during that phase; some statements are appropriate for more than one phase. What I want to emphasize, however, is that the next time you place your hand in the cold water, I want you to use the self-statements you have prepared.

Now, please watch the experimenter as he will role-play a person coping with stress. In this case the stressor is ice water. The experimenter will make the statements out loud. Ordinarily, self-statements are verbal thoughts which are not actually spoken. ...

(At this time the experimenter positioned a chair in front of the subject and told the subject that he was going to demonstrate to him how to use the self-statements. For

each of the four phases, the experimenter used two self-statements the subject had chosen and two from the sample list. The experimenter informed the subject that he would say the self-statements out loud for the sake of demonstration. The experimenter then went through the four phases in a modelling procedure, his hand not actually being placed in the water.)

## APPENDIX 4

## SAMPLE LIST OF SELF-STATEMENTS

## Phase I. Preparing for the stressor.

1. What is it I have to do to handle the cold?
2. I can develop a strategy to help me deal with the cold situation.
3. Get prepared so I can concentrate on what I am to do.
4. No negative self-statements, just think positively.
5. Don't worry, worry won't help anything.

## Phase II. Confronting and handling the stressor.

1. Don't think about the cold, just what-I have to do.
2. One step at a time, I can handle the situation.
3. I feel the cold, but I'm in control.
4. I expected some pain, but I can cope with it.
5. It's really not all that bad.

## Phase III. Coping with feelings of being overwhelmed.

1. No matter how cold it gets, I can handle it.
2. Keep the focus on the present, what is it I have to do?
3. Don't try to eliminate the cold entirely, just keep it manageable.
4. The pain had to rise, just keep it under control.
5. It's certainly not the worst thing that can happen.

## Phase IV. Rewarding self-statements.

1. Good, I did it, the self-talk works.
2. It's all over and it wasn't that bad after all.
3. I did well and I can see that I'd do even better next time.
4. I handled it just fine.
5. I controlled my thoughts and I really coped.

LIST OF SELF-STATEMENTS

Phase I. Preparing for the stressor.

1.

2.

Phase II. Confronting and handling the stressor.

1.

2.

Phase III. Coping with feelings of being overwhelmed.

1.

2.

Phase IV. Rewarding self-statements.

1.

2.

NAME \_\_\_\_\_

## RECOLLECTION OF SELF-STATEMENTS

Phase I. Preparing for the stressor.

1.

2.

Phase II. Confronting and handling the stressor.

1.

2.

Phase III. Coping with feelings of being overwhelmed.

1.

2.

Phase IV. Rewarding self-statements.

1.

2.

## Appendix 7

### HYPNOTIC INDUCTION PROCEDURE

The next part of this experiment involves a hypnotic induction procedure. Please listen closely and follow the instructions to the best of your ability.

Now I want you to seat yourself comfortably and rest your hands in your lap. That's right. Rest your hands in your lap. Now look at at your hands and find a spot on either hand and just focus on it. It doesn't matter what spot you choose; just select some spot to focus on. I shall refer to the spot which you have chosen as the target. That's right. . . hands relaxed. . . look directly at the target. I am about to give you some instructions that will help you to relax and gradually to enter a state of hypnosis. Just relax and make yourself comfortable. I want you to look steadily at the target and while keeping your eyes upon it to listen to what I say. Your ability to be hypnotized depends partly on your willingness to cooperate and partly on your ability to concentrate upon the target and upon my words. You can be hypnotized only if you are willing. I assume that you are willing and that you are doing your best to cooperate by concentrating on the target and listening to my words, letting happen whatever you feel is going to take place. Just let it happen. If you pay close attention to what I tell you, and think of the things I tell you to think about, you can easily experience what it is like to be hypnotized. There is nothing fearful or mysterious about hypnosis. It is a perfectly normal consequence of certain psychological principles. It is merely a state of strong interest in some particular thing. In some ways hypnosis is like sleepwalking; however, hypnosis is also an individual experience and is

not just alike for everyone. In a sense the hypnotized person is like a sleepwalker, for he can carry out various and complex activities while remaining hypnotized. All I ask of you is that you keep up your attention and interest and continue to cooperate as you have been cooperating. Nothing will be done that will cause you any embarrassment. Most people find this a very interesting experience.

Just relax. Don't be tense. Keep your eyes on the target. Look at it as steadily as you can. Should your eyes wander away from it, that will be all right. . . just bring your eyes back to it. After a while you may find that the target gets blurry, or perhaps moves about, or again, changes color. That is all right. Should you get sleepy, that will be fine, too. Whatever happens, let it happen and keep staring at the target for a while. There will come a time, however, when your eyes will be so tired, will feel so heavy, that you will be unable to keep them open any longer and they will close, perhaps quite involuntarily. When this happens, just let it take place. As I continue to talk, you will find that you will become more and more drowsy. When the time comes that your eyes have closed, just let them remain closed. You may find that your eyes may close before I finish my talking; that's okay. Just listen to my voice. If your eyes are closed and I give you suggestions to close your eyes, the suggestions will not bother. This suggestion will simply allow you to relax more and more.

You will find that you can relax completely but at the same time sit up comfortably in your chair with little effort. You will be able to shift your position to make yourself comfortable as needed

without it disturbing you. Now just allow yourself to relax completely. Relax every muscle of your body. Relax the muscles of your legs. . . Relax the muscles of your feet. . . Relax the muscles of your arms. . . Relax the muscles of your hands. . . of your fingers. . . Relax the muscles of your neck, of your chest. . . Relax all the muscles of your body. . . Let yourself be limp, limp, limp. Relax more and more, more and more. Relax completely. Relax completely. Relax completely.

As you relax more and more, a feeling of heaviness perhaps comes over your body. A feeling of heaviness is coming into your legs and your arms. . . into your feet and your hands. . . into your whole body. Your legs feel heavy and limp, heavy and limp. . . Your arms are heavy, heavy. . . Your whole body feels heavy, heavier and heavier. Like lead. Your eyelids feel especially heavy. Heavy and tired. You are beginning to feel drowsy, drowsy and sleepy. Your breathing is becoming slow and regular, slow and regular. You are getting drowsy and sleepy, more and more drowsy and sleepy while your eyelids become heavier and heavier, more and more tired and heavy.

Your eyes are tired from staring. The heaviness in your eyelids is increasing. Soon you will not be able to keep your eyes open. Soon your eyes will close of themselves. Your eyelids will be too heavy to keep open. Your eyes are tired from staring. Your eyes are becoming wet from straining. You are becoming increasingly drowsy and sleepy. The strain in your eyes is getting greater and greater, greater and greater. It would be so nice to close your eyes, to relax completely, and just listen sleepily to my voice talking to you. You would like to close your eyes and relax completely, relax completely. You will soon reach your limit. The strain will be so great, your eyes will be

so tired, your lids will become so heavy, your eyes will close of themselves, close of themselves.

Your eyelids are getting heavy, very heavy. You are relaxed, very relaxed. There is a pleasant feeling of warmth and heaviness all through your body. You are tired and drowsy. Tired and sleepy. Sleepy. Sleepy. Sleepy. Listen only to my voice. Pay attention to nothing else but my voice. Your eyes are getting blurred. You are having difficulty seeing. Your eyes are strained. The strain is getting greater and greater, greater and greater.

Your lids are heavy. Heavy as lead. Getting heavier and heavier, heavier and heavier. They are pushing down, down, down. Your eyelids seem weighted, weighted with lead, heavy as lead. . . Your eyes are blinking, blinking, blinking. . . closing. . .

Your eyes may have closed by now, and if they have not, they would soon close of themselves. But there is no need to strain them more. Even if your eyes have not closed fully as yet, you have concentrated well upon the target, and have become relaxed and drowsy. At this time you may just let your eyes close. That's it, eyes completely closed. Close your eyes now.

You are now comfortably relaxed, but you are going to relax even more, much more. Your eyes are now closed. You will keep your eyes closed until I tell you otherwise, or I tell you to awaken. . . . You feel drowsy and sleepy. Just keep listening to my voice. Pay close attention to it. Keep your thoughts on what I am saying--just listen. You are going to get much more drowsy and sleepy. Soon you will be deep asleep but you will continue to hear me. You will not

awaken until I tell you to do so. I shall now begin to count. At each count you will feel yourself going down, down, into a deep, comfortable, a deep restful sleep. A sleep in which you will be able to do all sorts of things I ask you to do. One--you are going to go deeply asleep. . . Two--down, down into a deep, sound sleep. . . Three--four--more and more, more and more asleep. . . Five--six--seven--you are sinking, sinking into a deep, deep sleep. Nothing will disturb you. Pay attention only to my voice and only to such things as I may call to your attention. I would like you to keep on paying attention to my voice and the things I tell you. . . Eight--nine--ten--eleven--twelve--deeper and deeper, always deeper asleep--thirteen--fourteen--fifteen--although deep asleep you can clearly hear me. You will always hear me no matter how deeply asleep you may feel yourself to be. . . Sixteen--seventeen--eighteen--deep asleep, fast asleep. Nothing will disturb you. . . Nineteen, twenty. Deep asleep! You will not awaken until I tell you to do so. Continue now to concentrate on my voice and the presentation that you will soon hear. You will find that you are able to listen carefully and you will find that you will be receptive to the presentation and will be able to recall it quite clearly. (Either Appendix 9A or 9B presented at this time.)

Remain deeply relaxed and pay close attention to what I am going to tell you next. In a moment I shall begin counting backwards from twenty to one. You will gradually wake up, but for most of the count you will still remain in the state you are now in. By the time I reach "five" you will open your eyes, but you will not be fully aroused. When I get to "one" you will be fully alert, in your normal state of wakefulness.

## APPENDIX 7

After you open your eyes, you will feel fine and you will be able to clearly remember everything I've said. You will have no headache or other after-effects. I shall now count backwards from twenty and at "five", not sooner, you will open your eyes but not be fully aroused until I say "one". At "one" you will be awake. Ready, now: 20--19--18--17--16--15--14--13--12--11--10, halfway, --9--8--7--6--5--4--3--2--1. Wake up! Wide awake! Any remaining drowsiness which you may feel will quickly pass.

## Appendix 8

### Stress Inoculation Training Rationale

The purpose of this portion of the experiment is to present to you a proven technique that is used in coping with stress. This technique will enable you to become more effective in coping with unpleasant events.

This is a proven technique. Pay close attention to this procedure and actively use it in times of stress and you, too, will be more effective in coping with stress in your everyday life. There have been numerous experimental reports, as well as clinical reports, that have shown the effectiveness of positive, coping self-statements, or mental talk, in dealing with stress. We have tested your reactions once by having your hand immersed in ice water and, in a few moments, we will test your stress tolerance again. You will show increased tolerance if you use this procedure. This procedure would not be worthwhile if it were useful only in experimental situations. It has many applications in everyday life.

Professor Meichenbaum at the University of Waterloo, through numerous experiments, has shown the effectiveness of these self-statements or verbal thought procedure in dealing with various types of stresses, such as fear of public speaking and so forth. By learning and using this procedure, you too, will find that you are better able to cope in situations where you previously had difficulty.

This procedure is based on the theories and practices of many different therapists and scientists. It is known as a semantic approach.

One of the main sources of this procedure is the work of Dr. Albert Ellis, the founder of Rational Emotive Therapy. Dr. Ellis

## APPENDIX 8

stresses the importance of negative, and unrealistic self-statements in causing and/or maintaining anxiety. Through his procedure, clients learn to be more positive in their self-statements and, therefore, more free of anxiety in everyday life. Dr. Ellis has reported numerous successes in the professional literature and has been very influential in the field of therapy in recent years.

Professor Meichenbaum has taken the semantic approach and has developed procedures that are based on experimental psychology and accepted learning theory approaches. Dr. Meichenbaum's approach has the advantage of being very amenable to group administration and, in specific instances, a briefer number of therapeutic sessions is required. His procedure consists of determining self-statements that an individual uses for coping in certain situations and, then, Dr. Meichenbaum demonstrates to the individual how these and similar statements can be useful in certain other situations where an individual has had difficulty in the past. The procedure we are using today is based on Professor Meichenbaum's approach.

Professor Melzack at McGill University and Professor Wall at the Massachusetts Institute of Technology have formulated the Gate Control Theory of Pain. This theory of pain is based on numerous clinical and experimental observations and studies. It is widely accepted in scientific circles. This theory suggests that there are three components to the experiencing of pain: The first component is the sensory-discriminative component which is concerned with how one perceives the stimulus; the second component is the motivational-

## APPENDIX 8

affective component which concerns the way a person feels while he is having pain; and the third component, the one that we will concentrate on today, is the cognitive-evaluative component which is concerned with the thoughts one has about the painful sensation. These are often negative such as "How awful!", "I can't handle it", and so forth. The cognitive-evaluative component is usually composed of four phases. The four phases are: (1) preparing for the painful stressor; (2) confronting and handling the stressor; (3) coping with feelings of being overwhelmed; and (4) rewarding oneself for having coped.

## Appendix 9

### HEART RATE APPARATUS PRESENTATION

The next part of this experiment involves a discussion of the physiological sensors attached to your body. These sensors are attached to your body for the purpose of monitoring a portion of your cardiac or heart performance during various portions of the experiment. Heart performance is the only physiological source of information we are observing in this experiment. Professor Lange, in 1885, was one of the first scientists to observe heart performance through instrumentation. It wasn't until 1926, however, that psychologists used heart performance information in their research. Professor Skaggs at Dartmouth College in New Hampshire was the first scientist to use heart performance, specifically heart rate or pulse, in a psychological experiment. (Heart rate or pulse is defined as the alternate expansion and recoil of an artery).

Instruments that are designed specifically to obtain pulse are called cardiometers. Other instruments that are concerned with heart performance include the electrocardiogram or ECG and the plethysmograph. These instruments obtain more detailed information than is necessary for the purposes of this experiment.

Currently, there is a considerable amount of discussion in the professional literature about the use of heart performance data in experiments. Professor Lacey of the University of Florida has been one of the strongest proponents in recent years of obtaining heart rate data in psychological experiments.

Today, we are interested in monitoring your pulse and, therefore, we are using a cardiometer. You may wonder how we can obtain a pulse

## APPENDIX 9

from the parts of the body where we have the sensors attached when people usually take a person's pulse from his wrists or temples. The reason that we can obtain your pulse from your arms is because what is actually measured is electrical activity. Since there is a measurable amount of electrical activity produced by heart contractions, sensors can be placed in various parts of the body and receive pulse information.

The cardiometer is a much more complicated instrument than one might think at first, however. The actual electrical activity of the heart that is measured is in the order of two millivolts. This small amount of electrical activity must be amplified by a factor of 2500 to bring it to a useable level. But this amplification does not solve all the problem involved. There are also various background noises and these have to be filtered out. The most difficult source of background noise to filter is that produced by the skeletal muscles. Through a complicated electronic procedure, filters can do their job and useful pulse information can be obtained.

Although the sensors will remain in place throughout the experiment, the actual measurement of pulse will only be observed at certain predetermined periods. The sensors remain attached throughout the experiment to avoid the inconvenience of removing them and reattaching them again. We ask your indulgence in this inconvenience.

Appendix 10  
Cold Pressor Test 2

The next part of this experiment involves testing your stress tolerance. In this case, the stressor is ice water. The experimenter will now place the container of water so that it is easily available for your nondominant hand... In a moment, you will be requested to place your hand in the water. Please try to keep your hand in the water as long as possible. Do not clench your fist or use the muscles of your hand; just let your hand hang limp. Do not touch the sides or the bottom of the container. Only remove your hand when you feel that you cannot keep your hand in the water any longer. In 30 seconds, I will say "NOW". Please place your hand in the ice water up to your wrist when I say "NOW"... (30 seconds) NOW! Place your hand in the water now...

That's great! The next component of the experiment involves the answering of a final questionnaire which the experimenter will now place in front of you. The answers you give are an extremely important source of information in this experiment. It is absolutely crucial that you be as honest and straightforward as you can. Please read the instructions carefully and answer the questionnaire completely.

## APPENDIX 11

### Cold Pressor (TMI) Test 2

Thank you. The next component of this experiment involves the testing of your stress tolerance a second time. Again, the stressor is ice water. In a moment, I will again ask you to place your hand in ice water. This time, try to keep your hand in the water longer than you did before, but do not clench your fist or use the muscles of your hand, just let your hand hang limp. Don't withdraw your hand until you really have to. Really try hard and give it your best. In fact, what we are asking you to do is when you first decide to take your hand out of the water, put up a maximum effort and leave your hand in just a little longer. The success of this experiment depends entirely on your willingness to cooperate and really do the best possible. In a pilot study, everyone who really tried to do their best held their hand in the water significantly longer the second time than they did the first. What I am asking is that you really psyche yourself up to tolerate the cold water for as long as you can. Really try hard and give it your best. In 30 seconds I will say "now." Please place your hand in the water and keep it there until you absolutely have to remove it or until I tell you to do so. I will say now in 30 seconds. ... NOW!

## APPENDIX 11

That's great. The next component of the experiment involves the answering of a final questionnaire which the experimenter will now place in front of you. The answers you give are an extremely important source of information in this experiment. It is absolutely crucial that you be as honest and straightforward as you can. Please read the instructions carefully and answer the questionnaire completely.

NAME \_\_\_\_\_

QUESTIONNAIRE

A. For questions 1-3, rate the intensity of the pain by circling the number that best corresponds to how you felt.

1. When the pain was first felt.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

2. At the most intense point.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

3. Immediately before your hand was withdrawn.

0      1      2      3      4      5      6      7      8      9      10  
no pain ..... worst pain  
felt ..... ever felt

4. On the average, how painful did you find the ice water?

0      1      2      3      4      5      6      7      8      9      10  
not ..... very  
painful ..... painful

B. The following questions refer to a specific type of mental technique which is sometimes used. People do say things to themselves (self-talk or mental talk). We are concerned, in this question, with only what you said to yourself. (This refers to the 2nd water test only.)

1. List the things that you were saying to yourself: a) immediately prior to the time you put your hand in the water, b) during the time your hand was in the water, c) when the cold was at its worst, and d) immediately after you took your hand out of the water. (If space is not sufficient, please continue on the back of this sheet.)

a)

b)

c)

d)

2. By circling a number below, estimate to the nearest ten percent the amount of the time your self-talk was positive.

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

3. Estimate the amount of time that your self-talk was negative.

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

4. What percentage of the time do you feel that your self-talk was effective in controlling the pain?

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

C. 1. Sometimes people use other techniques for dealing with pain, such as imagery, focusing, distraction, tensing, etc. If you did so, please indicate what these were.

2. How much of the time did you use these other techniques? (Circle to the nearest ten percent)

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

3. How effective do you feel your techniques were in controlling pain?

0%    10%    20%    30%    40%    50%    60%    70%    80%    90%    100%

1. To what extent do you feel that you were motivated to keep your hand in the water?

COLD TEST I

0 1 2 3 4 5 6 7 8 9 10

not motivated

.....

very motivated

COLD TEST II

0 1 2 3 4 5 6 7 8 9 10

not motivated

.....

very motivated

2. Rate the importance of each of the following items in helping you keep your hand in the water. (This refers to the second water test only.) Please look at all four items before starting to answer.

a) PRIDE

0 1 2 3 4 5 6 7 8 9 10

not important

.....

very important

b) INSTRUCTIONS

0 1 2 3 4 5 6 7 8 9 10

not important

.....

very important

c) DESIRE TO COMPLY

0 1 2 3 4 5 6 7 8 9 10

not important

.....

very important

d) SELF-TALK

0 1 2 3 4 5 6 7 8 9 10

not important

.....

very important

3. Referring to the question above, please try to explain your motivation level for both tests. If there is a difference between the first and second, please explain. (If space is not sufficient, please continue your answer on the back of this sheet.)

Bio. info.		Cold Pressor			Pain 1st.		Max. pain	Imed. befr.	Aver. pain	Self-state.	Oth. tec.	Motivat. factors	G										
a	b	CP1	CP2	CP3	1	2	D	1	2	D	F	G	H	I	J	K	L	M	N	O	P	R	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50

G  
P

j  
k  
l  
m

% tm. oth. tech. n imp. pride  
o imp. instr.  
p imp. desire  
r imp. SS  
O questionnaire

Means and Standard Deviations of Relevant Variables

Grp	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
SS	69.5	-20	-1	.3	-2	31	4.1	3.1	7.8	7.5	2.1	6.8	2.8	3.2	5.0	5.6	6.5	8.5
H																		
R	66.81	1.62	2.23	2.95	2.90	1.60	3.41	2.92	2.97	1.90	1.45	2.04	0.84	2.86	2.58	2.07	1.96	1.43
SS	107.0	-90	0	0	0	3.3	5.4	4.1	8.4	8.4	1.5	7.7	3.3	5.0	8.4	7.8	8.7	8.4
R	89.74	1.73	1.94	1.56	2.21	1.77	3.89	3.35	3.10	0.97	1.18	1.34	2.71	3.23	1.71	1.63	1.63	1.51
SS	90.4	-1.2	.2	.4	-7	2.2	5.5	6.1	7.2	8.3	1.1	7.6	3.9	6.1	7.3	6.7	7.9	8.3
H	91.16	1.62	1.81	3.27	1.25	.79	1.84	2.13	2.10	1.34	0.57	0.70	2.45	2.23	1.89	1.42	1.42	1.06
SS	62.8	.7	.3	.3	.5	1.9	5.0	4.8	6.2	6.5	1.8	6.7	3.3	4.5	7.7	6.9	7.7	8.0
	61.85	1.06	.45	1.66	2.28	.57	2.83	3.16	2.40	2.42	1.14	2.00	2.36	2.64	1.16	1.66	1.83	1.70
H	53.4	.7	.7	.2	.5	2.9	6.9	4.4	2.1	7.4	1.9	6.7	2.4	3.8	6.3	7.7	7.6	8.1
	48.63	1.70	1.77	2.53	2.01	2.13	2.18	2.01	1.20	2.17	1.37	2.63	2.32	3.43	3.50	1.41	2.46	1.80
TMI	74.5	-4	1.0	-4	1.2	2.2	6.3	5.1	3.3	7.0	2.5	6.7	5.3	5.1	7.2	7.0	9.4	7.8
con	88.91	1.85	1.05	1.73	1.69	2.04	3.16	2.56	2.99	1.94	1.96	2.11	2.41	2.56	3.08	2.83	3.03	1.32
non	15.1	.7	.8	.2	.2	1.3	5.8	6.1	1.9	6.6	2.0	5.9	4.1	5.5	5.5	4.7	6.4	7.1
TMI	34.22	1.57	1.32	1.40	1.62	2.75	2.20	2.03	2.73	1.98	1.05	2.08	2.28	2.07	2.51	2.98	2.27	1.20
con																		

\* Cold Processor Test  
 a Ph. 1st felt  
 b Max. pn. intensity  
 c Pn. inte. imed.  
 d before removal  
 e Average pain  
 f Motivation  
 g % time tech. used  
 h % time tech. eff.  
 i Number SS  
 j % time +SS  
 k % time -SS  
 l % time SS off,  
 m % tm. oth. tech.  
 n % tm. oth. tech.  
 o effective  
 p Imp. Pride  
 q Imp. Instr.  
 r Imp. Desir.  
 s Imp. S Tlk.

\* a-f refer to posttest minus pretest scores.