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The Effects of Two Types of Hypnotic Suggestions on Analgesic Responding in Moderately Hypnotizable Subjects

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THE EFFECTS OF TWO TYPES OF HYPNOTIC SUGGESTIONS ON ANALGESIC RESPONDING IN MODERATELY HYPNOTIZABLE SUBJECTS

by
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A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Arts
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
December 1991
THE EFFECTS OF TWO TYPES OF HYPNOTIC SUGGESTIONS
ON ANALGESIC RESPONDING IN MODERATELY
HYPNOTIZABLE SUBJECTS

Gloria M. Haddad, M.A.
Western Michigan University, 1991

This study assessed the effects of two hypnotic suggestions on hypnotic
performance in medium hypnotizable subjects. Subjects were exposed at separate
intervals to either an hypnotic suggestion patter containing specific imagery or
alternatively to a suggestion patter that provided only general problem-solving
direction. Hypnotic performance was assessed using tolerance and threshold measures
on a cold-pressor test.

The problem-solving suggestions were shown to increase both threshold and
tolerance of noxious stimulation. The imagery suggestions proved to be effective only
for the threshold measure.

These findings are discussed in terms of their implications for the use of
hypnosis with subjects who do not show high hypnotizability when traditional hypnotic
suggestions are used. In addition, implications for the classification of subjects along
hypnotizability dimensions are discussed. Further research is recommended to clarify
the impact of these experimental conditions on low hypnotizable subjects. Information
gathered from this study may contribute to the development of more effective hypnotic
suggestions for use with moderately hypnotizable individuals in clinical settings.
ACKNOWLEDGEMENTS

I would like to extend my sincere thanks to those who have assisted me throughout this project, especially Dr. C. Richard Tsegaye-Spates. I would also like to thank, Lisa Largo, Amy Ryzenga, Carman Stark, and Dale Taggett. In addition, I thank my parents for their encouragement and support.

Gloria M. Haddad
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The effects of two types of hypnotic suggestions on analgesic responding in moderately hypnotizable subjects

Haddad, Gloria M., M.A.

Western Michigan University, 1991
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CHAPTER I

INTRODUCTION

Review of the Literature

Hypnotic induction can be defined as a behavioral process whereby a listener is conditioned to respond in a somewhat precise and extreme fashion to the verbal stimulation of the speaker (Skinner, 1957) sometimes leading to stable and lasting performance after the formal induction ceremony has ended. Beyond this, many other features of the hypnotic process remain controversial or not well studied, i.e., whether "trance" is necessary to accomplish hypnotic performance or to explain it (Barber, 1979; Spanos & Chaves, 1989); whether many of the test suggestions often found in the standard hypnotic induction ceremonies are essential (Spanos & Chaves, 1989) or merely historical artifacts passed down through the ages; whether "depth" of trance has any bearing on post hypnotic performance (Weitzenhoffer, 1989). Further, the specific role played by much of the standard induction patter remains to be researched and better articulated as to whether it is essential.

Evidence suggests that the listener, under proper circumstances, can be conditioned to respond differentially to a variety of vocal and non-vocal stimulation arising from the speaker or from the listener's own behavioral and physiological activity if properly manded (Farthing, Venturino, & Brown, 1984; Spanos, Kennedy, & Gwynn, 1984; Spanos, Radtke-Bodorik, Ferguson, & Jones, 1979). Clues about the nature of these "proper circumstances" can be derived from experimental and
descriptive research on hypnotic performance. First, however, it is important to
distinguish between the listener's behavior during that phase typically referred to as the
hypnotic induction or "ceremony" and the listener's (hypnotically relevant) behavior
during the post-induction phase.

For hypnotically naive subjects, the evidence suggests that the listener's
behavior during the induction ceremony proper is comprised of arbitrary responses
evoked directly by the verbal stimulation of the speaker in a process designed to
establish strong control of the listener's performance by the speaker (Skinner, 1957).
The arbitrary nature of these early responses is suggested by the great variation in
response requirements associated with the various types of induction ceremonies. The
common characteristics of the responses evoked are that they (a) have little to no
practical utility, (b) can be initiated and terminated within the ceremony proper, (c)
often require visible motoric movements by the listener (facilitating operator knowledge
of whether compliance has occurred), and (d) can be included as part of a single
induction ceremony (therefore practice in operator-induced control of the listener can be
accomplished). In addition, it is often the case that responses are evoked which
comprise activity across multiple sense organs and system, i.e., behavioral activity
involving both receptors and effectors are evoked, respondents as well as operants are
elicited, and visual, auditory, cognitive, motoric, emotional, and olfactory response
systems are utilized during the induction ceremony and presumably play important roles
in accomplishing suggested performance. Although the significance of this latter
observation has not been thoroughly researched, it is assumed that certain characteristic
hypnotic reactions owe to the evocation of behavioral activity across these multiple
response channels and at least may play a role in convincing some subjects and
operators of the extensiveness of the range of hypnotic control.
That control by the speaker is the primary aim in utilizing these arbitrary responses in the early phase is further indicated insofar as no further use is made of the topographies thus generated, yet a great deal is made of the fact that the subject responds at all. In fact, it is on the basis of the subject's tendency to respond during this phase that conclusions are drawn regarding the listener's hypnotizability.

The scientific and clinical literature in the field suggest that some listeners on first presentation respond more readily to the speaker's verbal stimulation than others, i.e., are more hypnotizable (Barber, 1979; E. R. Hilgard, 1965; J. R. Hilgard, 1977). Further, it is clear that even though a listener responds to the speaker's verbal stimulation, what is most important during the induction phase is that such responding occurs in direct reaction to the speaker's stimulation, i.e., under control of the speaker's verbal behavior (Spanos & Chaves, 1989; Weitzenhoffer, 1989). That is to say, if the subject merely complies, but does not do so in a manner indicative of point-to-point correspondence with the speaker's stimulation or themes arising out of such stimulation, then control has not been established and the listener is said to be at best in a light trance or to be only low to moderately hypnotizable. Those listeners responding with clear indications of correspondence with the speaker's stimulation, are said to achieve a "deep trance" and referred to as highly hypnotizable.

It can be provisionally concluded that the early phase of hypnotic induction is designed to achieve functional control of a listener's behavior by the speaker's verbal stimulation. The manner in which such control is established (or which hypnotic induction technique is used) is less important than the fact that such control occurs before hypnosis can be said to have been induced. Thus there exists a large variety of induction ceremonies all seeking to establish this type of listener-speaker relationship. Some are highly standardized with explicit assessment procedures "built in" (e.g., The
Harvard Group Scale of Hypnotic Susceptibility, Form A, Shor & Orne, 1962; The Stanford Scale of Hypnotic Susceptibility, Forms A & B, Weitzenhoffer & Hilgard, 1959). Others are tailored to a specific listener within a broad framework that is assumed to comprise an hypnotic induction (e.g., The Creative Imagination Scale, Barber & Wilson, 1979). Some are brief, taking just 15-20 minutes (e.g., The Hypnotic Induction Scale, Spiegel & Spiegel, 1978; The Stanford Hypnotic Clinical Scale, Morgan & Hilgard, 1978-1979). Others require more time, sometimes 60-90 minutes (e.g., The Stanford Scale of Hypnotic Susceptibility, Form C, Weitzenhoffer & Hilgard, 1962).

Given the characteristic situation under which hypnosis is employed experimentally and clinically, typical induction ceremonies have evolved with several additional features as standard accompaniments. While the utility of each component included has not always been experimentally investigated, several features that appear across a large number of different types of induction ceremonies have received limited empirical support. These include the listener being stimulated to relax (Mitchell & Lundy, 1986); providing the listener with favorable information about hypnosis in a pre-induction discourse (Bates & Brigham, 1990; Spanos et al., 1983; Spanos, Robertson, Menary, & Brett, 1986); the listener being given verbal stimulation to sleep (Barber & De Moor, 1972); defining the situation as hypnosis (Barber & De Moor, 1972; Spanos, Kennedy, & Gwynn, 1984); and strongly soliciting cooperation from the listener (Barber & De Moor, 1972; Spanos et al., 1979). This evidence arises from the research of Clark Hull (1933), Theodore Barber (1979) and others who have taken an empirical stance regarding much that has historically been regarded as the mystique of hypnosis.
In addition to the above referenced features of the verbal stimulation supplied by the speaker in the induction ceremony, several characteristics of the behavior of highly hypnotizable listeners also have been identified. These characteristics refer to the hypnotically-relevant repertoires these subjects seem to bring to the induction ceremony. In behavioral terms these are repertoires for which the specific listener's natural environment has provided reinforcement, and that are therefore evoked with considerable facility. They are utilized during the induction ceremony toward the principal objective of establishing speaker control. It has been empirically established that persons bringing strong repertoires of this type to the induction ceremony will make better subjects (Lynn & Rhue, 1986, 1987; Nash, Lynn, & Givens, 1984; Spanos, Kennedy, & Gwynn, 1984; Wilson & Barber, 1981). They respond more readily to the speaker's verbal stimulation and as a consequence, their behavior easily enters the desired relation with the speaker. Included in such repertoires are (a) the propensity for spending great amounts of time under the control of private events or fantasy proneness (Lynn & Rhue, 1986, 1987, 1988); (b) the tendency to observe and respond differentially to private events as if they comprised similar events taking place at a public level or imaginative involvement (Hilgard, 1979); (c) the tendency to behave with respect to direction from others without particular concern, worry or fear. This repertoire is called trust and might be established when the verbal community provides positive reinforcement for behavior consistent with following directions provided by others (Spanos & Chaves, 1989); and (d) the demonstration of a specialized repertoire consisting of focusing attention on a single object, event, or activity for prolonged periods under the control of the given stimulus situation. This repertoire might be referred to as concentration (Farthing et al., 1984; Spanos, McNeil, Gwynn, & Stam, 1984; Spanos et al., 1979). These individuals also are highly motivated to do well in
the hypnotic situation, an orientation that is systematically established as a function of the speaker's preparatory remarks prior to the induction proper (Spanos & Chaves, 1989). One important part of the speaker's preparatory remarks strongly solicits the subject's cooperation with the hypnotic process and no doubt has a direct influence on the subject's motivation in this respect (Spanos, Brett, Menary, & Cross, 1987; Spanos, Cross, Menary, Brett & De Groh, 1987). In all instances of the above referenced repertoires the role played by the listener's natural environment is clear. Except for the subject's natural environment having already strengthened any given repertoire, the mere instruction to activate it, whether provided by the operator or the subject (as in self-hypnosis) is unlikely to be effective. When these repertoires are strong and available, the evidence suggests that a subject can easily be hypnotized through the special arrangement of suggestions known as the induction ceremony. When these repertoires are weak or absent, induction is at best made difficult and is probably unlikely. These response classes can be assessed independently and prior to an attempt at induction to determine their relative strength. This is accomplished through use of special scales called suggestibility or hypnotizability scales. They consist largely of preparatory remarks and hierarchies of test suggestions which are monitored by the operator to determine the level of subject responsiveness. These observations are reduced to quantitative scores indicating how well the subject complied with and subjectively experienced the operator's suggestions.

In most hypnotic situations, all of the operator and subject activity during the ceremony is usually oriented toward achieving some designated or agreed upon performance by the subject after the ceremony has ended. This is universally the case in the clinical context and most often the case in the experimental context. Both instances involve the use of post-hypnotic suggestions designed to bring about this
influence on the subject's behavior. This post-hypnotic performance may be called for immediately after the ceremony, or at a later time, and/or under special circumstances (Crassilneck & Hall, 1985).

Some investigators have raised the question of whether it is useful to consider as hypnosis the instances where the above referenced repertoires are very strong and available to the subject naturally, and where the hypnotist merely instructs the subject to perform. In Hilgard's terms in such instances "the experience of hypnosis resembles in a number of respects experiences of everyday life outside hypnosis" (Hilgard, 1970, p. 45). Hull (1933) commented on the same observation and concluded "the mere susceptibility to prestige suggestion, no matter in what degree, is not hypnosis" (p. 392). Finally, Barber (Wilson & Barber, 1981) has made similar observations within the context of a study on highly-hypnotizable subjects. He concluded that these subjects are fully capable of submitting to ostensibly extreme control by the hypnotist, and as well, can demonstrate self-induced hypnotic-like performance of an extreme degree. He documented positive and negative hallucinations, pain tolerance, and numerous other hypnotic-like performances by these subjects. He concluded that the contribution of the hypnotic ceremony in these instances is very minor and consists only in giving subjects an opportunity to "do for us what they can do independently of us in their daily lives" (p. 143). The fine line between making use of a subject's already strongly conditioned repertoires to demonstrate operator control, and using the hypnotic induction ceremony to strengthen such repertoires under conditions where they are relatively weak or even non-existent has been the target of much research in recent years. This line of research has concerned the modification of hypnotizability in otherwise low hypnotizable subjects (Spanos, Kennedy, & Gwynn, 1984; Spanos, McNeil, Gwynn, & Stam, 1984; Spanos et al., 1979, 1983, 1986).
The standard protocol entails first assessing hypnotizability, using one of the afore-referenced scales to determine status (i.e., low, high, or moderate). Selected variables, believed to directly influence hypnotizability, are then isolated and the subjects are introduced experimentally to this variable in order to maximize hypnotic performance. A control group of similarly low hypnotizables is exposed to an innocuous procedure (not containing elements of the experimental variable thought to influence hypnotizability) of the same duration and interpersonal structure as the experimental group. Subject performance is monitored before the experimental and control procedures on a laboratory task selected because it lends itself to direct observation and quantitative measurement and not simply subject report of private events. This pre-test usually reveals only low level performance for both the experimental and control subjects. The experimental procedure is then introduced to the experimental group and the control procedure is introduced to the control group. Their performance is again monitored using the laboratory task and scored in a post-test phase. The pre-test and post-test phases often consist of a single trial and the differences between scores (often consisting of subject ratings of one kind or another) at these points are used to assess the significance of experimental effects.

Exemplary of the experimental procedure outlined above is work by Nicholas Spanos and colleagues. Using this procedure Spanos (e.g., Spanos, Barber, & Lang, 1974; Spanos et al., 1979) has demonstrated that when subjects are given suggestions for analgesia they invariably report a reduction of pain. This appears consistent in both hypnotic and non-hypnotic cases. It has been found (Spanos, Kennedy, & Gwynn, 1984) that this relationship between hypnotic susceptibility and analgesia appears to be influenced by the "attitudes and expectancies" (p. 285) of subjects when engaged in a situation associated with hypnosis.
In one study (Spanos, Kennedy, & Gwynn, 1984) the Carleton University Responsiveness to Suggestion Scale (i.e., CURSS; Spanos et al., 1983) was administered to seventy-five undergraduate subjects who were then assigned to groups of low, medium, or high hypnotizables based upon the scores received on this scale. Within these three susceptibility levels, subjects were randomly assigned to one of three experimental conditions: (1) a hypnosis-plus-instruction treatment where they were given a ten minute induction ceremony and analgesia instructions which asked them to "do whatever you can to reduce pain" (p. 288); (2) an instructions-alone treatment which was the same as that administered to the first group, except that no reference was made to hypnosis; and (3) a group (the control group) who did not receive any intervention or suggestions.

For all subjects, pre-test data were obtained by exposing them to a cold-pressor apparatus and asking them to report on a scale of zero (no pain) to twenty (the most intense pain ever experienced) the amount of pain felt. They were asked to report this twice, once at thirty seconds and again at sixty seconds, just prior to removal of the hand from the water. Subjects were again tested after the experimental intervention in the same manner. After both trials were completed, subjects were asked to complete two questionnaires. One questionnaire asked for a subjective report of the amount of time spent thinking about the pain and the aversive aspects of the situation prior to the hand immersion; the other asked for a subjective report of the amount of time preceding the immersion that was spent thinking about events inconsistent with the pain.

It was found that in the hypnosis-plus-instructions group the amount of pain reduction reported was related to the subjects' pre-session level of hypnotizability. That is, the high-hypnotizable subjects reported higher levels of pain reduction than the
low-hypnotizable subjects. In the instructions-alone condition, no difference was found between amount of pain reported and hypnotizability. The high-hypnotizable subjects receiving the hypnotic treatment did not differ from any of the other groups (high, medium, or low hypnotizables) in the amount of pain reduction reported. The low susceptible subjects who were given the instructions alone treatment reported larger amounts of pain reduction than equally susceptible subjects given hypnosis-plus-instructions. Thus it was concluded that "there was no significant relationship between susceptibility level and degree of pain reduction" (p. 291). Low-hypnotizable subjects who are able to divert attention during the aversive situation reported pain reductions to the same degree as the high hypnotizable subjects who were given a specific analgesia suggestion. These findings contradict earlier reports (e.g., Hilgard, 1977) that low hypnotizable subjects are unable to reduce pain to the same degree as high hypnotizable subjects. Spanos and colleagues speculated that defining a situation as "hypnosis" clearly affects the amount of pain reported.

In another study (Spanos, McNeil, Gwynn, & Stam, 1984) eighty-four undergraduates, high and low in hypnotizability (as indicated by the CURSS:O), were tested on a cold-pressor task. Within each of the susceptibility levels, the subjects were randomly assigned to one of three treatment conditions with equal numbers of high and low hypnotizables in each group. One group was instructed to employ a distraction task; the second group was asked to imagine that their hand felt "like a piece of rubber" (p. 279); and the third group, who served as control subjects, received no special directives. The subjects were all instructed to report the amount of pain felt (on a scale from 0 to 20) every fifteen seconds that the hand was in the cold water. Pre-test and post-test trials were administered for each subject. After each immersion subjects responded to two questionnaires intended to yield a "coping score."
The results indicated that in the group given the suggestion to imagine the hand as a "piece of rubber" the high-hypnotizable subjects showed reduced pain ratings; the low-hypnotizable subjects did not report reduced pain. The low susceptible subjects given a distraction task reported reduced pain perception to a degree similar to the high hypnotizable subjects who were given the analgesia suggestions. Thus, it was concluded that the low hypnotizable subjects are as proficient as high hypnotizable subjects in reducing pain when "encouraged to employ the cognitive strategies that resonate with their abilities" (p. 282), supporting the social-cognitive view that low and high hypnotizable subjects differ not in their ability to "dissociate" the pain (as proposed by Hilgard & Hilgard, e.g., 1975), but in their tendency to employ skills that have previously been successful in reducing pain. These results indicate that given "permission" to employ the relevant repertoires, the low-hypnotizable subjects report as much of a reduction in pain as high-hypnotizable subjects (p. 278).

This latter study is significant insomuch as it raises the question of how hypnotizability is assessed. Standard hypnotizability scales rely heavily on suggestions that are rich in imagery-based verbal stimulation. The findings from this study call into question the utility of this approach in assessing hypnotizability. Subjects without a strongly established imagery-based repertoire might well score low on such scales, but can clearly demonstrate hypnotic performance. Future research in this area should attempt to determine if low or moderate hypnotizable subjects are merely those who do not bring a strong imagery repertoire to the hypnotic situation, but who are still responsive when the situation is recast, via suggestion, into one that calls forth more of a problem-solving or other alternative strategy to assist performance. Additionally, future research should seek to examine the relationship between pre-established hypnotically relevant repertoires and hypnotizability. For these purposes
hypnotizability should be assessed using well formulated test suggestions, i.e. susceptibility scales, that place equal emphasis on pre-established capacity to respond to verbal stimuli that instruct the subject to make use of visual imagery, distraction from an ongoing task and problem-solving abilities.

In a more recent study (Spanos, Perlini, & Robertson, 1989) the relationship between hypnotic suggestions, non-hypnotic suggestions, and placebo effects was examined with experimental (ischemic) pain reduction. Undergraduate subjects were administered the CURSS and degree of hypnotizability was assessed. A total of ninety-six subjects, high and low in hypnotizability were selected and randomly assigned to one of three treatment conditions: a baseline/hypnosis/placebo condition; a baseline/placebo/hypnosis condition; or a no treatment/control condition. In the first two situations, baseline data were obtained and subjects were then exposed to a five minute induction procedure followed by a forty-five second analgesia suggestion that instructed them that their hand was "becoming numb, dull, and insensitive and felt like it had been placed in a thick glove" (p. 287). Following this exposure to pain, and prior to the re-administration of another trial, the subjects were asked to rate the degree to which they felt the hypnotic treatment would be effective. The groups were then given a placebo "anesthetic" composed of colored water and ethyl alcohol. They were again asked to report the degree to which they expected this treatment to be effective. The only difference between groups one and two was the order in which the procedures were administered.

It was found that the high hypnotizable subjects reported a larger amount of pain reduction in the hypnotic trial compared to the placebo trial. The low hypnotizable subjects, on the other hand, showed no difference between hypnotic analgesia and placebo. Further, their scores on the expectation measure showed that "expectations"
have a significant effect in "suggestion-induced" pain reduction (p. 288). In a related experiment within this same study, the results were replicated. However, in this case, subjects who reported a reduction of pain engaged in "cognitive coping and less catastrophizing" (p. 285) than those who did not report such a decrement in pain perception.

The work by Spanos and colleagues described above is empirically based and framed in a social psychological context. However, because of reliance on intrapersonal variables, such as "expectancies," "cognitive attributes," and "attitudes," it is felt that the general theoretical posture is weakened. An explanation that relies more heavily on manipulable variables in the current environment, or which points to such variables in the past history of the subject is more desirable. Such an analysis would also clarify the limits of the hypnotic ceremony in its capacity for conditioning, i.e. shaping, hypnotically relevant repertoires when they are weak or absent.

Focus of Study

The analysis presented here offers a view of hypnotic performance based upon a radical behavioral conceptual framework. According to that framework hypnosis might best be understood in terms of the effects of a speaker on a listener and as such the interactional framework offered by Spanos and colleagues holds great promise in assisting such an analysis. By examining the effects of two types of hypnotic suggestions, both designed to enhance hypnotic performance in moderately hypnotizable subjects, the present investigation sought to clarify the role of traditional and non-traditional hypnotic suggestions on cold-pressor performance when such suggestions were superimposed upon a stable performance baseline.
CHAPTER II

METHOD

Subjects

Subjects were recruited for participation from Western Michigan University undergraduate psychology courses. Twelve subjects were selected and screened from a pool of qualified participants, all of whom scored in the medium hypnotizability range (based on The Harvard Group Scale of Hypnotic Susceptibility, Form A, Shor & Orne, 1962). Subjects included only females, eighteen to twenty-six years of age who volunteered for participation in the study. All subjects received course credit for their full participation. Subjects who had any previous contact with hypnosis or who were presently receiving psychotherapy of any kind were excluded from the study.

Setting

The research setting was the Psychology Clinic located in Wood Hall at Western Michigan University. The room used was furnished with a large easy chair in which the subject sat with her back to a one-way mirror. The principal experimenter sat behind the subject as the hypnotic suggestions were administered. The lighting consisted of standard fluorescent lighting, and the sound was attenuated appropriate to a standard therapy room. There were one to two observers present during all sessions to collect reliability, tolerance and/or threshold data. The observers sat behind two way mirrors during data collection.
Materials

The materials used in this study included a cold-pressor apparatus which consisted of a cubical shaped Styrofoam tank measuring 35 cm. x 35 cm. x 37 cm. used to hold ice and water. The water was maintained between zero and two degrees Celsius and was circulated after each immersion. The amount of time that a subject maintained her hand in the water was measured by a hand-held stopwatch (adapted from Spanos, Kennedy, & Gwynn, 1984). A separate stopwatch was used to measure the amount of time that a subject maintained her hand in the cold water prior to reporting any subjective discomfort.

Design

The design employed was an ABCA "crossover" design that allowed for between group experimental comparisons in addition to each subject serving as her own control. A "free operant" level of cold-pressor performance was obtained for each subject over six trials of hand immersion, following which each experimental subject was exposed to a common hypnotic induction, followed by one of two hypnotic suggestions designed to enhance cold-pressor performance. After experimental phase one, each subject was exposed to the alternate experimental manipulation (type of hypnotic suggestion), followed by a return to baseline condition. The hypnotic suggestions being tested were administered just prior to each immersion. The control group was instructed to immerse their hands in ice water across four phases and for the same number of trials within each phase as the experimental groups. The control group was not exposed to any hypnotic induction or hypnotic suggestions. As described below, they were exposed to conversational contact during the comparable period (and for an equivalent time duration) to that in which hypnotic instructions were provided for
the experimental groups. The independent variable consisted of the type of hypnotic suggestion administered (i.e., problem-solving vs. imagery-based). The major dependent variables consisted of two duration measures: (1) tolerance of noxious stimulation, as measured by the amount of time in seconds the hand was immersed in cold water; and (2) pain threshold, as measured by the amount of time in seconds after the hand was in cold water to the point where pain was reported.

Procedures

Subjects were screened and selected for participation based on scores on the Harvard Group Scale of Hypnotic Susceptibility: A (Shor & Orne, 1962). Only subjects whose scores on the Harvard Scale ranged between 4 and 7 were continued through the screening procedure. Subjects were also screened using the Social Desirability Scale (Crowne & Marlowe, 1960), and subjects who scored twenty or greater were excluded. In addition, the Hostility Inventory (Buss & Durkee, 1957) was used to further screen subjects where subjects who scored three or above on the "negativity" subscale and six or more on the "suspiciousness" subscale were excluded from participation in this study. Finally, subjects were excluded from participation if (a) they had any previous experience with hypnosis; and/or (b) were receiving counseling services during the course of this study.

The twelve subjects were randomly assigned to three groups of four subjects each, a control group and two experimental groups. Baseline data were collected for subjects in all conditions. The following instructions were given: "immerse your hand in the water for as long as you can" and indicate when "you first feel pain" by signaling the experimenter with the index finger of the hand not immersed in the water. These data comprised the threshold measure and were collected by one to two observers.
behind the one-way mirror through the use of a standard stopwatch. The total amount of time that a subject maintained her hand in the ice water comprised the tolerance measure and these data were also collected by observers behind the one-way mirror through the use of this same stopwatch.

Alternate hands were employed during successive trials, and no subject was allowed to submerge her hand longer than five minutes. There was a three-minute waiting period between each consecutive right and left hand immersion. These procedures were repeated in all phases of the study.

Baseline performance was obtained over six trials for all subjects; and once obtained, the second phase of the study was initiated. In the second phase, experimental subjects were exposed to the first experimental condition and were exposed to a hypnotic induction (adapted from The Stanford Scale of Hypnotic Susceptibility Scale, Form C, Weitzenhoffer & Hilgard, 1962) followed by either a problem-solving suggestion (adapted from Spanos, Kennedy, & Gwynn, 1984) or an imagery based suggestion (adapted from Cooke & VanVogt, 1965; and Evans & Paul, 1970). During phase three, subjects were exposed to the same hypnotic induction but provided the suggestion not administered during phase two. Specifically, subjects who were first exposed to the problem-solving suggestion were given the imagery-based suggestion (following administration of the hypnotic induction), and subjects who were first exposed to the imagery-based suggestion were given the problem-solving suggestion (following administration of the hypnotic induction). Subjects in the control condition did not receive a hypnotic induction but were engaged in conversation with the experimenter for the same amount of time that subjects in the experimental condition spent listening to the induction ceremony. Control subjects were administered a repetition of this "contact" procedure across both of these phases.
A return to baseline phase followed the second experimental phase, where all subjects received the following instruction: "Immerse your hand in the ice-water for as long as you can without the use of hypnotic suggestions." The control subjects also were asked to immerse "your hand in the ice-water for as long as you can"; however, no reference was made to hypnosis.

For purposes of clarification, note that subject selection was based upon (a) a HGSHE:A score between four and seven, (b) a Social Desirability Scale score of 19 or less, and (c) a score of 2 or less on the "negativity" subscale and a score of 5 or less on the "suspiciousness" subscale in regards to the "Negativity" and "Suspiciousness" subscales of the Hostility Inventory.

A total of 12 subjects were selected and assigned to one of the following three conditions:

1. Four subjects were assigned to the control condition in which no induction patter nor hypnotic suggestions were given. Conversational contact was provided during phases 2 and 3. In phase 4, subjects were asked to immerse the hand in ice-water without conversational contact or hypnotic suggestions.

2. Four subjects were assigned to the problem-solving condition first, then given the imagery-based suggestion in the next phase that involved SHSS + problem-solving suggestion followed in next phase by SHSS + imagery-based suggestion. Phase 4 consisted of a return to baseline condition where subjects were asked to immerse the hand in ice-water without hypnotic instructions or suggestions.

3. Four subjects were assigned to the imagery-based condition first, then given the problem-solving suggestion in the next phase: SHSS + imagery-based suggestion followed in next phase by SHSS + problem-solving suggestion. Phase 4 consisted of
a return to baseline condition where subjects were asked to immerse the hand in ice-water without hypnotic instructions or suggestions.
CHAPTER III

RESULTS

Preliminary Analyses

Preliminary analyses were conducted to assess for equality of initial performance between groups. Lateral dominance of participants was analyzed to determine if subject handedness provided a possible explanation for the findings. In addition the data were analyzed for effects due to the hand immersed in the water (left / right position).

These analyses (analysis of variance with repeated measures where lateral dominance was the between group variable and phases was the repeated measure; and the same analysis where hand immersion served as the between group variable and phases as the repeated measure) revealed no main or interaction effects due to lateral dominance. There was a main effect for hand immersed, however. The right hand consistently outperformed the left hand irrespective of group assignment or experimental phase. This was true for both tolerance and threshold. An analysis of variance for initial baseline performance of subjects across experimental groups on both tolerance and pain threshold was conducted to evaluate for any initial differences in performances. The results revealed no significant differences between groups at initial baseline for either dependent variable.

A final preliminary analysis concerned inter-observer reliability on the independent variables to assure that experimental conditions were being implemented as planned and assessment of inter rater agreement on the subjects' performance on the
dependent variables. Two observers simultaneously and independently rated the
performance (both threshold and tolerance) of subjects across 54% of the trials, evenly
distributed across phases. Recorded times were within one second of each other or
identical in 98.4% of the trials observed. The inter-observer reliability on independent
variable implementation was 100% between the experimenter and an independent
observer. These analyses suggest that any remaining differences were most likely due
to the experimental manipulations arranged by the design of the study.

Visual Inspection of the Data

The results are first graphically displayed with a frequency polygon reflecting
the mean tolerance and threshold data for all subjects' for each phase, first irrespective
of group assignment, and second as a function of group assignment. Visual analyses
can be performed on both dependent variables (threshold and tolerance). Secondly,
each subject's individual data are similarly presented graphically. Third, a two factor
repeated measures analysis of variance was performed on each of the dependent
variables (experimental condition as the between factor and phases as the within factor).
Finally, simple effects analyses were conducted, where appropriate, to permit an
examination of specific effects due either to group assignment and experimental phase.

Figure 1 presents a graphic summary of data for all subjects across phases. In
general, visual comparisons of changes between phase 1 (baseline 1) and phase 2 (the
first experimental phase) revealed an increase in performance on tolerance. Subjects'
performance rose from an average of 48 to 60 seconds of tolerance. This suggest a
marginal effect due to the experimental manipulations. Similarly, visual inspection of
change between phases 2 and 3 revealed a substantial elevation in performance.
Subjects' performance rose from an average of 60 seconds to an average
Figure 1. Summary of Data for All Subjects (Duration by Phase).

■ = Tolerance
○ = Threshold
of 106 seconds of tolerance in phase three. Finally, visual inspection comparing phase 3 and phase 4 (the return to baseline phase) revealed a relative drop in performance. Subjects' performance decreased from 106 seconds of tolerance in phase 3 to an average of 37 seconds of tolerance in phase four. These data represent average performance across 72 trials (12 subjects over 6 trials each) for each comparison.

Observation of the same figures reveals a similar pattern of responses for the threshold dependent variable for phases one and two (means were 28 and 46 seconds for each phase respectively); however, during phase three, the relative rise in threshold is proportionately less than the rise for tolerance (mean rose from 46 to 50 seconds). This would suggest that for phase three, subjects' report of pain perception was essentially unchanged by the collective experimental conditions, while overall tolerance was clearly affected. The threshold variables showed a return to baseline during phase four (from 50 to 27 seconds).

Figure 2 displays a summary of data for subjects in the control group across phases. These data reveal that performance is relatively stable across phases. The average tolerance was 49 seconds, with a range of 41 and 56 seconds. From the same graph it can be seen that data on the control group revealed stable threshold performance across phases as well. These data indicate that the average threshold was 36 with a range of 32 to 41 seconds. These subjects who did not receive an hypnotic intervention and who instead were simply asked to keep their hands in the water for as long as they could did not evidence a significant decrease or increase in either measure of response duration over repeated trials.

Figure 3 displays summary data for subjects in the problem-solving condition (those subjects who received both experimental interventions, but who received the
Figure 2. Summary of Data for All Subjects in Control Group (Duration by Phase).
Figure 3. Summary of Data for Subjects in Problem-Solving Condition.
problem-solving hypnotic suggestions first in sequence, followed by the imagery-based condition). It can be seen that between phases one and two, subjects showed an average change in tolerance of 44 seconds (changing from 25 seconds in baseline to 69 seconds in phase two). In phase three subjects in this group were administered the imagery-based hypnotic suggestions and they showed a further increase in performance, moving from 69 seconds of tolerance to 86 seconds on average. Finally, subjects in this condition demonstrated a return to baseline in that their performance dropped from an average of 86 seconds in phase three to an average of 34 seconds in phase four. These data suggest a clear effect due to the experimental manipulations.

The data with respect to threshold follow the pattern described for tolerance with slightly less absolute values, as can be seen from the same figures. The means for respective phases on the threshold measure were 19, 65, 82, and 32. In this group, subjects pain perception seems to have been affected by the experimental conditions in ways similar to their overall tolerance of noxious stimulation.

Figure 4 displays an overall summary of data for subjects in the imagery-based group. Subjects in this group received the imagery hypnotic suggestion first, followed by the problem-solving suggestion. It can be seen that when given the imagery suggestion in phase two, subjects' performance on tolerance dropped slightly below the baseline level. Subjects went from 64 seconds of tolerance in baseline to 60 seconds during phase two. In phase three when subjects received the problem-solving hypnotic suggestion, performance rose (from 60 seconds) to 192 seconds on average. Finally, during phase four, these subjects demonstrated a return to baseline by a drop in performance, from 192 seconds to 33 seconds. These data suggest relatively stable (although actually a marginal decrease in) performance between phases one and two, and an appreciable increase in performance during phase three, when the problem-
Figure 4. Overall Summary of Data for Subjects in Imagery Group Condition (Duration by Phase).
solving hypnotic suggestions were administered. The pattern described above for tolerance was generally replicated for the threshold-dependent variable (means for phases one through four, respectively were 23, 33, 33, and 15) with one important exception. That exception was during phase three (problem-solving suggestion period), where subjects' report of pain perception did not show a rise which was proportionate to the rise in tolerance. This suggests that the experimental condition entailing the problem-solving suggestion did not produce an effect on pain perception although it did produce an appreciable effect on pain tolerance. This latter finding, with respect to the desynchrony in the relationship between threshold and tolerance for subjects in this group during phase three will be highlighted still further by examination of individual subject data below.

Figures 5 through 16 present graphic displays of data for individual subjects, grouped according to experimental condition. First, it can be seen that those subjects in the control group (Figures 5 through 8) showed stable performance across all phases. The mean performance for each subject (over the six trials within each phase) is designated on each graph. This pattern of stable performance is true for each subject. This pattern of response between phases is generally true for both tolerance and threshold variables.

Figures 9 through 12 presents a display of subjects who received the problem-solving suggestion first. An analysis of individual cases, as was the case for the group data, also suggested a selective influence of the specific experimental conditions. For subjects who received the problem-solving suggestion first, 3 out of 4 showed the greatest change in performance after exposure to the problem-solving intervention in phase two. During phase three, these subjects showed either (a) slight further improvement with the additional intervention (imagery suggestions) provided (S# 1, 3
and 7), or (b) actually showed a decrement in performance (S# 10). One subject showed only a marginal increase from baseline to first exposure to the problem-solving intervention (S# 7) and greater gains during exposure to the "imagery" condition. These data would indicate that problem-solving suggestions had an appreciable effect on both tolerance and threshold performance by subjects who received this intervention first in sequence. There is further suggestion that the imagery condition either maintained the gains produced by the earlier intervention with problem-solving suggestions or actually produced a further rise in performance on both dependent variables (S# 1, 3, and 7). Only one subject (S# 10) showed a reduction in performance during the imagery condition when it followed the problem-solving condition.

Figures 13 through 16 display the data for subjects in the imagery group; those who received the imagery suggestions first in the sequence of hypnotic suggestions. It can be seen that after introduction of the imagery suggestions in phase 2, three of the four subjects in this condition showed at least a marginal rise in performance on both tolerance and threshold dependent variables. The fourth subject (S# 11) actually showed an appreciable reduction in performance with respect to tolerance, but not threshold. More noticeable, however, is the visually significant rise in performance from phase 2 to phase 3 for subjects in this group. All subjects showed an increase in performance during the problem-solving suggestion, but three out of four showed dramatic increases in performance on tolerance, while their report of pain perception remained relatively stable. All subjects in this group showed a return to baseline during phase four. The problem-solving suggestions clearly produced an experimental effect for subjects in this group especially on tolerance.
Figure 5. Threshold and Tolerance Data for Subject #4 (Control).
Figure 6. Threshold and Tolerance Data for Subject #6 (Control).
Figure 7. Threshold and Tolerance Data for Subject #9 (Control).

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Figure 8. Threshold and Tolerance Data for Subject #12 (Control).
Figure 9. Threshold and Tolerance Data for Subject #1 (Problem-Solving).
Figure 10. Threshold and Tolerance Data for Subject #3 (Problem-Solving).
Figure 11. Threshold and Tolerance Data for Subject #7 (Problem-Solving).
Figure 12. Threshold and Tolerance Data for Subject #10 (Problem-Solving).
Figure 13. Threshold and Tolerance Data for Subject #2 (Imagery).

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Figure 14. Threshold and Tolerance Data for Subject #5 (Imagery).
Figure 15. Threshold and Tolerance Data for Subject #8 (Imagery).
Figure 16. Threshold and Tolerance Data for Subject #11 (Imagery).
Taken together, these data suggest that the performance of individual subjects demonstrated an overall effect associated with the experimental manipulations when compared to the control group. The pattern of effect was the same for both threshold and tolerance measures, in general. Further, the experimental effects were selective and for the most part revealed greatest gains in tolerance of noxious stimulation during the problem-solving suggestions. The problem-solving condition seemed to produce the greatest change whenever it was introduced (compared to the imagery condition), and this was especially noticeable in the change between experimental phases (phases two and three), as compared to change between baseline and phase one. Thus when problem-solving suggestions followed the imagery suggestion in the crossover, subject performance uniformly increased to a visually appreciable degree. The increase under these circumstances was of a magnitude of an order of 3 in most cases. The increase for the "imagery" group between the first and second experimental phases (between baseline and imagery exposure) was much smaller on average. This comparatively smaller increase for the imagery condition was also the case for both threshold and tolerance between phases two and three. It was further observed that when the problem-solving suggestion followed the imagery condition, there was a break in the relationship between threshold and tolerance for the phase in which problem-solving suggestions were administered. This latter observation suggests that the experimental manipulation affected tolerance without altering subjects' pain perception. In most other phases, report of pain perception closely paralleled that of tolerance in terms of the basic pattern of performance, though in lesser absolute values.
Statistical Analysis

Tables 1 and 2 display the results of an overall repeated measures analysis of variance (for threshold and tolerance respectively), which partitioned the variance on dependent variables into one between factor consisting of group assignment, and one within factor consisting of experimental phases.

The purpose of this analysis was to determine if there was a significant group by phase interaction, thus permitting a more detailed analysis of the data in such a manner as to reduce the chances of a Type II error. No main effect for groups was anticipated since both experimental groups received all treatment conditions.

Table 1 displays the results of this analysis for threshold. It can be seen that a significant interaction, $F(6, 27) = 3.356, p < 0.013$ was found. Also, a main effect for the repeated measure was found, $F(3,27) = 5.646, p < 0.039$. This main effect for phases only suggests that the treatment conditions differed from the control condition or from each other.

Table 1

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Condition (A)</td>
<td>2</td>
<td>4377.04</td>
<td>2188.52</td>
<td>1.15</td>
<td>.3589</td>
</tr>
<tr>
<td>Subjects within Groups</td>
<td>9</td>
<td>17117.87</td>
<td>1901.99</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Repeated Measure (B)</td>
<td>3</td>
<td>5108.75</td>
<td>1702.92</td>
<td>5.65</td>
<td>.0039</td>
</tr>
<tr>
<td>AB</td>
<td>6</td>
<td>6073.12</td>
<td>1012.19</td>
<td>3.36</td>
<td>.013</td>
</tr>
<tr>
<td>B x Subjects within Groups</td>
<td>27</td>
<td>8143.12</td>
<td>301.60</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Table 2 displays the summary table for the comparable analysis on tolerance, and also identifies significant group by phase interactions, $F(6, 27) = 5.91, p< 0.005$; as well as a significant main effect for phases, $F(6, 27) = 10.16, p< 0.0001$. It can be seen that no significant main effects were due to group assignment, $F(2, 27) = 1.259, p< 0.3294$. These analysis suggested that further examination of the data would reveal important differences within phases when groups are considered.

**Table 2**

**Overall 2-Factor Repeated Measures Analysis of Variance for Tolerance**

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Condition (A)</td>
<td>2</td>
<td>13919.54</td>
<td>6959.77</td>
<td>1.26</td>
<td>.3294</td>
</tr>
<tr>
<td>Subjects within Groups</td>
<td>9</td>
<td>49735.12</td>
<td>5526.12</td>
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<td>N/A</td>
</tr>
<tr>
<td>Repeated Measure (B)</td>
<td>3</td>
<td>33086.17</td>
<td>11028.72</td>
<td>10.16</td>
<td>.0001</td>
</tr>
<tr>
<td>AB</td>
<td>6</td>
<td>38491.96</td>
<td>6415.33</td>
<td>5.91</td>
<td>.0005</td>
</tr>
<tr>
<td>B x Subjects within Groups</td>
<td>27</td>
<td>29309.87</td>
<td>1085.55</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Within Group Analysis**

An analysis of variance for each of the experimental groups with the corresponding simple effects analysis are shown in Tables 3, 4, and 5, for threshold and 6, 7, and 8 for tolerance. This basic repeated measures analysis identified within each group the existence of significant effects due to treatment conditions, i.e., type of suggestions administered in relation to each other and in relation to the baseline conditions. No such effects were identified for the control group.
Table 3
Control Group Repeated Measures Analysis of Variance for Threshold

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>2358.69</td>
<td>786.23</td>
<td>8.00</td>
<td>.0034</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>1179.25</td>
<td>98.27</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
<td>3</td>
<td>189.69</td>
<td>63.23</td>
<td>.575</td>
<td>.65</td>
</tr>
<tr>
<td>Residual</td>
<td>9</td>
<td>989.56</td>
<td>109.95</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>3537.94</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 4
Imagery Group Repeated Measures Analysis of Variance for Threshold

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>3033.69</td>
<td>1011.23</td>
<td>7.62</td>
<td>.0041</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>1592.25</td>
<td>132.69</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
<td>3</td>
<td>860.19</td>
<td>286.73</td>
<td>3.52</td>
<td>.0618</td>
</tr>
<tr>
<td>Residual</td>
<td>9</td>
<td>732.06</td>
<td>81.34</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>4625.94</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Specifically, there was no significant effect for treatments as a within subjects source of variance for the control group. There was a significant between subjects effect, however this finding is likely to have resulted from increased variability due to the small sample size. It has no importance for the meaningful interpretation of treatment effects (except in general to reduce the likelihood of finding them, which was not the...
Table 5
Problem-Solving Group Repeated Measures Analysis of Variance for Threshold

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>11725.50</td>
<td>3908.50</td>
<td>2.833</td>
<td>.0831</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>16553.50</td>
<td>1379.46</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
<td>3</td>
<td>10132.00</td>
<td>337.33</td>
<td>4.733</td>
<td>.0301</td>
</tr>
<tr>
<td>Residual</td>
<td>9</td>
<td>6421.50</td>
<td>713.50</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>38279.00</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 6
Control Group Repeated Measures Analysis of Variance for Tolerance

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>2002.25</td>
<td>667.42</td>
<td>4.266</td>
<td>.0288</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>1877.50</td>
<td>156.46</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
<td>3</td>
<td>548.25</td>
<td>182.75</td>
<td>1.237</td>
<td>.3521</td>
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<tr>
<td>Residual</td>
<td>9</td>
<td>1329.25</td>
<td>147.69</td>
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<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>3879.75</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Outcome in this instance. This suggests that the exposure to conventional intervention had no impact on cold pressor performance in the control group (see Tables 3, 9 and 10).

For the subjects in the imagery group, there was only a trend towards significance (p< 0.061) in the basic repeated measures ANOVA for this group.
Table 7

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>36874.69</td>
<td>12291.56</td>
<td>1.79</td>
<td>.2027</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>82436.25</td>
<td>6869.69</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
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<td>61004.69</td>
<td>20334.90</td>
<td>8.539</td>
<td>.0053</td>
</tr>
<tr>
<td>Residual</td>
<td>9</td>
<td>21431.56</td>
<td>2381.28</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>119310.94</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 8

<table>
<thead>
<tr>
<th>Source:</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-test</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>3</td>
<td>10858.19</td>
<td>3619.40</td>
<td>2.62</td>
<td>.0988</td>
</tr>
<tr>
<td>Within Subjects</td>
<td>12</td>
<td>16574.25</td>
<td>1381.19</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Treatments</td>
<td>3</td>
<td>10025.19</td>
<td>3341.73</td>
<td>4.59</td>
<td>.0326</td>
</tr>
<tr>
<td>Residual</td>
<td>9</td>
<td>6549.06</td>
<td>727.67</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>27432.44</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Therefore, any subsequent findings of significance which revealed (see Table 11) must be interpreted cautiously, as they may have resulted from a Type II error. Two such significant findings emerged from this analysis.

The repeated measures ANOVA on threshold for subjects in the problem-solving group revealed a significant treatment effect $F(3, 15) = 4.733 \ p<0.03$. This
Table 9
Control Group Means by Phases for Phases 1 Through 4 for Threshold

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>40.75</td>
<td>25.69</td>
<td>12.85</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>38.75</td>
<td>18.12</td>
<td>9.06</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>34.00</td>
<td>5.42</td>
<td>2.71</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>32.25</td>
<td>9.91</td>
<td>4.96</td>
</tr>
</tbody>
</table>

Table 10
Control Group Simple Effects Comparison Between Phases for Threshold

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>2.00</td>
<td>16.77</td>
<td>.024</td>
<td>0.27</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>6.75</td>
<td>16.77</td>
<td>.276</td>
<td>0.91</td>
</tr>
<tr>
<td>Phase 1 vs. 4</td>
<td>8.50</td>
<td>16.77</td>
<td>.438</td>
<td>1.146</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>4.75</td>
<td>16.77</td>
<td>.137</td>
<td>0.641</td>
</tr>
<tr>
<td>Phase 2 vs. 4</td>
<td>6.50</td>
<td>16.77</td>
<td>.256</td>
<td>0.877</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>1.75</td>
<td>16.77</td>
<td>.019</td>
<td>0.236</td>
</tr>
</tbody>
</table>

finding permitted an analysis of simple effects which resulted in the following findings (see Table 12). A significant increase was found in threshold between baseline and following the introduction of the problem-solving suggestions (p < 0.05). A significant decrease was observed between the second experimental phase where imagery suggestions were provided and the return to baseline condition. No difference
### Table 11
Imagery Group Simple Effects
Comparison Between Phases for Threshold

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>-9.25</td>
<td>14.43</td>
<td>0.701</td>
<td>1.45</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>-9.00</td>
<td>14.43</td>
<td>0.664</td>
<td>1.41</td>
</tr>
<tr>
<td>Phase 1 vs. 4</td>
<td>8.50</td>
<td>14.43</td>
<td>0.592</td>
<td>1.33</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>0.25</td>
<td>14.43</td>
<td>0.001</td>
<td>0.039</td>
</tr>
<tr>
<td>Phase 2 vs. 4</td>
<td>17.75</td>
<td>14.43*</td>
<td>2.58</td>
<td>2.78</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>17.50</td>
<td>14.43*</td>
<td>2.51</td>
<td>2.74</td>
</tr>
</tbody>
</table>

*Significant at 0.05

### Table 12
Problem-Solving Group 1-Factor Repeated Measure Analysis of Variance
Comparison Between Phases for Threshold

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>-46</td>
<td>42.73*</td>
<td>1.977</td>
<td>2.43</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>-63</td>
<td>42.73*</td>
<td>3.708</td>
<td>3.33</td>
</tr>
<tr>
<td>Phase 1 vs. 4</td>
<td>-13</td>
<td>42.73</td>
<td>0.158</td>
<td>0.69</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>-17</td>
<td>42.73</td>
<td>0.270</td>
<td>0.90</td>
</tr>
<tr>
<td>Phase 2 vs. 4</td>
<td>33</td>
<td>42.73</td>
<td>1.018</td>
<td>1.75</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>50</td>
<td>42.73*</td>
<td>2.336</td>
<td>2.64</td>
</tr>
</tbody>
</table>

*Significant at 0.05

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was found between the two experimental phases. Pain perception as measured by the threshold measure in this analysis was therefore observed to change as a function of the two types of suggestions administered.

The repeated measures ANOVA on tolerance for subjects within the control group revealed no significant treatment effect. There was a significant difference between subjects effect, which as the case for threshold, indicates variability likely due to the small sample size. Table 6 displays the results of this analysis. This suggests that the conversational intervention had no effect on tolerance in this group.

The repeated measures ANOVA on tolerance for subjects in the imagery group revalued a significant treatment effect, but no significant between subjects effect. The significant treatment effect, $F(3, 15) = 8.59, p < .0053$, suggests that the experimental conditions produced important differences from baseline conditions or between themselves. Simple effects analysis revealed further, that the problem-solving intervention at phase 2 for this group produced a significant increases in tolerance, although the imagery suggestions at phase 1 did not produce significant differences a phase 2. It was further revealed that there were no differences between the first and second baseline conditions. There was a significant difference between phase 2 and 3, indicating that the problem-solving intervention further tolerance significantly beyond that produced by the imagery suggestion (which was actually comparable to the baseline condition). Finally, the data analysis indicates that the subjects demonstrated a return to baseline condition at phase 4, in that a significant reduction in tolerance was revealed.

A similar repeated measures analysis of variance for subjects in the problem-solving group revealed a significant treatment effect, $F(3,15)= 4.59, p< .032$. Simple effects analysis demonstrated that both of the experimental interventions produced
significant increases in tolerance in comparison to the baseline condition (see Table 12). It was also revealed that subjects showed a return to baseline at phase 4, in as much as the comparison between phases 3 and 4 revealed a significant reduction.

Summary

The results of the overall repeated measures analysis of variance indicate a significant increase in performance between groups and as a result, follow-up analysis was conducted. Specifically, analysis of variance with repeated measures for each of the groups was separately performed.

The location within the data array of significant findings as suggested by F, (i.e., at what phases and within which groups are there important differences.) was summarized.

With regards to threshold, Table 3 presents the data for the control group; table 4 presents the data for the imagery group; and Table 5 presents the data for the problem-solving group. In regards to the tolerance data, Table 6 presents the data for the control group; Table 7 presents the data for the imagery group; and finally, Table 8 presents the data for the problem-solving group.

The results of the analysis described in Tables 9 through 20 yield pairwise comparisons among phases, which take into account the group’s error term (or, the within group variance). Such analysis reduces the likelihood of error due to false detection of significant effects when none are in fact present. This is accomplished because at each phase of the analyses, the relevant within group error term is used in calculating the resulting F ratio. This is in contrast to using simple pairwise t-tests which only consider the error term for the comparison analyzed.
Table 13
Problem-Solving Group 1-Factor Repeated Measure Analysis of Variance
Comparison Between Phases for Tolerance

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>-44.75</td>
<td>43.15*</td>
<td>1.835</td>
<td>2.35</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>-61.50</td>
<td>43.15*</td>
<td>3.465</td>
<td>3.22</td>
</tr>
<tr>
<td>Phase 1 vs. 4</td>
<td>-10.00</td>
<td>43.15</td>
<td>0.092</td>
<td>0.520</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>-16.75</td>
<td>43.15</td>
<td>0.257</td>
<td>0.880</td>
</tr>
<tr>
<td>Phase 2 vs. 4</td>
<td>34.75</td>
<td>43.15</td>
<td>1.106</td>
<td>1.820</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>51.50</td>
<td>43.15*</td>
<td>2.43</td>
<td>2.700</td>
</tr>
</tbody>
</table>

Table 14
Imagery Group Means by Phases for Phases 1 Through 4 for Threshold

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>24.00</td>
<td>22.52</td>
<td>11.26</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>33.25</td>
<td>23.13</td>
<td>11.56</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>33.00</td>
<td>11.16</td>
<td>5.58</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>15.5</td>
<td>9.40</td>
<td>4.70</td>
</tr>
</tbody>
</table>

In general, the treatments (types of suggestions) had specific effects depending upon the order in which they were administered. Subjects in both experimental conditions showed a return to baseline performance. Finally, control subjects showed stable performance across phases.
### Table 15

Problem-Solving Group 1-Factor Repeated Measure Analysis of Variance for Phases 1 Through 4 for Threshold

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>19.25</td>
<td>8.81</td>
<td>4.40</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>65.25</td>
<td>43.58</td>
<td>21.79</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>82.25</td>
<td>58.40</td>
<td>29.20</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>32.25</td>
<td>25.72</td>
<td>12.85</td>
</tr>
</tbody>
</table>

### Table 16

Control Group 1-Factor Repeated Measure Analysis of Variance for Phases 1 Through 4 for Tolerance

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>56.00</td>
<td>24.37</td>
<td>12.19</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>52.25</td>
<td>10.78</td>
<td>5.39</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>41.00</td>
<td>4.76</td>
<td>2.38</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>45.25</td>
<td>19.43</td>
<td>9.71</td>
</tr>
</tbody>
</table>

### Table 17

Control Group 1-Factor Repeated Measure Analysis of Variance Comparison Between Phases for Tolerance

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>3.75</td>
<td>19.44</td>
<td>0.063</td>
<td>0.436</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>15.00</td>
<td>19.44</td>
<td>1.106</td>
<td>1.148</td>
</tr>
</tbody>
</table>

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Table 17--Continued

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 4</td>
<td>10.75</td>
<td>19.44</td>
<td>0.522</td>
<td>1.251</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>11.25</td>
<td>19.44</td>
<td>0.571</td>
<td>1.309</td>
</tr>
<tr>
<td>Phase 2 vs. 4</td>
<td>7.00</td>
<td>19.44</td>
<td>0.221</td>
<td>1.815</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>-4.25</td>
<td>19.44</td>
<td>0.082</td>
<td>0.495</td>
</tr>
</tbody>
</table>

Table 18
Imagery Group 1-Factor Repeated Measure Analysis of Variance for Phases 1 Through 4 for Tolerance

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>63.75</td>
<td>71.71</td>
<td>35.86</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>59.75</td>
<td>32.62</td>
<td>16.31</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>192.00</td>
<td>112.06</td>
<td>56.03</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>32.75</td>
<td>25.91</td>
<td>12.96</td>
</tr>
</tbody>
</table>

Table 19
Imagery Group 1-Factor Repeated Measure Analysis of Variance Comparison Between Phases for Tolerance

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 vs. 2</td>
<td>4.00</td>
<td>78.067</td>
<td>0.004</td>
<td>0.116</td>
</tr>
<tr>
<td>Phase 1 vs. 3</td>
<td>-128.25</td>
<td>78.067*</td>
<td>4.605*</td>
<td>3.717</td>
</tr>
<tr>
<td>Phase 1 vs. 4</td>
<td>31.00</td>
<td>78.067</td>
<td>0.269</td>
<td>0.898</td>
</tr>
<tr>
<td>Phase 2 vs. 3</td>
<td>-132.25</td>
<td>78.067*</td>
<td>4.897*</td>
<td>3.833</td>
</tr>
</tbody>
</table>
Table 19—Continued

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mean Difference</th>
<th>Fisher PLSD</th>
<th>Scheffe F-test</th>
<th>Dunnett t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 2 vs. 4</td>
<td>27.00</td>
<td>78.067</td>
<td>0.204</td>
<td>0.782</td>
</tr>
<tr>
<td>Phase 3 vs. 4</td>
<td>159.25</td>
<td>78.067*</td>
<td>7.10*</td>
<td>4.615</td>
</tr>
</tbody>
</table>

Table 20

Problem-Solving Group 1-Factor Repeated Measure Analysis of Variance for Phases 1 Through 4 for Tolerance

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>4</td>
<td>24.75</td>
<td>11.61</td>
<td>5.81</td>
</tr>
<tr>
<td>Phase 2</td>
<td>4</td>
<td>69.50</td>
<td>41.25</td>
<td>20.63</td>
</tr>
<tr>
<td>Phase 3</td>
<td>4</td>
<td>86.25</td>
<td>57.80</td>
<td>28.90</td>
</tr>
<tr>
<td>Phase 4</td>
<td>4</td>
<td>34.75</td>
<td>25.00</td>
<td>12.50</td>
</tr>
</tbody>
</table>
CHAPTER IV

DISCUSSION

Previous studies in this area report that when subjects are given analgesic suggestions, they tend to indicate a reduction of pain independent of the subject’s level of hypnotizability (Spanos, Kennedy, & Gwynn 1984). In addition, it has been shown that a strong differential relationship exists between the type of suggestions given to subjects and hypnotizability as assessed on standard scales (e.g., Spanos, Kennedy, & Gwynn, 1984; Spanos et al., 1989). That is, a subject’s degree of hypnotizability may be related to his or her capacity for imagery, i.e., subjects who are more “imaginative” tend to be more hypnotizable than subjects who possess less imaginative ability, as rated on the standard scales. Because subjects chosen for this study were all medium in hypnotic susceptibility, it was deduced that they would also be “medium” with respect to imaginative ability, given the nature of the test suggestions found in the hypnotizability scales utilized. In this study, the presence of non-imagery-based suggestion (i.e., problem-solving suggestion) was shown to increase hypnotic performance as indicated by tolerance and threshold measures of noxious stimulation. This finding, at least as it pertains to threshold, is consistent with previous research and with the analysis of hypnotically-relevant repertories provided earlier. Pain perception seems to be affected by the type of suggestion provided, and traditional hypnotizability scales may not predict this relationship for low or medium hypnotizable subjects.

Previous studies have failed to evaluate differences in pain perception due to the laterality of the hand immersed. Given the frequent use of the alternating hand
procedure summarized with respect to the work by Spanos et al., (e.g., Spanos, Kennedy, & Gwynn, 1984; Spanos, Mc Neil, Gwynn, & Stamm, 1984) examination of the data for possible differences in this respect seems critical. In fact, there was a clear and significant difference favoring right hand performance in both tolerance and threshold in this study. This finding was consistent across trials and phases and was not contingent upon lateral dominance. The implications are that in future studies, especially those using alternate hand procedures, researchers should insure at least that pre- and post-test immersions are counterbalanced with equal numbers of left and right hand immersions on both trials. It is recommended, however, that repeated trials for each hand is the best procedure for ruling out instability in the data due to the hand immersed.

This study assessed the effects of hypnotic suggestions on two duration measures, tolerance and threshold, of hand immersion in cold water. The research questions addressed included the following:

1. What are the effects of hypnotic suggestions on pain tolerance in medium hypnotizable subjects?

2. What are the effects of hypnotic suggestions on pain perception in medium hypnotizable subjects? and finally

3. What are the differential effects of standard versus non-standard hypnotic suggestions on pain tolerance and pain perception?

In general, subjects in this study demonstrated an increase in performance when provided with the experimental interventions. The effect was evident in an overall sense during the change between the first phase and phase 2 for both threshold and tolerance. The within group analyses revealed that the effect was weakened in the imagery group for the change between phase 2 and phase 3 for the threshold, but
showed still greater change in tolerance. It is possible that the change observed for
tolerance between phases one and two were mediated by the change in pain perception
as indicated by the proportionate rise in threshold. This seemed likely for phases one
and two, but was not the case for the change between phases two and three, with only a
slight further rise in threshold. There was a considerable rise in tolerance in phase
three. Given the emphasis in both types of hypnotic suggestions on pain perception,
i.e., reduction of pain, one might wonder why there was no further rise in threshold
during phase three. It may be possible that pain perception is less modifiable beyond
certain limits, irrespective of change in tolerance. Future studies should address this
question more explicitly. Overall, the subjects demonstrated a return to baseline
performance in both tolerance and threshold. This provides clear evidence that, at least
with respect to the combined experimental interventions, subjects demonstrated no
"carry-over" effects when specifically instructed to keep their hand immersed without
the use of hypnosis.

It was of particular interest in this study to examine performance under
conditions of no experimental intervention (i.e., subjects being asked merely to
immerse their hand for as long as possible). This manipulation has never been tried in
the published hypnosis literature concerned with pain perception and tolerance. Aside
from the value of information derived from directly observing this effect, Hull (1939)
recognized that it is against this baseline that any "hypnotic effects" should be
measured. The evidence from this study reveals that there were no "practice effects"
due to repeated exposure of this type of noxious stimulation.

It should be noted that subjects in the control condition were not engaged in a
distraction task during the time the hand was immersed in the water. However, in
order to control for contact time with the experimenter, the control subjects were
engaged in conversation for the same duration as the experimental subjects spent receiving the hypnotic induction. The hands were not immersed during this conversational contact; nor were they during the comparable period of hypnotic induction for the experimental subjects.

Subjects who were exposed to the problem-solving suggestion first (followed by the imagery-based suggestion in phase three) demonstrated an overall increase in threshold and tolerance from phase one to phase two, and from phase two to phase three. As indicated by the changes in performance, it can be seen that threshold increased uniformly with tolerance. In the return to baseline condition, the threshold measure decreased correspondingly with the tolerance measure to near baseline conditions. This pattern of performance would argue well for the position that pain tolerance is mediated by the rise and fall in pain perception. There appears to be almost a one-to-one correspondence between threshold and tolerance. Nevertheless, it can be seen that threshold and tolerance were affected by the experimental manipulations. These findings are consistent with those reported in previous studies indicating that non-imaginal strategies are effective in reducing report of pain in both low and high hypnotizable subjects.

In contrast to the imagery group (i.e., subjects who received the imagery-based suggestion prior to receiving the problem-solving suggestion), threshold and tolerance for the problem-solving group did not seem to have the same one-to-one correspondence reported earlier. From phase one to phase two, there was a marginal increase in threshold and a slight decrease in tolerance. However, from phase two to phase three, the threshold measure remained at approximately the same level. This occurred while the tolerance measure increased at least three fold and as much as five fold. In the fourth phase, threshold and tolerance decreased to pre-baseline levels. In
contrast to the problem-solving group, the imagery group demonstrated minimal threshold changes across phases. It is only in this group that threshold and tolerance seem to have not been.

The results of the present study suggest that moderately hypnotizable subjects may significantly increase level of hypnotic performance when exposed to problem-solving suggestions. This group of subjects was more responsive to problem-solving suggestion than to imagery-based suggestion. Irrespective of when introduced, previous research would indicate that there would not be a significant effect for imagery suggestions for moderately hypnotizable subjects. At best, only moderate increases in hypnotizability would be expected with this group when given the imagery-based suggestion. If highly hypnotizable subjects had been employed it is hypothesized that they would be more responsive to the imagery-based suggestion. In comparing the performance of the two experimental groups it would seem that the problem-solving suggestion clearly added incrementally to the subjects' level of tolerance and threshold. During the imagery suggestion conditions, these subjects were being asked to respond to verbal stimuli which they had indicated, during screening, would be of limited effectiveness.

This study differs from those described in the literature in several important respects. Unique to this study is that subjects were given the opportunity to respond to noxious stimulation over repeated trials. Specifically, in each phase of the study, subjects alternately immersed their right and left hands on three separate occasions or a total of six hand immersions per phase. This resulted in twenty-four separate immersions over the course of the study. This is an important addition as previous studies have measured only pre and post single hand immersions. Specifically, a subject is typically asked to immerse one hand in the cold water, hypnotizability or
hypnotic performance assessed; then he or she would be given a hypnotic suggestion, then the alternate hand would be immersed and hypnotizability or performance reassessed. The present study indicates that the alternate hand immersion procedures typical of these studies may be suspect as a difference in tolerance and threshold measures was found when the right hand was immersed as compared to when the left hand. The majority of the subjects were able to maintain the right hand in cold water longer than the left hand.

Finally, in relation to the findings which suggest that non-imagery based suggestions may have produced a differential effect on threshold and tolerance, there are several implications for the use of standard hypnotizability scales in assessing suggestibility. First at the theoretical level, it is quite possible that such scales only assess pre-existing imagery related repertoires. That such repertoires are directly related to hypnotizability is unquestioned. However their failure to assess for "problem-solving" repertoires may lead to an unnecessary restriction in our understanding of who makes a good hypnotic subject. In other words the present study offers the possibility that medium hypnotizables can demonstrate very high performance under proper suggestive conditions. Because the present study did not make use of high hypnotizable subjects, no comparison can be made as to the relative magnitude of this performance. But it is clear that within the context of the present investigation, such performance of "problem solving" subjects, significantly surpassed that of "imagery subjects." Imagery may in fact provide only one channel for successful hypnotic performance. At least one other non-specific repertoire (referred to in this study as problem solving) may comprise an equally effective channel.

At a practical level, decisions are made within a clinical context to treat or not treat using hypnotic interventions based upon standard scales of suggestibility which
are heavily based on imagery instructions. Such decisions lead to the rejection of persons who fail to respond to test suggestions formulated to increase performance based upon a subject's ability to react to verbal stimulation rich in imagery. Yet these subjects may well have shown higher levels of responsiveness had another formulation of test suggestions (more permissive or indirect) been utilized. Thus the clinical decision to reject such persons, may be biased in the direction of over exclusion, when these individuals could in fact benefit from hypnotic treatment (Barber, 1980). The problem solving suggestions in the present study meet the criteria as permissive and indirect as described by Barber.

Hart (1985) takes a similar position with respect to the use of indirect and direct suggestions.

I believe that the controversy outlined above has been very helpful in elucidating the nature of the patient/procedure interaction in hypnotic suggestion for analgesia and can probably be extrapolated to other conditions as well. That is, the research suggests that hypnotizability is a valid concept in that it can guide the therapist to use the most efficacious type of suggestion. High hypnotizables tend to respond well to direct suggestion; low hypnotizables appear to respond just as well to indirect, permissive suggestion. Hypnotizability scores can thus become even more useful in helping to tailor hypnotic treatment to a relevant subject characteristic (p. 91).

Barber takes the same perspective in his claim that hypnotizability does not predict response to hypnotic analgesia via indirect suggestion, and that indirect suggestion is a viable alternative to direct suggestion for low hypnotizable subjects (Barber, 1977). This seems a reasonable argument with respect to moderately hypnotizable subjects in the present study.

There are limitations of this study that need to be addressed. One is that the small sample size employed restricts the external validity of the findings. In addition, reliability regarding the basic findings with regard to the unusual pattern of performance in phase three of the problem-solving group is open to questioned, and certainly further...
investigation. A larger sample size would increase confidence that this is a stable feature of subject performance.

This same procedure should be repeated with low, medium, and high hypnotizable subjects to further support the related hypothesis that conventional inductions primarily rely on imagery-based suggestions. After the completion of each experimental condition, the subjects could be asked the extent to which they followed the suggestions given by the experimenter or used other self derived strategies (e.g., Spanos, McNeil, Gwynn, & Stamm, 1984).

Additional studies in this area should employ a similar design, with the addition of a baseline phase between the two experimental phases to more clearly determine whether a hypnotic effect occurs as a result of the hypnotic suggestions given.

Finally, in order to assess whether a subject's level of hypnotizability changed as a result of exposure to these procedures, the HGSHS:A should be administered at the end of the study.
Appendix A

Criteria for Participation Form
Criteria for Participation Form

Name: __________________________________ Date: ________________

(1) Have you ever been hypnotized or had any other type of experience with hypnosis? If so, please describe: _____________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

(2) Are you currently receiving any type of therapy (e.g., counseling services)?
   Yes   No (circle one)

(3) If you do NOT meet the criteria for participation in this study, would you like to participate in any future studies concerning hypnosis?
   Yes   No (circle one)

IF YES:

your phone number: ________________________________

your address: _____________________________________________

____________________________________________________________________

How long would you like to be considered a participant (e.g., one semester, one year, while you remain at Western, etc.) ?

____________________________________________________________________

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Appendix B

Conversation Topics for Control Subjects
Conversation Topics for Control Subjects

- Major
- Year at WMU
- Why they chose to attend WMU
- Attendance at any other Universities
- Involvement in Sororities
- Classes currently being taken
- Plans after graduation
- Hobbies
- Sports
- Weather
- Family
- Recent movies seen
- Recent books read
- Vacation plans
Appendix C

Subject Recruitment Form
Subject Recruitment Form

You are invited to participate in a research study intended to measure the effects of verbal instructions on suggestibility.

In order to participate in the study, you must be female and at least eighteen years old. An initial screening session will be scheduled which will require your involvement in one group session intended to assess your current level of suggestibility, and then the completion of two short questionnaires. After this initial screening, you will be contacted and informed if you are eligible for further participation.

As a participant, you will be asked to immerse your hand in cold (0 to 2 degrees Celsius) water for as long as you can, but no longer than five minutes. A total of four sessions will be scheduled, each of which is not expected to exceed one hour. The entire study is expected to last no more than one month.

Participation in this study is voluntary and you are encouraged to participate for the entire duration, although you may withdraw at any time. You will receive 1.0 credit hour for your complete participation in this project. You will be financially responsible for paying the tuition cost associated with this one credit hour.

As a participant, no identifying information will be collected and only minimal information pertaining uniquely to you will be obtained.

If you are interested in participation in this study or have any questions regarding your role as a participant, please fill out the form below and return to me; or, you may reach me, Gloria Haddad, at 349-5198. Thank you for your interest in this study.

Your name: ____________________________________  Age:_____

Phone Number: ________________________________
Other Phone Number: ____________________

Best day and time to call: ____________________
Appendix D

Informed Consent for Participation in an Investigation
Informed Consent for Participation in an Investigation

I understand that I am agreeing to participate in a research study entitled “The Effects of Two Types of Hypnotic Suggestions on Analgesic Responding in Medium Hypnotizable Subjects.” This study will examine the effects that two different types of hypnotic instructions have on analgesia responding.

I understand that I will be asked to participate in an initial selection process which involves a group session intended to measure suggestibility and the completion of two very brief questionnaires entitled “the social desirability scale” and “the hostility inventory.” Based upon the responses obtained from these preliminary screening instruments, I may be asked to continue participation in this study. If I do not meet criteria for participation, I will be notified and discontinued.

Continued participation will require that I alternately immerse my right and left hands in cold (0 to 2 degrees Celsius) for as long as I can. I understand that I will not be allowed to maintain my hand in the cold water for more than five minutes.

I understand that the duration of each session is not expected to exceed sixty minutes and I will be asked to participate in a total of four session. The fourth and last session will occur within one month of the first session, thus the duration of this investigation is not expected to exceed one month.

I understand that if I meet all the criteria, am selected, and participate fully, I am eligible to receive 1.0 credit hour for my participation in this study. I understand that I will be financially responsible for paying the tuition associated with this one credit hour.

Participation in this study is voluntary. Although it is strongly recommended that commitment be for the full length of the study, I will be free to discontinue participation at any time. My participation in this study will in no manner affect my relations with Western Michigan University. There will be no identifying information collected and only minimal demographic data will be gathered which will be kept confidential.

Questions or complaints regarding this research or your rights as a participant may be directed to Gloria M. Haddad, M.A. at 349-5198. If the response is unsatisfactory, you may contact Richard Tsegaye-Spates, Ph.D., at 387-4496 or 387-4482.
My signature below indicates that this statement has been explained to me and I understand the above information, and have decided to participate.

__________________________________________  ____________________________
Signature of Subject                        Date and Time

__________________________________________  ____________________________
Signature of Investigator                   Signature of Witness
Appendix E
Instructions for Observers
Instructions for Observers

Once the instructions have been completed, the subject will be asked to "Now immerse your hand in the water for as long as you can." (A cold-pressor apparatus will be positioned in proximity to the subject so that the hand can be immersed with ease.) As soon as the hand is immersed in the cold water, the timing by the observers will begin.

One to two volunteer observers will collect data as the procedures are implemented by the principal investigator. They will be positioned behind a one-way mirror so as not to interfere with the subject's performance. Observers one and two will perform the same duties and collect the same data. The results obtained will be compared and checked against each other for reliability. Each observer will be equipped with a standard hand-held stopwatch that will be used to measure the amount of time that a subject maintains her hand in the water and indicates pain.

The observers will be responsible for taking two different duration measures: tolerance and threshold. The tolerance measure will constitute the total amount of time that a subject maintains her hand in the cold water. That is, from the second that the subject immerses her hand to the second that she takes it out.

The threshold measure will constitute the amount of time that a subject maintains her hand in the cold water up to the point where she signals that pain is being felt. The subject will signal the observers by raising the index finger on the hand not immersed in the water. Thus, observers will record the time between the second that the subject immerses her hand in the water and the second that the index finger is raised to indicate pain.

Both observers will also be responsible for reporting which of the two suggestions are administered to the subject: the problem-solving suggestion or the imagery-based suggestion. The observers will be provided with a written copy of both suggestions against which to check which was administered to the subject. The observers will be present for at least twenty-five percent of the total sessions to assure that contact was made with the independent variable.
Instructions for Observers One and Two

Each hand immersion is considered one trial.
Use one observation form per trial.

1. Compare the verbal instructions given by the principle investigator, G.H., to the copy of the two instructions you have been provided. On the data recording form (next page), circle which of the two instructions was given to the subject. See #4, where it reads "Instructions given to the subject."

2. As soon as you hear the principle investigator, say "Now immerse your hand in the water for as long as you can," begin timing with the stopwatch.

3. As soon as the subject signals with her index finger, look at the time on the stopwatch. DO NOT STOP THE WATCH. Record this time on the form, on blank #2.

4. As soon as the subject lifts her hand from the ice water, stop the watch. Record this time on the form, on blank #3.

5. Reset the stopwatch to "00.00."

6. The principle investigator will repeat the verbal instructions. The subject will now immerse the alternate hand. Repeat steps 1 through 4 as described above.
Appendix F

Data Recording Form
Data Recording Form

Subject # _____________  Session # _____________  Date: ____________

Observer’s name: ____________________________________________

Trial # ______

Hand Immersed: Right or left (circle one).

#2 Amount of time the hand is immersed in the water up to the point where pain is reported: ____________.

#3 Total amount of time the hand is immersed in the water: ____________.

#4. Suggestion given to the subject: Imagery-based or Problem-solving (circle one)
   Compare to the copy you have been provided.

Any comments:
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

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Appendix G

Approval Letter From the Human Subjects
Institutional Review Board
Date: February 20, 1991
To: Gloria M. Huddad
From: Mary Anne Bunda, Chair
Re: HSIRB Project Number 91-01-25

This letter will serve as confirmation that your research protocol, "The Effects of Two Types of Hypnotic Instructions on Analgesic Responding to Low Hypnotizable Subjects," has been approved after full review by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: R. Tsegaye-Spates, Clinical Psychology

Approval Termination: February 20, 1992
BIBLIOGRAPHY


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