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Physiological Differences between Self-Hypnosis and Hetero-Hypnosis

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PHYSIOLOGICAL DIFFERENCES BETWEEN
SELF-HYPNOSIS AND HETERO-HYPNOSIS

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Psychology

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This study compares physiological responses to self-hypnosis and hetero-hypnosis, examines the physiological reactivity associated with hypnosis in general, and assesses for an order effect of these types of hypnosis. It was hypothesized that participants would display different physiological activity when using self-hypnosis as compared to hetero-hypnosis. Second, it was expected that the physiological measures obtained during the second hypnotic session would be the same as the scores obtained during the first hypnotic session, regardless of condition.

Participants completed a group session assessing them for hypnotizability. Those showing some affinity for hypnosis then completed an individual lab session involving the use of Electromyography, Electrocardiography, impedance cardiography, blood pressure, and Electroencephalography. The lab session involved an A-B-A-B-A design with three resting baseline conditions and two hypnotic conditions. Participants were randomly assigned to hetero-hypnosis first or self-hypnosis first groups, which were counterbalanced for order.

Repeated-measures ANOVAs were conducted to assess differences in physiological data between the hetero-hypnosis and self-hypnosis conditions. A post hoc analysis of the reactivity from baseline to hypnotic conditions was conducted using

univariate ANOVA for each comparison. Second repeated measures ANOVAs were conducted comparing the first session of hypnosis (regardless of type) and the second session of hypnosis (regardless of type). In addition, a repeated measures ANOVA was conducted to explore for an effect of hypnosis across the study. Finally, a univariate ANOVA was conducted to assess the impact of hypnotizability level on reactivity.

Neither of the two hypotheses was confirmed, suggesting there was no difference between types of hypnosis, nor was there an order effect. There were differences in physiological reactivity between baseline and hypnotic conditions, regardless of type of hypnosis, with activity decreasing during hypnotic conditions. The comparison across baseline conditions yielded no significant findings suggesting that participants' physiological responses returned to baseline following hypnosis. Finally, no significant differences were found in physiological reactivity based on hypnotizability level. These findings suggest hypnosis may cause more relaxed physiological responding than a resting baseline condition and that the effects do not observably endure beyond the hypnotic experience.

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"My will shall shape the future. Whether I fail or succeed shall be no man's doing but my own. I am the force; I can clear any obstacle before me or I can be lost in the maze. My choice, my responsibility; win or lose, only I hold the key to my destiny."

Elaine Maxwell

TABLE OF CONTENTS

Chapter		Page
1	LITERATURE REVIEW	1
	Theoretical Underpinnings of Hypnosis	7
	Overview of the Application of Hypnotic Methods	13
	Research on the Application of Hypnotic Methods	15
	Procedural Considerations	16
	Hypnotizability Research.....	19
	Assessment of Physiological and Biological Events	25
	Research on Physiological and Biological Events as Related to Hypnosis	29
	Research on Hypnosis and EEG Site Placements.....	33
2	METHOD	37
	Participants.....	37
	Instruments.....	39
	Design	43
	Procedure	43
	Independent Variables	49
3	RESULTS	50
4	DISCUSSION	65
	REFERENCES	74
	APPENDICES	84
	Appendix A – HGSHS:A.....	84
	Appendix B – Response Booklet for the HGSHS:A	101
	Appendix C – Self-Report of Previous Experiences.....	119
	Appendix D – Personal Information	120
	Appendix E – Lab Session Observation Form.....	121
	Appendix F – Directions to Prepare for the Lab Session.....	122
	Appendix G – Eye Fixation Technique	123
	Appendix H – Chalkboard Induction Technique	124
	Appendix I – Informed Consent Form.....	126
	Appendix J – Debriefing.....	128

LIST OF TABLES

Table	Page
1	Mean Levels and Standard Deviations of Demographic Information for Participants Completing the Lab Session.....42
2	Percent of Participants Displaying Behaviors Associated with Hypnosis46
3	<i>F</i> Values for Hetero-Hypnosis Versus Self-Hypnosis51
4	<i>F</i> Values from ANOVA Examining Effect of Order53
5	Physiological Reactivity between Baseline 1 and Hypnotic Condition 1: Mean Differences, <i>SD</i> of the Mean Differences, and <i>F</i> Values (<i>p</i> values, if significant) 55
6	Physiological Reactivity between Baseline 2 and Hypnotic Condition 2: Mean Differences, <i>SD</i> of the Mean Differences, and <i>F</i> Values (<i>p</i> values, if significant) 57
7	Physiological Reactivity between Baseline 3 and Hypnotic Condition 2: Mean Differences, <i>SD</i> of the Mean Differences, and <i>F</i> Values (<i>p</i> values, if significant) 58
8	<i>F</i> Values (and <i>p</i> values, if significant) Resulting from a Repeated Measures ANOVA Comparing Baseline Data59
9	<i>F</i> Values (and <i>p</i> values, if significant) for Univariate ANOVA between Levels of Hypnotizability62

CHAPTER 1

LITERATURE REVIEW

The practice of hypnosis was introduced into western medicine only in the past 200 years; however, hypnosis has been in use in China for the past 4,000 (Sabourin, 1982). Hypnosis in western medicine has undergone several transformations in definition and understanding. There are two types of hypnosis currently used in contemporary practice; hetero-hypnosis and self-hypnosis. Hetero-hypnosis involves the participation of a facilitator, in that one person “induces” the hypnotic state in another person. Self-hypnosis, on the other hand, is when a person purposefully induces the hypnotic state in him or herself.

Division 30 of the American Psychological Association, the Society of Psychological Hypnosis, recently revised its definition for hypnosis (Green, Barabasz, Barrett, & Montgomery, 2005). This definition describes hetero-hypnosis as a procedure in which the hypnotist guides the experiences of a subject using suggestions (Green et al.). In this formal definition, the induction and imagery are viewed as suggestions, which is in contrast to previous definitions that described the induction as an *introduction* to hypnosis by the hypnotist. The authors additionally define self-hypnosis as the act of administering hypnotic procedures on one’s self. They propose that, to confirm if someone is experiencing hypnosis, the clinician or researcher need only observe the participant’s response to suggestions. Both definitions allow for individualized interpretations of hypnosis and loosely guide practitioners in the use of hypnosis in an open-minded fashion. Green et al. promote the official definition as being unifying for

clinicians who use hypnosis and as a guide to increase understanding among lay persons. These definitions of hetero-hypnosis and self-hypnosis will be utilized in this study.

A historical review of hypnosis and its definition merits a look into some of its earliest uses. Some of the earliest practitioners of hypnosis used hypnosis to treat hysteria (Lynn & Kirsch, 2006), a diagnosis that has been rendered obsolete by the mental health and medical communities over the past 50 years. However, this diagnosis has made an indelible mark on modern hypnosis. Symptoms of hysteria included dissociation, visual hallucinations, and paralysis of body parts which, we will come to see, are the same signs that are used as indicators of hypnosis in hypnotizability scales (e.g., arm immobilization or hallucination of the presence of a fly). One of the earliest physicians who used a form of hypnosis in western medicine was Dr. Franz Mesmer who claimed that the universe was filled with an invisible magnetic fluid that was responsible for gravity, magnetism, and electricity. He proposed that people's physical and mental complaints could be treated by magnetizing them; he called this magnetization mesmerism. Mesmer initially treated his patients by placing magnets on various locations on the body. The first patient he treated with mesmerism presented with symptoms of hysteria that were unresponsive to conventional treatments available at the time. This first patient sought treatment because she was experiencing convulsions as a result of the hysteria. During the treatment, her convulsions ceased and Mesmer found that he could control the occurrence of convulsions by placing magnets at certain places on the body and removing them. Others heard of her ailment and cure and sought treatment for similar symptoms. The set of behaviors presented as hysteria in this case came to be described as a convulsive crisis (Lynn & Kirsch).

Marquis de Puységur was another physician who treated patients among the lower classes of society during this time (Lynn & Kirsch, 2006). De Puységur began using mesmerism after he observed a stage demonstration of mesmerism in which the mesmerized state was induced using a shiny object. He began applying this method with his patients presenting with hysteria. However, these patients had not heard of the convulsive crisis and they reacted differently from Mesmer's patients when mesmerism was applied. When de Puységur used the techniques of mesmerism, his patients displayed a state similar to sleep. De Puységur labeled this sleep-like behavior the "hypnotic trance." De Puységur did not believe the trance was a result of the patient being magnetized, or "mesmerized, however, which is why he used the alternate term "hypnosis." The difference between practitioners using magnetism and hypnosis in the late 1700s was in the understanding of the state. Those using magnetism believed that people had magnetic energies within and that those energies could be controlled through magnetism, whereas, those using hypnosis believed that trance was unrelated to magnets and that an altered psychological state was being induced. In 1784, practitioners of hypnosis and mesmerism attracted the attention of the French government, which subsequently arranged for a committee (named the Franklin Commission) to examine the claims of mesmerism and hypnosis, labeling it as one single phenomena, mesmerism. As a result, the Franklin Commission engaged in a scientific exploration of the claims of mesmerism. The commission used sound control methods, given the time, to test the claims of mesmerism and concluded that the results of mesmerism were due to an individual's imagination and belief. Again, the commission did not differentiate between hypnosis and mesmerism, as the practitioners of the time did. The belief that part of the

effects of hypnosis were due to individual characteristics (i.e., imagination and belief) has carried through to the contemporary use of hypnosis in that recent research suggests the effects of hypnosis as practiced in modern times are dependent on subjects' beliefs about hypnosis (Lynn & Kirsch).

Another key developer of the western concept of hypnosis was James Braid. Braid (1853) also became interested in mesmerism after watching a stage mesmerist "magnetize" a participant by having him or her stare at a shiny object. Braid did not believe this was the result of invisible fluid in the universe but, rather, proposed that this state resulted from eye strain. He coined the phrase neurohypnosis, which was later shortened to hypnosis, which he defined as nervous sleep. Even in this very early work on hypnosis, Braid detailed the treatment of a constellation of symptoms that would come to be called conversion disorder, as well as general medical complaints such as headache, heart palpitation, rheumatism, and pain (Braid).

In the late 1800s and early 1900s, many practitioners made use of hypnosis on a more regular basis. Among them were Sigmund Freud, Clark Hull, and Milton H. Erickson. Freud began to use hypnosis as a strategy to access the unconscious but later abandoned its use in favor of free association (Kline, 1953). Hull also used hypnosis; however, he chose to examine its effect on aspects of cognitive and sensory functioning. He later used what he had observed from his work with hypnosis to develop his theory on behavioral learning (as stated in Triplet, 1982). Erickson changed the technique of hypnosis compared to the standard induction of the time by using a permissive voice and reframing individuals' perspectives to elicit change (Lynn & Kirsch, 2006). Prior to Erickson, practitioners of hypnosis favored the use of direct language during hypnosis.

For example, a physician might say “You are getting very sleepy” or “You will now close your eyes.” In contrast, Erickson used a more permissive tone, less directive voice, and preferred the use of metaphors to help his patients. One noted example is how he successfully assisted a patient who wanted to stop drinking alcohol by telling him about a cactus and how long it goes between drinks (cited in Rosen, 1982). These techniques continue to be in use today and are the foundation of modern hypnosis training programs. The modern use of hypnosis is beneficial in many psychotherapeutic settings as it is easily integrated within cognitive-behavioral, strategic, psychodynamic, and problem-focused interventions.

During the majority of the 1900s, there was little interest in hypnosis among the scientific community, with some notable exceptions such as Freud and Erickson. In addition, beginning in the late 1940s, prescription medications began to be developed for many psychiatric diagnoses such as bipolar disorder and psychotic disorders, which decreased the impetus for the use of hypnosis even more (Gitlin, 1996). However, there was increasing interest in studying hypnosis using some of the newly developed physiological devices such as electroencephalography (EEG), as will be mentioned later.

Early research in understanding brain activity through EEG helped to establish tentative information about the effects of hypnosis on the brain, changing the long-held belief that hypnotic trance was similar to sleep, as proposed by de Puysegur (as stated in Lynn & Kirsch, 2006). Interest in hypnosis increased during the last 50 years with the advent of assessment strategies to measure hypnotic responsivity and technological advances necessary to study hypnosis empirically. Many of the assessment scales in current use were developed and tested on students in college settings. In fact, major

universities such as Stanford and Harvard have developed scales to measure hypnotic phenomena (Shor & Orne, 1963; Weitzenhoffer & Hilgard, 1959).

In addition to the term “hypnosis,” several related terms need to be defined. In 2002, Weitzenhoffer provided definitions of hypnosis in general as well as of terms used in hypnosis based on his own and others’ research. He defined hypnosis to be a state and, as used in a traditional sense, to denote different levels of consciousness and, in a more contemporary sense, as the production, study, and use of hypnotic phenomena. He went on to say that the state of hypnosis is more of an inference rather than an objectively-observed event. Weitzenhoffer defined hypnotizability as the ability to enter a state of hypnosis regardless of depth. Additionally, he defined hypnotic responsiveness as the ability to respond to suggestions while in a trance. In other words, Weitzenhoffer suggested that the ability to go into a hypnotic trance and the ability to respond to suggestions are different abilities. In modern hypnosis training programs, the skills taught are presented as tools to be used during a formal hypnotic session and skills to be used for general therapeutic communication (e.g., softened voice tone and the use of metaphors). Throughout the available literature and training programs over the past 50 years (i.e., since production of the Stanford Scale Hypnotic Suggestibility: Form C; Weitzenhoffer & Hilgard, 1959), several terms have been used to refer to hypnotic responsivity. For the purpose of this study, the phrase hypnotic responsivity will be used to refer to what other authors have labeled as hypnotic susceptibility, hypnotizability, or hypnotic ability, as these terms are synonymous (Perry, Nadon, & Button, 1992).

Theoretical Underpinnings of Hypnosis

The specific theory of hypnosis to which a researcher or practitioner subscribes influences how that researcher or practitioner understands and employs hypnosis. At present, there are three main theories of hypnosis; however, only two merit discussion here. The two main schools of thought are the Altered State Theory and the social-cognitive perspective.

The older of these schools, the Altered State Theory, was developed from the works of Mesmer, de Puysegur, and Freud (Lynn, Fassler, & Knox, 2005). The Altered State Theory proposes that hypnosis is the result of an altered state of consciousness that directly causes an individual to be more open to suggestions. The changes resulting from hypnosis as a treatment, then, are due to the patient receiving the suggestions given when he or she is in an altered, and therefore more receptive, state. In their discussion of state and non-state theories of hypnosis, Kallio & Revonsuo (2003) described two main problems with the Altered State perspective. They point out that those supporting the Altered State perspective have not developed adequate behavioral criteria for defining the altered state. Additionally, the authors ask what the physiological correlates of such a state may be. Kallio and Revonsuo (2003) refute the sufficiency of the solutions proposed by Altered State theorists to rectify both of the above-mentioned concerns.

A second theory currently in use is the social-cognitive perspective, which was developed in response to the Altered State Theory (Kirsch & Lynn, 1998). Theories that fall within this perspective propose that the relationship with the hypnotist and the social context of hypnosis create and modify the hypnotic experience. Early theories proposed people were responsive to suggestions during hypnosis because individuals felt

compelled to comply as if there were a hidden observer measuring their actions, leading to the assumption that participants were faking. This belief was later dispelled and more recent theories propose hypnotic phenomena are associated with attentional focus and situational factors such as rapport, environmental setting, and patient comfort level.

As stated earlier, the APA Division 30 definition of hypnosis (Green et al., 2005) allows for differing theories of hypnosis, which is necessary at this time because of the different theoretical perspectives explaining hypnosis. There are several articles extolling the benefits of the social psychological perspective of hypnosis as well as the Altered State Theory of hypnosis (see Lynn and Rhue, 1991, for a collection of these works).

A review of articles in support of the Social Cognitive perspective can be found in Gfeller (1994). In keeping with the Social Cognitive perspective that social context can modify the hypnotic experience, Gfeller presents a discussion on the research pertaining to the use of the Carleton Skills Training Program to increase hypnotic responsivity (i.e., hypnotic capacity) scores. This research demonstrates that many people who initially tested as low hypnotizables on either the Carleton University Responsivity to Suggestion Scale or the Harvard Group Scale of Hypnotic Suggestibility scored within the high range after completing the training program. In an earlier study, Bates and Brigham (1990) obtained similar results, as reported in the articles discussed in Gfeller, which indicated that the intensity of the hypnotic experience may, in fact, be malleable, as suggested by the Social Cognitive perspective. However, commentators have suggested there is no way to clearly operationalize an “altered state” and that the studies thus far in support of the Social Cognitive theories of hypnosis have been insufficient. Lynn, Fassler, and Knox

(2005) have suggested researchers from both perspectives should collaborate to discuss these difficulties and to develop a single, appropriate theory and definition of hypnosis.

As suggested above, there currently exists no firm consensus as to the nature of the phenomenon called hypnosis. In response to this problem and the multi-faceted nature of hypnosis, the field of hypnosis research has been moving toward a model that allows for a multi-factor explanation of hypnotic phenomena, known as interactive-phenomenological theories. Interactive-phenomenological theories propose that meritorious components of previous theories should be combined with novel perspectives into one comprehensive theory. For example, an interactive-phenomenological theory may integrate the findings from a study on neuroimaging with findings from the malleability of hypnotic responsivity and attentional focus, and subsequently propose a new, multi-faceted theory.

This change in the field has been particularly motivated by Spiegel (2005) and Sarbin (2005). Spiegel proposes humans are motivated on both neural and social bases and that the Social Cognitive and Altered State Theories of hypnosis jointly account for portions of the total variability of hypnotic ability. In other words, hypnotic responsivity is not explained by one simple variable (e.g., an altered state, increased rapport). Rather, it is influenced by several social and contextual considerations. Although the neural events associated with hypnosis, such as increased brain waves in response to suggestion, are detectable through the use of event-related potentials, positron emission testing, functional magnetic resonance imaging, and magnetoencephalography (Raz, 2005), the social bases are currently not as easy to quantify. In order to research further the theory that hypnosis is attributable to both biological capacity and psychosocial ability to

respond, Spiegel (2007) conducted multiple studies examining nearly 5,000 participants using Eye-Roll scores and scores on the Hypnotic Induction Profile, both measures developed by H. Spiegel to measure hypnotic ability.

Based on the belief that hypnosis is a joint effect of biological and psychosocial factors, H. Spiegel defined hypnosis as a neural trance or the “synchronization of synaptic circuits that is activated to express each person’s unique proto-self and coping style” (Spiegel, 2007, page 398). He further proposes that hypnosis can be observed and measured through the components of dissociation between one’s main theme of response, perception or memory from one’s awareness, absorption into a focal point, and suggestibility to new information with usual critical judgment held in suspense.

In addition to Spiegel’s (2005) proposition, Sarbin (2005) proposes an interactive theory of hypnosis. He states that a hypnotic episode is a dynamic combination of proximal and distal features. He defined proximal features as subjective experiences that occur within an episode of hypnosis such as age regression, catalepsy, self reports of pain (reduction or sensation) or hallucinations, and changes in physiological events (e.g., heart rate and brain waves). Sarbin proposes these proximal features provide only some of the context and experience of hypnosis. He proposes that the remaining variability comes from the individual’s cultural beliefs about hypnosis, ability to imagine, and personal meaning of the experience, which he refers to as the distal features of hypnosis. From a research perspective, these integrationist theories suggest that no single research study may be able to capture all of the influences moderating an individual’s hypnotic ability successfully. As a result, researchers continue to look at factors that may moderate the

hypnotic experience (e.g., physiological aspects, social constructs, and beliefs about hypnosis) in studies isolating one proposed factor of hypnotic experience.

The interactionist perspective is further supported empirically when considering the research data suggesting that hypnotizability level is malleable. Hypnotizability level is the ease with which someone can become hypnotized (Weitzenhoffer, 2002). This term does not refer to how deeply an individual experiences hypnosis. As stated earlier, a review of the literature on hypnotizability enhancement (Gfeller, 1994) revealed that skills-training programs can increase the hypnotizability level of participants (for example from low to medium or high); however, these changes disappear over time. He also reported that individuals who scored in the high range after training tended to score lower, on average, than natural high scorers.

Unfortunately, neither the Social Cognitive perspective nor the Altered State theorists can explain the complexity existing in a study published by Capafons et al. (2005). They set out to examine the impact of varying levels of information regarding hypnosis and rapport building on hypnosis outcomes. Previous research has suggested that the method in which hypnosis is presented influences a subject's hypnotic responsivity (see Capafons et al. for a thorough discussion). Subjects in this study were placed into one of three groups. The minimum rapport group received general information about hypnosis; the trance group received information about hypnosis as an altered state; and the cognitive behavioral group received a cognitive-behaviorally based description of hypnosis. This last group represented the Social Cognitive perspective of hypnosis. Researchers concluded that there were no significant differences between groups with regard to hypnotizability; however, subjects in the two treatment groups

displayed increased collaboration with the researchers over those in the minimum rapport group (Capafons et al.). Although this study did not demonstrate differences in hypnotizability scores based on information provided, it did suggest that an aspect of hypnosis, collaboration with the researcher, could be increased.

Evans (2000) has also argued that a view of hypnosis reliant on any one attribute is too simplistic. Evans proposed four conceptual dimensions of hypnosis that combine features of both the Social Cognitive and Altered State perspective. Evans states that hypnosis is composed of the following conceptual dimensions: expectation of the experience, suggestions given in the experience, cognitive distortions, and dissociation within the experience. His conclusion is another example of the interactionist perspective.

Although there exists disagreement on a formal definition of hypnosis and its facets, pragmatically, researchers on this phenomenon must continue with the purpose of moving towards an accurate definition. Upon considering several interactionist theories of hypnosis and the research literature available on assessing hypnotizability, Lynn and Kirsch (2006) published a list of strategies that could improve hypnosis within research contexts. Some of their suggestions address common factors of therapy such as developing positive rapport and therapeutic alliance, whereas, others are more specific to hypnosis. For example, the authors recommend that researchers identify the individual's understanding of hypnosis and work to dispel any myths or misconceptions about hypnosis before starting (Lynn & Kirsch).

As a result of the variety of proposed theories, and with accommodations made for differing viewpoints, APA Division 30's definition appears to lack strength and is criticized by Nash (2005) for allowing for sloppy research founded on a priori theoretical

bases, a practices that is unacceptable in the scientific community. This has been cited as a problem within the literature on hypnosis with charges that researchers tend to fit the data to a particular theory (Woody, Bowers, & Oakman, 1992). In his arguments related to the Division 30 definition, Nash (2005) calls for a definition that is less specific in order to reflect the fact that current scientific knowledge about hypnosis is incomplete and lacking. Nash further suggests a less specific definition could more easily allow new research to examine and explore hypnosis, thus enhancing the scientific knowledge and allowing for a more accurate definition to be forged in the future. The developers of this definition admit it is not perfect (Green et al., 2005). Instead, they recommend that clinicians and researchers consider it a work in progress designed to be refined in response to future research findings.

Overview of the Application of Hypnotic Methods

Within the shifting definitions of hypnosis, a great deal of empirical research has been conducted using a variety of scientific methodologies and addressing a multitude of ailments. For example, many articles have been written presenting evidence that hypnosis is beneficial in the treatment of both physical and mental illnesses. Searching the keyword “hypnosis” produces hundreds of research articles that have been published on the use of both hetero-hypnosis and self-hypnosis. These articles propose the use of hypnosis as a supportive therapy for many clinical problems including, but not limited to, pain management, habit control issues (for example, smoking cessation or over-eating), mood and anxiety disorders (such as depression, post-traumatic stress disorder, and various anxiety disorders), behavioral medicine applications, and dental procedures (see Horowitz, 2006, and Lynn & Kirsch, 2006 for more detailed discussions). Hornyak

(2000) composed a chapter on the use of hypnosis to assist women with physical illnesses in addressing body image concerns. Within this article, she outlined a 10-session treatment protocol from a case study to enhance the client's feelings of competence, comfort with her appearance, increased vitality, and integration of her identities as woman and patient.

A common topic in these articles pertaining to hypnosis is pain management. Several articles have been published presenting hypnosis as a method for managing the pain for labor and delivery (e.g., Moon & Moon, 1984; Oster & Sauer, 2000). Other articles have addressed management of pain related to medical procedures such as minimizing the pain and anxiety associated with a lumbar puncture for children, and chronic pain management (see chapters 15-18 of Kane & Olness, 2004 & Weisberg, 2000 for examples).

The above-referenced articles have demonstrated potential uses of hypnosis; however, their methodologies often lack strong research designs. For example, many studies report findings without the use of a control group or large enough sample sizes to have adequate power. These studies have been helpful in increasing the knowledge base and potential uses of hypnosis within the fields of medicine, dentistry, and psychology, but they have not provided information about how hypnosis works. Although it is useful to have knowledge of what a technique may be used for, it is important to understand what the technique does and by what mechanism it effects change. In the current age of managed health care, there is a great need to show that a treatment, whatever it is, is effective through empirical research findings. However, demonstrating "that" a treatment works is different from demonstrating "how" it works.

Research on the Application of Hypnotic Methods

The potential clinical use of hypnosis in medical, dental, and psychological facilities is widespread. As previously mentioned, much of the published research has been done with inadequate controls and relatively few subjects. Yet, there are some well-done studies in this area as well. One well-controlled study conducted by Lioffi, White, and Hatira (2006) of the medical use of hetero-hypnosis compared anesthesia alone, hypnosis with anesthesia, and anesthesia with focused attention. The researchers wanted to examine the effects of hypnosis in managing pain and anxiety above and beyond the normally prescribed anesthesia for the procedure. The physicians were blind to group assignment. The researchers concluded that the combined effects of hypnosis and anesthesia were superior to anesthesia alone or anesthesia plus attention.

Hypnosis for anesthesia is receiving more scientific attention and the psychological community has been making progress in using more scientific methods in their empirical analyses of hypnotic phenomena. Two recent studies of the benefits of self-hypnosis were published in the same article in 2002 on the use of self-hypnosis relaxation training to decrease stress (Gruzelier, 2002). The initial study demonstrated that medical students using self-hypnosis to reduce stress experienced fewer viral infections over the course of the study than the control group. In the second study, Gruzelier expanded on the participant population by studying individuals with chronic herpes simplex virus-2. The study found that participants experienced nearly half the incidents of reoccurrence after six weeks of training in hypnosis. These participants also reported improved mood, decreased anxiety, and increased production of natural killer cells (Gruzelier).

In addition to objective outcome data, Gruzelier (2002) incorporated participants' self-reports of hypnotic experiences in his research, as have several other researchers (e.g., Fromm & Kahn, 1990; Hilgard, 1965; Woody et al., 1992). Some researchers have reviewed journal entries made by participants or interviewed the subjects in order to develop conclusions about hypnosis. For instance, Woody et al. (1992) described the hypnotic triangle. This triangle explains hypnosis as being constructed of the individual's subjective experience, the context of use, and the individual's hypnotic ability. They propose that the overt behaviors displayed in hypnosis are in response to deep effects occurring in the individual's subjective experience, that the individual must have some level of hypnotic ability (although this varies widely), and that labeling the situation as hypnotic is essential (Woody et al.).

Hilgard (1965) also conducted research on the subjective experience of hypnosis, finding that there are differences in the levels of experience between individuals who are high versus low on hypnotic responsivity. Yet, these differences are relatively small and not statistically significant. The most commonly reported experiences for those with high hypnotic responsivity and those with low hypnotic responsivity include feeling disinclined to speak (89% and 68%, respectively), feeling disinclined to move (87% and 64%, respectively), and feeling similar to being asleep (80% and 68%, respectively).

Procedural Considerations

As discussed previously, self-hypnosis is defined as the act of administering hypnotic procedures on one's self (Green et al., 2005). Some researchers propose that self-hypnosis should be studied when the person is in isolation (Fromm & Kahn, 1990) whereas others propose that a researcher may be present (Johnson, 1979; Ruch, 1975). In

the 1970s, there was increased interest in researching the subjective experience of self-hypnosis. Ruch (1975) proposed that the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) and the Stanford Scale of Hypnotic Susceptibility, Form C (SSHS:C; Weitzenhoffer, & Hilgard, 1959) would (1) produce similar scores whether used in self- or hetero-hypnosis, that (2) self-hypnosis would approximate hetero-hypnosis in effectiveness, and that (3) self-hypnosis would be inhibited after an individual had been exposed to hetero-hypnosis. Both the HGSHS:A and SSHS:C are self-report measures of hypnotizability, and the SSHS:C, from which the HGSHS:A is modeled, is considered a gold standard within hypnotizability research. The first two hypotheses were supported. Scores on these measures were similar between the two conditions and the results using self-hypnosis were as effective as when using hetero-hypnosis. The results for the third hypothesis, however, were more complex. Ruch found those exposed to hetero-hypnosis first had greater difficulty utilizing self-hypnosis during the testing phases than those initially exposed to self-hypnosis, which he expected. Unexpectedly, those individuals who were exposed to listening to another person being hypnotized did not have this difficulty and, instead, appeared to have the same ease with self-hypnosis as those who had been initially presented with self-hypnosis (Ruch). Ruch's findings regarding impaired learning of self-hypnosis is contrary to the field's widely held belief that clinicians are first advised to facilitate trance within session and then teach the client to use self-hypnosis within and outside of therapy sessions. Johnson (1979) also conducted early research on the differences between self-hypnosis and hetero-hypnosis. Using a counterbalanced design for self- and hetero-hypnosis, Johnson, similar to Ruch, found there were no significant behavioral differences between the two

types. However, he did find different subjective experiences reported as a result of the types of hypnosis. Johnson developed a scale of behavioral events that may be associated with hypnosis based on a factor analysis of the hypnosis inventory (created for the study by Field & Palmer, 1969) and the SSHS:C (Weitzenhoffer & Hilgard, 1959) that was conducted by Field and Palmer (1969). These studies suggest the subjective experiences reported after self-hypnosis and hetero-hypnosis are similar, but not identical.

Specifically, Johnson found individuals using self hypnosis experienced more time distortion, disorientation, active direction, and trance variability, whereas individuals using hetero-hypnosis reported more feelings of unawareness, passivity, and loss of control.

A criticism (Fromm & Kahn, 1990) of both of the above-mentioned studies (i.e., Johnson, 1979; Ruch, 1975) is that a researcher was in the room during the self-hypnosis conditions and, in the study by Ruch, the participants were told what to do while in trance. To counter these studies and increase the knowledge about self-hypnosis, Fromm and her colleagues focused on researching the subjective experiences associated with self-hypnosis in a home-like setting without other people present. Their research on self-hypnosis was so prolific, it was named “The Chicago Paradigm.” In their studies, participants practiced self-hypnosis while alone in home-like research labs. Through initial pilot studies, researchers again found there were no differences in subjective reports of hypnotic experience between sessions of self-hypnosis as compared to hetero-hypnosis. In later research, their subjects described some tasks as easier to complete during hetero-hypnosis than in self-hypnosis. These included hallucinations, profound age regressions, and role-plays. In contrast, the subjects reported that self-hypnosis was

sometimes better because the individual knew the words and images that would be most beneficial to assist her or him in going into trance and deepening the hypnotic experience (Fromm & Kahn). Although Fromm and Kahn used well-known empirical scales in their research, the majority of their stated findings resulted from self-report methods including personal interviews and journal entries. Despite the fact that Fromm and Kahn reported concern for participants using self-hypnosis with others present, several researchers have tested the use of self-hypnosis in the presence of others without concern (e.g., Barker, & Jones, 2006; Butler, Symons, Henderson, Shortliffe, & Spiegel, 2005; Lioffi, White & Hatira, 2006).

Hypnotizability Research

One may ask whether it is important to assess an individual's hypnotic responsivity. According to Lynn and Shindler (2002), it is important to continue to assess hypnotic responsivity because the process and factors associated with hypnosis are not yet fully understood. The literature has not supported the notion that hypnosis is attributable to a single ability, such as dissociation or fantasy proneness, nor has the research fully supported a Social Cognitive perspective (compliance to authority or the hidden observer). Hypnosis, thus far, appears to be a conglomeration of individuals' attitudes, beliefs, and expectancies about hypnosis; how individuals assess their responses; their ability to imagine; the rapport established with the hypnotist; and how individuals interpret the suggestions from the hypnotist. Due to the broad framework of hypnotic responsivity and the number of variables to be manipulated, there is great potential for future research.

Hypnotizability scales were developed to assist researchers to understand hypnosis better. The first series of scales developed were the Stanford scales, the most common being the SSHS:C (Weitzenhoffer & Hilgard, 1959). The Stanford scales were individually administered taking 45-60 minutes to complete. In response to the lengthy time commitment involved in assessing participants, group scales of hypnotic responsivity were developed.

The HGSHS:A was developed as a group scale version of the SSHS:C, however there were doubts as to whether hypnotizability could be measured in a group setting. Bentler and Roberts (1963) set out to explore the validity and accuracy of using the HGSHS:A in a group setting. They recruited subjects from introductory psychology classes both as volunteers ($n = 52$) and “coerced volunteers” ($n = 39$; Bentler and Roberts). The latter group members were “coerced” in the sense that participation in the study allowed them to fulfill their class research requirements. Each participant completed the HGSHS:A and those scoring above 8 also completed the SSHS:C. The results suggest that participants’ scores were not significantly different when using the HGSHS:A as compared to the SSHS:C, and the correlation between the scores was high regardless of whether the participants were voluntary or coerced ($r = .72$ and $.67$, respectively). The authors concluded group measures of hypnotic responsivity were acceptable; however, they recommended two facilitators be present in such settings, emphasizing it may be more difficult to maintain a serious environment in a group setting.

Although hypnotizability scales are used in contemporary research, studies are more often published focusing on physiological events or self-report of experiences

during hypnosis. For example, Gruzelier, Allison, & Conway (1988) conducted interesting research on the psychophysiological differences between individuals in hypnosis and those simulating hypnosis. This study was designed to address the concerns raised by previous researchers about people who were faking hypnotizability and therefore, potentially receiving elevated hypnotizability scores. In the study, one group of medical students was asked to cooperate with the hypnotist and go into hypnosis and the other group was only to simulate being in hypnosis. They had the participants rest for five minutes prior to starting hypnosis, then presented an eight-minute induction followed by suggestions. Those individuals simulating hypnosis were to ignore the hypnotist and instead focus on relaxing. Those asked to cooperate were to attend to the hypnotist. All the subjects were presented with a tone at regular intervals to which all participants became habituated over the course of the study. The hypnotic susceptibility scores were statistically the same; however, those in hypnosis habituated to the tone twice as quickly as those simulating hypnosis. There were no differences between the groups regarding skin conductance.

Participants' self reports of hypnosis together with hypnotizability have also been studied in recent years. Researchers examined the self-report of participants while in hypnosis using a dial ranging from 0 to 100. A score of zero meant that the individual did not believe that he or she was experiencing a suggested phenomenon and a score of 100 reflected the individual's belief that she or he was experiencing a suggested phenomenon (McConkey, Wende, & Barnier, 1999). Participants were labeled as low, medium, or highly hypnotizable based on their scores on both the HGSHS:A and an abbreviated version of the SSHS:C. The participants were asked to indicate whether they felt they

were experiencing a suggestion while in hypnosis. Each participant was asked to use the self-report dial to indicate whether he or she was experiencing the suggestions (for example, arm levitation). Results suggest those with higher hypnotizability scores were more likely to indicate the suggestions were experienced than were those individuals with low hypnotizability scores (McConkey et al.).

In an effort to demonstrate the accuracy of self-report following hypnosis, Younger, Kemmerer, Winkel, and Nash (2005) employed undergraduate student confederates to conduct an objective rating of participants' HGSHS:A scores. The researchers had found previous studies examining individuals' self-reports of hypnosis wherein the participants had inflated the self-report of the hypnotic events, especially when using the HGSHS:A. Other researchers had examined this concern and had not found inflation to be a real problem. Younger et al. expressed concern with previous findings as subjects had been aware not only that their self-report scores would be compared to the scores from observers but, in some cases, who the observers were. In attempting to remedy these problems and more clearly examine the accuracy of self-report, Younger et al. did not inform participants they were being observed until after they completed the HGSHS:A and did not inform participants who the observers were. These confederates were scripted to function as participants in the study and results suggest that true participants were unaware of the confederates' role in this study. As such, it is believed their scores would not be impacted by the knowledge of being observed. Despite participants being unaware of being observed, there was a fairly high degree of agreement between the participant's self-report and the observer's report. Agreement ranged from a low of 68% (on arm immobilization) to a high of 82% (on hand

lowering, fly suggestion, and ankle touching). The self-reported scores predicted just below 50% of the variance of the observer's score (Younger et al.).

In addition to understanding participants' perceptions of hypnosis, researchers have begun to challenge basic beliefs about hypnosis. For example, Banyai and Hilgard (1976) compared traditional inductions with active-alert formats of hypnosis. Robin, Kumar, and Pekala (2005) explored differences between direct and indirect scripts of hypnosis. Traditional formats for hypnosis encourage the participant to relax and become calm. The facilitator/hypnotist may suggest that the participant close his or her eyes (Banyai & Hilgard). Active-alert formats are used when the participant is involved in some activity, such as cycling or jogging. These are more similar to natural trance states such as those that occur when driving a familiar route. Direct scripts give the participant explicit instructions. For example, the HGSHS:A (Shor & Orne, 1962) contains examples of direct scripts, using statements such as "Soon you will not be able to keep your eyes open. Soon your eyes will close of themselves." An indirect script allows the participant some options. For example, the eye fixation induction (West Virginia University Study Group, 2005) states "You may find yourself blinking more often..." in part of the script. Additionally, the language is more suggestive and less demanding. For example, the hypnotist may ask what it might feel like to allow one's eyes to close after staring at a spot for a long time.

Banyai and Hilgard (1976) sought to broaden the available research base on hypnosis by examining an individual's performance on a standardized scale of hypnotic ability during a traditional format (i.e., eyes shut, relaxed, sitting calmly) as compared to during an active-alert format (i.e., riding a stationary bike, eyes open). In the traditional

format, participants were given suggestions to relax and to increase feelings of drowsiness. In the active-alert format, suggestions were given to participants for alertness, attentiveness, and freshness. Each participant was exposed to both conditions, in a counterbalanced format. Although there were differences on individual items between formats, they were not significant. There were also no significant differences between the formats in the overall score of the measures given (Banyai & Hilgard).

Other researchers have also looked at the response of participants to different suggestion strategies. Robin, Kumar, & Pekala (2005) studied the different experiences of individuals during hypnosis when direct versus indirect procedures were used. Milton Erickson (as cited in Lynn & Kirsch, 2006) proposed that indirect suggestions could be as effective as direct suggestions in the use of hypnosis. Previous claims had been made that some individuals respond better to indirect suggestions. To examine this, Robin et al. compared behavioral and subjective experiences and patterns of correlations on two group measures, one using direct suggestions (i.e., HGSHS; Shor & Orne, 1962) and one using indirect suggestions (i.e., Alman-Wexler Indirect Hypnotic Susceptibility Scale; Alman & Wexler, 1988). Results of this study indicated more resistant subjects responded better to direct suggestions whereas less resistant subjects responded better to indirect suggestions (Robin et al.), which is in direct contrast to the current practice of hypnosis. However, no further research has been conducted to examine this issue. The second purpose of this study was to examine the psychometric properties of the hypnotizability measures (Robin et al.). These two measures did not differ significantly and they had similar reliability values.

Additional research has been conducted using Item Response Theory and Factor Analysis to arrive at a more accurate understanding of what is being measured in hypnotizability scales (Sadler & Woody, 2004) and to examine whether mean scores on measures of hypnotizability have increased over time (Benham, Smith, & Nash, 2002). In their analysis of over 11,000 responses from students at a Canadian university from 1962 to 2000, Sadler and Woody found what was being measured in these scales as best defined through a 2-factor model, with one factor composed of challenge suggestions (i.e., arm immobilization, eye catalepsy), and the other factor composed of direct suggestions (i.e., head falling, posthypnotic suggestions). In a review of 2,800 studies using the HGSHS:A in its original format, Benham, Smith, and Nash found average scores on the HGSHS:A have increased since its publication in 1962 by nearly 1.0, the cause of which is unknown. Using weighted means, a significant correlation was found between sample mean and year ($p = .001$).

Assessment of Physiological and Biological Events

Although there is some understanding of what hypnosis can do, after many years of research, clinicians using hypnosis still do not understand all the mechanisms of the hypnotic phenomenon (Nash, 2005). Even so, hypnosis has been in use in the practice of western medicine since the early 19th century (see Davis, 1989; Sabourin, 1982 for thorough reviews). Initial studies of the physiological attributes of hypnosis were conducted in the 1930s using electroencephalography (EEG), and pursuit of this research area has waxed and waned over the past 70 years (Sabourin). EEG is one of the techniques developed to allow for inconspicuous observation of electrical activity within living animals. In general medical use, EEG is used to diagnosis seizure activity and

abnormalities within the brain (Pagana & Pagana, 2002). EEG records the electrical activity of the brain in a graphic representation. It is non-invasive in that the electrodes detecting the electrical activity are placed on the scalp according to the 10/20 International System (Jasper, 1958). EEG readings may be compromised as a result of fasting, consumption of caffeine, movement, bright or flashing lights, or sedating drugs (Pagana & Pagana).

Over the past 40 years, studies have become more sophisticated using EEG spectral analysis, which allows for the collection of data from several leads measuring multiple bands of brain waves (Sabourin, 1982). In 1924, Hansberger discovered that electrodes could be attached to the scalp to record electrical differences between points in the brain (Tyner, Knott, & Mayer, 1983). Variability occurred across time and amplitude in this early design. Variability occurring across time is called frequency (cycles per second) and is measured in hertz (Hz). Amplitude is a measure of voltage; the higher the amplitude, the higher the voltage. Amplitude is very small in EEG and is, therefore, measured in microvolts (μV). Hansberger initially described alpha and beta waves, although later researchers defined additional waves. Initial recordings of EEG relied on a single channel of data. Contemporary equipment minimally has 8-16 channels.

Human EEG signals are measured in amplitude, ranging from 1 to 100 microvolts, and frequency, ranging from .005 to 100 hertz (Hz). Research in hypnosis using EEG has focused attention mainly on the frequency ranges of theta (4 Hz – 8 Hz), alpha (8 Hz – 12 Hz), and beta (12 Hz – 26 Hz) waves (Marshall-Goodell, Tassinary, & Cacioppo, 1990). Levels of consciousness have been associated with different EEG bands. For example, when someone is relaxed and awake, they tend to display an optimal

alpha rhythm, and when in a light sleep, individuals present with sleep spindles and a loss of alpha waves. Alpha band waves are most often seen when individuals are awake and active and they increase when an individual closes his or her eyes. Alpha waves are blocked when an individual experiences sensory stimulation or mental activity. Beta waves are considered low amplitude, high frequency waves. These are affected by tactile, auditory, and emotional stimulation and are blocked by voluntary efforts associated with anxiety. Theta band waves appear to be the type most commonly associated with hypnosis and are seen when the individual experiences an end of pleasurable activity, lucid dreams, and light sleep (Ray, 1997).

Similar to EEG for the brain, the electrocardiogram (ECG) graphically records the electrical impulses of the cardiac cycle through the skin's surface. A standard ECG uses 12 leads, six on the limbs and six on the chest. The ECG measures several different events including atrial electrical depolarization, ventricular depolarization, ventricular repolarization, and times between various cardiac events. Atrial electrical depolarization is referred to as the P wave and represents the atrial contraction. Ventricular depolarization is often reported as the QRS complex. This consists of a small negative wave (energy decreases, Q wave), a large positive wave (energy increases significantly, R wave), and a small negative wave (S wave). These three waves are close together in those with normal ventricular depolarization. When these are not close together, there is prolonged depolarization of the ventricles. Ventricular repolarization represents the return of neutral electrical activity in the ventricles. Factors interfering with the ECG include inaccurate placement of electrodes, electrolyte imbalance, poor contact between the skin

and electrodes, movement, and consumption of digitalis, quinidine, or barbituates (Pagana & Pagana, 2002).

Impedance cardiography measures blood flow in the thorax, which allows, in conjunction with ECG data points, for determination of stroke volume (SV), cardiac output (CO), pre-ejection period (PEP), left ventricular ejection time (LVET), and the heather index (HI). Stroke volume is derived from the measurement of ml of blood expelled from the heart per heart beat. Cardiac output is the product of heart rate and stroke volume and provides an output voltage that reflects the electrical output produced during the average heartbeat. The HI represents sensitivity to changes in the strength of the myocardial contraction because it compares the times of the start of the Q wave and the peak of the dZ/dt . The stronger the contraction of the heart tissue, the more efficient each beat of the heart. The interval between the onset of the Q wave and the onset of LVET is represented as PEP. PEP is inversely related to stress in psychophysiological research (Pagana & Pagana, 2002). LVET is the time, measured in seconds, for the left ventricle to empty of blood. Impedance cardiography is most appropriate for use with individuals with normal hearts and those who are not obese. Additionally, the measurements will be negatively impacted by the participant's movement beyond that normally associated with breathing (Sherwood et al., 1990).

Research on physiological correlates of hetero-hypnosis has been conducted fairly frequently, specifically examining the effects of hetero-hypnosis on physiology through the use of EEG, electrocardiography (ECG), functional magnetic resonance imaging (fMRI), and positron emission testing (PET). The changes in cerebral blood flow and oxygenation in response to cerebral activity are measured through the use of fMRI as a

non-invasive technique. A typical fMRI lasts 1 to 2 hours (Columbia fMRI, n.d.). PET is a sophisticated second measure of activity within the body. PET is more invasive than fMRI, requiring the participant to be injected with a radioactive tracer to detect the rates of biological processes in vivo. Water and carbon dioxide have both been used as cerebral tracers in PET studies (Department of Molecular and Medical Pharmacology, Regents of the University of California, 2000). The technology necessary to conduct research on hypnosis using fMRI or PET are beyond the capabilities of this research, although in future years it will be interesting to see these resources used to learn more about hypnosis. The initial impact of hypnosis on heart rate, brain waves, and muscle tension, as well as long-term benefits of hypnosis, are still being studied and appear to warrant further research. The lack of knowledge and understanding of hypnosis prompts a need for additional research. Although it is interesting to note that hypnosis has been proven effective in treating various problems, it is important to understand the mechanism by which it works as well. The amount of known information about basic physiological effects of hypnosis remains minimal.

Research on Physiological and Biological Events as Related to Hypnosis

Small advances have been made in the knowledge base of hypnosis including its effect on the brain. Initial research using EEG failed to identify physiological events that served as markers of hypnosis as a state. Over the past 40 years, however, researchers have begun to find such markers through the use of alternate strategies such as event-related potentials and changes in the brain between resting and hypnotic periods (Gruzelier, 1998; Nowlis & Rhead, 1968). Nowlis and Rhead published a study examining the relation between alpha waves in an eyes-closed resting condition and

hypnotizability level. Participants were asked to complete a measure of hypnotic susceptibility and to then rest in a chair while EEG measures were taken for two minutes. Nowlis & Rhead found a positive correlation between hypnotizability level and EEG alpha rhythms during an eyes-closed resting session. In this article, the authors noted that the two-minute observation period was too short to draw firm conclusions (Nowlis & Rhead).

Another early study examining the EEG patterns of hypnosis compared it to the physiological events occurring for those practicing Zen meditation (Kasamatsu & Hirai, 1969). Throughout the study, participants using Zen meditation were asked to keep their eyes open. Forty-two Buddhist priests and disciples participated with experience ranging from one to over 20 years of study in meditation. Eighteen research fellows and four elderly men with no experience in meditation served as a control group. Findings suggested that the Zen masters, those with more than 20 years of experience, displayed alpha waves within 50 seconds. Furthermore, within eight minutes, 20 seconds, these alpha waves became higher than normally seen in alert participants or less experienced practitioners of Zen meditation. There were no changes in alpha patterns among individuals in the control group. Those using hypnosis displayed fewer alpha waves and had more prominent activating patterns than those practicing Zen meditation (Kasamatsu & Hirai). This suggests, when individuals meditate, they are more alert than when they practice hypnosis, but that both states have less brain activity than when individuals are awake and alert.

A third early study of the physiology of hypnosis and resting conditions was conducted by Galbraith, London, Leibovitz, Cooper, and Hart (1970). This study used

three unipolar EEG leads placed along the midline and one placed over the left temporal cortex to collect data within the 1 – 30 Hz range. Results suggested that data collected from the eyes-open resting condition were the most predictive of hypnotizability. Findings indicated that those in the high hypnotizable group demonstrated significantly higher theta ranges and spectral frequencies than those in the low hypnotically susceptible group (Galbraith et al.). In his review of this early EEG spectral analysis, Sabourin (1982) criticized the authors for using the HGSHS:A as the sole measure of hypnotizability citing research suggesting that an individual's hypnotic susceptibility is not accurately predicted using only the HGSHS:A.

Additional research has been conducted on hypnosis using EEG in the past 20 years. One of the more prolific researchers has been de Pascalis (e.g., de Pascalis, Marucci, & Penna, 1989; de Pascalis, Marucci, Penna, & Pessa, 1987; de Pascalis, Ray, Tranquillo, & Amico, 1998). Much of his research has examined the hemispheric differences seen during hypnosis. Through such studies, he and his fellow researchers have demonstrated that individuals tested as highly hypnotizable present with different EEG densities based on testing condition and emotional state. DePascalis and Penna (1990) later extended these findings by showing that women scoring within the high hypnotizability range tended to show an increase in 40-Hz EEG density in both hemispheres during the early induction phase, and later that they showed a decrease in the left hemisphere while showing an increase in the right hemisphere during late induction phase. More recently, DePascalis et al. (1998) demonstrated that high hypnotizable, right-handed, female subjects displayed greater theta 1 (4 – 6 Hz) and alpha 1 (8.25 – 10 Hz) bands than low hypnotizable, right-handed, female subjects. Despite

such pioneering studies, all of their research was conducted using all-female samples, as research suggests that females are more hypnotizable than males. Research conducted elsewhere (e.g., Galbraith, London, Leibowitz, Cooper, & Hart, 1970; Graffin, Ray, & Lundy, 1995; Gruzelier, Allison, & Conway, 1988; Sabourin, Cutcomb, Crawford, & Pribram, 1990) has used both sexes without apparent complication produced by sex of the participant.

In 1990, Sabourin, Cutcomb, Crawford, and Pribram conducted a thorough examination of hypnosis with both men and women using EEG Fast-Fourier spectral analysis, EEG coherence between selected derivations, and a maximum spectral power within each EEG band. Their goal was to expand on previous findings by stringently screening their subjects. In their research, they demonstrated that individuals who scored within the high hypnotizability range had significantly more theta band power during hypnotic suggestions than those individuals who scored within the low hypnotizability range. They also found an interaction between hypnotic susceptibility, condition of hypnosis (self- or hetero-hypnosis), and intrahemispheric location during the eyes-closed rest periods. Subjects who scored in the high range displayed more theta power than those subjects in the low range in the occipital, central, and frontal EEG locations in all conditions except in the final waking baseline (Sabourin et al.).

Sturgis and Coe (1990) also attempted to expand the physiological research on hypnosis by using EEG, electromyogram (EMG), and measures of heart rate. EMG detects and measures the electrical impulses existing within the muscle tissue through a non-invasive lead placed on the skin. In this study, participants previously screened with the HGSHS:A completed the SSHS:C while physiological measures were taken. After

data were collected, only data from participants whose HGSHS:A and SSHS:C scores were similar (in the same level of hypnotizability) were used for analysis. These researchers found non significant results based on hypnotizability for heart rate, but did find an interaction between level of hypnotizability and tasks, with high hypnotizables displaying more beats per minute than low-hypnotizables on hand lowering and arm rigidity items of the SSHS:C. They also found a small but significant effect for tasks in the EMG data with scores being high for individuals when given the suggestions for post-hypnotic amnesia and negative hallucination.

Katayama, Gianotti, Isotani, Faber, Sasada, Kinoshita, and Lehmann (2007) compared EEG data in an eyes-closed resting period, light hypnosis, deep hypnosis, and a recovery condition. This study measured the spatial configuration of potential distribution maps on the head surface, called EEG microstates. EEG microstates are measured by three parameters: duration, occurrences per second, and percent of time covered. Their findings suggest that the parameters for the eyes-closed resting condition and the recovery condition were between the parameters recorded for light hypnosis and deep hypnosis, which were also different from each other (Katayama et al.).

Research on Hypnosis and EEG Site Placements

De Pascalis reviewed the available literature on EEG and hypnosis in 1999 and drew three main conclusions regarding highly hypnotizable females. First, he concluded that highly hypnotizable females display greater physiological flexibility to shift between states of consciousness, meaning they can more readily go into, and return from, a trance state. Second, he reported that this group displayed an increase in 40 Hz EEG in posterior regions. Finally, he reported that they display significantly greater beta activity during early hypnotic induction than

others. One study that was not included in DePascalis' review was published by Graffin, Ray, and Lundy (1995). They examined EEG data during a baseline period, during the entire session, and during the induction. They reported that individuals scoring within the high range of hypnotizability had more theta activity at frontal and temporal sites during baseline. During induction, they reported there was a significant interaction between hypnotizability level and gender, with highly hypnotizable females producing higher theta in the occipital areas than low females or males. Overall, these researchers found that, in the posterior (parietal and occipital lobes) areas, there was a significant interaction between level of hypnotizability and time, with highs experiencing a decrease in theta and lows experiencing an increase in theta from pre-induction to post-induction. They also reported significant findings for alpha waves. These researchers reported that, during baseline, those testing as high hypnotizables had more alpha waves in temporal sites than those testing with low hypnotizability. During the overall experience, they found more activity in the frontal, temporal, and occipital sites at pre-induction than at post-induction across subjects. No significant differences were found in relation to beta waves.

As a follow-up, Ray (1997) conducted a formal review of all the literature recently available regarding the physiological study of hypnosis. He concluded that there were no solid findings related to alpha activity and more research was needed. He further stated that theta activity may offer the strongest evidence of a physiological marker of hypnotizability and hypnosis. Lastly, he suggested that researchers move away from simple data analysis methods (i.e., Fast-Fourier analysis), which decompose the data, thus limiting information gleaned, and instead implement time-series designs with accurate, frequent measurement over sufficient periods of time.

In research examining the effect of psychotherapeutic methods on the brain, Linden (2006) suggested a methodology for investigating the effect through functional neuroimaging both before and after the introduction of a psychotherapeutic technique. He laid out three methods for exploring the effects of various techniques while also stating that producing the desired mental states targeted across subjects will be daunting with most traditional methods of psychotherapy (i.e., cognitive behavioral or psychodynamic). He reported that studies results exploring the impact of hypnosis have been promising in targeting specific mental states and specific brain areas.

Hypnosis has been suggested to have a complementary effect when combined with traditional therapeutic techniques used in psychodynamic and behavioral approaches. Self-hypnosis, specifically, can easily be incorporated into currently practiced and prescribed treatments of relaxation, can be used to reduce a client's dependence on the therapist, and can be used with clients who fear losing control during hypnosis (Martinez-Tendaro, Capafons, Weber, & Cardena, 2001). Increased knowledge on the effectiveness of self-hypnosis and the benefits that it has on an individual's physiology would provide increased likelihood of its use in clinical settings. Despite over 30 years of physiological research on hypnosis, primarily on hetero-hypnosis, there have not been any studies examining the physiological correlates of self-hypnosis. Thus, the purpose of the current study is to examine the physiological correlates of self-hypnosis as compared to hetero-hypnosis. In order to explore these differences, two hypotheses were explored. The first hypothesis was that the participants would display different physiological activity when using self-hypnosis as compared to hetero-hypnosis. Second, and in an attempt to rule out any effect of order, it was expected that the physiological

measures obtained during the second hypnotic session would not be statistically different from the scores obtained during the first hypnotic session, regardless of condition.

CHAPETER 2

METHOD

Participants

Participants were selected from undergraduate students drawn randomly from the General Psychology Subject Pool and additional subjects were recruited as volunteers from other undergraduate psychology classes. A total of 120 students from the Subject Pool were contacted by telephone and/or email communication and screened for exclusion criteria. The exclusion criteria included the presence of a pacemaker or an internal electrical device, use of beta blockers, use of birth control medications, and/or diagnosed hypertension. Of these 120 participants, 63 students from the Subject Pool satisfied the inclusion criteria and agreed to participate in this study, with nine of these individuals failing to attend the first session. According to the scoring protocol established by the developers (Shor & Orne, 1963), participants scoring above a 0 would be invited to participate in the lab session of this study. Only 19 (35%) of the remaining 54 participants from the Psychology Subject Pool scored high enough on the HGSHS:A to complete the study. The mean score on the HGSHS:A for students from the Psychology Subject Pool was -1.24. Among these 19 individuals, 4 participants elected not to complete the lab portion of the study.

As few subjects from the Psychology Subject Pool scored high enough to complete the study, additional participants were recruited from undergraduate psychology courses not requiring participation in the psychology subject pool. Announcements were made in classes by professors that participation in this study was available, and some professors provided extra credit to those participating. Thirty six undergraduate students

not enrolled in the Subject Pool expressed interest in this study and signed up for a group session: five participants did not appear for their group session. Among the 31 undergraduate students who completed the HGSHS:A, the mean score was 2.65 with 20 (65%) of these students scoring high enough to complete the study. Among these 20 participants, 7 participants chose not to complete the study either by not scheduling for a lab session or not showing up for their lab session, and 2 participants showed up but were unable to complete the lab session for medical reasons not previously disclosed.

Of the 156 potential participants contacted, a total of 26 participants completed both the HGSHS:A and the lab session. A total of 86 participants (45 females and 41 males) completed the HGSHS:A session and 26 participants (14 female and 12 male) completed the lab portion (52.33% of those who completed the HGSHS:A and 53.85% of those who completed the lab portion were female).

Demographic data were only collected on participants who completed the lab portion of the study. There were 19 (73%) participants who identified as Caucasian, 1 (3.84%) participant who identified as bi-racial, 4 (15.38%) participants who identified as African American, 1 (3.84%) participant who identified as Latino/a, and 1 (3.84%) participant who identified as Asian.

Participant's ages ranged from 18 years of age to 37 years of age. The mean age of participants completing the lab session was 21.12 years ($SD = 4.20$). The participants drawn from the Psychology Subject Pool were slightly younger than participants who volunteered from other psychology courses ($M_{\text{Psychology Subject Pool}} = 20.44$ years, $SD = 3.37$, $M_{\text{Non-Psychology Subject Pool}} = 22.20$ years, $SD = 5.29$). It should be noted that, of the participants drawn from other courses, one participant was much older than the other

students; without that participant's age included, the group mean becomes 20.56 years ($SD = 1.01$) and the overall mean age becomes 20.48 years ($SD = 1.91$).

Instruments

The Harvard Group Scale of Hypnotic Susceptibility: Form A (HGSHS-A, see Appendix A for the manual and Appendix B for the Response Booklet) was developed by Shor and Orne (1962) as an adaptation of the Stanford Hypnotic Susceptibility Scale, Form A (Weitzenhoffer & Hilgard, 1959). The Stanford Hypnotic Susceptibility Scale, Form A is an individually-administered, objectively-scored measure of hypnotic ability. The HGSHS-A was designed as a group-administered, subjectively-scored measure of hypnotic ability. The scale from Stanford is the gold standard in individual hypnosis research, and the HGSHS-A is modified only in adapting the Stanford scale to a group setting. The measure takes approximately 1 hour to administer and includes suggestions that the participants close their eyes, lower their hands, and hallucinate the presence of a fly. Responses to questions are scored as either plus or minus for each of the 12 items (Shor & Orne).

The mean score on the HGSHS:A was found to be 7.39 in the original group sample consisting of 132 volunteers (Shor & Orne, 1962). A similar mean score of 6.92 was reported by Bentler and Roberts (1963) with only 52 subjects. The mean obtained by Bentler and Roberts was not significantly different from the original mean reported. Consistent with guidelines from de Pascalis and Penna (1990), participants scoring 4 and below on a scale of 1 -12 were labeled as low in hypnotizability, those scoring between 5 and 8 were labeled as medium in hypnotizability, and those scoring above 9 were labeled as high in hypnotizability. Two changes were made to the presentation of the HGSHS:A

in the current study. First, the request that participants write their names on the response booklet was not necessary as a number specific to the study was located there.

Additionally, the HGSHS:A was read live in each group rather than recorded; either presentation is acceptable in the literature. In the current study, the mean score on the HGSHS:A for all participants was .1163, a significantly lower mean than that presented in previous literature.

Of the 26 participants completing the lab session, the HGSHS:A scores were not significantly different based on whether the participant was recruited from the Psychology Subject Pool or from undergraduate psychology courses ($M_{\text{Psychology Subject Pool}} = 4.88$, $SD = 2.80$ and $M_{\text{Non-Psychology Subject Pool}} = 5.70$, $SD = 3.13$), $t(24) = -0.70$, $p > .05$ (two-tailed), $d = -0.83$. Among the 16 participants recruited from the Psychology Subject Pool, 9 participants scored in the low level of hypnotizability, 5 scored in the medium level of hypnotizability, and 2 participants scored in the high level of hypnotizability. Among the 10 participants not recruited from the Psychology Subject Pool, 4 participants scored in the low level of hypnotizability, 5 scored in the medium level of hypnotizability, and one scored in the high level of hypnotizability.

A second measure given to participants was a measure created for this study that asked students about their prior experiences with relaxation, meditation, and hypnosis. This measure was created to determine if prior experience may have increased an individual's hypnotizability (Sabourin, Cutcomb, Crawford, & Pribram, 1990). Please find a copy of this measure in Appendix C. Participants were asked whether they had previous experience with relaxation, meditation, or hypnosis and, if they had, they were asked the duration of their practice in weeks. Twenty participants reported a previous

history of practicing relaxation ($M_{\text{Relaxation}} = 118.42$ weeks, $SD = 158.69$); their mean HGSHS:A score was .45 ($SD = 5.56$). Thirteen participants reported a previous history of practicing meditation ($M_{\text{Meditation}} = 116.54$ weeks, $SD = 157.65$); their mean HGSHS:A score was 1.31 ($SD = 5.31$). The final area of interest on this survey was whether participants had prior experience with hypnosis, either stage hypnosis or clinical hypnosis. Four participants reported they had previously practiced hypnosis, 3 of them had experienced stage hypnosis, and 1 individual reported using hypnosis over an 8 week period. The mean HGSHS:A scores for these participants was -1.00 ($SD = 6.00$). It does not appear in this study that there is support for these experiences influencing participant's HGSHS:A scores.

Participants were asked for demographic information because some personal characteristic information was needed for the ECG and impedance machines (see Appendix D). The demographic information requested included date of birth; height; approximate weight; hours of sleep the previous night; and time since the participant last engaged in eating, consuming caffeine, consuming alcohol, consuming nicotine, and exercise (Sabourin et al., 1990). Female participants were also asked about the date of onset of their last menses. The demographic data from this study are presented in Table 1.

The electroencephalogram (EEG) and electromyogram (EMG) were recorded with the BioGraph V1.01 using an IBM-compatible PC. Electrodes for the EEG measurements were used according to the International 10/20 Electrode Placement System (Jasper, 1958). Although EEG measures electrical brain activity throughout the brain, these sites have been used by previous investigators to study hypnosis (e.g., de Pascalis, 1999; Graffin, Ray, & Lundy, 1995).

Table 1

Mean Levels and Standard Deviations of Demographic Information for Participants Completing the Lab Session

	μ	<i>SD</i>
Hours of Sleep the Previous Night	7.36	1.51
Hours Since Last Meal	6.79	4.86
Hours Since Last Caffeine Consumption	17.29	12.54
Hours Since Last Nicotine Consumption	8.70	5.02
Days Since Last Alcohol Consumption	3.62	2.06
Days Since Last Exercise	2.81	2.29
Days Since Start of Last Menses (females only)	16.46	5.29

ECG was recorded using the Hutcheson Impedance Cardiograph-3000 (HIC-3000) Bioelectric Impedance Cardiograph system. This is a “non-invasive instrument used for detecting and monitoring bio-impedance cardiography signals from human subjects” (Bio-Impedance Technology, Inc., n.d.). This system integrates with the Cop-Win/HRV data acquisition system and is used to monitor the heart’s mechanical functioning (Sherwood et al., 1990).

Systolic and diastolic blood pressures were obtained using an IBS SD-700A automated sphygmomanometer, which employs a pressure sensor embedded in an occluding cuff positioned over the brachial artery of the participant’s non-dominant arm. The cuff was inflated to a maximum pressure of 160 mm Hg during the systolic measurement in order to minimize discomfort to participants.

Design

This study utilized a within-subject, repeated-measures design. The independent variable was the type of hypnosis (hetero-hypnosis versus self-hypnosis). Condition was counterbalanced with half of the participants receiving instructions for self hypnosis during the first hypnotic condition and the remaining participants receiving these instructions during the second hypnotic condition. This was accomplished by random assignment to group using a coin toss. Seventeen (65.38%) participants were randomly assigned to the hetero-hypnosis first group and 9 (34.62%) participants were randomly assigned to the self-hypnosis first group. All participants received both hetero-hypnosis and self-hypnosis conditions.

Procedure

Potential participants were contacted by telephone and advised as to the hypnotic nature of the study. If they did not meet exclusion criteria, mentioned above, and agreed to participate based on that information, they were scheduled to come in to an initial group session. Each participant was scheduled for two sessions totaling a commitment of 4 hours over the course of the semester for those completing the study. The first session, lasting a maximum of 90 minutes, involved giving participants more detailed information regarding the nature of the study, obtaining informed consent, and completing the HGSHS:A. Session two lasted a maximum of 120 minutes and involved collection of the biofeedback, EEG, ECG, impedance, and EMG data, counterbalancing hetero-hypnosis and self-hypnosis. Measures were taken of the participants' brain waves (EEG), electrocardiogram (ECG) and impedance measures, blood pressure, and muscle tension (EMG) prior to, during, and after hypnosis.

During the first session, the participants were given more detailed information as to the nature of the study and provided informed consent forms to review. Any questions about their participation were answered at that time. After consenting to participate in this study, participants completed the questionnaire regarding their experiences with relaxation, meditation, and hypnosis, and then participated in the HGSHS:A (Shor & Orne, 1962). Although some concern has been raised in the literature as to whether participants can provide a valid account of their hypnotic experience, recent research (Younger, Kemmerer, Winkel, & Nash, 2005) suggests that self-reports of hypnotic phenomena predict just under 50% of the variance of observer rated scores ($r = .68, p = .001$). Based on this research, participants were asked to score their own experiences. The HGSHS:A was read by the primary investigator for each group, as the procedure was originally intended by the creators. The initial session of this study, involving the group administration of the HGSHS:A, occurred on the first floor of the psychology building at IUP. Groups of 5-20 students were evaluated at one time. At the end of the first session, each participant scoring above a zero was scheduled for the second session, which was an individual laboratory session. Each participant was provided an instruction sheet with information about the lab session (see Appendix F). The primary investigator was present or available via cell phone during all sessions related to this study.

Participants were asked to attend a single lab session that took place in the basement of Uhler Hall. Subjects were randomly assigned to groups (i.e., hetero first, self first) based on a coin flip. When a participant agreed to participate in the study during the initial phone contact, the project author tossed a coin. If the coin landed heads up, the participant was placed in the hetero first group. If the coin landed tails up, the participant

was placed in the self-hypnosis first group. During session two (the lab session), those in the self-first group first received brief instruction in self-hypnosis with attention provided to any questions the participant raised and, subsequently, were asked to use self-hypnosis for relaxation. Participants in the hetero-first group participated in hetero-hypnosis first. During the second half of each session, participants used the form of hypnosis they had not used during the first half.

During the lab sessions, graduate students from the psychology department observed the participants for signs associated with hypnosis in previous literature (West Virginia University Hypnosis Study Group, 2005). During these sessions, the graduate student used the “Lab Session Observation Form” (Appendix E) to document the occurrence of observable signs of hypnosis, such as eye flutters and facial relaxation. As can be seen by reviewing these data, the relaxation of facial muscles and slowed breathing rate were most likely to occur across both hypnotic conditions. Also, head dropping, relaxing the mouth, and ideomotor signaling were least likely to be observed by the graduate assistants. A summary of these data are represented in Table 2.

In the self-hypnosis protocol, participants were asked to use self-hypnosis to go into trance and then to focus on a particularly relaxing scene. When the participant had practiced self-hypnosis and focused on the relaxing scene for a total of 5 minutes, the graduate student assisted the participant to come out of trance. During the hetero-hypnosis sessions, participants were asked to describe a relaxing scene for use during

Table 2

Percent of Participants Displaying Behaviors Associated with Hypnosis

	Not Observed	Hetero	Self	Both
Relaxation of Facial Muscles	15.38%	11.54%	15.38%	50.00%
Slowed Breathing Rate	7.69%	7.69%	7.69%	76.92%
Eyes Fluttering	38.46%	7.69%	11.54%	42.31%
Dropping the Head	61.54%	3.85%	19.23%	15.38%
Relaxation of Mouth	84.52%	7.69%	0%	7.69%
Relaxation of Body Overall	42.31%	19.23%	23.08%	15.38%
Ideomotor Signaling	61.54%	19.23%	15.38%	3.85%

hypnosis. At the beginning of the lab session, each participant was asked the demographic questions (see Appendix D) and outfitted with a blood pressure cuff and electrodes for cardiovascular monitoring, brain wave monitoring, and muscle tension monitoring. These four measures ran throughout the sessions. The cardiovascular monitoring electrodes consist of four bands of electrodes, two around the neck and two around the thorax of the participant. A heart monitor was also used to assist in the collection of cardiovascular data. This monitor was placed over the heart to the left of the sternum and above the breast tissue. EEG leads were placed at Fz (located over the frontal lobe of the brain on the midline) and Cz (located over the approximate boundary of the frontal and parietal lobes of the brain on the midline). An HIC-2000 Bioelectric Impedance Cardiograph was used to measure cardiac pre-ejection period, left ventricular

ejection time, stroke volume, and derived indices of cardiac output, and Heather Index. Data from the HIC-2000 Bioelectric Impedance Cardiograph was combined with blood pressure data to obtain the measures of mean arterial pressure and total peripheral resistance. After attaching all the leads, the participant was asked to sit in a recliner for the duration of the session.

Once the participant was seated in the chair, the graduate student began the timer. For the first 9 minutes no data were collected in order to allow the participant to become comfortable with the leads and tape on her or his body. During this time, the graduate student asked the participant to describe a relaxing scene with as much detail as the participant could provide. After the adjustment period ended, a 5-minute resting baseline period began in which the data collection commenced on both computers. Because of the nature of the two programs being run simultaneously for EEG and ECG, it was necessary to use two computers for this study, one for each program. All procedures prior to minute 14 were the same regardless of group assignment.

In the self-hypnosis session, from minutes 14 to 16, the graduate student trained the participant in a technique of self-hypnosis using focused attention. The participant was advised at minute 16 to use the self-hypnosis strategy to induce a trance and then to imagine a relaxing scene. During this time, the graduate student observed the participant for overt signs of hypnosis (e.g., eye flutters, relaxation of the facial muscles). After spending a total of 5 minutes using self-hypnosis and imagining a relaxing scene, the graduate student asked the participant to terminate hypnosis and open his or her eyes.

In the hetero-hypnosis session, at minute 14, the graduate student began the hypnotic induction using the eye fixation technique (Appendix G), or the chalkboard

technique (Appendix H), depending on whether the participant is interested in a passive or active induction. The scripts for these inductions are from the training manual provided to attendees of the Annual West Virginia University Hypnosis Workshop. During the induction, the graduate student observed the participant for overt signs of experiencing hypnosis (e.g., eye flutters, relaxation of the facial muscles; Appendix E). When the graduate student believed the individual was experiencing hypnosis, she completed the induction and transitioned into describing the relaxing scene provided by the participant, with suggestions included for increased relaxation and calm. After the fifth minute of the hetero-hypnosis condition, the graduate student guided the participant through termination of hypnosis by counting up from one to five. At five, the participant was instructed to become awake feeling refreshed and relaxed.

Regardless of the hypnotic condition (self- or hetero-), for the 5 minutes after the hypnotic state, the participant was asked to remain seated in the chair for a second baseline measurement period. After this rest period, participants in the hetero first group were given the self-hypnosis protocol and the members of self first group were given the hetero-hypnosis protocol. After the second protocol was completed, participants again rested for 5 minutes for a final baseline measurement period. At the completion of this final baseline period, each participant was offered assistance in removing the leads and was offered an alcohol swab to clean off the sites of the tape. After completing the lab session, the participants were debriefed on the study. Those participants recruited through the Psychology Subject Pool were asked to complete a short survey about their experiences to be returned to the subject pool office.

Independent Variables

The independent variable is the type of hypnotic induction (i.e., self-hypnosis, hetero-hypnosis) utilized. All participating graduate students had completed at least 18 hours of training and/or experience in the use of hypnosis prior to participation of this study. During the lab sessions, the graduate assistant was asked to observe and record signs of hypnotic trance as seen in Appendix D.

CHAPTER 3

RESULTS

The first hypothesis was that the participants would display different physiological responsivity when using self-hypnosis as compared to hetero-hypnosis. This was analyzed by comparing the means for each physiological parameter (i.e., EMG, SBP, DBP, CO, HR, SV, HI, PEP, LVET, MAP, TPR, EEG, and alpha and theta band activity) by hypnotic condition (i.e., self first, hetero first) using a repeated measures ANOVA. There was a significant difference in pre-ejection period (PEP) between the hetero-hypnosis condition and the self-hypnosis condition, $F(1, 24) = 5.60, p = .03$. The PEP is the time between ventricular depolarization (initiation of the QRS complex or electrical stimulation of the heart tissue) and cardiac ejection (the physical contraction of the heart muscle in response to the electrical stimulation; American Heritage Stedman's Medical Dictionary, 2002). According to the data collected from this study, there appears to be a trend in participant's PEP being longer during hetero-hypnosis than during self-hypnosis, however a significant difference was not found ($M_{\text{Hetero-hypnosis}} = 115.64, SD = 12.71$ and $M_{\text{Self-hypnosis}} = 111.34, SD = 17.37$). All other comparisons between the hetero-hypnosis and self-hypnosis sessions yielded p values greater than .05. The F values for all data are presented in Table 3.

The second hypothesis addressed order effect and proposed that the physiological measures obtained during the second hypnotic session would not be statistically different from the scores obtained during the first hypnotic session, regardless of condition. An ANOVA was conducted to compare the first condition of hypnosis to the second

Table 3

F Values for Hetero-Hypnosis Versus Self Hypnosis

Physiological Measure	<i>F</i> Value
Electromyogram (EMG)	2.89
Systolic Blood Pressure (SBP)	0.05
Diastolic Blood Pressure (DBP)	0.14
Cardiac Output (CO)	1.68
Heart Rate (HR)	1.45
Stroke Volume (SV)	0.98
Heather Index (HI)	0.35
Pre-Ejection Period (PEP)	5.60*
Left Ventricular Emptying Time (LVET)	1.62
Mean Arterial Pressure (MAP)	1.14
Total Peripheral Resistance (TPR)	1.48
Overall Electroencephalogram (EEG)	2.33
Alpha band activity	3.30
Theta band activity	1.95

* $p < .05$

condition of hypnosis. None of these comparisons were significant as they had p values greater than .05, as was expected (see Table 4).

To investigate the first hypothesis further, a post hoc analysis was conducted comparing the reactivity (i.e., change from baseline) of the physiological measures while controlling for participant's basal activity level. Univariate ANOVAs were conducted on the differences between (1) the first baseline condition and first hypnotic condition (hereafter noted as D1), (2) the second baseline condition and second hypnotic condition (hereafter noted as D2), and (3) the third baseline condition and second hypnotic condition (hereafter noted as D3). All comparisons were made from means derived from minutes four and five of the hypnotic condition and the baseline condition, respectively, to minimize interference of carryover from the previous condition. As the hypnotic conditions were predominantly not statistically different from each other, examining effects of the inductions in this chronological format was examined without regard for condition in this analysis. Complete reports of the mean differences, SD , and F values (p values when significant) have been provided in Tables 4, 5, and 6 for D1, D2, and D3, respectively. Ten comparisons yielded significant differences across analysis of the three sets.

In comparing the reactivity for D1 (Baseline 1 – Hypnotic Condition 1), there were significant differences found for DBP, HR, EEG, Alpha band activity, and Theta band activity. The DBP during the first baseline condition was significantly lower than the DBP during the first hypnotic condition, $M = -0.60$, $SD = 7.57$, $F(1, 26) = 9.56$, $p = .005$. The HR during the first baseline condition was higher than the HR during the first

Table 4

F Values from ANOVA Examining Effect of Order

Physiological Measure	Hetero-First Group	Self-First Group
EMG	0.97	1.65
SBP	0.00	0.23
DBP	0.21	0.00
CO	0.06	0.80
HR	1.78	0.69
SV	0.10	0.25
HI	1.04	1.31
PEP	0.01	0.08
LVET	0.97	0.12
MAP	1.03	0.74
TPR	0.49	0.19
EEG	0.18	0.07
Alpha	0.03	0.17
Theta	0.55	0.00

hypnotic condition, $M = 1.60$, $SD = 4.62$, $F(1, 26) = 11.11$, $p = .003$. The overall EEG activity was greater during the first baseline condition than during the first hypnotic condition, $M = 27.65$, $SD = 63.07$, $F(1, 23) = 11.10$, $p = .003$. The Alpha band EEG activity during the first baseline condition was higher than during the first hypnotic condition, $M = 3.87$, $SD = 9.04$, $F(1, 23) = 10.98$, $p = .003$. The Theta band EEG activity during the first baseline condition was higher than during the first hypnotic condition, $M = 7.32$, $SD = 13.38$, $F(1, 23) = 5.26$, $p = .03$. The differences in all other physiological measures between the first baseline condition and first hypnotic condition yielded p values greater than .05; the mean differences, SD , and F values can be found in Table 5.

In comparing the reactivity for D2 (Baseline 2 – Hypnotic Condition 2), there were significant differences found for DBP, CO, MAP, and alpha band EEG activity. The DBP during the second baseline condition was higher than the DBP during the second hypnotic condition, $M = 0.82$, $SD = 16.64$, $F(1, 25) = 6.32$, $p = .02$. The CO during the second baseline condition was lower than the CO during the second hypnotic condition, $M = -0.16$, $SD = 0.58$, $F(1, 24) = 9.63$, $p = .005$. The MAP during the second baseline condition was higher than the MAP during the second hypnotic condition, $M = 1.60$, $SD = 16.38$, $F(1, 20) = 27.92$, $p = .000$. The alpha band EEG activity was higher during the second baseline condition than during the second hypnotic condition, $M = 1.31$, $SD = 5.59$, $F(1, 23) = 4.58$, $p = .05$. The differences in all other physiological measures

Table 5

*Physiological Reactivity between Baseline 1 and Hypnotic Condition 1**Mean Differences, SD of the Mean Difference, and F Values (p values, if significant)*

Physiological Measure	Mean Difference	SD	F Value
EMG	13.93	44.74	0.90
SBP	-0.98	5.75	2.92
DBP	-0.60	7.57	9.56 **
CO	0.00	0.79	0.30
HR	1.60	4.62	11.11 **
SV	-5.20	10.68	2.41
HI	-0.23	0.76	0.33
PEP	3.50	15.48	0.01
LVET	-2.21	11.05	0.35
MAP	-1.57	5.11	1.16
TPR	2.00	81.11	0.76
EEG	27.65	63.07	11.10 **
Alpha	3.87	9.04	10.98 **
Theta	7.32	13.38	5.26 *

* $p < .05$ ** $p < .01$

between the second baseline condition and the second hypnotic condition yielded p values greater than .05; the mean differences, SD , and F values can be found in Table 6.

The differences between data from the third baseline and the second hypnotic condition were assessed to determine if the participants' physiological responses returned to baseline levels or if there was any lasting effect of experiencing two conditions of hypnosis. In comparing the reactivity for D3 (Baseline 3 – Hypnotic Condition 2), there was significant reactivity found between the third baseline condition and the second hypnotic condition on CO. The CO during the third baseline condition was lower than the CO during the second hypnotic condition, $M = -0.10$, $SD = 0.45$, $F(1, 24) = 7.35$, $p = .01$. The differences in all other physiological measures between the second baseline condition and the second hypnotic condition yielded p values greater than .05. Mean differences, SD , and F values can be found in Table 7.

A second post hoc analysis was conducted to explore whether baseline conditions differed or if subjects truly returned to baselines between and after hypnotic inductions. This was conducted utilizing a repeated-measures ANOVA across minutes four and five of the three baseline conditions. There was a significant difference between the three baseline conditions for HI, $F(1, 23) = 4.70$, $p = .04$. The means for these three conditions are $M_{\text{Baseline 1}} = 11.89$, $SD = 4.30$, $M_{\text{Baseline 2}} = 11.54$, $SD = 4.30$, and $M_{\text{Baseline 3}} = 11.53$, $SD = 4.02$. As this was the only comparison out of 14 that was significant, it is likely that this was a result of chance and the comparison was not further explored. All other p values were greater than .05 and can be found in Table 8.

In the current study, hypnotizability was assessed using the HGSHS:A (Shor & Orne, 1962). It is important for researchers to continue to assess hypnotizability because

Table 6

Physiological Reactivity between Baseline 2 and Hypnotic Condition 2

Mean Differences, SD of Mean Differences, and F Values (p values, if significant)

Physiological Measure	Mean Difference	SD	F Value
EMG	0.23	72.88	0.00
SBP	-1.12	4.16	3.26
DBP	0.82	16.64	6.32 *
CO	-0.16	0.58	9.63 **
HR	1.82	3.34	0.02
SV	-7.15	101.37	0.17
HI	-0.09	1.84	2.71
PEP	2.58	8.66	0.96
LVET	-4.32	35.39	0.01
MAP	1.60	16.38	27.92 ***
TPR	-49.00	339.16	1.18
EEG	49.73	106.84	1.54
Alpha	1.31	5.59	4.58 *
Theta	5.68	14.48	1.76

* $p < .05$

** $p < .01$

*** $p < .001$

Table 7

Physiological Reactivity between Baseline 3 and Hypnotic Condition 2

Mean Differences, SD of Mean Differences, and F Values (p values, if significant)

Physiological Measure	Mean Difference	SD	F Value
EMG	-29.98	74.93	0.09
SBP	-0.24	4.39	0.32
DBP	-1.02	6.11	0.17
CO	-0.10	0.45	7.35 **
HR	1.36	3.50	0.00
SV	-17.05	70.83	0.67
HI	-0.40	0.47	1.02
PEP	4.42	10.17	0.89
LVET	-5.34	38.35	1.92
MAP	0.47	5.49	0.54
TPR	7.75	106.75	0.00
EEG	48.94	104.31	2.50
Alpha	4.91	13.42	0.43
Theta	9.28	19.41	2.01

** p < .01

Table 8

F Values (and p values, if significant) Resulting from a Repeated Measures ANOVA

Comparing Baseline Data

Physiological Measure	Linear	Quadratic
EMG	1.49	0.01
SBP	2.29	0.39
DBP	2.60	0.02
CO	1.59	3.52
HR	0.28	0.15
SV	0.09	0.52
HI	4.70 *	0.18
PEP	0.98	0.62
LVET	1.09	0.38
MAP	1.09	0.32
TPR	0.72	0.32
EEG	0.75	0.33
Alpha	0.31	2.42
Theta	0.40	0.36

* $p < .05$

so little is understood about the phenomena involved in hypnosis and the factors that cause it (Lynn and Shindler, 2002). In order to incorporate the level of hypnotizability within the current study, a series of univariate ANOVAs were conducted to determine if there were differences in physiological reactivity between those with different levels of hypnotizability. Participants were placed in low, medium, or high levels of hypnotizability based on the ratings provided by de Pascalis and Penna (1990). Participants scoring four and below on the HGSHS:A were placed in the low hypnotizable group, those scoring between five and eight were placed in the medium hypnotizable group and scores of nine or above corresponded to the highly hypnotizable group.

Two significant findings were revealed on the measure of LVET. Specifically, reactivity in LVET for those with high hypnotizability was greater than those with medium hypnotizability, which was greater than those with low hypnotizability ($M_{\text{High}} = 50.67$, $SD = 69.79$, $M_{\text{Medium}} = 10.78$, $SD = 37.71$, and $M_{\text{Low}} = -4.08$, $SD = 6.06$) ($F(1, 25) = 4.34$, $p = .03$). The second significant difference was between the third baseline condition and the second hypnotic condition for LVET ($F(1, 25) = 4.34$, $p = .03$). Reactivity in LVET for those with high hypnotizability was greater than those with low hypnotizability, which was greater than those with medium hypnotizability ($M_{\text{High}} = 58.33$, $SD = 77.57$, $M_{\text{Medium}} = -0.67$, $SD = 7.25$, and $M_{\text{Low}} = 3.65$, $SD = 33.12$).

Because of the few significant results from all the comparisons made, it is likely that these two significant findings are more likely a product of chance than indicative of real differences among the groups. All other analyses were not significant with p values greater than .05; all F values (and p values, when significant) can be found in Table 9.

There are three comparisons being made for each measure: data from baseline 1 minus data from hypnotic condition 1 (D1), data from baseline 2 minus data from hypnotic condition 2 (D2), and data from baseline 3 minus data from hypnotic condition 2 (D3). Please use these abbreviations when referring to Table 9.

Table 9

F Values (and p values, if significant) for Univariate ANOVA between Levels of Hypnotizability

Physiological Measure	Comparison	<i>F</i> Value
EMG	D1	3.45
	D2	1.61
	D3	0.72
SBP	D1	0.56
	D2	1.40
	D3	0.44
DBP	D1	0.26
	D2	1.08
	D3	0.98
CO	D1	0.04
	D2	2.60
	D3	0.55
HR	D1	1.72
	D2	0.35
	D3	0.50

Physiological Measure	Comparison	<i>F</i> Value
SV	D1	2.30
	D2	1.11
	D3	0.75
HI	D1	1.11
	D2	1.07
	D3	0.75
PEP	D1	0.40
	D2	0.26
	D3	3.09
LVET	D1	0.65
	D2	4.34 *
	D3	4.15 *
MAP	D1	0.53
	D2	1.32
	D3	0.09
TPR	D1	0.37
	D2	2.90
	D3	0.02

Physiological Measure	Comparison	<i>F</i> Value
EEG	D1	0.35
	D2	0.20
	D3	0.73
Alpha band activity	D1	0.22
	D2	0.82
	D3	2.30
Theta band activity	D1	0.36
	D2	1.70
	D3	1.87

* $p < .05$

CHAPTER 4

DISCUSSION

The first hypothesis, that there would be a difference in physiological responding during hetero-hypnosis as compared to self hypnosis, was not supported except for PEP. The general lack of observable differences is similar to the findings of Johnson (1979) who found there was a lack of behavioral (observable) differences between self-hypnosis and hetero-hypnosis. However, Johnson measured only the outward behaviors included in the HGSHS:A and the Inventory of Self-Hypnosis (i.e., eye closure, hand lowering; as cited in Johnson, 1979). Johnson did not employ measures of physiological responses as were used in this study, and data from the current study between the two hypnotic conditions were significantly different for the measurement of PEP. Pre-ejection period represents the time difference between the electrical stimulation of the heart tissue and the time of the physical contraction of the heart tissue in response to that stimulation. Therefore, the solitary change in PEP, without statistically significant change in other measures, suggests that the electrical stimulation rate remained the same while the muscular response slowed or relaxed during hetero-hypnosis as compared to self-hypnosis. Although it is not possible to conclude from this study the cause of this difference, there are some factors that could be explored in future research. For example, it is possible that hypnosis contributed to a relaxation of the cardiac muscle while failing to impact the nervous system in the participants of this study. It is also likely that this solitary significant finding is due solely to chance and is not remarkable at all. Given the number of parameters assessed in this study (14), the latter supposition appears to be more likely.

The second hypothesis proposed that the physiological measures obtained during the second hypnotic condition would not be statistically different from the scores obtained during the first hypnotic condition, regardless of the type of hypnosis. This hypothesis was supported in the current study; the data on physiological measures was similar across sessions of hypnosis. This conclusion supports previous literature that there is no difference in the cardiovascular, muscular, or neurological systems between hetero-hypnosis and self-hypnosis.

However, practitioners of hypnosis may have expected there would be a difference between first and second sessions of hypnosis because they often suggest that individuals using hypnosis can deepen their hypnotic experiences by coming out of hypnosis and then going back in relatively soon. This practical expectation is not supported by the physiological literature, either prior to or as a result of this study.

The initial analysis for the first hypothesis examined the difference between physiological data in the two groups. The first post hoc analysis was conducted in order to compare the reactivity (i.e., change from baseline) of the physiological measures while controlling for participant's physiological start point prior to the comparison. In other words, this analysis compares the change in physiological data from the baseline condition to the hypnotic condition while controlling for each participant's level of functioning at minute three during the baseline to control for individual basal functioning. The data from the first post hoc analyses of physiological reactivity suggest that the participants' cardiovascular activity was more relaxed during both hypnotic conditions when compared with the preceding baseline conditions. This is demonstrated by the decreased HR during the first hypnotic condition as compared to the first baseline

condition, the decreased DBP during the second hypnotic condition as compared to the second baseline condition, in the increased CO during the second hypnotic condition as compared to the second baseline condition, decreased MAP during the second hypnotic condition as compared to the second baseline condition, and the increased CO during the second hypnotic condition as compared to the third baseline condition, all suggesting more efficient functioning of the cardiovascular system. These five findings suggest that, during hypnotic conditions, participants experienced relaxation of cardiovascular functioning as compared to resting, awake conditions (baseline).

One seemingly significant finding that did not support the conclusion that participants were experiencing relaxation of the cardiovascular system was in the increase in DBP from the first baseline condition to the first hypnotic condition. An increase in DBP would suggest that participants may have been experiencing increased anxiety causing a tightening of the cardiovascular system. This finding is in direct opposition to the purpose of hypnosis, as generally applied. Closer examination of the DBP data across the course of the study may provide an explanation for this unexpected finding. Due to the nature of the measure, blood pressure (yielding the measures of SBP and DBP) can safely be taken only in two-minute intervals, not in one-minute intervals as the rest of the data can be taken. As a result, the difference scores for each comparison are calculated on one data point from each condition (i.e., minute five from the baseline conditions and minute four from the hypnotic conditions). When all data from minute five of the baseline conditions are explored, it appears that participants were anticipating the end of the baseline and start of the hypnotic condition. When data from minutes three

and five of the baseline condition are compared, the significant effect disappears, $F = 0.14, p > .05$.

Analyses also suggest that participants experienced a relaxation in neurological functioning as demonstrated by lower overall EEG activity, alpha band activity, and theta band activity during the first hypnotic condition as compared to the baseline condition, and lower alpha band activity during the second hypnotic condition as compared to the second baseline condition. EEG activity is an overarching measure of all electrical activity occurring in the brain local to the site of the leads, in this case in the frontal area of the brain on the midline. Alpha band activity is generally associated with being awake and alert and decreases during sensory stimulation or mental activity. Theta band activity is associated with the end of pleasurable activity and light sleep (Ray, 1997). Taken together, these findings suggest that hypnosis, even for a brief period of time, may encourage a relaxation of the mind and body. However, additional research is needed to support this conclusion.

A second post hoc analysis was conducted to determine if there were any lasting effects from hypnosis that caused a change in physiological measures during baseline conditions. Data compared across the three baseline conditions yielded a significant result. As there was only one significant finding out of 14 total comparisons, this is likely due to chance. The lack of significant differences between the baseline conditions suggests that participant's physiological responses returned to baseline, or normal, levels following each hypnotic condition. In this study, at least, there were no significant effects of the hypnotic conditions on participants' cardiovascular, muscular, or neurological systems.

A final post hoc analysis was conducted to determine if there was a difference in physiological reactivity between participants with different levels of hypnotizability. Most comparisons were not statistically significant and it is likely that the two significant findings on LVET were likely due to chance. Physiological reactivity was not different among people with different levels of hypnotizability in this study. Graffin et al. (1995) reported individuals scoring within the high range of hypnotizability had more theta activity at frontal and temporal sites during baseline, a finding not supported by the current investigation. The EEG lead placements in the current study were at the frontal lobe. There were very few participants who scored within the highly hypnotizable range ($n = 3$).

One possible design flaw that may have reduced the sensitivity of measurement in this study is that participants were asked to describe in some detail a relaxing scene to the graduate assistant prior to the collection of any data. Although not previously considered, it is possible that description of a relaxing scene immediately prior to the first baseline prompted a premature relaxed state. In the practice of hypnosis, describing and/or imagining a relaxing scene is sometimes used as an induction to facilitate trance. Although this was not considered previously as a confounding variable in this study, it is possible that this may have decreased the impact of the first hypnotic condition as participants may have already been relaxing.

Some of the limitations of this study include the small sample size, the short duration of the hypnotic condition, and the use of less sophisticated measures of brain activity. The current study is especially limited by few participants scoring within the highly hypnotizable range (i.e., 12% of the group). It is possible that, with a larger sample

size, the data may be more representative of the population as a whole. It was intended to conduct this study with at least 50 participants, as there is a great outcry in the field that many studies have small sample sizes. However, the difference in the previously reported means for the HGSHS:A and the scores for the participants of this study was large. In assessing this vast difference, consideration was given to the possibility of errors in administration and/or scoring. After errors had been ruled out, these differences with the findings of previous studies were explored more thoroughly.

The initial studies conducted by Shor and Orne (1962) used 132 volunteers who were sufficiently interested in hypnosis to take the opportunity to participate in their study. Their research on the HGSHS:A yielded a mean score of 7.39. A follow-up study conducted by Bentler and Roberts (1963) yielded a mean score of 6.92 with only 52 subjects. The latter study looked at the scores attained by "pure volunteers" recruited from psychology classes and "coerced volunteers" (Bentler & Roberts, p. 93). Pure volunteers were those students who volunteered for the study after being told about the hypnotic nature; no additional incentive was offered here. Volunteers who were considered to be coerced were offered extra credit in their psychology class to participate in the study. There were no significant differences found between the two groups (Bentler & Roberts).

The current study utilized participants who were coerced more than those in Bentler and Roberts (1963). Participants recruited from the psychology subject pool were required to complete up to six credits of research participation over the course of the semester. If a participant is contacted to participate in a study and refuses, the student may be assigned an alternate assignment to read and summarize a research study, called a

read and review. Because the nature of this study (hypnosis) may be objectionable to some people (i.e., religious beliefs), the subject pool provided leniency (i.e., no alternate assignment was assigned) if a student refused to participate. The effect of this coercive “read-and-review” measure, however, was witnessed during the initial phone contacts in which some of the students referenced the consequence of receiving a read and review if they refused to participate and then agreed to participate stating that they wanted to avoid this consequence. Also, General Psychology students are assigned randomly to studies rather than signing up for studies in which they have an interest, which may account for some of the difference in observed results between studies.

When the data from the subjects recruited from the psychology subject pool were compared with the data from the subjects recruited from other psychology classes, a large difference was noted in the mean scores of these two groups. The participants from the other psychology classes, who are more similar to those studied by Bentler and Roberts (1963), scored higher and had a higher rate of eligibility for the study than those recruited from the psychology subject pool. As the current practice of hypnosis emphasizes the importance of the individual’s motivation to be hypnotized, this is not a surprising finding. For those participants recruited from the psychology subject pool, the motivation for being present for the administration of the HGSHS:A was to avoid receiving the perceived punishment of having to read a research article and summarize it. The motivation to experience hypnosis may not have been as present in subjects recruited from the psychology subject pool as it was in the initial studies conducted in the initial development of the HGSHS:A. Additionally, the mean score of the participants recruited from other psychology classes was also lower than those previously reported. Although

the cause of this effect is unknown, there may be an aspect of avoiding a poor grade (for those receiving extra credit) that contributed to the lower scores in this group.

In addition to the above considerations, there may be a generational difference affecting the scores of the participants in this study and those who completed the HGSHS:A in the 1960s. For instance, most of the participants in the current study have always lived in a highly stimulating and technologically focused world. All students in the study carried cell phones with them, as demonstrated at the beginning of the group sessions when people pulled out their phones to turn them off or to silence them. Many of them have never lived in a home without a computer, VCR/DVD player, and either satellite or cable television. They are likely familiar with at least one gaming system and may also participate in online communities such as MySpace.com. Although this is beyond the scope of this study, it would be interesting to further explore the impact of these lifestyle changes on HGSHS:A performance.

A second limitation of this study is that the hypnotic conditions were relatively short. The 5-minute windows of hypnosis were sufficient to complete the hypnotic inductions and allow participants at least two minutes to imagine the relaxing scene. This time period was selected in line with previous research conducted by Nowlis and Rhead (1968) who found that a 2-minute hypnotic session was sufficient for the induction but that the observation period was too short. Further examination of longer hypnotic conditions would be beneficial. The increased time may allow for a better understanding of the impact of hypnosis on physiological reactivity. This may also allow for better examination of the impact, if one exists, for observable effects of hypnosis beyond the termination of the hypnotic condition.

As mentioned previously, there are more rigorous and sophisticated measures of brain activity than an EEG, such as functional Magnetic Resonance Imagery (fMRI) and Positron Emission Topography (PET) scans, both of which were unavailable during the course of this study. Even so, by starting with less sophisticated measures, as in this study, the available basic research base has been increased and made available to future researchers.

This study was originally designed to identify specific physiological differences that exist between hetero-hypnosis and self-hypnosis. Observing no reliable notable differences, the power in the results comes from the assessment of physiological reactivity that occurred as a result of hypnotic induction, both self and hetero. Hypnosis was believed, for many years, to result from motivation of the participant and/or an effort to please the hypnotist or hypnotherapist, having no correlated physiological changes associated with the phenomenon. Although motivation has been identified to be important to the success of a hypnotic induction, a physiological picture of hypnosis, distinct from normal awakening consciousness, is emerging. Understanding hypnotic phenomena and their sequelae is critical to insure maximum utilization of the hypnotic state. This research has contributed an in-depth glimpse into the fundamental physiological changes that occur in the cardiovascular system and parts of the neurological system. Continued research in this area is necessary to add to the basic hypnotic changes knowledge base and aid practitioners in understanding the power of the hypnotic induction, regardless of type.

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Appendix A

HGSHS:A

Establishing Rapport Prior to the Initial Induction (7 minutes)

Preliminary remarks by the examiner. In a few minutes I am going to administer a standard procedure for measuring susceptibility to hypnosis. At the end of this standard procedure you yourself will report on what the experience was like in the Response Booklet which has been distributed to you. Note that the booklet is sealed. Do not open the Response Booklet until I specifically tell you to do so at the end of the standard procedure. On the cover page of the response booklet are spaces for your name, address and some other general information, you do not need to complete this information for this study. Again, please do not open the booklet now.

Let's talk a while before we start. I want you to be quite at ease, and it may help if I answer a few of your questions first. I am assuming that for some of you this is the first time you are experiencing hypnosis.

(In presenting the following remarks, the examiner may find it useful in establishing rapport to elicit some questioning and participation from members of the group. Questions are to be answered by paraphrasing the points made below.)

People experiencing hypnosis for the first time are sometimes a little uneasy because they do not know what the experience will be like, or because they may have a distorted notion of what it is like. It is very natural to be curious about a new experience. Your curiosity will be satisfied before we are through, but you can best get the answers you want by just letting yourself be a part of what goes on, and by not trying to watch the process in detail.

Some people, however, have a tendency to allay their initial uneasiness in a new situation by laughing, giggling or whispering. We must request that you refrain from this type of response for the duration of the procedures here so as not to disrupt the concentration of the individuals around you.

Research findings to date indicate that norms derived from the adapted scale are congruent with norms derived from the individually-administered version (Bentler & Hilgard, 1963; Shor & Orne, 1963).

The same social and ethical responsibilities that apply in the individual administration of the scale also apply, of course, in a group administration. Because in a group administration the examiner has little direct contact with the individual reactions of his (or her) subjects, it behooves him (or her) to take extra precautions to be alert to the possibility of an occasional disturbance which may arise attendant to the hypnotic experience. Out of hundreds of subjects hypnotized with the individually-administered and group-administered versions of the scale, only two or three percent felt in the least disturbed by the experience, but it is valuable to learn from these subjects. "In some cases a disturbance such as a headache resulted from the revival under hypnosis of bad childhood experiences under chemical anesthetics; in other cases the disturbance attributed to hypnosis could be shown to have been there prior to the hypnotic induction. While hypnosis is in general entirely harmless, and often helpful, the assumption must not be made that it is a trivial experience. For some subjects it is a deep intrusion into their private lives. Hence the person planning experiments on hypnosis should be prepared for the possibility of some unusual consequences" (Weitzenhoffer & Hilgard, 1959, p. 6).

To allow you to feel more fully at ease in the situation, let me reassure you on a few points. First of all, the experience, while a little unusual, may not seem so far removed from ordinary experience as you have been led to expect. Hypnosis is largely a question of your willingness to be receptive and responsive to ideas, and to allow these ideas to act upon you without interference. These ideas we call suggestions.

Second, you will not be asked to do anything that will make you look silly or stupid, or that will prove embarrassing to you. We are here for serious scientific purposes.

Third, and finally, I shall not probe into your personal affairs, so that there will be nothing personal about what you are to do or say during the hypnotic state.

You may wonder why we are doing these experiments. Hypnotism is being used more and more by physicians: for example, by dentists to relieve pain, by obstetricians to make childbirth easier, by psychiatrists to reduce anxiety. If we can understand the processes involved, we will know more about the relationship between ideas and action, more about the way in which personality operates. So in participating here you are contributing to scientific knowledge of a kind that can be used to help other human beings. We are trying here merely to understand hypnotism. Probably all people can be hypnotized, but some are much more readily hypnotized than others, even when each of them co-operates. We are studying some of these differences among people.

Have you any questions or comments before we go ahead? (Answer questions by paraphrasing the above points).

Now please make yourself comfortable in your chair. Clear you lap of books and papers, and prepare to begin. Individuals who where glasses should keep them on. If,

however, you are wearing contact lenses, it might be more comfortable to remove them.
(The examiner should also communicate the following if the main procedures are tape recorded.)

Main Procedures

(The following instructions are to be presented verbatim)

1a. HEAD FALLING

[42:15]

To begin with, I want you to experience how it feels to respond to suggestions when you are not hypnotized. If you will now please sit up straight in your chair....Close your eyes and relax; continue, however, to sit up straight. That's right. Eyes closed and sit up straight. Please stay in that position with your eyes closed, while at the same time letting yourself relax. (Allow 30" to pass.) Now just remain in the same position and keep your eyes closed.... Sitting up straight in your chair....with your eyes closed.

In a moment I shall ask you to think of your head falling forward. As you know, thinking of a movement and making a movement are closely related. Soon after you think of your head falling forward you will experience a tendency to make the movement. You will find your head actually falling forward, more and more forward, until your head will fall so far forward that it will hang limply on your neck.

Listen carefully to what I say and think of your head falling forward, drooping forward. Think of your head falling forward, falling forward, more and more forward. Your head is falling forward, falling forward. More and more forward. Your head is falling more and more forward, falling more and more forward. Your head is going

forward, drooping down, falling forward, falling, swaying, drooping, limp relaxed, forward, forward, falling, falling, falling.....Now!

That's fine. Now please sit up and open your eyes. That's right. Sit up and open your eyes. You can see how thinking about a movement produces a tendency to make the movement. You learn to become hypnotized as you bring yourself to give expression to your action tendencies. But at this point you have the idea of what it means to accept and act upon suggestions.

2a. EYE CLOSURE (total time 15' 25'') [38.45]

Now I want you to seat yourself comfortably and rest you hands in your lap. That's right. Rest your hands in your lap. Now look at your hands and find a spot on either hand and just focus on it. It doesn't matter what spot you choose; just select some spot to focus on. I shall refer to the spot which you have chosen as the target. That's right...hands relaxed...look directly at the target. I am about to give you some instructions that will help you to relax and gradually enter a state of hypnosis. Just relax and make yourself comfortable. I want you to look steadily at the target and while keeping you eyes upon it to listen to what I say. Your ability to be hypnotized depends partly on you willingness to cooperate and partly on your ability to concentrate upon the target and upon my words. You have already shown yourself to be cooperative by coming here today, and with your further cooperation I can help you to become hypnotized. You can be hypnotized only if you are willing. I assume that you are willing and that you are doing your best to cooperate by concentrating on the target and listening to my words, letting happen whatever you feel is going to take place. Just let it happen. If you pay close attention to what I tell you, and think of the things I tell you to think about,

you can easily experience what it is like to be hypnotized. There is nothing fearful or mysterious about hypnosis. It is a perfectly normal consequence of certain psychological principles. It is merely a state of strong interest in some particular thing. In a sense you are hypnotized whenever you see a good show and forget you are part of the audience, but instead feel you are part of the story. Many people report that becoming hypnotized feels at first like falling asleep, but with the difference that somehow or other they keep hearing my voice as a sort of background to whatever other experience they may have. In some ways hypnosis is like sleepwalking; however, hypnosis is also an individual experience and is not just alike for everyone. In a sense the hypnotized person is like a sleepwalker, for he can carry out various and complex activities while remaining hypnotized. All I ask of you is that you keep up your attention and interest and continue to cooperate as you have been cooperating. Nothing will be done that will cause you any embarrassment. Most people find this a very interesting experience. (Time: 3' 35'')

[35:10]

Just relax. Don't be tense. Keep your eyes on the target. Look at it as steadily as you can. Should your eyes wander away from it, that will be all right...just bring your eyes back to it. After a while you may find that the target gets blurry, or perhaps moves about, or again, changes color. That is all right. Should you get sleepy, that will be fine, too. Whatever happens, let it happen and keep staring at the target for a while. There will come a time, however, when your eyes will be so tired, will feel so heavy, that you will be unable to keep them open any longer and they will close, perhaps quite involuntarily.

When this happens, just let it take place. (Time: 1' 10'')

[34:00]

As I continue to talk, you will find that you will become more and more drowsy, but not all people respond at the same rate to what I have to say. Some people's eyes will close before others. When the time comes that your eyes have closed, just let them remain closed. You may find that I shall still give suggestions for your eyes to close. These suggestions will not bother you. They will be for other people. Giving these suggestions to other people will not disturb you but will simply allow you to relax more and more.

You will find that you can relax completely but at the same time sit up comfortably in your chair with little effort. You will be able to shift your position to make yourself comfortable as needed without it disturbing you. Now just allow yourself to relax completely. Relax every muscle of your body. Relax the muscles of your legs...Relax the muscles of your feet...Relax the muscles of your arms...Relax the muscles of your hands...of your fingers...Relax the muscles of your neck, of your chest...Relax all the muscles of your body...Let yourself be limp, limp, limp. Relax more and more. More and more. Relax completely. Relax completely. Relax completely.

(Time: 2'15")

[31:45]

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

are getting drowsy and sleepy, more and more drowsy and sleepy while your eyelids become heavier and heavier, more and more tired and heavy. (Time 1' 25'')

[30:20]

Your eyes are tired from staring. The heaviness in your eyelids is increasing. Soon you will not be able to keep your eyes open. Soon your eyes will close of themselves. Your eyelids will be too heavy to keep open. Your eyes are tired from staring. Your eyes are becoming wet from straining. You are becoming increasingly drowsy and sleepy. The strain in your eyes is getting greater and greater, greater and greater. It would be so nice to close your eyes, to relax completely, and just listen sleepily to my voice talking to you. You would like to close your eyes and relax completely, relax completely. You will soon reach your limit. The strain will be so great, your eyes will be so tired, your lids will become so heavy, your eyes will close of themselves, close of themselves. (Time 1' 20'')

[29:00]

Your eyelids are getting heavy, very heavy. You are relaxed, very relaxed. There is a pleasant feeling of warmth and heaviness all through your body. You are tired and drowsy. Tired and sleep. Sleepy. Sleepy. Sleepy. Listen only to my voice. Pay attention to nothing else but my voice. Your eyes are getting blurred. You are having difficulty seeing. Your eyes are strained. The strain is getting greater and greater, greater and greater. (Time 50'')

[28:10]

Your lids are heavy. Heavy as lead. Getting heavier and heavier, heavier and heavier. They are pushing down, down, down. Your eyelids seem weighted, weighted with lead, heavy as lead...Your eyes are blinking, blinking, blinking...closing...closing... (Time: 35'')

[27:35]

Your eyes may have closed by now, and if they have not, they would soon close of themselves. But there is no need to strain them more. Even if your eyes have not closed fully as yet, you have concentrated well upon the target, and have become relaxed and drowsy. At this time you may just let your eyes close. That's it, eyes completely closed. Close your eyes now. (Time 35") [27:00]

You are now comfortably relaxed, but you are going to relax even more, much more. Your eyes are now close. You will keep your eyes closed until I tell you otherwise, or I tell you to awaken....You feel drowsy and sleep. Just keep listening to my voice. Pay close attention to it. Keep your thoughts on what I am saying—just listen. You are going to get much more drowsy and sleepy. Soon you will be deep asleep but you will continue to hear me. You will not awaken until I tell you to do so. I shall now begin to count. At each count you will feel yourself going down, down, into a deep, comfortable, a deep restful sleep. A sleep in which you will be able to do all sorts of things I ask you to do. One—you are going to go deeply asleep...Two—down, down in to a deep, sound sleep...Three—four---more and more, more and more asleep...Five—six—seven—you are sinking, sinking into a deep, deep sleep. Nothing will disturb you. Pay attention only to my voice and only to such things as I may call to your attention., I would like you to keep on paying attention my voice and the things I tell you...Eight – nine—ten—eleven—twelve—deeper and deeper, always deeper asleep—thirteen—fourteen—fifteen—although deep asleep you can clearly hear me. You will always hear me no matter how deeply asleep you may feel yourself to be...Sixteen—seventeen—eighteen—deep asleep, fast asleep. Nothing will disturb you. You are going to experience many things that I will tell you to experience...Nineteen, twenty. Deep asleep! You will not

awaken until I tell you to do so. You will wish to sleep and will have the experiences I shall presently describe. (Time 3' 40'')

3a. HAND LOWERING (LEFT HAND) (Total time: 5' 05'') [22:20]

Introduction. As you become even more drowsy and sleepy, it will not disturb you to make yourself comfortable in your chair and put your head in a comfortable position.

Now that you are very relaxed and sleepy, listening without effort to my voice, I am going to help you to learn more about how your thoughts affect your actions in this state. Not all people experience just the same things in this state, and perhaps you will not have all the experience I will describe to you. That will be all right. But you will have at least some of the experiences and you will find these interesting. You just experience whatever you can. Pay close attention to what I tell you and watch what happens. Just let happen whatever you find is happening, even if it is not what you expect.

Instruction Proper. Please extend your left arm straight out in front of you, up in the air, with the palm of your hand down. Left arm straight out in front of you...straight out, up in the air, with the palm of your hand down. That's it. Left arm straight out in front of you...palm down. I want you now to pay close attention to this hand, the feelings in it, and what is happening to it. As you pay attention to it you are more aware of it than you have been—you notice whether it is warm or cool, whether there is a little tingling in it, whether there is a tendency for your fingers to twitch ever so slightly...That's right, I want you to pay close attention to this hand because something very interesting is about to happen to it. It is beginning to get heavy...heavier and heavier...as though a weight were pulling the hand and the arm down...you can picture a weight pulling on it...and as it feels heavier and heavier it begins to move...as if something were forcing it down...a

little bit down...more and more down...down...and as I count it gets heavier and heavier and goes down more and more... one, down...two, down...three, down...four, down, more and more down...five, down...six, down...seven...eight...heavier and heavier, down and more and more...nine...down...ten...heavier and heavier...down more and more. (Allow 10’')

That’s fine...just let your hand now go back to its original resting position and relax. Your hand back to its original resting position and relax. You must have noticed how heavy and tired the arm and hand felt; much more so than it ordinarily would if you were to hold it out that way for a little while; you probably noticed how something seemed to be pulling it down. Now just relax...your hand and arm are quite comfortable again...quite comfortable again. There...just relax. Relax.

4a. ARM IMMOBILIZATION (RIGHT ARM) (Total time: 2’55’’) [17:15]

You are very relaxed. The general heaviness you have felt from time to time you now feel all over your body. Now I want you to pay close attention to your right arm and hand...Your right arm and hand share in the feeling of heaviness...how heavy your right hand feels...and note how as you think about this heaviness in your hand and arm the heaviness seems to grow even more...Now your arm is getting heavy...very heavy. Now your hand is getting heavy...so heavy... like lead...perhaps a little later you would like to see how heavy your hand is...it seems much too heavy to lift...but perhaps in spite of being so heavy you could lift it a little, although it may now be too heavy even for that...Why don’t you see how heavy it is...Just try to lift your hand up, just try. Just try to life your hand up, just try. (Allow 10’')

That's fine...stop trying...just relax. You notice that when you tried to lift it, there was some resistance because of the relaxed state you are in. But now you can just rest your hand again. Your hand and arm now feel normal again. They are no longer heavy. You could lift them now if you wanted to, but don't try now. Just relax...relax completely. Relax. Just relax.

5a. FINGER LOCK (Total time: 1' 40")

[14:20]

Now let us try something else. Put your fingers together. Interlock your fingers together. Interlock your fingers and press your hands tightly together. That's it. Put your fingers together. Interlock your fingers together and press your hands tightly together. Interlock tightly...hands pressed tightly together. Notice how your fingers are becoming tightly interlocked together, more and more tightly interlocked together...so tightly interlocked together that you wonder very much if you could take your fingers and hands apart...Your fingers are interlocked, tightly interlocked...and I want you to try to take your hands apart...just try... (Allow 10")

That's right. Stop trying and relax. You notice how hard it was to get started to take them apart. Your hands are no longer tightly clasped together...You can take them apart. Now return your hands to their resting position and relax. Hands to their resting position and relax...just relax.

6a. ARM RIGIDITY (LEFT) (Total time: 2' 25")

[12:40]

Please extend your left arm straight out in front of you, up in the air, and make a fist. Arm straight out in front of you. That's right. Straight out, and make a fist. Arm straight out, a tight fist...make a tight fist. I want you to pay attention to this arm and imagine that it is becoming stiff...stiffer and stiffer...very stiff...and now you notice that

something is happening to your arm...you notice a feeling of stiffness coming into it...It is becoming stiff...more and more stiff...rigid...like a bar of iron...and you know how difficult...how impossible it is to bend a bar of iron like your arm...See how much your arm is like a bar of iron...test how stiff and rigid it is...try to bend it...try. (Allow 10’)

That’s good. Now just stop trying to bend your arm and relax. Stop trying to bend your arm and relax. I want you to experience many things. You felt the creeping stiffness...that you had to exert a good deal of effort to do something that would normally be very easy. But your arm is not stiff any longer. Just place your arm back in resting position...back in resting position. Just relax and as your arm relaxes, let your whole body relax. As your arm relaxes, let your whole body relax.

7a. HANDS MOVING (TOGETHER) (Total time: 1’ 45’’) **[10:15]**

Please hold both hands up in the air. Straight out in front of you, palms facing inward – palms facing toward each other. Hold your hands about a foot apart...about a foot apart. Both arms straight out in front of you, hands about a foot apart...palms facing inward...about a foot apart.

Now I want you to imagine a force attracting your hands toward each other, pulling them together. As you think of this force pulling your hands together, they will move together, slowly at first, but they will move closer together, closer and closer together as though a force were acting on them...moving...moving...closer, closer...

(Allow 10’ without further suggestion)

That’s fine. You see again how thinking about a movement causes a tendency to make it. Now place your hands back in their resting position and relax...your hands back in their resting position and relax.

8a. COMMUNICATION INHIBITION (Total time: 1' 25") [8:30]

You are very relaxed now...deeply relaxed...think how hard it might be to communicate while so deeply relaxed...perhaps as hard as when asleep...I wonder if you could shake your head to indicate "no." I really don't think you could... You might try a little later to shake your head "no" when I tell you to...but I think you will find it quite difficult...Why don't you try to shake your head "no" now...just try to shake it. (Allow 10")

That's all right...stop trying and relax. You see again how you have to make an effort to do something normally as easy as shaking your head. You can shake it to indicate "no" much more easily now. Shake your head easily now...That's right, now relax. Just relax.

9a. HALLUCINATION (FLY) (Total time: 1' 30") [7:05]

I am sure that you have paid so close attention to what we have been doing that you have not noticed the fly which has been buzzing about you...But now that I call your attention to it you become increasingly aware of this fly which is going round and round about your head...nearer and nearer to you...buzzing annoyingly...hear the buzz getting louder as it keeps darting at you...You don't care much for this fly...You would like to shoo it away...get rid of it...It annoys you. Go ahead and get rid of it if you want to... (Allow 10").

There, it's going away...it's gone...and you are no longer annoyed...no more fly. Just relax, relax completely. Relax...just relax.

10a. EYE CATALEPSY (Total time: 2') [5:35]

You have had your eyes closed for a long time while you have remained relaxed. They are by now tightly closed, tightly shut...In a few moments I shall ask you to try to open your eyes. When you are told to try, most likely your eyes will feel as if they were glued together...tightly glued shut. Even if you were able to open your eyes, you would, of course, only do so momentarily and then immediately close them again and relax, so as not to disturb your concentration. But I doubt that you will be able—even momentarily—to open your eyes. They are so tightly closed that you could not open them. Perhaps you would soon like to try to open your eyes momentarily in spite of their feeling so heavy and so completely...so tightly close. Just try...try—to open your eyes. (Allow 10”)

All right. Stop trying. Now again allow your eyes to become tightly shut. Your eyes, tightly shut. You’ve had a chance to feel your eyes tightly shut. Now relax. Your eyes are normal again, but just keep them closed and relax. Normal again...just keep them closed and relaxed...relaxed and shut.

11a. POST-HYPNOTIC SUGGESTION (TOUCHING LEFT ANKLE); AMNESIA
(Total time: 3’ 35”) [3.35]

Remain deeply relaxed and pay close attention to what I am going to tell you next. In a moment I shall begin counting backwards from twenty to one. You will gradually wake up, but for most of the count you will still remain in the state you are now in. By the time I reach “five” you will open your eyes, but you will not be fully aroused. When I get to “one” you will be fully alert, in your normal state of wakefulness. You probably will have the impression that you have slept because you will have difficulty remembering all the things I have told you and all the things you did or felt. In fact, you

will find it to be so much of an effort to recall any of these things that you will have no wish to do so. It will be much easier simply to forget everything until I tell you that you can remember. You will remember nothing of what has happened until I say to you: “Now you can remember everything!” You will not remember anything until then. After you open your eyes, you will feel find. You will have no headache or other after-effects. I shall now count backwards from twenty, and at “five,” not sooner, you will open your eyes but not be fully aroused until I say “one” At “one” you will be awake...A little later you will hear a tapping noise like this (Demonstrate). When you hear the tapping noise, you will reach down and touch your left ankle. You will touch your left ankle, but forget that I told you to do so, just as you will forget the other things, until I tell you “Now you can remember everything.” Ready, now: 20 – 19 – 18 – 17 – 16 – 15 – 14 – 13 – 12 – 11 – 10, half-way – 9 – 8 – 7 – 6 – 5 – 4 – 3 – 2 – 1. Wake up! Wide awake! Any remaining drowsiness which you may feel will quickly pass.

(A distinct tapping noise is now to be made. Then allow 10” before continuing).

TESTING

Now please take your Response Booklet, break the seal and turn to the second page of the booklet. Do not turn to the third page until I specifically instruct you to do so later. On the second page please write down briefly in your own words a list of the things that happened since you began looking at the target. You should not go into much detail here on the particular ways in which you responded, but please try to mention all of the different things that you were asked to do. You will now be given three minutes to write out this information. At the end of three minutes you will be asked a number of more specific questions regarding your experiences. (Allow 2’) Please complete your list in

one more minute. If you have already completed your list, spend the next minute trying to recall if there was anything else which you may have neglected to mention. (Allow 1' more).

All right, now listen carefully to my words. Now you can remember everything. Please turn to page three and write down a list of anything else that you remember now that you did not remember previously. You will be given two minutes more to write out this information. (Allow 2').

Now please turn to page four, and answer the questions in the remainder of the booklet. Use your own judgment where questions are ambiguous.

(Collect booklets at the end of the session. If necessary, instruct subjects to answer only as much of the last section on subjective experiences as time permits.)

Appendix B

Response Booklet of the HGSHS:A

Individual version © 1959 by Stanford University
Group adaptation © 1962 by Harvard University
Adaptation 10/02 by John F. Kihlstrom

HARVARD GROUP SCALE OF HYPNOTIC SUSCEPTIBILITY

FORM A

Response Booklet

Name: _____ *Date: _/_/_*

please print

Age: _____ Birthdate: _/_/_ Sex: _____ Expected Graduation: _____

Campus Address: _____

Telephone: _____

Permanent Address: _____

Telephone: _____

Have you ever seen anyone on television or in the movies who was hypnotized?

Have you ever read a novel about anyone who was hypnotized?

Have you ever known anyone who was hypnotized?

Have you yourself ever been hypnotized before?

If so, please cite the circumstances and describe your experience.

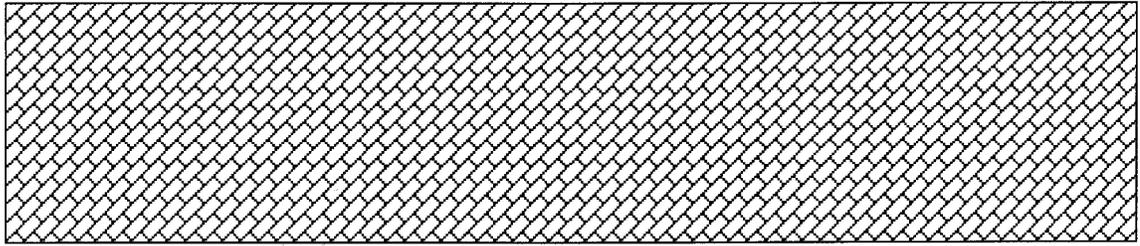
**PLEASE DO NOT OPEN THIS BOOKLET
UNTIL THE EXPERIMENTER
SPECIFICALLY INSTRUCTS YOU TO DO SO.**

This page is blank.

Now please write down briefly, in your own words, a list of all the things that happened *since you began looking at the target*. Please do *not* go into detail. Spend three minutes, no longer, in writing out your reply.

**PLEASE DO NOT OPEN THIS BOOKLET
UNTIL THE EXPERIMENTER
SPECIFICALLY INSTRUCTS YOU TO DO SO.**

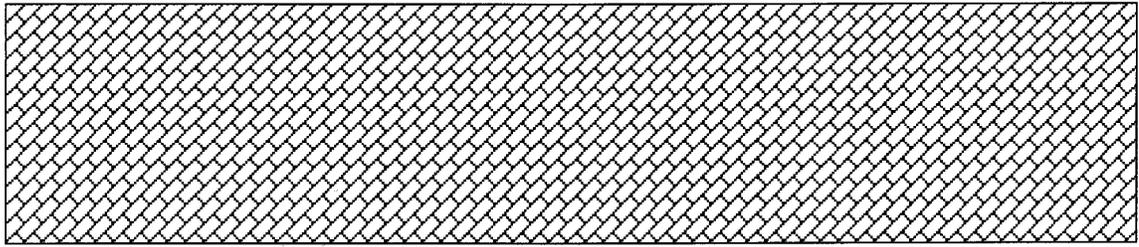
Page 2



On this page please write down a list of *anything else* that you now remember that you *did not* remember previously. Please do not go into detail. Spend two minutes, no longer, in writing out your reply.

**PLEASE DO NOT OPEN THIS BOOKLET
UNTIL THE EXPERIMENTER
SPECIFICALLY INSTRUCTS YOU TO DO SO.**

Page 3



Now please complete the rest of the pages in this booklet. None of the other sections are timed. Just proceed at your own pace, turning pages as finish. You need not wait for further instructions from the experimenter.

PLEASE DO *NOT* CHANGE ANY ENTRIES ON THE EARLIER PAGES.

SUBJECTIVE IMPRESSIONS OF RESPONSE

During the tape recording, several suggestions were administered. We are interested in your impressions about how you experienced these suggestions. The items, listed in the order presented, are described briefly below. For each item, please check the appropriate column.

Item	Suggestion	Successful	Unsuccessful
01.	Head falling forward.		
02.	Eyes becoming heavy and closing.		
03.	Extended left arm becoming heavy and pulling down		
04.	Right arm heavy and difficulty in lifting it		
05.	Difficulty in separating interlocked fingers		
06.	Extended left arm becoming stiff and difficult to bend.		
07.	Outstretched arms, hands being pulled together.		
08.	Difficulty in shaking head "no".		
09.	Getting rid of annoying fly.		
10.	Difficulty in opening eyes.		
11.	Touching left ankle at tapping sound.		
12.	Temporary difficulty in remembering events of hypnosis.		

SECTION ON OBJECTIVE, OUTWARD RESPONSES

Listed on the next three pages, in chronological order, are 12 specific suggestions that were administered to you during the standardized hypnotic procedure. We would like you to estimate whether or not you *objectively* responded to these 12 suggestions; i.e., whether or not *an onlooker* would have observed that you did or did not make certain definite responses by certain specific, pre-defined criteria.

In this section we are interested in your estimates of your *outward behavior* and *not* in what your *inner, subjective experience* was like. Later on you will be given more opportunity to describe your inner, subjective experience, but in this section refer only to the outward behavioral responses irrespective of what the experience may have been like subjectively.

It is understood that your estimates may in some cases not be as accurate as you might wish them to be and that you might even have to guess. But we want you to make whatever you feel to be your *best estimates* regardless.

Beneath a description of each of the 12 suggestions are two sets of responses, labeled A and B. Please *circle* either A or B for each question, whichever you judge to be more accurate.

Please answer *every* question.

PLEASE DO NOT RETURN TO EARLIER PAGES

01. HEAD FALLING

You were first told to sit up straight in your chair for 30 seconds and then to think of your head falling forward. Would you estimate that *an onlooker* would have observed that your head fell forward at least 2 inches during the time you were thinking about it happening?

- Circle one:*
- A. My head fell forward at least 2 inches.
 - B. My head fell forward less than 2 inches.

02. EYE CLOSURE

You were next told to rest your hands in your lap and pick out a spot on either hand as a target and concentrate on it. You were then told that your eyelids were becoming tired and heavy. Would you estimate that *an onlooker* would have observed that your eyelids had closed (before the time you were told to close them deliberately)?

- Circle one:*
- A. My eyelids had closed by then.
 - B. My eyelids *had not* closed by then.

03. LEFT HAND LOWERING

You were next told to extend your left arm straight out and feel it becoming heavy as though a weight were pulling the hand and arm down. Would you estimate that *an onlooker would* have observed that your hand lowered at least 6 inches (before the time you were told to let your hand down deliberately)?

- Circle one:*
- A. My hand lowered at least 6 inches by then.
 - B. My hand lowered less than 6 inches by then.

04. RIGHT ARM IMMOBILIZATION

You were next told how heavy your right hand and arm felt and then told to try to lift your hand up. Would you estimate that *an onlooker* would have observed that you did not lift your hand and arm up at least 1 inch (before you were told to stop trying)?

- Circle one:*
- A. I did not lift my hand and arm at least 1 inch by then.
 - B. I did lift my hand and arm 1 inch or more by then.

05. FINGER LOCK

You were next told to interlock your fingers, told how your fingers would become tightly interlocked, and then told to try to take your hands apart. Would you estimate that *an* onlooker would have observed that your fingers were incompletely separated (before you were told to stop trying to take them apart)?

- Circle one:*
- A. My fingers were still incompletely separated by then.
 - B. My fingers had completely separated by then.

06. LEFT ARM RIGIDITY

You were next told to extend your left arm straight out and make a fist, told to notice it becoming stiff, and then told to try to bend it. Would you estimate that *an* onlooker would have observed that there was less than 2 inches of arm bending (before you were told to stop trying)?

- Circle one:*
- A. My arm was bent less than 2 inches by then.
 - B. My arm was bent 2 or more inches by then.

07. MOVING HANDS TOGETHER

You were next told to hold your hands out in front of you about a foot apart and then told to imagine a force pulling your hands together. Would you estimate that an onlooker would have observed that your hands were not over 6 inches apart (before you were told to return your hands to their resting position)?

- Circle one:*
- A. My hands were not more than 6 inches apart by then.
 - B. My hands were still more than 6 inches apart by then.

08. COMMUNICATION INHIBITION

You were next told to think how hard it might be to shake your head to indicate “no”, and then told to try. Would you estimate that an onlooker would have observed you make a recognizable shake of the head “no” (before you were told to stop trying)?

- Circle one:*
- A. I *did not* recognizably shake my head “no”.
 - B. I *did* recognizably shake my head “no”.

09. EXPERIENCING OF FLY

You were next told to become aware of the buzzing of a fly which was said to become annoying, and then you were told to shoo it away. Would you estimate that *an onlooker* would have observed you make any grimacing, any movement, any outward acknowledgement of an effect (regardless of what it was like subjectively)?

- Circle one:*
- A. I did make some outward acknowledgement.
 - B. I did not make any outward acknowledgement.

10. EYE CATALEPSY

You were next told that your eyelids were so tightly closed that you could not open them, and then you were told to try to do so. Would you estimate that *an onlooker* would have observed that your eyes remained closed (before you were told to stop trying)?

- Circle one:*
- A. My eyes remained closed.
 - B. My eyes had opened.

11. POSTHYPNOTIC SUGGESTION (TOUCHING LEFT ANKLE)

You were next told that after you were awakened you would hear a tapping noise at which time you would reach down and touch your left ankle. You were further informed that you would do this but forget being told to do so. Would you estimate that *an onlooker* would have observed either that you reached down and touched your left ankle, or that you made any partial movement to do so?

- Circle one:*
- A. I made at least a partial observable movement to touch my left ankle.
 - B. I *did not* make even a partial movement, which would have been observable, to touch my left ankle.

SECTION ON SUBJECTIVE, INWARD RESPONSES

The 12 specific suggestions are listed, again in chronological order, on the next four pages. This time, you should focus on your subjective feelings while responding to these suggestions, regardless of what an objective onlooker would have observed, and even if you responded only partially to a suggestion.

People respond to hypnotic suggestions in a variety of ways.

- Sometimes, their response is mostly voluntary and deliberate. For example, when it is suggested that their hands are moving together (Item #03), they purposefully direct the movement of their hands most of the time.
- Sometimes their response is mostly involuntary and automatic. For example, they may find their hands moving together without their helping them.
- Sometimes their response is a mixture of voluntary and involuntary response, so that it is impossible to distinguish between the two feelings. For example, they may find that they cannot tell whether their hands moved voluntarily or involuntarily.
- Sometimes the feeling of purposefulness is replaced by the feeling of involuntariness. For example, people may begin by purposefully directing the movements of their hands, but later find that their hands continue to move together with no further effort on their part.
- Sometimes the opposite occurs: the feeling of involuntariness is replaced by the feeling of purposefulness. For example, their hands might begin to move together by themselves, but they find that they have to complete the suggestion deliberately.
- Sometimes the response is hard to define in these sorts of terms.
- And, of course, sometimes there is no response at all.

To the extent that you responded positively to any of the 12 suggestions, whether fully or only in part, please on the next four pages indicate to what degree your response was voluntary, and to what degree it was involuntary. For each of the 12 suggestions, please circle the letter corresponding to the description that most closely characterizes your experience.

Again, it is understood that your estimates may in some cases not be as accurate as you might wish them to be and that you might even have to guess. But we want you to make whatever you feel to be your *best estimates* regardless. Please answer *every* question.

PLEASE DO NOT RETURN TO EARLIER PAGES.

01. HEAD FALLING

You were first told to sit up straight in your chair for 30 seconds and then to think of your head falling forward.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

02. EYE CLOSURE

You were next told to rest your hands in your lap and pick out a spot on either hand as a target and concentrate on it. You were then told that your eyelids were becoming tired and heavy.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

03. LEFT HAND LOWERING

You were next told to extend your left arm straight out and feel it becoming heavy as though a weight were pulling the hand and arm down.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

04. RIGHT ARM IMMOBILIZATION

You were next told how heavy your right hand and arm felt and then told to try to lift your hand up.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

05. FINGER LOCK

You were next told to interlock your fingers, told how your fingers would become tightly interlocked, and then told to try to take your hands apart.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

06. LEFT ARM RIGIDITY

You were next told to extend your left arm straight out and make a fist, told to notice it becoming stiff, and then told to try to bend it.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

04. RIGHT ARM IMMOBILIZATION

You were next told how heavy your right hand and arm felt and then told to try to lift your hand up.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

05. FINGER LOCK

You were next told to interlock your fingers, told how your fingers would become tightly interlocked, and then told to try to take your hands apart.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

06. LEFT ARM RIGIDITY

You were next told to extend your left arm straight out and make a fist, told to notice it becoming stiff, and then told to try to bend it.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

10. EYE CATALEPSY

You were next told that your eyelids were so tightly closed that you could not open them, and then you were told to try to do so.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

11. POSTHYPNOTIC SUGGESTION (TOUCHING LEFT ANKLE)

You were next told that after you were awakened you would hear a tapping noise at which time you would reach down and touch your left ankle. You were further informed that you would do this but forget being told to do so.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

12. POSTHYPNOTIC AMNESIA (TEMPORARY FORGETTING)

You were also told that after you came out of hypnosis you would be unable to remember the things you did while you were hypnotized, until you were told you could remember everything.

- Circle one:*
- A. I did not respond at all during this time.
 - B. My response was mostly voluntary.
 - C. At first my response was involuntary, but then later on I had to continue it voluntarily.
 - D. The feeling that my response was voluntary was completely intermixed with the feeling that it was involuntary.
 - E. At first my response was voluntary, but then later on it continued to occur involuntarily.
 - F. My response was mostly involuntary.

OVERALL SUBJECTIVE RATING

On the following scale, position '1' represents completely un hypnotized, while position '10' represents as deeply hypnotized as anyone could become. Please put a mark on the scale to indicate, subjectively, how deeply hypnotized you became during the tape-recorded hypnosis session.

1 2 3 4 5 6 7 8 9 10

Briefly explain *why* you chose this number.

THANK YOU FOR YOUR PARTICIPATION

Appendix C

Self-Report of Previous Experiences

Name: _____

Subject #: _____

The research suggests that individuals with prior experiences with relaxation strategies, meditation, or hypnosis may impact current facility with hypnosis. For the experiences below, please indicate which you have experience with and for how long you have been practicing them.

Activity (with examples)	Experience with this activity (yes/no)	For how long? (weeks, months, years)
Relaxation Strategies (guided imagery, diaphragmatic breathing, progressive muscle relaxation)		
Meditation (transcendental meditation, long prayer sessions)		
Hypnosis (self-hypnosis, hypnosis induced by a dentist, physician, or psychologist)		

Appendix D

Personal Information

Subject Number _____ Age _____ Ethnicity _____

Weight _____ Height _____ Highest Grade Completed _____ Student? Y N

Date of session _____

Hours of Sleep last night _____

Time since last meal _____

Time since last caffeine _____

Time since last nicotine _____

Time since last alcohol _____

Time since last exercise _____

Current Medications _____

Family History of hypertension

Family History? Yes No

If yes, in whom? _____

Women: Date of the first day of last menstrual period _____

Appendix E

Lab Session Observation Form

Subject Number _____ Lab Session 1 2 (Circle One)

_____ Facial muscles relax

_____ Breathing slows

_____ Eyes Flutter

_____ Head droops

_____ Relaxation of all muscles

_____ Mouth opening

_____ Ideomotor signaling (Explain: _____

Appendix F

Directions to Prepare for the Lab Session

To prepare for your lab session, please follow the following recommendations as they may affect the measures we will be using:

- Please wear a loose fitting top as we will need to place medical tape and electrodes on your chest and abdomen. If you are female, please wear a sports bra or bikini top for your comfort.
- Please try to get a good night sleep the night before testing.
- Do not eat or drink anything within 2 hours of testing except water.
- Because alcohol affects your cardiovascular system, we ask that you do not drink alcohol for 24 hours before testing.
- If you smoke, please do not smoke within 2 hours of testing as this will affect our results.
- One last request, please do not exercise within 4 hours of testing as exercise causes changes in your cardiovascular system that will affect our results.

You are scheduled to come to Uhler Hall, Room G-31 for your individual Lab session on _____ at _____. If you need to cancel for any reason, please call 724-840-5965 and leave a message. Thank you.

Appendix G

Eye Fixation Induction Technique (Adapted to the participant's pace)

“Without moving your head, let your eyes drift up to the ceiling and pick a spot to fix your gaze”

“Keep watching that spot and pay no attention to anything else around you.”

Just keep looking at that spot, watch the spot, and pay attention **only** to the spot and the sound of my voice.”

“You may find yourself blinking more often, which is perfectly natural”

“As you watch the spot, you will notice that it may waver in and out of focus and the edges of the spot may begin to get a little fuzzy.”

Your eyelids begin to get **very tired**. They get **very heavy** and begin to want to close”

“Your eyelids are getting **heavier** and **heavier** and it is more difficult to open them each time you blink.”

“Soon you just let your eyes remain closed.”

“Your eyes find it difficult to focus on the spot, it wavers, the eyes water, they blink and they really want to be more comfortable.”

“They burn a little and the eyelids get **heavier** and **heavier**.”

“They would be much more comfortable closed and relaxed.”

(When the eyes close)

“That’s right. As your eyes stay closed, let that wonderful feeling of relaxation spread to your face, your neck, your shoulders and your entire body as you...(transition to describing the relaxing scene provided by the participant.”

Appendix H

Chalkboard Induction Technique

Graduate Student (GS): This is a test of your ability to imagine and concentrate. It is a simple test of concentration. Will you follow my instructions precisely and exactly?

Participant (P): Yes

GS: Please close your eyes and picture a chalkboard. It may be any kind of chalkboard, anywhere. When you can see this chalkboard in your mind, let me know by nodding your head.

P: (Nods affirmatively)

GS: Fine. Now at the bottom of the chalkboard is a tray. Pick up the piece of chalk in the tray and, in your imagination, I would like you to draw a large circle on the chalkboard. When you have done that, let me know by nodding your head.

P: (Nods affirmatively)

GS: Fine Step back and look at your circle for a few seconds, and then pick up the eraser that is in the tray and erase the circle you have drawn.

P: (Nods affirmatively)

GS: Now look closely at the chalkboard and tell me what you see.

P: (Provides response)

GS: (Responds supportively)

GS: That's fine. Now turn away from the chalkboard and you will see a table in front of you and on it is some flowers. What colors do you see?

P: (provides color(S))

GS: That's right! And about how many are there?

P: XX

GS: Fine! Now show me with your hands about how long the stems are.

P: (Demonstrates length of the stems)

GS: That's fine, you have done well. Now turn away from the table and let your mind relax as you take a deep breath. As you let it out, let your whole body relax as you imagine... (Describe relaxing scene described by participant).

Appendix I

Informed Consent

You are invited to participate in this research study. The following information is provided in order to help you to make an informed decision whether or not to participate. If you have any questions please do not hesitate to ask. You are eligible to participate because you are a student in the General Psychology course at Indiana University of Pennsylvania.

The purpose of this survey is to assess physiological functioning during self and hetero hypnosis. Participation in this study will involve the use of hypnosis three times on two different days.

Your participation in this study is voluntary. You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the research investigators at IUP. Your decision will not result in any loss of benefits to which you are otherwise entitled. If you choose to participate, you may withdraw at any time by notifying the researcher or informing the person administering the survey. Upon your request to withdraw, all information pertaining to you will be destroyed. If you choose to participate, all information will be held in strict confidence and will have no bearing on your academic standing or services you receive from the University. The information you provide us will be considered only in combination with that of other participants. The information obtained in the study may be published in scientific journals or presented at scientific meetings but your identity will be kept confidential.

If you are willing to participate in this study, please sign the statement below and return it to the person administering the survey. When you complete the survey, you will be given an information sheet that will provide contact information if you wish to receive results of the study, and with referral sources if you would like to receive counseling regarding any issues that may arise from participating in this study.

Participant Name

Date

Participant Signature

Student Researcher:

Kristina J. Luna, M.A.
Doctoral Candidate, Clinical Psychology
Uhler Hall
1020 Oakland Ave
Indiana, PA 15705
724-840-5965

Dissertation Chair:

Lynda Federoff, Ph.D.
Faculty, Psychology Dept.
Uhler Hall 103
1020 Oakland Ave.
Indiana, PA 15705
(724) 357-4525

This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone: 724/357-7730).

Appendix J

Debriefing

Thank you for participating in this study on hypnosis. There was no deception involved in this study. The purpose of this study was to learn more about the impact of hypnosis on the human body, specifically if it impacts the cardiovascular system or the brain. I hope that you felt comfortable in asking any questions you may have had over the course of this study. If not, please feel free to contact me by email at k.j.luna@iup.edu with any questions related to your participation in this study. If you would like further information on this study please refer to the articles listed below.

- Green, J. P., Barabasz, A. F., Barrett, D., & Montgomery, G. H. (2005). Forging ahead: The 2003 APA division 30 definition of hypnosis. *Journal of Clinical and Experimental Hypnosis, 53* (3), 259-264.
- Ruch, J. C. (1975). Self-hypnosis: The result of hetero-hypnosis or vice versa. *International Journal of Clinical and Experimental Hypnosis, 23* (4), 282-304.
- Sturgis, L. M., & Coe, W. C. (1990). Physiological responsiveness during hypnosis. *International Journal of Clinical and Experimental Hypnosis, 38* (3), 196-207.