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An Experimental Investigation of the Differential Effects of Hypnotic, Post-Hypnotic and Waking Suggestion on Learning, With Tasks Varied in Complexity

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To the Graduate Council:

I am submitting herewith a dissertation written by Herman Carl Salzberg entitled "An Experimental Investigation of the Differential Effects of Hypnotic, Post-Hypnotic and Waking Suggestion on Learning, With Tasks Varied in Complexity." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

W. O. Jenkins, Major Professor

We have read this dissertation and recommend its acceptance:

Harold D. Holloway, K. R. Newton, M. E. Keister, C. Pascal

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

March 16, 1959

To the Graduate Council:

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W. O. Jenkins
Major Professor

We have read this thesis and
recommend its acceptance:

Kenneth R. Mintz
Orville K. ...

Harold D. Hallaway

Mary Elizabeth Keister

Accepted for the Council:

Dale Mantling
Dean of the Graduate School

AN EXPERIMENTAL INVESTIGATION OF THE DIFFERENTIAL EFFECTS OF
HYPNOTIC, POST-HYPNOTIC AND WAKING SUGGESTION ON
LEARNING, WITH TASKS VARIED IN COMPLEXITY

A DISSERTATION

Submitted to
The Graduate Council
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Doctor of Philosophy

by

Herman Carl Salzberg

June 1960

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CHAPTER I

INTRODUCTION

Purpose Of The Study

This study was designed to test, first of all, whether there were any differential learning effects following hypnotic, post-hypnotic, and waking suggestion. Secondly, the investigation was designed to test whether learning following suggestion increased or decreased differentially when learning tasks varied in complexity. Finally, the study was set up to find out whether there was a difference between the quality and quantity of learning following suggestion. A large number of the features of previous experiments in the area of hypnosis and learning were combined. As past experimenters found contradictory results, no hypotheses were forwarded regarding the outcome of this investigation. Several features not found in past experiments were included in the design of this investigation. These features are mentioned following the review of the literature in this chapter.

Review Of The Literature

The literature on hypnosis is voluminous, and any review must be selective. Kline (67) points up the difficulty in reviewing just two years of publications in hypnosis because of the large variety of journals and books in which these studies are published. Hypnosis is

such a fertile area for scientific investigation at the present time, however, that it is difficult to delimit the scope of literature reviewed to the specific topic under investigation. Any person working in the field of hypnosis must be familiar with a large part of the literature, because there are many possible pitfalls when hypnosis is used as a research instrument. The experimenter in this type of research ceases to be an objective observer. When he produces hypnotic behavior in his subjects, he becomes part and parcel of his results. Therefore, he must be an accurate and sensitive measuring instrument. Of course, this is true to some extent with the chemist's handling of test tubes or reading of counters and the psychologist's handling of his animals or reading instructions to college students, but this becomes even more true for any hypnotic experiment.

The present chapter deals with more of the literature than that which bears directly on the present study. The reader is given a picture of the past history of hypnotic investigations and the present trends. In discussing the literature bearing directly on the present study, the author goes into more detail and only skims other areas. Since there are so many different theories of hypnotic behavior, at present, and there have been so many others during its history, theory is only brought in when it seems especially pertinent. This review covers anecdotal reports, case studies, and experimental investigations of hypnosis. Some material from other areas related to hypnosis are also discussed briefly, for example, voodoo, black magic, Yoga, and Christian Science.

It seems fitting to begin with the past of hypnosis and bring it up to the present. The reader can see how hypnosis progressed from the mystical, supernatural and the fantastic to a very useful and fruitful tool for scientific investigation. The formal history of hypnosis from Mesmer to Freud will not be discussed, but any interested reader can refer to Maslow (86) Newbold (96)(97)(98) Mc V. Hunt (59) Wydenbruck (150) Bramwell (11) and almost any textbook in abnormal psychology.

Interesting And Fantastic Reports

The present section deals with typical reports dating from the ancient Romans to the present time. In fact, hypnosis in some shape or form has probably existed since the beginning of man. The Roman historian, Plutarch, relates how Pyrrhus of Epicus would cure cases of colic by "touching" the sufferer with his big toe (148). Gassner, an ex-monk, is said to have attracted ten thousand patients by his supposed capacity to exorcise devils (132). There are several reports in New Orleans of a witch doctor causing heavy stones to fall on people's homes and on policemen (131). Cannon (14) has reported on the authenticity of voodoo death. He concluded that voodoo death is "real" but is due to shocking emotional stress caused by obvious or repressed terror. Rhodes (111) reports several interesting incidents connected with religious beliefs. A man of the Christian Scientist faith reported that his five-year-old-daughter fell out of a third story window, and blood was spurting from her mouth. The man instantly said, "There is one law - God's law - under which man remains perfect", and the bleeding immediately stopped. The girl reportedly became paralyzed

but through her and her father's faith she overcame her paralysis. There were no marks on the girl's body on the next day except a bruised eye. Rhodes also reports that Mary Baker Eddy, the founder of the Christian Science movement, once volunteered to let Dr. Edward Everett cut through the main artery of her arm. She said that she would stop the effusion of blood by an act of will.

Abraham (111) reports a reaction to suggestion found in some of the Malay inhabitants of Borneo. Thus, the cook of a coasting steamer had his baby brought to him when the ship was in port. He was known to be intensely devoted to and proud of the child. While he was nursing the baby in his arms on the deck, one of the Malay crew came along with a billet of wood which he pretended to nurse in his arms like a baby. Next, he began to toss the billet of wood in the air, catching it again as it fell, knowing that the man, unable to resist, would imitate him. He did so, and when the sailor opened his arms and let the wood fall on the deck, the miserable father did likewise with the baby which fell heavily on the deck and never regained consciousness.

Craige (22) reports that a man in Haiti, after being shot at and missed, was so firmly convinced that he had been mortally wounded that he died. Another old habitant of Haiti announced that a "bocor" had put a "wanga" on him and that he would die in three days at sunset. He did die, and on schedule. Apparently the cause was purely psychic. No symptoms of poison were found.

Worcester (149) tells of a maid who, in delirium, spoke Rab-

binical Hebrew which had fallen upon her unheeding ear years before in the house of a learned pastor. According to Worcester, a number of people in a hospital were cured by two tuning forks. It was suggested to the patients that they were powerful magnets, contact with which would remove pain and cure many forms of disease.

Mohammed Ali Beg Muza (70) claims he can take a flat-chested female, put her in a trance and expand her bust by inches. He reports two cases in which he expanded the bust two inches.

Wilson (146) reports a prisoner capable of extraordinary hypnotic feats. He was said to be able to achieve a state of suspended animation, coming out of it at will, as illustrated when he awakened just before having an autopsy performed on him. This prisoner also apparently hypnotized a guard who gave him his belt without being aware of it. In a state of deathlike suspension, the prisoner was able to raise red welts on his skin of the twelve signs of the zodiac. In this state he did not bleed due to insufficient blood pressure. The author of the book and a neurologist observed this Indian Yogi perform all of these behaviors. The most unusual incident reported is of this prisoner telling the two observers that all the patients in the epileptic ward of the prison would not have any seizures for twenty-four hours. After this period, they all would have a seizure at a specified time of day. According to Wilson, this unexplainable event occurred on schedule.

Life magazine (80) contains a story about a performer from India who pushed a sword through his body with no pain or bleeding.

The article is illustrated with photographs and X-rays.

Kuda Bux (44) is reported to have driven a bicycle around town blindfolded. He is said to be able to read a book blindfolded as long as it isn't hidden behind an object. That he walked across red hot coals in his bare feet is attested to by a large number of medical men who set up rigid controls against trickery. There was no blistering or scarring. A medical student tried it immediately after and got terrible blisters on his feet.

Esdaile (85), a physician working in India used hypnotic anesthesia to perform several thousand minor operations painlessly and some three hundred major operations including nineteen amputations. His specialty was removing the giant scrotal tumors which were common in India at the time. The usual mortality rate for this operation was fifty per cent. In one-hundred and sixty-one of these cases, Esdaile only had a five per cent mortality rate. None of his patients died immediately following the operation.

Sampimon and Woodroof (116), two Australian physicians, were held captive by the Japanese in a prison camp during World War II. They performed many operations on their fellow captives using hypnotic anesthesia. Some advantages they found were elimination of nervousness, full cooperation by the patient, eradication of post-operative complications such as nausea, reduction or removal of post-operative pain, less bleeding and more rapid healing of wounds.

Marks (85) reports the case of a New York physician who used post-hypnotic suggestion twice daily to return a patient to normal

whose spinal column had rotated forty-five degrees. With each session, pain was neutralized and the patient was encouraged to rotate his spine several degrees toward the normal plane. It was successful according to the report.

Le Cron and Bordeaux (76) report the following interesting incidents. Father Gassner, observed by a physician, touched a woman with the crucifix and she fell to the floor in a swoon. He commanded her in Latin, and although she was unfamiliar with the language, she obeyed. He increased and decreased her pulse and heart beat. He then told her to be dead on the floor. The physician pronounced her dead. On command, however, she revived and rose, completely alive and "cured" of her disorder after the demon had been ordered to depart.

Moll (76) reports that if you tell a person under hypnosis that he has never been born, the consciousness becomes a complete blank. Wolberg (147) states that, in several cases, he was successful in regressing subjects to an infantile level, so that they lost the capacity for expressive speech and for ambulation, producing at the same time typical sucking and grasping movements.

Muhl (76) reports patients under hypnosis reading a book aloud while carrying on automatic writing with both hands at once, each writing of a different matter - a triangle of mental activity.

Hollander (55) reports being able to achieve several feats. He tells of a twenty-two-year-old girl who was referred to him by a physician. She had suffered for ten years from chorea, the sequela of rheumatic fever and heart complications (endocarditis). She was unable

to walk. She recovered completely solely through the use of hypnosis. Hollander claims that by touching symmetrical points on the cranium, manifestations such as devotion, anger, benevolence, conceit, vanity, anxiety, hunger, and so forth, as well as combinations of these states are elicited without telling the person what to experience. He also claims to have helped quite a large number of young men with their examinations in such varying subjects as law, accounting, engineering, surveying, military and naval sciences. He says that inattentive and forgetful boys acquired concentration and memory, and that timidity and weakness turned into self-confidence and decision through the training given them during hypnosis. He also reports subjects hearing the ticking of a watch at thirty-five feet; discriminating with the naked eye the details of a microscopic preparation; locating objects blindfolded by smell; distinguishing a coin by touch when included with a dozen other coins. Most of the above were done theatrically and not as experiments using adequate controls.

Estabrook (39), a reputable contemporary psychologist, reports that while in the hospital for a broken bone, through auto-suggestion he was able to hallucinate a pet polar bear by merely counting to five. This animal would parade around the hospital ward in most convincing fashion, over and under the beds, kiss the nurses and bite the doctors. The bear would obey "mental" commands even jumping out of a three story window on demand. The only trouble was that after Estabrook was released from the hospital the bear would turn up in the most unexpected places without being sought. This embarrassed Estabrook, and people

began to suspect things. Estabrook finally banished the bear. He gives some good illustrations of the dangers of hypnosis. One is about a stage hypnotist who hypnotized a dignified member of the community in a local theatre. The hypnotist had him stand on his head, bark around the stage on all fours, take off a goodly portion of his clothes and give, in general, a very humiliating exhibition. He then awakened the subject who just as promptly knocked him down in anger. The subject, unable to resist the suggestions of the hypnotist, was still extremely indignant about it. Estabrook also gives an account of Bergson's report that a boy was able to read a book through the reflection in the hypnotist's eyes. The letters were one-two-hundred-fifty-sixth of an inch high.

Mary Baker Eddy (32) tells about a felon, on whom some Oxford students experimented. He fancied himself bleeding to death and died when only a stream of warm water was trickling over his arm. She reports fantastic cures through faith such as rheumatism, constipation, astigmatism, hernia, fifty-pound fibroid tumor, epilepsy, broken bone, cancer, tuberculosis, childhood deafness, eczema, and others. Coue (21) reports curing a large variety of illnesses through teaching conscious auto-suggestion such as asthma, paralysis, gout, tuberculosis, and so forth. Bonjour (31) reports treating olopecia areata (hair falling out) by suggestion. He offers photographs as proof.

Tracy (134) reports some degree of success in improving the play of various teams using hypnosis and self-hypnosis. He also gave suggestions over television to buy a certain product. People called and

said they were hypnotized, and the sponsor had an increase of customers.

Kupper (73) reports the case of a twenty-four-year-old man who had convulsive seizures, the first of which had occurred at age eighteen. Regressed, under hypnosis, to ages below eighteen, the electroencephalogram became normal until the age eighteen was reached, at which time it resumed its abnormal adult form.

Brunton (13), a newspaper man who was apparently aware of trickery, tells of his own experiences with a man from Egypt who exhibited telepathic powers by having Brunton write a question on a piece of paper while standing yards away from the Egyptian. Then Brunton crumpled the paper in his hand and opened it. The answer was written on the paper. This procedure was repeated three times. Brunton found another Yogi who could stop his heart and pulse, and could stop breathing for several hours. Brunton also reports that, in 1837, a fakir was buried in a tomb for six weeks while English army officers watched. The tomb was guarded closely the whole time, but the fakir emerged healthy and alive. Brunton has come across Yogis who claim to be four-hundred years old. He also tells of being hypnotized by a Yogi without any words passing between them. Other observations included seeing a Yogi push skewers through his cheek without any pain, bleeding or laceration. This same Yogi then proceeded to take his eye out of its socket and let it hang on his cheek. Voodoo men of India are reported to injure a man's enemies, dispose of and unfavored wife for a small fee. Brunton tells another fascinating incident about a professor of chemistry at the University of

Calcutta who observed a Yogi lick a few drops of poisonous acid, and also stuff glowing charcoal into his mouth and keep it there until it stopped glowing. Later, a group of scientists gathered to watch him lick sulphuric acid, strong carbolic acid and potassium cyanide. He took enough potassium cyanide to kill any other man within three minutes yet he was unharmed. He ate ground glass and later his stomach was pumped. The poison was found and the glass was excreted the next day. Sir C. V. Raman, Nobel prize winner, was present and described the performance as a challenge to modern science. The Yogi apparently counteracted the effects of the poison by a trance. Later in his history, this same Yogi performed the same feat but did not go into a Yogi trance because of unexpected visitors. He died with tragic swiftness. Another story that Brunton tells is of a Yogi who produced different scents one at a time on a handkerchief with a magnifying glass and sunlight. Brunton named the scent beforehand and says he was not hypnotized. This same holy man brought a sparrow back to life after it had been strangled to death and lay dead in front of Brunton for an hour. Using a magnifying glass and sunlight, the bird flew happily for a few moments and then fell to the floor dead again.

Braid (11) had a young working girl as one of his subjects who did not know the grammar of her own language and was entirely ignorant of music. She was able, under hypnosis, to correctly accompany Jenny Lind in several songs in different languages, and also in a long and difficult chromatic exercise which was specially improvised to test her.

Prince (11) reports a case in which the subject under hypnosis was able to recall events of which the normal consciousness possessed no knowledge, notably those that had occurred during the delirium of fever.

Fere, Binet and Parinaud (9) contended that if cards were colored red and green by suggestion and these colors were superimposed, the patient would see gray as the resulting color produced by the mixture of these two complementary colors. Bernheim (9) tried this and was not able to confirm the results.

Bernheim (9) cites the magnetic stone which the Egyptians used in the preparation of their prophylactic amulets which cured gout, headaches, toothaches and hysteria. Bernheim lists hundreds of cures, mostly hysterical in origin, accomplished by hypnosis at the Nancy School established by Leibault.

Artault (8) reports a pregnant woman who met a man who had an extreme malformation of one of the nails on his hand. The pregnant woman became obsessed with this deformity. She was terrified lest her child be born with a similar finger nail. A finger nail exactly like it was found on her child at birth.

In Islam there are stories of people whose hands are not burned by a hot iron, and who do not bleed when stabbed with a sword during the ordeal of the sword (8).

Before closing the present section one of the author's personal observations should be mentioned. He observed his supervisor and instructor in hypnosis, G. R. Pascal, administer a hypnotic suggestion

to a girl who was being used as a research subject that boils which she had for three months on her buttocks would heal in two days. The location of these boils had been mapped out by a female secretary previous to the suggestion. Following the suggestion, when the girl came back two days later, many of the boils had shown healing.

Except for a few, all the above reports and incidents are what one may call pseudo-scientific. Many of them are unexplainable in terms of present scientific knowledge. Undoubtedly, a large number of them are exaggerated or coincidental. They do, however, lead scientists to ask new questions. They also are capable of turning up leads for controlled scientific research. The following sections will deal with more scientific investigations of the phenomena of hypnosis.

Previous Reviews Of Hypnotic Experiments

Several reviews have been made on hypnotic literature. Young (151)(154) did two reviews, one in 1931 and one in 1941. Bind (10) published a bibliography on suggestion in 1939. Hull (56) reviewed the literature in his book on hypnosis. Dorcus (26) and Weitzenhoffer (136) have made the most recent reviews. Guze (52) did a review in 1953 of the experimental literature of 1950 and 1951. Rosen (113) did a review of the same period concerning hypnotherapy. Stein (127) did a limited critical review of experimentation up to 1930. None of these reviews was really comprehensive because of the voluminous literature available. Almost all of these reviews concentrated on the most recent experimental studies dealing with hypnosis, and made little or no mention of anecdotal evidence. Although Hull wrote

his book, Hypnosis and Suggestibility, in 1933, over twenty-five years ago, most people working in experimental hypnosis still refer to it and to several articles he wrote (57)(58) as the major source. Hull made the best attempt to evaluate previous research and to place hypnosis on a par with other areas of scientific investigation.

Many articles in the hypnosis literature today are non-quantitative, theoretically biased, and are based on findings obtained using one subject. A large number of these articles deal with hypnotherapy and will not be reviewed here. That is not to say that hypnotherapy is not a genuine or useful technique, but it is hard to separate the facts from the investigator's theoretical bias in many cases. Most of the data are obtained on the couch, and the results are usually based on inference rather than objectively controlled observation.

Elimination Of Pain, Blisters And Warts

Ambrose (3) successfully treated six multiple sclerotic patients by teaching them auto-hypnosis. However, he only reports that they felt better subjectively and does not mention any objective behavioral changes. Shapiro and Kline (124) report improvement under hypnotic suggestion in one multiple sclerotic patient in sensory-motor coordination, spatial perception and small muscle activity.

Sears (123), in an experiment on analgesia of the skin found that those bodily changes which occur during painful stimulation and are subject to some voluntary control (verbal report, facial flinch, respiratory changes) showed the greatest decrement as a result of suggestion for anesthesia. Those changes which are not voluntary, con-

trollable such as the cardiac and galvanic skin reaction, showed a smaller decrement. He found, on the whole, however, that the ability of the organism to suppress the bodily reaction to pain is far greater in the trance state than in the waking state.

Dorcus and Kirkner (30) suppressed pain hypnotically in two contrasting groups; five male patients suffering from paroxysmal pain associated with spinal cord injury and five women suffering from chronic dysmenorrhea. The spinal cord cases reported temporary relief but not freedom. The dysmenorrhea, on the other hand, remained relatively pain-free.

Raginsky (110) has shown that the amount of anesthetic agent can be remarkably reduced in surgery when used with hypnosis. Nerve and muscle potentials occur under stimulation when the person is under hypnosis, but do not with a novacain block. Individuals under hypnosis perceive sensation, but it does not arouse feelings of pain. Heron (54) reports several cases of people who had severe reactions to ordinary anesthetics but who were anesthetized very successfully under hypnosis during dental operations.

Von Szallosy (31) suggested to a patient under hypnosis that the back of his hand was being burned with a hot iron, and there would be a blister the next morning. Although the iron was never applied, the following morning a blister was evident identical to the one that the patient already had from a severe burn. Ooswald and Kreiback (31) produced blisters through hypnotic suggestion in two patients. The blisters required considerable time to heal, and they left scars.

Forachon (31) produced blisters by sticking a postage stamp to the skin of a subject, and gave a suggestion at the same time that it was a mustard plaster. He produced the reverse phenomenon, too; the blistering effect of an actual mustard plaster was prevented by hypnotic suggestion. Delboeuf (31) gave the suggestion that a subject would feel no pain in his right arm. Then, both arms were burned with a red-hot iron, eight mm. in diameter. The duration and the space covered by the application was identical in both cases. Pain was perceived, however, only in the left arm. The burn spots were dressed, and the subject was put to bed. During the night, the pain in the left arm continued. On the following morning, there was a burn three cm. in diameter encircled by a ring of inflammatory vesicles on the left arm. On the right side there was only the mark of a burn exactly the size of the iron but without the redness or inflammation. The following day the left arm became even more painful. Analgesia was successfully suggested whereupon the wound soon dried and the inflammation subsided. Sears (123) reports a single subject to whom a post-hypnotic suggestion of anesthesia to burning heat was given with no change in normal acuity to cold. When a piece of ice shielded from sight was applied to his leg, the subject reported "something like cold ice", but when a burning hot piece of metal was applied to the same spot the subject reported he felt nothing, even after he witnessed the metal being heated. Pattie (108) reviews most of the literature on the production of blisters under hypnosis. Blister formation seems genuine although the mechanism is not clear.

Sulzberger and Wolf (129) and Obermeyer and Greenson (101) report

on the successful treatment of warts by suggestion. Block (31) found in his clinic that four different physicians had respectively 44 per cent, 35 per cent, 31 per cent and 25 per cent success in curing warts by hypnotic suggestion.

Hypnosis And The Autonomic Nervous System

Lewis and Sarbin (79) inhibited gastric contractions by suggesting to hypnotized subjects that they were eating. A correlation was found between the depth of hypnosis and the ability to inhibit these hunger contractions.

Moody (94) reports on the use of hypnotically induced relaxation for the reduction of radiologically diagnosed peptic ulcers. Comparison with a control group treated pharmacologically showed more improvement with hypnosis than with medication.

Dunbar (31) reports a case where psychogenic vomiting was cured successfully by psychoanalysis, but a short time later the patient died, and an autopsy revealed a tumor of the third ventricle. The vomiting was probably not psychogenic but due to the tumor.

Hanson (26) found specificity of enzyme secretion for specific food substances. Heyer (31) gives an example of a patient under hypnosis eating a barium meal, once with the suggestion of having no appetite for food, the other with the suggestion that the meal was delicious and that the abdomen would be soft and her bowels would function well. The first meal caused constipation and other irregularities in digestion. The second caused good stomach configuration,

powerful peristalsis and no constipation. Hoyer also reports a case of constipation of more than twenty years duration cured in barely two weeks by hypnotic suggestion and the giving of an innocuous drug. Dorcus and Kirkner (29) report eliminating hiccoughs successfully using hypnotic suggestion in fourteen out of eighteen patients. Dorcus and Goodwin (28) relieved "dumping symptoms" following gastrectomy for ulcer in four patients by using suggestions of relaxation and suggestions of an increase in food intake.

Heilig and Hoff (136) found that hypnotically suggested pleasant feeling reduced water, sodium chloride and phosphate secretion, unpleasant feeling caused an increase in urinary output, sodium chloride and phosphate. Wittkower (31) produced strong affective states in subjects under hypnosis, then determined the leukocyte count and the differential blood picture, at five-minute intervals. In about fifty experiments he found the leukocyte count went up unaccompanied by any essential changes in the blood picture. He also could control secretion of bile. Marcus and Sahlgren (31) report considerable inhibition of the effect of adrenalin, pilocarpin and atropin by suggestion. Gogon, Argnir and Brauch (31) report experiments on four patients in whom it was possible to reduce the blood sugar by hypnosis with the suggestion of quiet and the suggestion that the pancreas would secrete insulin, that blood and urine sugar would markedly decrease. Haller (31) found the white blood cells dropped fifty per cent when a suggestion of warmth was given at the beginning of a 28 minute hypnotic session. Glazer (147) noted that the calcium content of the blood could be brought up

and down by hypnotic suggestion. Pavoriorsky and Finne (147) suggested that subjects were partaking of large amounts of honey, and then discovered a marked increase in the blood sugar. On the other hand, when suggestions were made that there was an absence of sugar and sweeteners in food eaten the blood sugar rise was inhibited even though sugar was imbibed.

Dunbar (31) reports an experiment where an exciting experience was suggested to subjects under hypnosis with the simultaneous suggestion of complete amnesia for it. Furthermore, the post-hypnotic suggestion was given that with a certain signal (seemingly accidental showing of a handkerchief) the subject would have the same sensations as during the experience. When, after hypnosis, the handkerchief was shown, there was in all cases a definite increase in pulse rate (maximum twenty-eight beats per minute) similar to that during the suggestion of the experience while under hypnosis.

Estabrooks (39) reports a Russian psychologist giving large quantities of alcohol to people with the suggestion that they would not get drunk. They did not show any behavioral changes in hypnosis or after the trance state. Eiff (33) found a decrease in basal metabolism rate under hypnosis. He found it was not a function of depth of hypnosis and was greater in male than in female subjects.

Kline and Guze (68) found, with one subject, that only the indirect suggestion that he was rising in an airplane to 100,000 feet would cause a drop in body temperature to 95.6 degrees as opposed to 98.6 in the waking state. Regression to time of fever or

direct suggestion of temperature rising or dropping was ineffective. Eichelberg (31) reports being able to raise and lower a person's temperature through hypnosis, but the people were suspected of having an hysterical fever.

Hypnosis and Childbirth

Abramson and Heron (2) report successful results using hypnosis in obstetrics. Success was measured by the duration of the first stage of labor and the amount of sedation given the patient. Dunbar (31) presents a report where Paikin used hypnotic suggestion on eleven women who had difficult pregnancies previously. Vomiting had interrupted pregnancy one or more times before. With the use of hypnotic suggestion all but one woman delivered normally. Dunbar also reports a number of well authenticated cases in the literature in which the term of labor was fixed under hypnosis and the child was delivered at the suggested time. Baudouin (8) reports a case where he suggested to a woman, without her being aware of the suggestion, that she would fall asleep on Thursday at two o'clock, that labor would begin Thursday night and the child would be born Friday noon. The suggestion was carried out to the letter. Abramson (1) reports a study using 100 experimental patients treated by hypnotic conditioning for childbirth and 100 control subjects. He found that the experimental group had shorter and less variable labor and required less analgesia drugs.

Hypnosis, Electrical Action And Reflexes

Barker and Burgwin (6)(7) found that the induction of hypnosis

by itself does not produce changes in the EEG characteristic of sleep. It was found that when a subject under hypnosis was definitely told that ordinary sleep was desired, and when suggestions were directed at establishing muscular relaxation and loss of sensory contact with the environment, EEG changes similar to those observed during normal sleep were obtained. Loomis et al (81) report of a single case in which the activity of the alpha rhythm (EEG) was obscured in relation to the periodic suggestion of blindness in the hypnotic state. This occurred in both a dark and light room and ended when the suggestion to see was given.

Gidro-Frank and Buch (48) produced the Babinski reflex in age regression under hypnosis. This was confirmed by True and Stephenson (135). Cooper and Tuthill (19) report the presence of action currents in the superficial flexor muscles of the thumb of a hypnotized subject who was hallucinating himself in the act of writing.

Hypnosis And Psychosomatic Symptoms

In many cases where a frightening experience was obviously asthmogenic, Brugelmann (31) suggested amnesia for the experience thus affecting the repression of a psychic trauma which the patient could neither repress nor abreact by himself. The procedure was effective to the extent of stopping asthmatic attacks. To prevent other symptom formation hypnosis was combined with breathing exercises and certain degree of psychic exploration. Dunbar(31) reports Braun's treating twelve hay fever patients exclusively by hypnosis between 1930 and 1932. Ten suffered no relapse over a period of several years.

He even brought his patients into contact with pollen during the treatment. Another patient was given the hypnotic suggestion that the odor of roses was particularly harmful to her. Even in the waking state, the slightest odor of roses, or even the idea of a rose nearby, was sufficient to produce attacks. However, a skin test with rose extract after several weeks training was negative. Dunbar (31) reports several cases of urticaria (rashes) arising on specific spots through autosuggestion and hypnotic suggestion. Bunneman (31) eliminated eczema of two and one-half years duration in three hypnotic sessions. Afterward, the patient remained symptom-free for one and one-quarter years. Bunneman produced the condition again by suggestion, let it persist for three months and eliminated it again by hypnotic suggestion.

McCord reviews some cases where hypnosis was used to eliminate stuttering (88). Both Rosen and LeCron had some success but attention should be given to the permanence of any cures of this kind and what other symptoms the person develops as a substitute. Estabrooks (39) reports stammerers which he found would usually talk without difficulty in the hypnotic trance.

There are a large variety of physiological changes reported as a result of hypnosis, but most of the studies do not use control groups to determine whether or not ordinary suggestion can bring about the same changes. There are indications that indirect suggestions to experience an emotion or action work better than direct suggestions for specific physiological changes.

Variables Important For Hypnotic Induction

Hypnosis And Personality

Barber (5) found a close relationship between normal waking suggestibility and hypnotic suggestibility. He used seven tests; hand clasp, finger rigidity, hand levitation, anesthesia, five minute rising, with thirst and amnesia. He found that the more suggestible people subjectively tended to be leaders, sociable, emotionally stable, happy-go-lucky and not self-centered or hypersensitive. It was also found that if a subject could fall asleep easily during the day by lying down and closing his eyes he could be hypnotized deeply. Barber (4) did another study using the Guilford Zimmerman Temperament Survey on eighteen students, and he found a negative correlation with restraint ($-.45$), and positive correlations with ascendance ($.70$), sociability ($.56$), emotional stability ($.49$), and objectivity ($.47$). White (143) correlated hypnotic susceptibility with several variables using thirteen male and nine female college students ranging in age from 19 to 25 years. He found a $.19$ correlation with grades, $.28$ with weight, $.33$ with the Otis intelligence test, $-.36$ with height, $.70$ with the Neyman-Kobler Extraversion-Introversion test and $.74$ with the body sway test. Solovey and Milechnin (125) found that hypnotizability is dependent on parental relationship, and they feel prestige is also very important. Wells (141), using an extraversion scale, temperament test, and an ascendance-submission scale, found that the more hypnotizable are not the more uncritical, gullible and submissive in everyday life, but, slightly the reverse.

Hypnosis, Suggestibility and Susceptibility

Hull (56) found that hypnosis and suggestibility are highly correlated, and that women and girls are slightly more suggestible than men and boys. He also found a slight positive correlation between intelligence and suggestibility. He further found that hypnosis and waking suggestibility both improve with practice and that most people are more suggestible during hypnosis. Hypnosis was found to be different from sleep, and involuntary responses were not appreciably disturbed during hypnosis. Suggestion increases the range of voluntary movement, according to Hull. He found hypnotic anesthesia almost entirely abolishes the voluntary and semi-voluntary concomitants of pain, but voluntary processes show a twenty per cent to seventy per cent reduction under such circumstances.

According to Liebault (9), one-fifth to one-sixth of all subjects are somnambulistic. Bernheim (9) obtained similar results. According to them, hypnotizability decreases with age, and women tend to become somnambulistic slightly more easily than men (nineteen per cent for women and eighteen per cent for men). Dittborn (25) used a standard method of hypnotic induction on nineteen male volunteer subjects and found that the body sway correlated well with hypnotic susceptibility. Only three out of nineteen of his cases were able to achieve amnesia, however. Eysenck and Furneaux (41), in a factor analytic study on sixty neurotic patients, used ten tests of suggestibility and found two types of suggestibility; primary (ideo-motor) characterized by body sway, pendulum and hand levitation, and secondary. They found that hypno-

tizability is distributed continuously and not dichotomously, and the hypnotizability could be predicted with considerable accuracy from a knowledge of a person's scores on two or more of the suggestibility tests. A multiple correlation of .96 indicated that the tests of suggestibility involved account for 92 per cent of the variance in hypnotizability. It was also shown that post-hypnotic amnesia is a natural consequence of hypnosis and is not dependent on suggestion, either direct or indirect, to that effect. They found further that the length of time during which suggestion was continued profoundly influenced the effect of the suggestion. Finally, they found the body sway to be so highly correlated with auto-suggestion that the two could not be differentiated experimentally. Furneaux (45) tested for hypnotizability in a group of 105 male and 20 female university students. He found that 62 per cent of the males and 45 per cent of the females reported reaction to the body sway suggestion, whereas 50 per cent of the males and 65 per cent of the females reported marked reaction to suggestions of drowsiness and eye closure. This points up the possibility that although females may not show as much waking suggestibility as males, they tend to be better hypnotic subjects.

Gale and Herman (47) successfully hypnotized 12 of 20 organic psychotics and 19 of 36 non-organic psychotics. They report, however, that very few of them were able to go into a very deep trance using simple techniques. Christensen (15) attempted hypnosis on 32 veteran patients. He had 6 per cent failures, 47 per cent light trances, 28 per cent borderline trances, 13 per cent difficult or atypical ~~scenambules~~

and 6 per cent easy somnambules. They were all patients in a veterans administration neuropsychiatric installation. Christensen compared these patients to a volunteer group of women and soldiers. He found important variables to be prestige of the operator, length of the attempt, selection of subjects, goal of hypnosis, amount of operator activity, method of induction, and degree of awareness. He found that in the control group, rapport was a major factor, and unconscious motivation or lack of resistance fostered ease of hypnosis. Wilson, Corman and Cole (145) attempted to hypnotize 32 organic and 18 psychotic patients, and were able to do so in 18 of the former and 12 of the latter. Very few were able to go into deep hypnosis, however. No direct correlation was discovered between contact with reality and hypnotizability. Maholick and Warkentin (83) hypnotized seventeen psychotic patients previous to administering electric shock treatments, and found the patients were much calmer, less aggressive and more cooperative as a result. The hypnosis was performed with the aid of curare.

LeCron (75) did a survey on the hypnotizability of 59 hypnotists. Nine had never been hypnotized, 34 classed themselves as poor subjects, 12 as fair, 2 as good and 2 as very good. The major reason that they gave for a hypnotist being a poor subject was that he is apt to be too analytic of the process, and too critical of the suggestions and tactics of the operator. Pardell (102) reports that thirty psychiatrists he questioned who used hypnosis on their patients had never been hypnotized themselves. Jacoby (61), in using hypnosis for dental surgery, found that out of 197 subjects in 776 sessions, only 4 individuals re-

fused all instruction, 4 were not able to enter trance or relaxed mood, 43 reached a hypnoidal stage, 41 achieved a light trance, 65 a medium trance and 40 a somnambulistic trance.

Methods, Measurement And Theory

Davis and Husband (24) constructed a very useful scale of hypnotic depth on which a person may receive a score from 0 to 30 according to the types of behavior which may be elicited during the hypnotic procedure. This scale can serve as a useful guide for investigators attempting to standardize their hypnotic procedures. LeGron (74) measured the depth of hypnosis in thirty subjects by asking them, "How deep are you?" and giving them a rating device. He found the method quite reliable.

Marcuse (84) found it necessary to hypnotize his subjects for at least fifteen or twenty minutes for any decent experimental work.

Maeres (91) found that using the tendon reflex elicited by a heavy, soft plessor, and telling the person to relax, he could predict hypnotizability by their responses.

Weitzenhoffer (136) cites many authors who claim to be able to hypnotize a person without his being aware of it. Wells (140) found that a method of waking hypnosis could be used to elicit many of the phenomena of sleeping hypnosis. Sometimes he induced sleeping hypnosis by first using waking hypnosis.

Erickson and Erickson (37) point out that during the post-hypnotic act the subject is really in a trance state. They also found that if there is no post-hypnotic amnesia there is really no post-hypnotic suggestion carried out as there is no post-hypnotic

trance state. They are able to demonstrate this best by interfering with the execution of a suggested act. If properly done, it leads to an immediate arrest of the subject's behavior and a prolongation of the post-hypnotic trance.

Krueger (72) found that more than half of the hyper-suggestibility characteristic of the trance appears to have accumulated by the middle of the hypnotization period, which indicates a curve of negative acceleration. After termination there is a clear persistence in hyper-suggestibility for several minutes after the trance. He used a small number of subjects.

For people who are interested in hypnotic technique, Schneck (119) has prepared a reading list for professional instruction.

General Experiments In Hypnosis

Hypnosis And Muscular Strength

Mead and Roush (90) used eleven female volunteer subjects, and found no difference between trance and waking states for a grip dynamometer test, but for the arm dynamometer test found an increase under hypnosis in every case (t was 5.25). The average increase under hypnosis was 16.8 per cent and ranged from 2.6 per cent to 33.3 per cent. Nicholson (99) found a greater ability to resist muscular fatigue in the trance state than in the waking state. Williams' (56) carefully controlled experiment confirmed this finding, but the advantage of the trance state was not as great. Young (152) reports no difference between the two states.

Weitzenhoffer (136) used auto-suggestion on himself and was able to produce in himself a state of rigidity which enabled him to support two-hundred pounds of weight on the unsupported part of his body, when it was suspended as a bridge between two chairs. Tracy (134) was able to produce the same phenomenon, and he offers photographs as evidence. The author also found that he was able to support himself in the waking state (he has not tried weights, however), and has observed this done in the hypnotic state without weights on a fairly frail girl by Pascal several times. Wells (139) used ten subjects who were able to achieve deep hypnosis, and he put them through four tests using a dynamometer. On the first three pre-hypnotic trials, he measure their maximum strength. For the second test he gave post-hypnotic suggestions that they would expect to be stronger but would be paralyzed. All the subjects were barely able to make any score. The third test began with a post-hypnotic suggestion that the subjects would expect to have less strength but would do better because of greater exertion. Nine out of ten of them increased their performance after the first three trials. The last test was a post-hypnotic test given with amnesia for the other two tests. No other suggestion was given. This test was used to ascertain practice and fatigue effects. All subjects did poorer on this test than on the third test, and seven did poorer than in the first three pre-hypnotic trials. Two others improved and one stayed the same. The experiment demonstrates the effectiveness of suggestion in increasing or decreasing physical strength. Eysenck (40) used only one subject and found that there was considerably more resistance to fatigue

after successive trials using a dynamometer under hypnosis than in the waking state. Hadfield (151) used three subjects and told them to grip a dynamometer as tightly as they could. When they were told they were weak they made an average score of 29 pounds. When a suggestion of strength was given they made an average score of 142 pounds. In the waking state their average score was 101 pounds. In a less well controlled experiment, Robinson (151) found that a rather frail young woman under hypnosis could hold up her arm without trouble long after several of the more robust men in the class had succumbed to the pain engendered in the conscious effort to outlast her.

Hypnosis, Thresholds And Discrimination

Koster (71) used 21 patients as hypnotic subjects and found that hypnosis alone brought about a lowering in muscular strength and in discriminative ability, whereas hypnotic suggestions of augmented ability brought about sharp increases in muscular strength in two-thirds of his subjects and an increase in discriminative ability in one-third of his subjects. This points up the difference between ordinary hypnosis and hypnotic suggestion, and indicates that this is an important variable in any experiment investigating change in performance.

Dynes and Erickson (26) produced a complete hypnotic deafness in one ear, but it has been shown that with a good experimental technique (107) hearing is really present in both ears although the subject is unaware of it. This was also found to be true for blindness and for touch. Sterling, Miller, Young, Eysenck and Weitzenhoffer (26) explored the effects of hypnosis on visual acuity. The overall results

show that hypnosis sometimes leads to an increase, decrease or no change in visual acuity, but hypnosis as a single variable cannot lower thresholds.

Erickson and Erickson (38) report the hypnotic hallucination of the primary colors followed by their negative afterimages. These subjects did not know the complementary colors yet saw them even though they did not name them in color association. Similar findings were first obtained by Fere, Binet and Parinaud (9) mentioned previously. Other experiments have confirmed these results to some degree. If this is a valid phenomenon, present theory concerning color vision might need revision. It would mean that perception of color is a central rather than a peripheral process.

Lifschitz (151) did an experiment with 41 subjects and gave them a suggestion of increased hearing ability. He found thresholds lowered 5 per cent in the waking state, 200 per cent in light hypnosis, 315 per cent in a medium trance, and 1355 per cent in a somnambulistic trance. Fisher (151) reported that one of his subjects could hear the ticking of a watch at twice the distance under hypnosis than in the waking state. Kline and Guze and Haggerty (69) did a fascinating experiment using one subject who could become deaf as measured by all clinical observations under hypnosis. Using a feedback technique, they tested the subject on speed of reading of subject matter graded in five levels of difficulty, during hypnotic deafness, waking feedback, and no feedback. For every level of difficulty the subject read faster under hypnotic deafness with feedback than with waking feedback.

He only did slightly better with no feedback than with feedback under hypnotic deafness. The effect showed up more as level of difficulty increased. A question arises that could be explained by future research. If the feedback mechanism produces what looks like a physiological change in the individual, how is he able to overcome it to a great extent under hypnotic deafness when it has been explained by Pattie (107) that hypnotic deafness has no physiological effect?

Weitzenhoffer (137) used seven college students and tested for recognition of a card hallucinated to be colored under hypnosis and then mixed with other cards. He compared the trance with waking performance. Only one subject did significantly better under hypnosis. Some waking scores were higher than trance scores. The one student had a perfect score under hypnosis but his reaction time scores were longer and they increased as tests became more difficult. Weitzenhoffer felt that the atypical subject was not functioning at full capacity in his normal waking state. The subjects varied in depth of hypnosis. This particular subject was not in a deep trance.

Hypnosis And Clinical Practice

Sarbin (117) found that in hypnotic regression, intelligence test scores did not get as low a mental age as the regressed age, but did get lower than the scores for subjects who were told to try to get a score corresponding to the regressed age in the waking state. Kline (66) attempted to "progress" a woman from 22 years to 65 years. Her Wechsler-Bellevue scores showed alterations in time, accuracy and total

achievement at a clinically significant level. Kline (65) found similar results for the Terman-Miles M-F test, there being a shift to femininity paralleling that seen in late maturity. Again only one subject was used with no controls, and clinical judgment was offered rather than objective data.

Sweetland (130) used fifteen hypnotic subjects and administered the MMPI in the normal state and with suggestion for hypochondriasis, depression and inverted depression. For the suggested hypochondriasis and depression, he found significant differences between the mean scores of the waking state and hypnotic state on most of the scales. There was no significant difference between the normal state and the inverted depression state.

Levine, Grassi and Gerson (78) gave the Rorschach under the following conditions; normal waking, normal hypnosis, suggested situational depression, elation, hypochondriasis, depression, sexual concern without anxiety, and apprehension. The various changes in moods caused changes in behavior and Rorschach responses. The authors report these changes to be consistent with the suggested mood, but the scoring was possibly biased especially with the Rorschach's subjective scoring. They only used one subject and did not take into consideration possible effects of previous suggestions. They conclude that basic personality was not changed, at least. They used no similar suggestions with controls in the waking state. Norgarb (100) administered a Rorschach test to a twenty-year-old male regressed to the ages of seventeen, fifteen, eleven, eight, and five years respectively. Norgarb claims to have

gained some insight into this subject's ontogenetic development. This technique has some possibilities especially in correlating Rorschach responses with case history data. Norgarb claims that Klopfer is able to sort protocols of patients' Rorschachs into age levels when they are regressed in this manner.

Schneck (119) uses a hypnotic technique where patients fantasy the therapist. He says that the image of the therapist undergoes certain distortions demonstrating dynamics such as projection and identification as utilized by the patient. Coue (21) used to tell his patients that he would think of them every evening at a fixed time. He would request the sick man to collect his thoughts at the specified time and to put himself in mental rapport with his doctor. The value of the treatment, the patient was told, would speedily become apparent. The patient obeyed orders, but at the appointed time, Coue was gardening or fishing. Nevertheless, after a few sittings, a cure ensued.

Kesner (64) hypnotically induced conflict in twenty good hypnotic subjects measured by a significant difference in reaction time between the charged and non-charged association list words. He found an "emotional" therapy technique more successful in resolving the conflict than a factual technique, although neither thoroughly removed the conflict. This is a promising method of studying the effects of various types of therapy, and more work should be done in this area with the type of therapy more behaviorally defined.

Hypnosis, Performance And Conditioning

Cooper and Tuthill (19) used five subjects and had them hallucinate practice in the trance state for writing with the non-preferred hand. The subjects reported a "real" experience of practice. Subjects were first trained to finish the hallucination of completed activities involving approximately a half-hour's action in an allotted time of ten seconds. They were then trained to hallucinate the writing of a word, with the non-preferred hand, at least ten times, in an allotted time of ten seconds, doing it carefully and without hurrying. They compared this group to five controls without practice and found the former group to be able to write more letters as a result of the practice. Cooper and Erickson (17) have reported evidence of temporal condensation under the influence of hypnosis. For instance, a subject counted 664 hallucinated cows in 65 seconds objective time, the subjective time being 30 minutes. Mental processes during temporal condensation take place very effectively in distorted time. During the hallucinated learning real sounds were able to penetrate into the hallucination. These sounds were found to be prolonged. This is another promising area of investigation with many practical applications, particularly in improving study habits and memory.

Messerschmidt (92) found that when two tasks were done simultaneously, overall efficiency was decreased even though the subject was not aware of one of the tasks. There is evidence, in other words, of mutual interference of the tasks. This is a factor that is not usually

measured by many writers who report that subjects are able to do automatic writing while engaging in conversation. They seldom measure the person's efficiency while performing the tasks.

Breiman and Gill (12) report several experiments with hypnotic subjects showing that after a number of tasks were given in hypnosis, half completed and half interrupted, the subjects preferred the completed tasks both in the hypnotic state and the waking state which followed directly. When subjects were allowed to complete all the interrupted tasks in the waking state after being interrupted during hypnosis and then put back into a trance, they recalled more interrupted tasks than completed tasks. Three months later, when the subjects were regressed to the day of the experiment, they recalled five times as many interrupted tasks as completed ones.

Scott (42) demonstrated that the conditioning of a motor response is significantly facilitated in the hypnotic state and remains in the waking state without suggestion and with suggested amnesia.

Corn-Becker, Welch and Fisichelli (20) told subjects that they were to participate in an experiment on palmar skin resistance, and electrodes were applied to their hands. Then words were projected one at a time on a screen. The word "red" was shown, and immediately thereafter a red light was turned on. "Music" was followed by actual music. Seven words were presented and reinforced by the actual event. On the eighth, twelfth and sixteenth trial the words "electric shock" appeared never being reinforced. In a group of naive subjects, 73 per cent gave psychogalvanic responses to this stimulus which were either greater or

of longer duration than the same response given to any of the other stimuli. In a control group, in which no verbal stimuli were reinforced, the corresponding percentage was thirteen. There was no correlation between the subjects expectation or non-expectation of electric shock and the size and duration of the galvanic response. This study demonstrates how reinforcement can enhance the effects of suggestion. It furnishes a neat parallel between conditioning and hypnotic suggestion.

Hypnosis And Post-Hypnotic Suggestion

Kellogg (63) did a well controlled experiment on the durability of post-hypnotic suggestion. He showed that given the suggestion to breathe twice as fast while reading odd-numbered pages as when reading even-numbered pages, subjects would carry this out for two months without reinforcement. It weakened initially but then levelled off. Control subjects given the suggestion in the waking state, however, maintained the responses without the initial drop. There was more variability in the waking suggestion group, however. The hypnotic subjects had post-hypnotic amnesia for the suggestion. He concludes that although a post-hypnotic suggestion is effective, waking suggestion, at least for commonplace things is more effective as a motivating device. The reader should especially note the term "commonplace". Kellogg's conclusion does not apply to the comparative effects of waking and hypnotic suggestions for unusual or difficult acts.

Berhheim (9) was able to induce an hallucinating post-hypnotic effect which became operative after a lapse of a little more than two

months. Estabrooks (39) gave a man a post-hypnotic suggestion to carry out at their next meeting. He did not see the man for twenty years, at which time he met him in a hotel lobby and the suggestion was carried out to the letter.

In one of Erickson's experiments (34), the subject was interrupted by a post-hypnotic cue in the midst of uttering a long word. He performed the post-hypnotic act which took about fifteen or twenty minutes, and then returned to finish the remaining syllable of the word he had been consciously enunciating. Erickson cites this as evidence that the post-hypnotic act is carried out in a trance state in dissociation from the normal waking state. Other evidence he cites is the distraction and confusion evidenced by a subject before and after the post-hypnotic act. He illustrates this by a stenographer who was told as a post-hypnotic suggestion to change pencils on the 320th, 550th, and 725th words of dictation. She did so with accuracy while taking the dictation, and at each change she went into what looked like a brief, confused trance.

Unique And Promising Experiments

Glasner (50) used Thurstone's paired comparisons Study of National Preferences to see if he could modify attitudes by the use of hypnotic and waking suggestion. He administered the test to 160 university students. Twenty-nine of these volunteered as hypnotic subjects. A light trance was induced and a suggestion was given for them to be less prejudiced. The subjects were tested two weeks later. Half of the remaining group of 131 subjects were given waking suggestion

to be less prejudiced. The rest served as controls. It was found that after retest the waking suggestion group and hypnotic group had scores significantly higher (less prejudiced) than the control group, but there was no amnesia for the suggestion in the hypnotic group since the author only used light hypnosis. There were no significant differences between the waking suggestion group and the hypnotic group. If he had a group under deep hypnosis with amnesia for the suggestion, the results might have been more significant. This procedure should be attempted by future investigators.

Rowland (115) gave a suggestion to his subjects to pick up a coiled rattlesnake. The subjects attempted to carry out this suggestion, but there was a sheet of glass, not visible to the subjects, which barred their paths. In another experiment Rowland instructed subjects to throw sulphuric acid into his face. The act was again attempted in all cases. Of course a glass plate was again in the way. Subjects in the waking state would do neither of these acts. This brings forth the old question of how far will a subject go while under hypnosis. This is a debatable question, and in most cases it is unethical to really put it to scientific test. Rowland made an ingenious attempt, but other investigators have criticized his results, saying that each time it was not possible to carry out the act completely. If, however, the act was carried out, Rowland would have committed a crime. It still is an unsolved problem and probably will be until more ingenious methods of testing it are introduced.

Luria (82) induced severe neurotic conflicts in his experimental

subjects through the use of deep hypnotic trance states. He then told them they would have amnesia for the experience bringing on the conflict. He used words for free association, some connected to the neurosis-inciting story. When these words were presented, they evoked all the confusion and tension usually associated with extreme neurotic behavior. One man was told he had burned a hole in a young lady's dress at a dance. Because he was ashamed of his clumsiness, he had allowed her to go home believing she had burned it herself. Under post-hypnotic amnesia the young man went through the ritual of giving cigarettes away. He rationalized his action by explaining to his friends that he was giving up smoking for reasons of health. This is a promising method for the investigation of unconscious motivation and the form it takes in behavior. Another very interesting report is a case where a deep-seated conflict was causing migraine headaches. Hypnotically minor conflicts were suggested to the subject which were similar to the original conflict. These brought on milder headaches. When these conflicts were resolved, the headaches disappeared. During several sessions, more elements of the original conflict were suggested and resolved, the headache disappearing each time. Finally, the individual no longer experienced the migraines. This is a very interesting technique similar to crowding the threshold in learning experiments.

There are many other studies which could be reported, but the author has attempted to give a selected sample of the literature perused to give the reader an overview of the field. The next section will take up those experiments which bear directly on the present

dissertation.

Hypnosis And Learning

There have been a large number of seemingly contradictory studies in the area of learning and hypnosis mainly because of the varied conditions the investigators used and the lack of controls. In the present section an evaluation of each study is made, and strengths and weakness are pointed out. Only the more important studies will be reviewed in detail.

✓ Gray (51) used six subjects who were weak in spelling, and had them learn one list in the waking state and one while under hypnosis. He found that while under hypnosis they only improved about 2 per cent. Recall, however, was executed both times in the waking state which makes the cue change for the hypnotic learning greater than for waking learning. We know that change of cues affects learning and retention. Possibly, if recall had been done in the hypnotic state after hypnotic learning, there would have been greater recall. No control subjects were used to check out practice effects or possible cooperation of subjects.

✓ Bermussi (151) reports a much greater ability in his subjects to reproduce a series in backward order under hypnosis.

✓ McCord (87) presented material hypnotically to a sixteen-year-old mentally retarded child with an IQ of 55. After ninety days, he tested for retention and found almost 100 per cent retention for the spelling of words, for reading and for general information. There

was a 50 per cent loss in retention of multiplication tables. This may be a promising method of teaching mentally retarded children, but no control subjects were used, and an N of one is too small to validate any conclusions drawn.

X Wells (138) used only one subject, a twenty-seven-year-old mental patient, and tested him in the normal waking state and under hypnosis (with suggestion of heightened efficiency) on the Woodworth substitution test, reaction time and tapping. He found significantly improved performance (measured by speed) under hypnotic suggestion on the substitution test (one-third less time) but no significant differences for the two states on reaction time and tapping. It is unfortunate that he used only one subject and did not have control subjects to test for cooperation. Here again, however, hypnotic suggestion produced significant results on a fairly complex task.

X Huse (60) used eight college students who were able to achieve deep hypnosis. He used four series of learning and recall of nonsense syllables. Each subject served as his own control and all learning was done in the waking state. Twenty-four hours later, retention was tested for alternately in the trance and waking state in counterbalanced order. Huse found no significant differences in amount of retention for the two states. Some subjects retained more in the waking state, some in the trance. He did not use any suggestion of heightened efficiency, however, and he did not have a group who learned in the trance state. The previous comment about cue change applies here also. There is more cue change for retention in the trance state than in the waking state. In

Huse's favor is the fact that he did control for practice effects, and used a sufficient number of subjects.

✓ Sears (121) compared memory for objects in the trance and in the waking state, and found it was better in the trance state for immediate as well as delayed recall at the .01 level. Sears' use of objects as a memory task is an unusual procedure. Most investigators test for memory using words or nonsense syllables. Sears (120) did another experiment using 25 experimental subjects and 25 controls. The experimental group learned Morse code in the hypnotic state while the control group learned it in the waking state. All subjects were tested in the waking state after 10, 20, and 30 hours of learning. The difference in errors made by the two groups was greater as time of practice increased, being significant at the 30 hour test with the hypnotic group making fewer errors. Again there might have been more significant results if cue change for the two groups had been held constant. X Sears used enough subjects and had control subjects, but he did not use a suggestion for increased efficiency. ✓ Sears (122) gave eleven students, all with IQs of 135 and above who were making low C grades in college, a post-hypnotic suggestion for concentration and better study habits. He saw them for several sessions, and used their grades for the following semester as a measure of the effectiveness of the suggestion. He found that 4 received an A average, 3 a B average, and 3 a high C average. The other subject developed a personality problem during the study and was not used. Sears did not use other subjects as controls with waking suggestion which might have been a valuable addition to the

study. However, suggestion again proved effective.

✓ Rosenthal (114) used thirteen subjects in both the trance and waking state in testing for recall of previously learned material. He found no significant difference in recall of nonsense syllables, but found a significant difference in recall of poetry with the hypnotic state more effective. There was, however, a trend for better recall even of nonsense syllables in the trance state. Possible this would have become significant if suggestions of heightened efficiency had ✓ been used. White, Fox and Harris (144) used eight college students as their own controls and tested for recall of nonsense and meaningful material. They found no significant differences between waking and hypnotic states for the nonsense material (paired associates), but found that hypnotic recall was significantly more effective for meaningful material (poetry).^λ They used five experimental and four control subjects with casual material (short moving picture scenes), and found hypnosis to favor recall here also.^λ All their subjects showed the effect both for the meaningful and casual material. Unfortunately, ✓ depth of hypnosis ranged from light to deep, and there is no way of knowing if this had any effect. Cue change is again an important complicating factor.

✓ Stalnaker and Riddle (126) used twelve male subjects, and tested for long delayed recall of poems. The subjects learned the poems in the waking state. A year later they were tested for recall during counterbalanced waking and trance states. The trance state was found to be 64.9 per cent more effective than the waking state. Every subject show-

ed the effect with a range from 18 per cent to 259 per cent. All his subjects were able to achieve a deep trance. This is a remarkable study, and indicates that remote memories are very efficiently aided in recall by hypnosis.

X Nagge (95) and Mitchell (93) present some confusing contradictory data which are difficult to explain. Both of them tested the differential effects of trance and waking states as interpolated activity between original learning and recall. Nagge used ten subjects and worked with nonsense syllables while Mitchell used two subjects and used three-place numbers. Nagge's procedure had many more conditions. The essential contradiction was that when original learning and recall are both done in the waking state, Nagge found interpolated trance activity led to a higher savings score than interpolated waking activity. Mitchell found the reverse to be true; that interpolated waking activity led to higher savings scores than interpolated trance activity. When original learning and recall were both performed in the trance state, Nagge found waking activity led to higher savings scores than trance activity, while Mitchell again found the reverse. Unfortunately, they did not compare the original learning and recall in waking with original learning and recall in trance. This is one of the few studies where learning and recall were always done in the same state to minimize cue change. No individual data are presented either, since the investigators were interested in the type of interpolated activity. Nagge's data does show that the greater the cue change of the interpolated activity the less interference it has with recall which follows sound learning principles.

Mitchell found the reverse to be true but used numbers instead of the more commonly used syllables and only used two subjects.

Before going into three really comprehensive studies of learning under hypnosis and post-hypnotic suggestion several studies dealing with post-hypnotic suggestion and post-hypnotic amnesia will be discussed.

✓ Patten (106) used eighteen hypnotic subjects who were able to achieve deep hypnosis and amnesia, two non-amnesic hypnotic subjects and sixteen waking control subjects and tested for the duration of post-hypnotic suggestion. All subjects were told to press a button automatically to certain classes of words which were interspersed in a list of words in the waking state. The hypnotic subjects were given this suggestion under hypnosis and the controls in the waking state.^{*} After the first third of the test, 18.1 per cent of the amnesic, 8.5 per cent of the non-amnesic, and 35.4 per cent of the control subjects failed to react. This shows that the suggestion was most effective for the hypnotic group at the beginning. During the last third of the test, however, 62.5 per cent of the amnesic, 100 per cent of the non-amnesic and 25 per cent of the control subjects failed to react. ^{Results} This shows that, after a period of time, suggestion becomes less effective for the hypnotic group. As sidelights to the experiment, Patten reports that on the whole amnesic subjects had a longer reaction time and he found that the post-hypnotic suggestion showed no signs of disappearing completely. Using rehypnotization it was found that the response still persisted and eleven of the eighteen amnesic subjects were never consciously aware that they were pressing the button to certain words. Patten did another

investigation (105) to find out if subjects under post-hypnotic amnesia showed practice effects in the waking state. He used seven hypnotic and seven control subjects. They were matched according to sex and scholastic achievement. He gave them all a number of additions to do every day for eighteen days. During the seventh through the twelfth day the hypnotic subjects did the additions in a hypnotic trance. Comparing the differences between the sixth and thirteenth days of the two groups it was found that the hypnotic group showed just as much practice effects as the control group even though the hypnotic subjects had post-hypnotic amnesia for working on the seventh through the twelfth day. ^X It should be noted that the matching was not very good since the hypnotic group from the beginning of the experiment until the last day did quite a bit more poorly on the task. ^X Life (80) did a similar experiment and confirmed Patten's result.

^X Strickler (128) did an experiment testing the effects of post-hypnotic amnesia which relates to the previous comments about cue charge. He used four college students who had no previous hypnotic experience. They served as their own controls and the test used was learning associations between figures and nonsense syllables. The trance procedure consisted of first learning a series in trance, then recalling fifteen minutes after original learning in waking state followed by relearning in waking state. After 24 hours, a second relearning was given. The control procedure consisted of first learning a series while awake, then recalling fifteen minutes afterward with a five minute trance in-between and the same steps after that as for the trance

procedure. Both procedures were administered about twelve times to every subject. Strickler found that amnesia following trance learning was 98 per cent but when the normal amount of forgetting exhibited by the controls was subtracted it was 80 per cent. Post-hypnotic relearning amnesia appeared to be only 50 per cent as compared to control relearning. After 24 hours, the hypnotic procedure led to nearly twice as great an amount of forgetting as the normal control series even though the trance procedure involved about 36 per cent of excess total learning. Strickler also found that a trance suggestion to speed up learning was distinctly effective at first but later learning curves were similar to the controls. This experiment does not directly test the cue change hypothesis mentioned previously but puts forth evidence in its favor. The control procedure was more effective in terms of recall and relearning than the trance procedure since there was no cue change in the former and there was in the latter. The hypnotic procedure entailed learning in the trance and recall and relearning in waking state while in the control procedure, learning, recall and relearning were all done in the waking state. If the hypnotic procedure involved the same amount of cue change but had learning take place in the waking state and recall and relearning in the trance state it would have been exactly like many of the other studies that found no improvement in the trance state. Whether Strickler would have gotten similar results if this had been done remains an experimental question. However, it must be considered in evaluating previously mentioned studies.

✓ Pascal (103) did a study with twelve subjects and compared recall

of nonsense syllables after relaxation with recall after no relaxation. He used six experimental and six control subjects and found relaxation alone was effective in increasing recall. The relaxation was carried out just before recall. When it was done immediately after learning or without instruction by the experimenter to relax it was not effective. The results were consistent but not of very great magnitude which indicates that relaxation or a hypnoidal state may be of intermediate effectiveness in facilitating recall.

Three fairly comprehensive studies were undertaken by Young (153) (154) Eysenck (40) and Hammer (53). These are really the forerunners of the present investigation. They are discussed and compared together. Young's study was done in 1925, Eysenck's in 1939 and Hammer's in 1954. All of them investigated the effects of some type of hypnosis on performance. They all used a large number of different tasks.^X These tasks were chosen more or less haphazardly by each of the investigators with little rationale, and the studies were all more or less exploratory.

✓ It would take too much time to list all the tasks used but all the tasks used in other studies were included with several additions. Altogether these investigators used forty different tasks. There was some overlap in the tasks used by the different authors but not very much. The only task that all three of them used was adding. Hammer used 25 tasks, Young used fifteen and Eysenck used thirty. Hammer used nine subjects who were able to attain post-hypnotic amnesia, Eysenck used only two deep hypnotic subjects (one of them was only used for part of the tasks) and Young used sixteen subjects varying in hypnotic depth and six waking

controls who could not be hypnotized. Both Hammer and Eysenck used a self control design whereas Young used both the self control design and control subjects. All three counterbalanced their experimental and control conditions to control for practice and fatigue effects. They all used slightly different experimental treatments. Young tested the effects of hypnosis per se on performance and did not use suggestion. He compared hypnotic versus waking performance in his hypnotic subjects and then compared this to the performance of his control subjects who were not given any suggestion for improved performance. Eysenck also did not use hypnotic suggestion of increased performance but on one subject he used post-hypnotic suggestion, afterward, for several, but not all, of the tasks. Hammer used post-hypnotic suggestion on all his subjects and compared their performance in the waking state without suggestion to performance in the waking state following suggestion. Young found practically no significant differences in his hypnotic subjects in comparing waking and trance states. This was true for subjects in each level of hypnotic depth and for all subjects combined. Furthermore, the hypnotic groups did not differ significantly from the control subjects. He does not report any statistical analysis but an inspection of his data shows chance findings in almost every case. Only two tasks (steadiness and alphabet backwards) were significant with the hypnotic subjects showing higher performance. Two out of fifteen tasks showing significance may in itself be a chance finding. Eysenck, on the other hand, found improvement in both the hypnotic and post-hypnotic state on almost every

task. With all the tasks combined his subject improved 33 per cent in the hypnotic state and somewhat less in the post-hypnotic state. ^X He does not report levels of confidence either, but his results indicate significance beyond the .01 level. [✓] Hammer found that under post-hypnotic suggestion performance increased significantly in 24 out of 25 tasks over the waking state without suggestion. ^X The one task that was not significant was delayed memory of meaningful syllables which Stalnaker and Riddle (126) did find significant using hypnotic recall. Even on this task, Hammer found that performance under suggestion was higher than performance without suggestion. All the other tasks were significant at the .10 level or less (five less than .10, nine less than .05, five less than .02, five less than .01).

[✓] Young concluded that hypnotic performance is no better than waking performance. Eysenck concluded that hypnosis is effective in increasing performance but explained Young's data with the hypothesis that as tasks increase in difficulty and complexity hypnosis is less effective in increasing performance. ^X No one has ever tested this hypothesis either systematically or even haphazardly since 1939. [✓] Hammer concluded that school grades could possibly be improved by post-hypnotic suggestion. ^X He was working on a limited hypothesis and was possibly not aware of the vast amount of contradictory literature preceding his paper. In the opinion of the present author, [✓] Hammer's study was the first good experimental study showing such consistent improvement on such a large number of different tasks.

Rationale For Present Study

The present study attempts to combine the better features of the studies just mentioned and improve upon controls wherever possible. It also tests Eysenck's hypothesis that improvement in performance decreases as difficulty or complexity of the task increases. Hammer did not use control subjects under waking suggestion as a comparison group which this study does. Eysenck did not use enough subjects, did not use control subjects, and he did not give hypnotic suggestion for increased performance. Young had control subjects but used too many different stages of hypnosis, not leaving enough subjects in any one group. Besides this, he used as his control subjects people who were not susceptible to hypnosis which made them a completely different population and probably had an effect on performance. None of the investigators selected their tasks systematically to see whether amount of improvement was a function of the type of task. None of them discriminated between how much the subject attempts to do and how much he gets correct (measure of quantity and quality). Only Eysenck attempted to compare hypnotic performance with post-hypnotic performance, but he used only one subject who did not do all the tasks in the post-hypnotic state. All these investigators had their subjects come back for a large number of sessions which conceivably could lead to either conscious or unconscious cooperation on their parts. None of them mention the method of hypnosis used and none of them used a systematic one consistent for each subject. Hammer did not present his individual data to show how consistent his

individual subjects were. The present study attempts to correct for most of these criticisms.

CHAPTER II

METHOD

The present study really consists of two experiments, the second being a replication of the first with variation. The methods differed only slightly but will be explained separately to aid in clarity of presentation.

First Experiment

Subjects

The subjects were both male and female students from the first year general psychology course at the University of Tennessee. They all volunteered to be subjects and were given extra credit in their course whether or not they were found to be good hypnotic subjects. They ranged in age from seventeen to twenty-nine years with a median age of nineteen. Almost the entire class was willing to participate as subjects.

Materials

Three tasks were used; a counting task, a memory task and an abstraction task. Two forms of each task were constructed. The counting task consisted of numbers and letters interspersed in ten lines with fifty letters and numbers in each line. The letters were obtained by taking every fourth letter in a popular magazine. The numbers were obtained from a table of random numbers. Numbers and letters were assigned

to each line in random order. The letters were capitalized and the numbers were Arabic numerals. "Is" were not used since they could be confused with the numeral "1". At the end of each line was a place for the subject to record his total. (See Appendix B).

The abstraction task mainly consisted of the Shipley-Hartford Abstraction Test. To obtain two forms the author used a split half method. Items on each form were arranged in order of difficulty. Two difficult number series completion items were added to each form by the author to increase the length of the task. Each form contained twelve items. (See Appendix B).

Procedure

All the Ss in the hypnotic, post-hypnotic and waking suggestion groups were seen for two sessions. Those Ss in the normal waking group without suggestion were seen only once. Several Ss were given the tasks before the experiment proper was initiated to minimize difficulties which could otherwise have arisen during the experimental procedure.

For both the hypnotic and post-hypnotic groups the procedure was as follows. The subjects were seen individually during each session. During the initial part of the first session an attempt was made to establish rapport and allay any fears Ss might have about hypnosis. It was explained that hypnosis is not dangerous and has no deleterious effects if it is used in a professional setting. Any questions Ss had about hypnosis were answered at this time. The subjects were also told that if they satisfied certain criteria they would be asked to come back for a second session. The criteria were not enumerated but Ss were told

that at the end of the experiment everything would be explained to them, including the purpose of the experiment, and any questions they had about the procedure would be answered at that time. They were also told not to communicate any part of the procedure to any of their fellow students, since some of them would also be used as Ss and previous knowledge of the experiment would invalidate the results. Next, S was told that his only job throughout the entire procedure was to relax and to listen. He was told that both over-cooperation or resistance can interfere with the hypnotic procedure. If S had no questions, E began the procedure by demonstrating the Kohnstamm phenomenon. This consisted of applying pressure with only the arm to a wall and then turning away from the wall and relaxing. The experimenter's arm would rise slowly as a result. The experimenter pointed out that this step was used to illustrate the fact that over-cooperation (rising voluntarily) or resistance (keeping the hand from rising) were not what E was looking for. The experimenter explained that all he wanted S to do was to let his arm rise. If this step was completed satisfactorily by S, the body sway was attempted next.

The body sway test consisted of having S stand with his feet together in the center of the room. The experimenter explained to S that he would stand in back of him, have S tilt his head back and close his eyes and would tell S that he was falling backward. The experimenter explained that there is a natural tendency for S to fall backward from that position if he remained relaxed and had confidence that E would catch him. (On one occasion E began to lose confidence in himself when

one S weighed close to three hundred pounds.) The experimenter also explained that this step was used to assure S of the safety of the situation so that he would be more able to relax and listen later on. The subject had to fall backward keeping his feet together and not putting his foot back or catching himself as he felt himself falling. The experimenter explained further that S was not to try to fall or keep himself from falling but to let himself fall backward. If S completed this step successfully he was asked to lie on the couch. If S failed to execute either the Kohnstamm phenomenon or the body sway he was discarded and not taken any further through the procedure. Verbal reinforcement for the completion of each step was given by E to S in the form of "good" or "that's fine", and so forth. The experimenter always called S by his first name to put S more at ease and to help in establishing and maintaining rapport.

When S was in a prone position E turned the lights off in the room and began talking to S in a soft voice. He told S to close his eyes and to place his hands at the side of the couch. Again S was instructed merely to relax and to listen and not to "try" to do anything to either help or hinder E. The subject was then told to take deep breaths holding them until E told him to exhale. The experimenter gave suggestions of tension when the breath was held and relaxation as the breath was exhaled. This was done seven times. The experimenter told S to breathe normally and easily as he began to experience a soothing relaxing feeling starting to flow through his body progressively from the tips of his toes to the top of his head, loosening all his muscles and freeing them from tension, making his blood circulate easily and his

organs function in a well-coordinated manner. The experimenter then "talked" this feeling through S's body and when he was through asked S if he felt relaxed. If S nodded, he was reinforced with sounds of approval by E. Incidentally, E instructed S when he first got into a prone position to answer all questions with a nod for "yes" and a shake back and forth to indicate a negative answer. This way S did not have to speak during the entire procedure.

Next, S was told that he was beginning to lose all sensation of pain and heaviness in his left arm from his elbow down to the tips of his fingers and that it was progressively getting lighter and more numb. After repeating this several times E told S his arm would lift off the couch into the air. As soon as it had risen a couple of inches E instructed S to let it float there and he tested S for glove anesthesia by scratching him with a pin leaving a visible scratch on S's hand. The experimenter then asked S if he felt any pain. If S responded negatively E reinforced this again with sounds of approval. If hand levitation or glove anesthesia was unsuccessful, S was discarded at that point. If it was successful, S was taken through all the next steps.

After testing for glove anesthesia E instructed S that his hand would continue to rise as a feeling of drowsiness started to come over him and that when his hand touched his face he would be in a deep, relaxing, comfortable, peaceful, secure hypnotic sleep listening to the sound of E's voice. The experimenter repeated these directions as S's hand rose, and gave reinforcement all the time, especially when S's hand touched his face.

Next E told S that all normal sensations were flowing back into his left arm. The experimenter instructed S to put the arm back to the side of the couch, giving S suggestions for deeper and deeper sleep. After this E explained to S that he was going to have him sit up, turn around on the couch and open his eyes. The subject was told he would be able to do this while remaining completely asleep. After sitting up, S was told, he would draw a picture he remembered drawing in grammar school or thought he might have drawn in grammar school. He was told he would also be able to do this while remaining completely asleep and following the drawing he would lie back down on the couch remaining asleep. The subject was then asked if he understood E's instructions. Approval was given for a positive answer. The experimenter then instructed S to follow through the directions talking him through them, giving sounds of approval. After S completed the drawing E told him to write the number 5-8-7-4-0 on the piece of paper. When S did this E instructed S that later on when he woke S and asked, "What's the number?" S would say "5-8-7-4-0" but would not remember writing the number down and would not remember E telling it to him. The experimenter told S he would also not remember sitting up and drawing. The experimenter then asked S if he understood the directions and awarded a positive nod with more approval. The subject was then told to lie down on the couch remaining asleep.

After a short transition period during which E repeated suggestion of a deep, restful and peaceful sleep, E gave S the suggestion that upon awakening and talking to E he would feel pebbles sticking him

in his left shoe. The subject was further told that he would take off his shoe, shake out the pebbles and put his shoe back on again. The subject was told he would do this without remembering E telling him about it while he was asleep. Again E asked S if he understood and rewarded a nod by S with approval. Another brief transition period followed with suggestions from E of deep sleep, calmness, freedom from tension and feelings of restful relaxation. This was followed by E telling S that he would count to ten to awaken him and that with each number he counted S would get more alert, awake and refreshed. The subject was also told that when completely awake he would feel like he had a nice, comfortable relaxing sleep and would feel very good. The experimenter again asked S if he understood the instructions and rewarded understanding with more approval. The experimenter then counted slowly increasing the volume of his voice with each number and turning on the lights just before reaching the number ten.

Upon awakening, S was asked how he felt and whether he felt like he had been asleep. Then E said, "What's the number?". After S gave him the number, E asked him where he had gotten the number. If S remembered E telling it to him while asleep E asked what else he remembered. If S did not remember E showed him the drawing and asked if he remembered that. The experimenter then watched to see if S removed his shoe and shook it out. When S did this, E questioned him as to the reason for it. If S showed he did not remember E giving him the suggestion, E explained everything that had gone on while S was asleep. It should be noted that this method of induction is very similar to the one

used by Pascal (103).

If S was able to achieve post-hypnotic amnesia and carry out the post-hypnotic suggestion he was given an appointment to come back the following week to run through the experiment. If S did not achieve post-hypnotic amnesia or carry out the post-hypnotic suggestion no appointment was made and he was not used in the experiment. If S achieved post-hypnotic amnesia but failed to carry out the post-hypnotic suggestion without prompting E had him come back and ran him in the hypnotic group where ability to carry out post-hypnotic suggestion is not really crucial. The subject was then again cautioned not to communicate the procedure to anyone and was told that E would explain the entire experiment to him after the next session.

The preliminary session for the waking suggestion group was somewhat different. Subjects who volunteered were not told that it was a hypnotic experiment but reported to the same place. The experimenter established rapport with them and also immediately called them by their first names. The experimenter then told them that the experiment would take two sessions and that they might be confused by some of the steps in both sessions. They were told, however, that the purpose of the experiment would be explained to them at the end of the second session and they could ask any questions they had at that time. The experimenter then collected information about the S's major, class, interests, grade point average, hobbies, birthplace, marital status, age, and so forth. After this E told S he was going to give him several tests for relaxation and proceeded to go through the Kohnstamm phenomenon and the body-sway

as he did with the experimental Ss. Approval was also given to these Ss for completion of these tests. Next E demonstrated Chevreul's pendulum telling them if they relaxed the weight on the string would go around in a circle when females held it and up and down in a straight line when males held it. If it worked S was given more approval. After this, S was instructed to draw a picture that he recalled drawing in grammar school or thought he might have drawn. These instructions were the same as those given to the hypnotic Ss. All Ss were given an appointment for the second session and were again cautioned not to communicate anything about the procedure to their classmates.

No preliminary session was spent with the normal waking group. They were only seen for the experiment proper. During the first rest period between tasks E asked them about their majors in college. During the third rest period they were again asked to draw a drawing similar to the other groups. This was done so there would be little or no time for rehearsal of the tasks.

All Ss were given the three tasks to do four times, twice with each form. Form I was given the first two times and Form II the second two times. Experimental conditions were counterbalanced to control for practice and fatigue effects. Half of the Ss in the hypnotic group had the series hypnotic-normal-normal-hypnotic. The other half had the series normal-hypnotic-hypnotic-normal. The post-hypnotic group and the waking suggestion group had the series counterbalanced in the same way but the experimental state differed. The hypnotic group did the tasks twice under hypnosis with suggestion. The post-hypnotic group did them

twice while awake following post-hypnotic suggestion. The waking suggestion group did the tasks twice in the waking state following waking suggestion. All three groups did the tasks the other two times while awake with no suggestion. This last group was used just to check out the practice and fatigue effects of the tasks. Table I illustrates the procedure for the four groups.

The waking suggestion group read magazines during the rest periods. The experimenter talked to the Ss in the other groups during their one rest period. The hypnotic group had amnesia for doing the tasks under hypnosis and for the suggestion. The post-hypnotic group only had amnesia for the suggestion since they did all the tasks in the waking state. The waking suggestion group remembered both the tasks and the suggestion since hypnosis was not used. They were given the suggestion and did all the tasks during the waking state. The hypnotic procedure was the same as it was during the preliminary session except that it was faster and began with hand levitation except for the initial hypnosis which started with the deep breathing stage.

The suggestion was the same for all Ss. It was as follows:

On a set of tasks which you will do shortly you will find that you will have increased concentration and attention. Your memory will be better than it ever was before. You will be able to think much more clearly than usual and you will have increased ability to form concepts. Your speed and accuracy will improve to a great extent and you will have unusual confidence in your ability to do the tasks well. You will do the tasks with ease, without tiring, and you will not be bothered by distractions.

The highlights of the suggestion were usually repeated. The hypnotic group was told that they would not remember doing the tasks or being given the suggestion when awakened and the post-hypnotic group were

TABLE I

THE ASSIGNMENT OF Ss TO EXPERIMENTAL CONDITIONS
IN THE FIRST EXPERIMENT

Group	Form I		Form I		Form II		Form II		
	N	Interval Test	Interval Test		Interval Test		Interval Test		
Hypnotic	2		N	Hypnosis	H	Hypnosis	H	Awakened	N
	2	Hypnosis	H	Awakened	N	Rest	N	Hypnosis	H
Post-Hypnotic	2		N	Hypnosis & Awakened	PH	Hypnosis & Awakened	PH	Hypnosis & Awakened	N
	2	Hypnosis & Awakened	PH	Hypnosis & Awakened	N	Rest	N	Hypnosis & Awakened	PH
Waking	3		N	Rest	S	Rest	S	Rest	N
Suggestion	2		S	Rest	N	Rest	N	Rest	S
Normal Waking	4		N	Rest	N	Rest	N	Rest	N

N - Normal Waking

H - Hypnotic Suggestion

PH- Post-Hypnotic Suggestion

S - Waking Suggestion

told they would not remember the suggestion. This was tested for at the end of the experiment by quizzing all Ss in the hypnotic groups as to what they remembered. If they did not achieve post-hypnotic amnesia, they were not used. In each set of tasks one minute was allowed for the counting task, one minute for learning of the words in the memory task and as much time as needed for recall, and one and one-half minutes for the abstraction task. The directions for the counting and abstraction tasks are given on top of the forms in the appendix. The instructions for the memory task were as follows:

I am going to give you a list of thirty words which I want you to try to learn and remember. Try to remember them as best as you can in the order that they appear on the list. After a period of time, I will take this sheet away and give you another to write down all of the words you remember.

The experimenter made sure that S understood all of the instructions before letting S begin to work on any task. The instructions were repeated each time a task was given even though S had heard them on previous presentations. All Ss were told, before any tasks were given, that they would be timed on all the tasks and that the tasks were set up so they would not be able to finish any of them. They were also told not to feel badly about not finishing. The subjects were told that they did well after each task whether or not they were under suggestion and no matter which group they were in. The counting task was always given first, memory second and abstraction third. At the end of the experiment, E explained the purpose of the experiment, answered any questions S had and again pointed out how communication with other potential Ss could invalidate the results.

Second Experiment

Subjects

All Ss for this experiment were also taken from a first year general psychology course. They were also both male and female volunteers. The only difference between them and the Ss in Experiment I was that these Ss were attending summer school while Ss from the first experiment were used during the regular school year. They did not differ in age, sex or college class, however.

Materials

The same types of tasks were used with some slight changes. The counting task was changed so that there were twenty lines of numbers and letters rather than the previous ten. Each line was made up of twenty-five rather than fifty items. This made it possible for S to complete more lines in the time allotted and allowed for a larger sample of behavior to be measured. The numbers and letters themselves were exactly the same as in the first experiment. The experimenter merely divided each line in half. The only change made in the memory task was to put numbers before the words in the original list. This aided S in associating a word with a number and focused his attention on remembering the items in the correct order. The abstraction task was lengthened to allow for more variability. The experimenter inserted four items in each form which were of intermediate difficulty. This made the items increase more gradually in difficulty than before. Time allowed on the counting task was increased from one minute to one and one-half minutes. Time for learning the words was also increased from one minute to one

and one-half minutes. Time for recall was still not limited. The abstraction task still retained its one and one-half minute time limit. This gave S an equal amount of time to work on each task not counting the additional time allotted for recall on the memory task. The instructions remained the same for each task. The tasks are included in Appendix B.

Procedure

The initial screening session remained exactly the same except for one change. During the middle of the second experiment, E changed the wording of the post-hypnotic suggestion so that S was instructed to take off his shoe when E lit a cigarette. This cued S and it could be controlled better by E. Previously E had difficulty in waiting for the response to be made since S was told only to take off his shoe while S and E were talking. The waking suggestion group, this time, all thought they were to be hypnotic subjects when they came in for the initial session. At the beginning of the session, E explained that he did not need any more hypnotic Ss but that he was running another experiment which would also take two sessions. The rest of the procedure for this group was the same as in the first experiment except that Chevreul's pendulum was not used.

The procedure for the second session remained exactly the same except that only three groups were used, the hypnotic, post-hypnotic and waking suggestion groups. The normal waking group was discarded since they behaved very much like the waking suggestion group in the first experiment. Six Ss were used in each group this time. Everything else was

exactly the same as in the first experiment. Table II illustrates the procedure.

Scoring: First and Second Experiments

For each task an "attempted" and a "correct" score was obtained. The former was a measure of quantity and the latter a measure of quality of performance. Each task was scored separately. The "attempted" score for the counting task was obtained by totaling all the number and letters completed. In other words if S finished ten lines of twenty-five numbers and letters his score was two hundred and fifty. The correct score for the counting task was tabulated by taking the total of the numbers and letters of the lines which S counted correctly. In the same example if S got only eight lines correct his score was two hundred.

For the memory task the "attempted" score was obtained by merely counting the number of words S recalled regardless of order. No score was given for words written a second time or words that did not appear on the list. The "correct" score on the memory task was obtained by awarding three points to each word placed in its exact position on the original list. Two points were given to a word if it was not in the same position as on the original list. One point was awarded for each correct word out of position and not following the same word as it did in the original list. For example, if S recalled fifteen words which appeared on the original list his "attempted" score was fifteen. If eight were in their original position, three were out of the correct position but followed the same word as on the original list and the other four were out of position and did not follow the same word as on

TABLE II

THE ASSIGNMENT OF Ss TO EXPERIMENTAL CONDITIONS
IN THE SECOND EXPERIMENT

Group	N	Form I		Form I		Form II		Form II	
		Interval	Test	Interval	Test	Interval	Test	Interval	Test
Hypnotic	3		N	Hypnosis	H	Hypnosis	H	Hypnosis	N
	3	Hypnosis	H	Hypnosis	N	Rest	N	Hypnosis	H
Post-Hypnotic	3		N	Hypnosis & Awakening PH	Hypnosis & Awakening PH	Hypnosis & Awakening PH	Hypnosis & Awakening PH	Hypnosis & Awakening N	
	3	Hypnosis & Awakening PH	Hypnosis & Awakening PH	Hypnosis & Awakening N	Rest	N	Hypnosis & Awakening PH	Hypnosis & Awakening PH	
Waking	3		N	Rest	S	Rest	S	Rest	N
Suggestion	3		S	Rest	N	Rest	N	Rest	S

H - Hypnotic Suggestion

PH- Post-Hypnotic Suggestion

S - Waking Suggestion

N - Normal Waking Without Suggestion

the original list S received a "correct" score of 34. The first eight words received a score of three each, the next three words, two each, and the last four words, one each.

The abstraction task was scored very easily. The number of items that S completed was the "attempted" score. The number that S completed correctly was the "correct" score. If an item was started but not completed it was not counted on either score.

Each S received six standard scores. All of them were computed by dividing the sum of the scores in both experimental series by the sum of the scores in both normal waking series and multiplying by one hundred. This was done separately for each task and for each type of score. This method compares, in one figure, S's relative performance in waking and experimental state and avoids the cumbersome calculation of analysis of covariance. It also standardizes the scores across tasks and makes them readily comparable. Any score above one-hundred indicates improvement over the normal state while any below one-hundred indicates better performance in the normal state. The number above one-hundred indicates the percentage improvement over the normal waking state. For example, a score of 150 indicates that performance in the experimental state is 50 per cent better than in the waking state.

CHAPTER III

RESULTS

The results section is broken up into five segments for clarity of presentation. Since the preliminary session and the first and second experiments were all really independently performed, a section is devoted to each of them. The fourth section presents the analysis of the data of the first and second experiments combined to give an overall picture of the results. Finally, a summary of results is presented. All probability values reported in this section are two-sided since this is an exploratory study and no definite hypotheses were formulated beforehand. All P values larger than .10 are reported as not significant (n.s.) unless they come very close to that figure in which case they are reported as less than .10. All P values were obtained from Pearson and Hartley (109), McNemar (89), Jenkins (62) and Cureton (23). Statistical procedures were obtained from Jenkins (62), Cureton (23) and McNemar (89).

Preliminary Session

The preliminary session never took more than 45 minutes and took as short a time as 20 minutes. The actual hypnotic procedure starting with the Kohnstamm phenomenon took from 5 to 25 minutes with the average about 20 minutes. Careful notes were taken, at the end of each session, on the behavior displayed during the session by S. If S failed to satisfy either the Kohnstamm phenomenon, body sway or hand levitation E

did not continue the procedure any further. Only 7 out of 56 Ss failed to go through the entire procedure. Of course all Ss in the waking suggestion group were given an appointment for the following week and were not subjected to any form of hypnosis. Of the 29 Ss who satisfied the criteria only 20 were used as Ss in the experiment. Two Ss did not return for the second session because of final exams or illness and two other Ss failed to return because their parents requested they discontinue. Four Ss were not able to achieve the same depth of hypnosis the second session and E had to eliminate one S because of an error made in procedure during the experiment.

Table III shows the percentage of people who satisfied the criterion for the most important steps of the hypnotic procedure. This includes Ss from both experiments. Of those who satisfied these criteria there were some who did not exhibit the phenomena completely or immediately. These are grouped under the category "Satisfied Criterion With Qualification". The qualifications for each step were as follows:

1. Kohnstamm phenomena. Worked too fast or did not work first time.
2. Body sway. Put foot back while falling at first or caught themselves a few times before falling back easily.
3. Hand levitation. Took an unusually long time.
4. Glove anesthesia. Felt pain first time they were scratched but not the next.
5. Post-Hypnotic amnesia. Had hazy memories when told about procedure after awakening or remembered one thing hazily and forgot the rest.
6. Post-Hypnotic suggestion. Had to be asked if something bothered them

TABLE III

PERCENTAGE OF SUBJECTS SATISFYING THE CRITERION SET FOR THE
VARIOUS STEPS IN THE HYPNOTIC PROCEDURE
56 SUBJECTS: 39 MALES- 17 FEMALES

		Kohnstamm Phenomenon	Body Sway	Hand Levitation	Glove Anesthesia	Post- Hypnotic Amnesia	Post- Hypnotic Suggestion
Didn't Satisfy Criterion	Males	3	8	13	15	36	54
	Females	6	12	12	12	29	35
	Both	4	9	13	14	34	48
Satisfied Criterion With Qualification	Males	10	23	21	5	15	13
	Females	0	35	12	12	12	0
	Both	7	27	18	7	14	9
Satisfied Criterion Completely	Males	88	69	66	80	49	33
	Females	94	53	76	76	59	65
	Both	89	64	69	79	52	43
Satisfied Completely And Satisfied With Qualification	Males	97	92	87	85	64	46
	Females	94	88	88	88	71	65
	Both	96	91	88	86	66	52

before shoe was taken off.

A person able to satisfy all of these criteria is considered to be in a somnambulistic trance according to the Davis-Husband scale (24). Bernheim (9), Jacoby (61) and many other investigators have found that the usual percentage of people going this deep is 20 per cent. The table indicates that 52 per cent of these Ss went as far as carrying out a fairly unusual post-hypnotic suggestion. These investigators also usually find that about 50 per cent of all Ss can achieve a medium trance. The table shows that the use of the present procedure induced a medium trance (measured by glove anesthesia) in 86 per cent of Ss. The body sway test was found to be a good predictor for a medium trance (41) (25) but not for the somnambulistic trance. Of the 91 per cent of Ss who passed the body sway test only 52 per cent were able to achieve a somnambulistic trance. Those people who did carry out the post-hypnotic suggestion, however, were usually able to satisfy the earlier steps without qualification.

Women were found to be able to go into a deep trance more easily than men as was found by Hull (56) and Liebault (9). Seventy-one per cent and 65 per cent of females were able to achieve post-hypnotic amnesia and post-hypnotic suggestion respectively while the corresponding percentages for men were 64 per cent and 46 per cent. Males and females were not as different for the earlier stages, however. Although this sex difference in ability to reach a deep stage of hypnosis was not statistically significant it should be noted that the overall figure of 52 per cent might have been higher if the experiment had used as many

females as males.

It was observed that all Ss who were able to carry out the post-hypnotic suggestion also achieved post-hypnotic amnesia. The reverse was not true, however. Eight people who achieved post-hypnotic amnesia did not carry out the post-hypnotic suggestion. This is consistent with findings in the past that amnesia is necessary for a post-hypnotic suggestion to be carried out (37), and that the ability to carry out a fairly unusual post-hypnotic suggestion is a deeper state of hypnosis than ability to achieve post-hypnotic amnesia (24).

The practical and theoretical implications of this hypnotic procedure will be discussed in the next chapter.

As a sidelight, E was interested in what types of drawings Ss would draw under hypnosis when they were asked to draw a picture recalled from grammar school. The experimenter also wondered how waking Ss' drawings would compare when given the same request. The experimenter was amazed at the similarity of the drawing made in the hypnotic state by all Ss and observed that almost all Ss in this state used very light pressure on their pencils. Very often their hands seemed to float on the page barely making a visible marking. Table IV describes the content of the drawings made by both hypnotic and control Ss. The most common drawing was that of a house, in both groups. Often this was the only thing drawn but sometimes it was surrounded by trees and people. Almost half of the Ss had houses as the theme of their drawings. The next most frequent drawing was a tree or other plant life like flowers. This was included in the drawings of about one-quarter of both groups.

TABLE IV

CONTENT OF DRAWINGS MADE BY FORTY-NINE EXPERIMENTAL
SUBJECTS AND SIXTEEN CONTROL SUBJECTS
DURING THE PRELIMINARY SESSION

Type of Drawing	Experimental Subjects		Control Subjects	
	N	%*	N	%*
House	24	49	7	44
Tree or Other Plant	13	27	4	25
Animal	9	18	0	0
Human	7	14	0	0
Sun	5	10	2	13
Boat, Car, Plane, Windmill, Lighthouse	5	10	3	19
Other: Cube, Haystack, Lollipop, Wigwam, Mountain	1	2	6	38

* Some drawings contained several items. Therefore, percentages
total over 100 percent.

Animal and human percepts were completely lacking in the drawings of control Ss while 32 per cent of the hypnotic Ss included them. Control Ss very often complained of poor artistic ability while no hypnotic Ss made any comment to that effect. The sun and other objects used for transportation or a useful purpose were drawn with about the same frequency in each group with the control Ss tending to draw them more frequently. Only one hypnotic S drew anything else while six or 38 per cent of control Ss drew other percepts. In general both groups displayed very limited range of content considering the open-ended request made of them. The hypnotic Ss drew less of a variety of content than the control Ss.

First Experiment

Table V presents the results for individual Ss in standard percentage scores, the computation of which are outlined in the procedure. The individual S's scores are presented along with the means and medians because of the small N and to allow the reader to get a total picture of the data. All the means of the two experimental groups are above 100, except one, which signifies improvement under hypnotic and post-hypnotic suggestion. The one case where the mean is below 100 is the correct score for the counting task in the hypnotic group. Here every S shows a drastic reversal doing more poorly under suggestion. Aside from this reversal, mean improvement varies from 8 per cent to 45 per cent. It is noteworthy that the highest improvement is shown by the post-hypnotic group on the same task on which the hypnotic group did most poorly.

TABLE V

RESULTS OF FIRST EXPERIMENT IN STANDARD PERCENTAGE SCORES

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
Hypnotic	131	150	123	69	142	115
	109	118	108	78	103	109
	92	114	100	44	115	100
	115	121	117	64	120	109
	112	126	112	64	120	108
Means	112	126	112	64	120	108
Medians	112	120	113	67	118	109
Post-Hypnotic	114	109	140	105	111	120
	102	91	117	139	79	110
	117	142	163	158	142	114
	111	110	100	179	100	93
	111	113	130	145	108	109
Means	111	113	130	145	108	109
Medians	113	110	129	149	106	112
Waking Suggestion	98	83	100	126	130	100
	96	96	100	92	86	86
	96	100	93	77	106	100
	93	135	81	149	100	79
	99	79	93	126	121	93
Means	96	99	93	114	109	92
Medians	96	96	93	126	106	93
Normal Waking	106	94	78	125	148	78
	97	104	86	97	101	92
	103	96	83	257	111	129
	97	100	92	113	86	88
	101	99	85	148	112	97
Means	101	99	85	148	112	97
Medians	100	98	85	119	106	90

The means of the two control groups indicate just above chance fluctuation with five means above 100 per cent and seven means below 100 per cent. They range from a 15 per cent decrease in performance to a 48 per cent increase in performance. It may also be observed that the medians differ only very slightly from the means. The largest variation was 29 per cent, the correct scores of the counting task for the normal group. The next largest deviation is found on the same task for the waking suggestion group. It should be noted that on this particular measure each group showed some deviation. This was the main reason that this measure was altered in the second experiment. One score in the normal group, 257, was so out of line with every other score on that task and in that group that for the analysis of variance this one score was changed to 107 which is the mean of the Ss other scores and the scores of other Ss in his group on that task. This elevated score was mainly due to his extremely poor performance on the two series of tasks used as a baseline (See Table XXIV in Appendix A) and not because of high absolute performance. For this reason the radical procedure of converting this score did not seem illegitimate.

The only common overall statistical analysis that could shed light upon the interactions of tasks, types and groups was a multi-dimensional analysis of variance. It was included mainly for this reason but it must be pointed out that the assumption of independence across columns was violated as each S was given six scores. Inspection of the individual data indicates that the variances are homogeneous. There is of course independence down rows as each score was obtained

from a different S. Table VI presents the summary table of the analyses of variance with both attempted and correct scores included in the analysis. Hypnotic and post-hypnotic groups were combined to form the experimental group and the waking suggestion group and normal waking group were combined to form the control group. The last S in the waking suggestion group was not included in the analysis so that each group would have an equal number of Ss and the analysis of variance would be less complex. This S was included in other analyses, however, that did not require an equal number of Ss in each group. The table shows that only the group difference was significant at less than the .01 level of confidence. The group and type interaction approached significance because of the marked discrepancy in the attempted scores for the counting task. It was noteworthy that the sum of squares for the type variable was zero which indicates that considering the amount of variation among subjects there was almost significantly too little difference between the attempted and correct scores. This pointed up even more the need to analyze attempted and correct scores separately since this violated the assumption of independence across columns to a lesser extent as a high correlation seemed to exist between the attempted and correct measure.

Table VII presents the summary of the analysis of variance for attempted scores only. Here both the overall F and difference between the groups was significant at less than the .001 level of confidence. Neither the task variable nor the first order interaction was significant. This indicates that the experimental groups did significantly better than the control groups under hypnotic and post-hypnotic suggestion in terms of how much they attempted.

TABLE VI

RESULTS OF ANALYSIS OF VARIANCE FOR FIRST EXPERIMENT
 INCLUDING BOTH ATTEMPTED AND CORRECT SCORES.
 HYPNOTIC AND POST-HYPNOTIC GROUPS ARE
 COMBINED AND WAKING SUGGESTION AND
 NORMAL GROUPS ARE COMBINED

Source	Sum of Squares	df	Mean Squares	F	P
Total	46356	95			
Between	8334	11	758	1.7	n.s.
Within	38022	84	453		
Group	3991	1	3991	8.8	<.01
Task	912	2	456	1.0	n.s.
Type	0	1	0	0.0	n.s.
Group X Task	1591	2	796	1.8	n.s.
Group X Type	1625	1	1625	3.6	n.s.
Task X Type	181	2	91	0.2	n.s.
Group X Task X Type	34	2	17	0.0	n.s.

TABLE VII

RESULTS OF ANALYSIS OF VARIANCE FOR FIRST EXPERIMENT INCLUDING
ATTEMPTED SCORES ONLY. HYPNOTIC AND POST-HYPNOTIC
GROUPS ARE COMBINED, AND WAKING SUGGESTION
AND NORMAL GROUPS ARE COMBINED

Source	Sum of Squares	df	Mean Squares	F	P
Total	15213	47			
Between	6398	5	1280	6.1	<.001
Within	8815	42	210		
Group	5355	1	5355	25.5	<.001
Task	294	2	147	0.7	n.s.
Group X Task	749	2	375	1.8	n.s.

Table VIII presents the same summary as Table V but with correct scores only. None of the variables were significant here or even approached significance which indicates that for the correct scores neither the groups nor tasks could be significantly differentiated. This was most probably a function of the inappropriate counting measure. This was substantiated by other types of statistical analyses.

Table IX presents the results of an application of the binomial expansion to test for the consistency of any effect. For the hypnotic and post-hypnotic groups taken separately and combined, or with attempted and correct scores taken separately and combined, every P was significant except for the hypnotic group on the correct measure. Here, the four reversals were on the counting task previously discussed. On a consistency basis the correct scores of both groups combined was significant even though the analysis of variance did not show significance. This is probably due to the weight given to the drastic reversals of the hypnotic group on the counting task which was given less weight using a consistency measure. The overall trend for the waking suggestion group was to do more poorly in the waking state with suggestion. This is especially true of the attempted measure which is significant at the .02 level of significance but in the opposite direction of the experimental group. The normal group did not show this effect as all tasks were performed without suggestion. For the correct measure neither of the control groups showed a trend to do either better or worse but performed at just about a level one would expect by chance. In comparing the attempted score with the correct score, (each of S's

TABLE VIII

RESULTS OF ANALYSIS OF VARIANCE FOR FIRST EXPERIMENT INCLUDING
 CORRECT SCORES ONLY. HYPNOTIC AND POST-HYPNOTIC
 GROUPS ARE COMBINED AND WAKING SUGGESTION
 AND NORMAL GROUPS ARE COMBINED

Source	Sum of Squares	df	Mean Squares	F	P
Total	31143	47			
Between	1946	5	389	0.6	n.s.
Within	29197	42	695		
Group	261	1	261	0.4	n.s.
Task	799	2	400	0.6.	n.s.
Group X Task	886	2	443	0.6.	n.s.

TABLE IX

RESULTS OF FIRST EXPERIMENT USING THE BINOMIAL EXPANSION TO SHOW CONSISTENCY OF DATA.

Ps ARE IN TERMS OF IMPROVEMENT IN EXPERIMENTAL STATES AND HIGHER ATTEMPTED
SCORES THAN CORRECT SCORES. TIES ARE SPLIT BOTH WAYS

	Attempted				Correct				Attempted and Correct Combined				Attempted Versus Correct			
	>100	<100	100	P	>100	<100	100	P	>100	<100	100	P	Attempted Higher	Correct Higher	Tie	P
Hypnotic	10	1	1	.02	7	4	1	n.s.	17	5	2	.02	9	2	1	.09
Post-Hypnotic	10	1	1	.02	9	2	1	.09	19	3	2	.002	7	4	1	n.s.
Waking Suggestion	1	11	3	.98	6	6	3	n.s.	7	17	6	n.s.	5	8	2	n.s.
Normal Waking	3	8	1	n.s.	7	5	0	n.s.	10	13	1	n.s.	3	7	2	n.s.
Hypnotic and Post-Hypnotic	20	2	2	<.001	16	6	2	.06	36	8	4	<.01	16	6	2	.06
Waking Suggestion and Normal Waking	4	19	4	.98	13	11	3	n.s.	17	30	7	>.90	8	15	4	n.s.

attempted scores were compared with each of his correct scores) the hypnotic group's attempted scores were significantly higher than their correct scores at the .09 level of confidence. This again was due mainly to the drastic reversals on the counting task. The post-hypnotic group showed the same trend slightly but it was not significant. When both groups were combined, however, and the binomial expansion applied again, attempted scores were significantly higher at the .06 level of confidence. Although the control groups showed a trend in the opposite direction (higher correct scores) it was not significant.

Table X presents the results of the application of the Friedman Rank Analysis of Variance (X_R^2) as a test for the difference between tasks and a Wilcoxon Matched-Pair Rank T to test for the difference between types of scores. Both of these measures take into account the correlation and both magnitude and direction of effect. The Friedman X_R^2 yielded a significant P only for the hypnotic group on the task variable. This was true for both attempted and correct scores. In both of these cases Ss did best on memory. The fact that they had such low correct scores on the counting task added to the significance. There was no significant difference between tasks for the post-hypnotic and waking suggestion groups.

The Wilcoxon Rank T was applied to the hypnotic and post-hypnotic groups combined and the attempted scores tended to be higher. (Each S given his mean attempted score and his mean correct score.) This was almost significant at the .10 level. Again the low correct scores on the counting task for the hypnotic group played a large role in gener-

TABLE X

FRIEDMAN'S RANK ANALYSIS OF VARIANCE TO TEST FOR DIFFERENCES
BETWEEN TASKS, AND WILCOXON MATCHED-PAIR RANK T TO
TEST FOR THE DIFFERENCE BETWEEN THE TYPE
MEASURE IN THE FIRST EXPERIMENT

		Friedman's Rank Analysis of Variance			
		Attempted		Correct	
	N	χ^2_R	P	χ^2_R	P
Hypnotic	4	6.0	.05	6.5	<.05
Post-Hypnotic	4	2.0	n.s.	1.5	n.s.
Waking Suggestion	5	0.1	n.s.	3.7	n.s.
Hypnotic and Post-Hypnotic	8	1.0	n.s.	1.0	n.s.
Wilcoxon Matched-Pair Rank T					
Attempted Versus Correct					
Smaller Sum of Ranks				P	
Hypnotic and Post-Hypnotic		8		>.10	

ating the significance.

Table XXIV in Appendix A presents the raw scores of the normal group with means to see if there would be any practice effects on differences between performance on the first and fourth series of tasks combined and the second and third series of tasks combined. By inspection there seemed to be little practice effect on the counting task after the first series which would tend to make the first and fourth series lower than the second and third series of tasks which the means show it does. On the memory task there seemed to be a practice effect from one series to the next but a drop when a new list of words was introduced. There did not seem to be any large difference between the first and fourth series and the second and third series. The attempted scores for the abstraction task showed the same increment as with memory but there seemed to be very little practice effects in terms of correct scores. There again was no great difference between the first and third and second and fourth series. In general, the two forms seemed to be equivalent and the counterbalanced order seemed justified.

Table XXV in Appendix A presents the individual data for performance during the normal state in each group. The scores are in percentages and were obtained by dividing an S's raw score in the normal state by the total possible score he could receive if he did all of the items on the test and multiplying that quotient by 100. A standard percentage score across tasks was obtained in this manner. Table XXVII in Appendix A shows that in comparing scores obtained in the normal state for the experimental Ss with the same scores for the control Ss no significant differences were obtained between the groups on any of

the tasks in either measure using the Wilcoxon-Mann-Whitney Rank T for independent groups. The experimental groups mean scores were higher in four out of the six, however, which indicates that there was a very slight tendency for experimental Ss to do better, even in the normal state, than control Ss.

Second Experiment

Table XI presents the results in standard percentage scores of the individual Ss' performance under suggestion. Means and medians of the groups are also presented. The hypnotic and post-hypnotic group means were unusually homogeneous varying from 110 per cent to 122 per cent. The means of the waking suggestion group did not overlap with the experimental group means and were also very homogeneous ranging from 92 per cent to 101 per cent. Every mean in the experimental groups showed improvement while four out of six in the control group showed a decrement in performance. Of the two which did not show a decrement, one was exactly at 100 per cent and the other at 101 per cent. Medians were very close to means for both the experimental and control groups. The greatest discrepancy was 9 per cent. The correct scores for the counting task fell in line with the rest of the data as opposed to the first experiment. This was due mainly to the crucial change in procedure mentioned in the last chapter.

A classical analysis of variance was employed to get an overall picture of the significance of the results and an indication of the interaction effects of tasks, groups and types. The same assumption of

TABLE XI

RESULTS OF SECOND EXPERIMENT IN STANDARD PERCENTAGE SCORES

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
Hypnotic	106	92	85	84	102	100
	121	111	121	128	100	121
	114	129	112	166	129	156
	92	105	123	98	97	113
	129	138	131	117	138	127
	131	110	138	111	104	114
	Means	116	114	118	117	112
Medians	118	111	122	114	103	118
Post-Hypnotic	96	82	100	81	122	114
	127	123	150	122	112	138
	109	124	136	109	124	127
	125	137	100	134	137	90
	113	110	118	100	139	100
	118	97	118	113	90	106
	Means	115	112	120	110	121
Medians	116	117	118	111	123	110
Waking Suggestion	99	97	100	99	95	100
	93	108	105	117	91	88
	103	80	100	94	73	100
	86	95	93	88	77	125
	95	103	100	94	96	100
	115	112	84	115	122	89
	Means	99	99	97	92	100
Medians	97	100	100	97	93	100

independence across columns was violated but only in order to get at the interaction effects. Table XII presents the summary table when attempted and correct scores were analyzed together. The overall F was significant at less than the .10 level. This was generated almost completely by the difference between the groups which was significant at less than the .001 level. None of the interactions or other variables approached significance, there again being almost significantly too little difference in the type measures. This again suggested a positive correlation which was not being accounted for by the analysis of variance technique. The analysis of variance was performed on attempted scores and correct scores separately. Table XIII presents the summary for the attempted scores only. Here the overall F was significant at less than the .10 level and again the significance was generated almost completely by the difference between the groups which was significant at less than the .001 level. The task variable and the first order interaction between the group and task variable did not approach significance. Table XIV presents the summary of the analysis of variance for correct scores only. Here only the group variable was significant at less than the .02 level and the overall F failed to reach significance. Again both the task variable and task and group interaction were far from being significant. The group variable was slightly less significant than for the attempted scores because of the larger within sum of squares which indicated greater individual variability.

Table XV presents the results and the Ps obtained after applying the binomial expansion to the data. Again this was used to demonstrate

TABLE XII

RESULTS OF ANALYSIS OF VARIANCE FOR SECOND EXPERIMENT
INCLUDING BOTH ATTEMPTED AND CORRECT SCORES

Source	Sum of Squares	df	Mean Squares	F	P
Total	34387	107			
Between	8813	17	518	1.8	<.10
Within	25574	90	284		
Group	7528	2	3764	13.3	<.001
Task	210	2	105	0.4	n.s.
Type	1	1	1	0.0	n.s.
Group X Task	344	4	86	0.3	n.s.
Group X Type	25	2	13	0.0	n.s.
Type X Task	1	2	1	0.0	n.s.
Group X Task X Type	704	4	176	0.6	n.s.

TABLE XIII

RESULTS OF ANALYSIS OF VARIANCE FOR THE SECOND
EXPERIMENT INCLUDING ATTEMPTED SCORES ONLY

Source	Sum of Squares	df	Mean Squares	F	P
Total	14279	53			
Between	4014	8	502	2.2	<.10
Within	10265	45	228		
Group	3734	2	1867	8.2	<.001
Task	108	2	54	0.2	n.s.
Group X Task	172	4	43	0.2	n.s.

TABLE XIV

RESULTS OF ANALYSIS OF VARIANCE FOR THE SECOND
EXPERIMENT INCLUDING CORRECT SCORES ONLY

Source	Sum of Squares	df	Mean Squares	F	P
Total	20106	53			
Between	4797	8	600	1.8	n.s.
Within	15309	45	340		
Group	3818	2	1909	5.6	<.02
Task	102	2	51	0.2	n.s.
Group X Task	877	4	219	0.6	n.s.

TABLE XV

RESULTS OF SECOND EXPERIMENT USING THE BINOMIAL EXPANSION TO SHOW CONSISTENCY OF DATA.

Ps ARE IN TERMS OF IMPROVEMENT IN EXPERIMENTAL STATES AND HIGHER ATTEMPTED
SCORES THAN CORRECT SCORES. TIES ARE SPLIT BOTH WAYS

	Attempted				Correct				Attempted and Correct Combined				Attempted Versus Correct Attempted Correct			
	>100	<100	100	P	>100	<100	100	P	>100	<100	100	P	Higher	Higher	Tie	P
Hypnotic	15	3	0	.008	13	3	2	.03	28	6	2	<.01	9	6	3	n.s.
Post-Hypnotic	13	3	2	.03	13	3	2	.03	26	6	4	<.01	11	4	3	n.s.
Hypnotic and Post-Hypnotic	28	6	2	<.01	26	6	4	.01	54	12	6	<.001	20	10	6	n.s.
Waking Suggestion	6	9	3	n.s.	4	11	3	n.s.	10	20	6	n.s.	8	5	5	n.s.

the consistency across the individual Ss. Taking experimental groups separately and combined, and types of scores separately and combined, all Ps were highly significant indicating that almost all Ss showed the effect. The waking suggestion group tended to do more poorly under suggestion on both types of scores but this failed to achieve significance. In comparing attempted scores with correct scores (procedure for comparing was the same as in the first experiment) in all three groups attempted scores tended to be higher than correct scores but this did not achieve significance in any case.

Table XVI presents the results of the Friedman Rank Analysis of Variance (X_R^2) to test for the difference between tasks and the Wilcoxon Matched-Pair Rank T to test for the difference between types of scores. (Procedure same as in the first experiment.) None of the Ps were significant which indicated no significant difference between tasks or types for any of the groups when both magnitude and consistency were taken into account.

Table XXVI in Appendix A presents the scores of individual Ss' performance in the normal state. They are in percentages and were calculated the same way as mentioned in the last section. ($\frac{\text{Scores in normal}}{\text{total possible}} \times 100$.) Table XXVII in Appendix A presents the results of the application of the Mann-Whitney-Wilcoxon Rank T for independent groups to the data. No significant differences in normal waking scores were found between the experimental group and the control group. The controls tended to do better, however, on each task for both types of scores. This was contrary to the first experiment where the experimental group

TABLE XVI

FRIEDMAN'S RANK ANALYSIS OF VARIANCE TO TEST FOR DIFFERENCES
BETWEEN TASKS, AND WILCOXON MATCHED-PAIR RANK T TO
TEST FOR THE DIFFERENCE BETWEEN THE TYPE
MEASURE IN THE SECOND EXPERIMENT

		Friedman's Rank Analysis of Variance			
		Attempted		Correct	
	N	χ^2_R	P	χ^2_R	P
Hypnotic	6	0.1	n.s.	1.0	n.s.
Post-Hypnotic	6	3.6	n.s.	0.2	n.s.
Waking Suggestion	6	0.0	n.s.	1.3	n.s.
Hypnotic and Post-Hypnotic	12	2.2	n.s.	1.0	n.s.
Wilcoxon Matched-Pair Rank T					
Attempted Versus Correct					
		Smaller Sum of Ranks		P	
Hypnotic and Post-Hypnotic		25		n.s.	

tended to do better.

First and Second Experiments Combined

The analyses of variances of the first and second experiments separately established the fact that the group variable was highly significant. An attempt was made to ascertain which group difference generated most of the significance. The other statistical analyses indicated that the hypnotic and post-hypnotic groups pulled way apart from the waking suggestion group but that there was no significant difference between the hypnotic and post-hypnotic groups. Each S was given the total of all his standard percentage scores and a single classification analysis of variance was performed to test for the difference between groups. For simplicity in computation the extra S in the waking suggestion group from the first experiment was again not included so that the number of Ss in each group would be equal. The F was 7.4 which yielded a probability of less than .01. A Tukey Gap Test was then applied to the data and even when the .05 one-sided significance level was chosen the only gap was between the waking suggestion group and the other two experimental groups. The two experimental groups did not pull apart significantly. The gap needed for significance at the .05 one-sided level was 40.26. The means were as follows: post-hypnotic group 700.7; hypnotic group 675.9; and the waking suggestion group 592.9. There were 83 points between the hypnotic and waking suggestion group which was far in excess of what was needed for significance, but only 24.1 points between the hypnotic and post-hypnotic groups which was

about half of what was needed for significance. The small difference between the hypnotic and post-hypnotic groups could be accounted for simply on the basis of the differences between the two groups on the attempted scores of the counting task in the first experiment.

Table XVII presents the results following the application of the binomial expansion. The hypnotic and post-hypnotic groups separately and combined in their attempted and correct scores taken separately and combined showed significant improvement under suggestion. This was found previously when each experiment was analyzed separately, but to a lesser extent. The waking suggestion group did significantly poorer under suggestion when the two experiments were combined. Each one taken separately before showed a trend but did not yield significance. They still did not do significantly worse in terms of correct scores although the trend is in that direction. The normal waking group showed very little difference in the two states which might be expected since their scores were percentagized artificially and no experimental treatment was applied. When attempted scores were compared with correct scores as they were in the first and second experiment and the binomial expansion applied again significance emerges where it did not when each experiment was analyzed separately. Both the hypnotic and post-hypnotic groups did better on the attempted measure than on the correct measure at the .10 level. When these two groups are combined the difference between the two types of scores yields a significance of less than .05. Again there was no significant difference between types of scores for the waking suggestion or normal waking group.

TABLE XVII

RESULTS OF FIRST AND SECOND EXPERIMENT COMBINED USING THE BINOMIAL EXPANSION
TO SHOW CONSISTENCY OF DATA. Ps ARE IN TERMS OF IMPROVEMENT
IN EXPERIMENTAL STATES AND HIGHER ATTEMPTED SCORES
THAN CORRECT SCORES. TIES ARE SPLIT BOTH WAYS

	Attempted				Correct				Attempted and Correct Combined				Attempted Versus Correct Attempted Correct			
	>100	<100	100	P	>100	<100	100	P	<100	>100	100	P	Higher	Higher	Tie	P
Hypnotic	25	4	1	<.001	20	7	3	<.05	45	11	4	<.001	18	8	4	.10
Post-Hypnotic	23	4	3	<.01	22	5	3	<.01	45	9	6	<.001	18	8	4	.10
Hypnotic and Post-Hypnotic	48	8	4	<.001	42	12	6	<.001	90	20	10	<.001	36	16	8	<.05
Waking Suggestion	7	20	6	.95	10	17	6	n.s.	17	37	12	<.95	13	13	7	n.s.
Normal Waking	3	8	1	n.s.	7	5	0	n.s.	10	13	1	n.s.	3	7	2	n.s.
Waking Suggestion and Normal Waking	10	28	7	<.95	17	22	6	n.s.	27	40	13	n.s.	17	20	9	n.s.

Table XVIII presents the results of the Friedman Rank Analysis of Variance (X^2_R) to test for differences between tasks and the Wilcoxon Matched-Pair Rank T to test for differences between types. Previously in the first experiment this technique yielded significant differences between the tasks for the hypnotic group on both types of measures. The second experiment yielded no significant X^2_{Fs} . When the two are combined the tasks become significantly different on the attempted measure for the post-hypnotic group. The P is less than .10. Since this is barely significant and seven other measures were taken this may very well be a chance phenomenon. Certainly this is not a big effect and no more than a trend in the data. In both experiments the post-hypnotic group tended to do best on abstraction and worst on the memory task in regard to the attempted measure. In the other cases the trends in the first experiment tended to be cancelled out by opposite trends in the second experiment. Using a Wilcoxon T in comparing types of scores it was found that attempted scores were significantly (P equals .10) higher than correct scores for the hypnotic group. There was no significant difference on this measure for the post-hypnotic group, however, and when both groups were combined it yielded a significance level of slightly greater than .10. The trend in the post-hypnotic group, however, was for attempted scores to be higher also. Several drastic reversals with high ranks cut down on this significance. Actually only three out of ten Ss in the post-hypnotic group and two out of ten Ss in the hypnotic group did poorer on the attempted measure.

Table XIX presents the Spearman rank correlation between the

TABLE XVIII

FRIEDMAN'S RANK ANALYSIS OF VARIANCE TO TEST FOR DIFFERENCES BETWEEN TASKS, AND WILCOXON MATCHED-PAIR RANK T TO TEST FOR THE DIFFERENCE BETWEEN THE TYPE MEASURE IN THE FIRST AND SECOND EXPERIMENTS COMBINED

		Friedman's Rank Analysis of Variance			
		Attempted		Correct	
	N	χ^2_R	P	χ^2_R	P
Hypnotic	10	2.5	n.s.	3.8	n.s.
Post-Hypnotic	10	5.6	<.10	0.1	n.s.
Waking Suggestion	11	0.1	n.s.	0.6	n.s.
Hypnotic and Post-Hypnotic	20	1.3	n.s.	1.5	n.s.
		Wilcoxon Matched-Pair Rank T			
		Attempted Versus Correct			
		Smaller Sum of Ranks		P	
Hypnotic		11		.10	
Post-Hypnotic		24		n.s.	
Hypnotic and Post-Hypnotic		62		>.10	

TABLE XIX

SPEARMAN RANK CORRELATIONS OF TASKS AND TYPES FOR BOTH EXPERIMENTS
 COMBINED USING THE STANDARD PERCENTAGE SCORES FOR
 BOTH THE HYPNOTIC AND POST-HYPNOTIC GROUPS

Tasks or Types Correlated	Attempted			Correct			Combined Attempted Scores Versus Combined Correct Scores
	Counting	Counting	Memory	Counting	Counting	Memory	
	Versus	Versus	Versus	Versus	Versus	Versus	
	Memory	Abstraction	Abstraction	Memory	Abstraction	Abstraction	
Spearman Rank R	.58	.50	.34	-.09	.19	.23	.66

tasks in each measure and between the two types of scores. For the attempted measure the correlation between Counting and Memory, Counting and Abstraction and Memory and Abstraction were .58, .50 and .34 respectively. For the correct measure the corresponding correlations were -.09, .19 and .23 respectively. It seems that there was a much higher correlation between improvement on tasks for the attempted measure than for the correct measure. The former look significant by inspection while the latter do not. They are not very high correlations in any event which indicates that Ss improved differentially on each task. The correlation between Ss total attempted score and his total correct score was .66 which indicates that the extremely low F on the type measure in the analysis of variances might have very well been due to the fact that it did not take this correlation into account.

Table XX presents the results of the Mann-Whitney-Wilcoxon Rank T for each task separately to test for differences between the hypnotic and post-hypnotic group and to also test for differences between the experimental and control group. It can be noted that for every task on the attempted measure the experimental groups did significantly better than the control groups. For the correct measure the same thing was true, except for the counting task. Here the reversals of the first experiment washed out any significance the second experiment may have yielded. In comparing the hypnotic group with the post-hypnotic group no significant differences emerged on any of the tasks for either measure except for the correct scores on the counting task when the post-hypnotic group did significantly better than the hypnotic group. (P

TABLE XX

MANN-WHITNEY-WILCOXON RANK T FOR EACH TASK SEPARATELY TO TEST FOR DIFFERENCES BETWEEN THE EXPERIMENTAL GROUP AND THE CONTROL GROUP. THE SAME TEST IS ALSO APPLIED TO TEST FOR DIFFERENCES BETWEEN THE HYPNOTIC GROUP AND THE POST-HYPNOTIC GROUP. FIRST AND SECOND EXPERIMENTS ARE COMBINED

Smaller Sum of Ranks and P Values						
Attempted			Correct			
		Counting	Memory	Abstraction	Counting	Memory
		Counting	Memory	Abstraction	Counting	Memory
Experimental						
Versus						
Control	101	116	87	171	123	101
Sum of 128, P- .05						
Sum of 114, P- .01	.01	.05	.01	n.s.	.05	.01
Trend	Exp.	Exp.	Exp.	Exp.	Exp.	Exp.
Hypnotic						
Versus						
Post-Hypnotic	91	94	97	81	103	108
Sum of 78, P- .05						
Sum of 71, P- .01	n.s.	n.s.	n.s.	<.10	n.s.	n.s.
Trend	P-Hyp.	Hyp.	P-Hyp.	P-Hyp.	P-Hyp.	Hyp.

is less than .10.) This was again caused by the drastic reversals in the first experiment. The directional trends do not indicate any clear cut advantage for the post-hypnotic group. They did better on four tasks and the hypnotic group did better on the other two. The post-hypnotic group did do better on both the attempted and correct measure of the counting task although only the latter attains significance.

Table XXI presents the Spearman rank correlations of performance in the normal state and amount of improvement under suggestion for the hypnotic and post-hypnotic groups. The correlations were calculated separately for the first and second experiments and for the tasks and types of scores. One glance at the table indicates that there was no relationship between absolute level of performance and the effect of hypnotic and post-hypnotic suggestion. There are six positive and six negative correlations ranging from $-.54$ to $.34$, almost a perfect chance distribution.

Table XII presents the Spearman rank correlation of the tasks and type measures for each experiment using the normal scores for all the groups. High correlation between tasks would indicate that the tasks measure similar abilities while a low correlation would indicate that the tasks measure different abilities. The experimenter originally selected the tasks because they seemed to measure different capacities and did not have any statistical validity for this choice of tasks. The extremely low positive correlations indicate the tasks did measure different capacities. In some cases there are even negative correlations between two tasks. The type scores are moderately correlated but the

TABLE XXI

SPEARMAN RANK CORRELATIONS OF PERFORMANCE IN NORMAL
STATE AND AMOUNT OF IMPROVEMENT FOR
HYPNOTIC AND POST-HYPNOTIC GROUPS

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
First Experiment	.16	-.05	-.21	-.50	.34	-.51
Second Experiment	.01	.25	-.24	-.12	.01	.26

TABLE XXII

SPEARMAN RANK CORRELATIONS OF TASKS AND TYPES FOR EACH EXPERIMENT
USING THE NORMAL SCORES FOR ALL GROUPS

Tasks or Types Correlated	Attempted			Correct			Combined Attempted Scores Versus Combined Correct Scores
	Counting Versus Memory	Counting Versus Abstraction	Memory Versus Abstraction	Counting Versus Memory	Counting Versus Abstraction	Memory Versus Abstraction	
First Experiment	-.14	.05	-.17	.47	.07	-.02	.55
Second Experiment	.27	.15	.05	.25	.01	.16	.52

correlation is somewhat lower than would be expected since correct scores were dependent on attempted scores, i.e., an individual could only get as many items correct as he attempted.

Table XXIII presents the standard percentage scores of the five males and five females in the post-hypnotic group. By chance no female Ss were placed in the hypnotic group and half the Ss in the post-hypnotic group were male and half female. A comparison of means shows no consistent difference between the sexes. Males do better on three of the measures and females do better on two and the last is a tie.

Tables XXVII, XXIX and XXX present the raw scores of the hypnotic, post-hypnotic and waking suggestion groups respectively. They may be found in Appendix A.

Summary of Results

Since there is such a large amount of data and so many statistical analyses were made an attempt is made here to summarize the major findings of the entire study. It is hoped that this will help clarify the findings for the reader.

First of all more than twice the percentage of people usually reported in other studies were able to achieve medium and deep trances. The most significant finding in the two experiments was that both hypnotic and post-hypnotic groups performed significantly better than either waking suggestion or normal groups. The waking suggestion group tended to do more poorly under suggestion than in the waking state. The difference between the groups showed up when both tests of consistency

TABLE XXIII

STANDARD PERCENTAGE SCORES OF FIVE MALES AND FIVE
FEMALES IN POST-HYPNOTIC GROUP

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
Females	114	109	140	105	111	120
	111	110	100	179	100	93
	96	82	100	81	122	114
	127	123	150	122	112	138
	118	97	118	113	90	106
	Means	117	104	127	125	109
Medians	114	109	118	113	111	114
Males	102	91	117	139	79	110
	117	142	163	158	142	114
	109	124	136	109	124	127
	125	137	100	134	137	90
	113	110	118	100	139	100
	Means	117	126	134	128	130
Medians	113	124	118	134	137	110

and magnitude were applied. No significant interactions between tasks, types of scores or groups were found. There was no consistent difference in performance between the hypnotic and post-hypnotic groups and no significant difference was found between the tasks. There was a tendency for hypnotic and post-hypnotic Ss to improve more on the attempted measure than the correct measure. There was no significant difference between the experimental and control groups in regard to performance in the waking state. In the experimental groups there was no significant correlation between performance in the normal state and amount of improvement under suggestion. Improvement on the tasks for the attempted measure was moderately correlated while improvement on the tasks for the correct measure was not correlated. Improvement on the attempted measure and correct measure was significantly correlated. Tasks were found to be measuring different capacities as evidenced by extremely low correlations of scores for all groups. There were no significant sex differences found and the use of a counterbalanced order was justified by the scores of the normal group.

CHAPTER IV

DISCUSSION

A lot of important findings often are obtained through incidental observations. For this reason, E will discuss some of the observations of behavior he noted about his Ss, during the entire experiment, that were not quantified. First of all, it was felt that communication among Ss would be a very big problem. Surprisingly, however, no evidence of any communication was observed by E throughout the six months that both experiments were run. Several Ss told E that they tried to find out beforehand what the experiment was about from Ss who had served previously, but could not find out anything. The graduate students who assisted in teaching the class from which the experimental population was drawn confirmed the fact that there was no communication among any of the Ss who had served in the experiment to people who had not yet served. This was an important variable since E did not want to get "cooperation" from his Ss. In other experiments of this sort, cited in the introduction, Ss were often seen for many sessions, and no attempt was made to minimize communication. When an experimental design is set up in that fashion, the criticism can always be made that Ss knew what E was attempting to demonstrate. The subjects then may either consciously or unconsciously perform in the manner which E expects.

By using only one session for each S during the experiment proper, E eliminated practically all possibility of S realizing what the experiment was set up to demonstrate. In questioning Ss following the

experiment, it was found that almost all of them were surprised when they learned about the actual design. Many of them thought it was an experiment testing how fast they could learn.

The experimenter observed that the best hypnotic Ss took the shortest time during preliminary session. The experimenter had to make very little effort to establish rapport with these Ss, and they asked very few questions about hypnosis. They listened carefully to E's explanation of hypnosis, and usually admitted that they had volunteered partially out of curiosity and partially for credit. Those Ss who denied being interested in receiving credit or who said that they were very interested in psychology and how it works, were usually not as good hypnotic Ss. The experimenter felt that the "normal well-adjusted" student made the best S and that those people who showed an unusual amount of tension, lacked self-confidence, or exhibited deviant behavior in the situation were poor Ss.

It usually took a little longer to establish rapport with women than with men simply because of the stories they had heard about hypnosis or because of the sex difference between E and S. Once rapport had been established, however, they usually were excellent Ss as was noted in the previous chapter. If rapport was established easily with a female S, she usually turned out to be an unusually good hypnotic S. Two females who were excellent Ss never came back for the second session because their parents forbade them to. (This illustrates the fact that often a girl's mother has many misconceptions about hypnosis.) No male S was unable to come back for a second session on account of his parents.

In the initial stages of the study, E had no idea that the hypnotic technique would be as successful as it was. It seems like hypnotic behavior is in the repertoire of most people's behavior, or at least most college students' behavior. The method with which this behavior is elicited is probably an important factor contributing to the success of the procedure. Experience of the operator seems to play an unimportant role when a standard procedure is used since E was able to successfully hypnotize the same percentage of people early in the study as he was able to hypnotize in the last phases. The reason for the success of this particular hypnotic procedure seems to lie in the fact that it is a nonauthoritarian approach in which E never challenges S, and the principles of reinforcement and cue change are applied. This illustrates the fact that principles like cue change and reinforcement do not only serve a useful purpose in laboratory experiments with animals, but that these principles have a wider application. This study has substantiated that fact, since the use of these principles more than doubled the successes usually found in hypnotic experiments, even those using nonauthoritarian approaches alone.

Aside from the theoretical implications of this method for inducing hypnosis, it has many practical applications. First of all, the short time needed for induction lends itself very readily to use by professional people whose time is valuable. This technique can also be readily adapted to auto-hypnosis which would eliminate the need for an operator. It was observed by E that hypnosis was induced much faster after the first session, and that almost all Ss were able to achieve the

same depth of hypnosis during the second session. In other words, the method is highly reliable. It can be learned easily, and therefore will require little training. One of the most important aspects of this method is that it is systematic and standard. This is a very important factor when hypnosis is used as a research tool. The investigator can use Ss who achieve the same depth of hypnosis and can cut down on the variability of the hypnotic state. It makes all stimuli fairly constant previous to the application of any experimental treatment. One of the criticisms which can be made of past hypnotic investigations is the fact that most of them were not careful about using a standard hypnotic technique, and depth of hypnosis was purely a subjective judgment on the part of the investigator. Many previous investigators did not even mention the method of induction employed. This has led to a lot of confusion and contradictory results.

One other control that was used in this investigation and not used in other investigations dealing with recall was that all Ss in this study learned and recalled the material in the same state. As was stated in the introduction, many past investigators had Ss learn material in the waking state and recall in the hypnotic state or vice versa. Often their control Ss both learned and recalled material in the waking state. This procedure introduced cue change into the experimental conditions and not into the control conditions. It is well known that cue change is an important variable that leads to changes in behavior. Overlooking this factor probably has been one of the big reasons that some previous investigators did not find hypnosis to be effective for recall of learned material.

The experimenter was very surprised at the large number of houses that were drawn in response to the request to draw something which S remembered drawing in grammar school. Even more surprising was the similarity in the types of houses drawn. Most of them were very simple drawings of the front of the house with two windows, a door and a path leading up to it. When all the drawings of houses are put together it would be very difficult to see that different people drew them. The small range of content was also surprising considering the apparent open-endedness of the request. The fact that hypnotic Ss sometimes drew people and animals leads one to believe that perhaps they were less guarded and defensive under hypnosis than the waking subjects who did not draw any human and animal percepts. Humans and animals are more difficult to draw and Ss were more critical of themselves in the waking state. This was illustrated by the fact that most of the waking Ss complained of their inability to draw while no hypnotic S showed any resistance to drawing.

In regard to the actual experiments themselves, there were several variables controlled in the present study that are often left out in other studies. One was the use of control subjects who received very similar treatment and spent approximately the same amount of time with E. The use of control Ss made the difference in test scores between the experimental and control groups more a function of hypnotic or post-hypnotic suggestion than of extraneous factors. Including a normal waking group added to this control since the waking suggestion group tended to do more poorly than the normal waking group. More Ss

were used in this experiment than in most experiments of this nature, and it has already been mentioned that there was less opportunity for Ss to "cooperate" with E. It was shown that since the normal group and waking suggestion group did not do any better than the hypnotic and post-hypnotic groups during the waking state, there could not have been any cooperation either consciously or unconsciously on the part of experimental Ss.

Waking suggestion, post-hypnotic suggestion and hypnotic suggestion have never before been compared in relation to learning a set of tasks. Most previous investigators did not use hypnotic suggestion, but merely tested to see if the hypnotic state itself was sufficient to yield significantly more learning. Many of the previous investigators used a large number of tasks and gave no rationale as to why the tasks were selected. This investigation was undertaken to study differential effects of suggestion on tasks varying in complexity. The counting task was chosen because it was a simple task requiring merely attention and speed. Ability to count comes in fairly early ontogenetically and requires only a limited conceptual capacity. The material is always present, and S does not have to bring anything new into the situation. A memory task is slightly more complex. Here the individual also did not have to bring anything new into the situation, but the material was taken away and S had to elicit it again while it was absent. This was a power test in the sense that there was no limit put on the time to recall the words. The ability to remember long series of verbal symbols comes much later ontogenetically and probably requires more cortical capacity than counting concrete objects. Alertness and speed were

much less important for this task than for the counting task where there was a time limit imposed. The abstraction task was used as the most complex task because in order to solve a problem on an abstract level, S had to bring something new into the situation. This is what we ordinarily call reasoning or logical thinking which requires a large degree of cortical capacity. Many adults of low intelligence do not have the ability to solve problems of this nature. With this task performance becomes more a function of capacity than effects of practice. It is possible to practice speed of counting and memory but it is questionable as to whether logical thinking or reasoning ability can be improved with practice. This is the basis for many tests of intelligence. In fact, the Shipley-Hartford from which this test was constructed is used as an intelligence test.

Many investigators have talked about hypnosis in terms of it increasing attention, concentration and having a motivating effect on an individual, but very few have entertained the possibility that under hypnosis a person may be helped to mobilize his cortical capacity and apply it to solving problems. The best prediction that could have been made previous to this experiment would have been that as complexity increases improvement under hypnosis decreases. This hypothesis was put forward by Eysenck (40) but was never tested. The fact that the experimental group improved as much on the complex tasks as on the simple tasks raises the question as to whether hypnosis is capable of improving more than merely speed, attention and motivation. In fact, improvement on the abstraction task was more consistent in this study than on any of the other tasks. This was true for both experiments. Of course the

possibility of increasing reasoning ability through the use of hypnosis must be investigated further before any definite conclusions can be drawn. Other populations should be studied aside from college students, and a variety of reasoning tasks should be used.

It should also be mentioned that hypnotic and post-hypnotic suggestion does not increase performance twofold and threefold. The most typical improvement is between 10 and 25 per cent which is still remarkable since it is a well known fact that college students usually work very hard without reward and very often bring their own rewards to the experimental setting. This is illustrated by the difficulty in getting Ss to improve performance in studies using praise and reproof. In other words college students usually work at their utmost capacity with no rewards given to them by E and it is exceedingly difficult to increase motivation any further.

There was a tendency for hypnotic Ss to improve more in attempted scores than in correct scores. Most previous investigators like Young (152), Eysenck (40), and Hammer (53) used almost all measures of quantity rather than quality. They used measures like time and speed, and very seldom used a measure of quality or correct responses. In this study S tended to improve more on the attempted measure but improved significantly on both the attempted and the correct measure. The correct measure is more related to capacity than the attempted measure. The latter measurement is mostly a function of speed, attention and increased motivation. There is no doubt that these factors did play a role in increasing performance of the experimental groups. The

important question is why didn't the same suggestion increase performance in the waking suggestion group? This group did significantly worse under suggestion than in the normal state. Actually, this is a rather unusual finding similar to negative suggestibility often found in the hypnotic Ss. The best explanation seems to be that the suggestion put increased tension on the Ss, and they tended to become too aware of their performance which caused a loss of confidence and blocking. It was also probably typical of them to doubt the truth of E's statement when he told them they would perform with increased capacities and abilities. This was not true of the hypnotic Ss. The hypnotic group was under hypnosis while working on the tasks, and it has been pointed out that while in that state, they tended to be less critical of themselves and of their productions and more accepting of another person's suggestions. The post-hypnotic group was not even consciously aware of the suggestion while working on the tasks.

It is interesting that three of the poorest experimental Ss, in regard to improvement under suggestion, did display signs of negative suggestibility. One was a male S in the hypnotic group who reported that his arm began to get heavy when E told him it was getting lighter. He said that it rose with much difficulty because of this heavy feeling. Another female S in the hypnotic group reported that she was getting a headache while working on the tasks. The experimenter's instructions were for S to feel alert, awake and refreshed. The last S was also a female in the post-hypnotic group who only did poorly on the memory task. After she was told under hypnosis that her mind would be clear, and no

interfering ideation would detract from her performance, she reported that her mind was a blank when recall of the first memory task was attempted. An interesting follow-up to this would be to investigate, more extensively, the individual who is capable of achieving a deep hypnotic trance easily and yet responds negatively to suggestion.

It should be noted that there were no significant correlations between the tasks for both measures which indicates that these tasks are measuring different capacities or abilities of the individual. This substantiates the a priori scaling of the tasks into different levels of complexity on a logical basis. The experimenter was quite sure that the differentiation of the tasks in terms of complexity had face validity, but the low correlations tends to substantiate this experimentally. The low correlation between improvement scores for the tasks demonstrates further that Ss improve differentially under suggestion on the various tasks. This was especially true of correct scores. The fairly high correlation in improvement between the attempted and correct measures is mainly a function of the fact that people who work fast usually have more ability than people who work slowly. In other words, speed of performance is usually correlated with ability.

The first experiment had several flaws. The most striking one was the inadequacy of the correct measure for the counting task which resulted in increased variability in each group and caused drastic reversals in the hypnotic group. The difficulty with the task was that the items in each line were too long, and the score was based on a very small sample of behavior. By increasing the time allowed to work on the

task in the second experiment, and by making the length of the lines half as long, the behavioral units on which the correct score was based increased threefold, and cut down on the variability among Ss. The reversals in the hypnotic group were eliminated in the second experiment, and the rest of the groups showed less variability. It is possible that hypnosis cuts down slightly on the alertness of Ss; just enough so that they skip one or two numbers on a line and therefore get it wrong. Since only from three to six lines were completed on the counting task in the first experiment, a slight reduction in alertness could have been sufficient to cause the drastic reversals.

The second experiment equalized the time for each task and utilized a larger number of Ss. The abstraction task was also improved by adding items of intermediate difficulty and increasing the time allowed to work on it. In general, the second experiment showed less variability among Ss and was more consistent. This also may have been a function of E's experience in administering the tasks. The experimental population was equivalent for both experiments, and there was no difference between the percentage of Ss qualifying as hypnotic Ss. In the first experiment the hypnotic Ss did significantly better on the memory task than on the other two. However, the second experiment cancelled out this effect. On the whole, trends for task differences shown in the first experiment were cancelled out by the second experiment, and the combined data showed no significant effects except for the abstraction task with regard to attempted scores. Here, in both experiments, the post-hypnotic group tended to do better on that task but the combined data only yields a significance level of less than .10 which can be expected by chance

considering it is one of a cluster of eight X^2 s.

A chance distribution of correlation was obtained between performance in the normal state and improvement under suggestion. This indicates that people with high ability and people with low ability both improve under hypnotic and post-hypnotic suggestion and how much a person will improve cannot be predicted from his initial performance. This lends generality to any application of these experimental findings. Hypnotic suggestion is effective with a wide range of abilities. The fact that no significant sex differences were found increases the generality of the findings even more.

Now that the positive aspects of the study have been discussed, some limitations must also be mentioned and further steps in research proposed. First of all, this investigation has not answered the question definitely as to whether there is any difference between hypnotic and post-hypnotic suggestion. Although no significant differences were found in this study it seems that if different tasks were used some differentiation might have been evident. The fact that the hypnotic Ss worked while under hypnosis and the post-hypnotic Ss in the waking state should lead to differences in the performance of certain tasks. Further experimentation regarding this particular problem is needed before a solution is reached. More experimentation is sorely needed in this area on populations other than college students. Some preliminary work has been done with mental defectives (87) which should be followed up. Children and older people should also be added to experimental populations. One of the great difficulties in doing hypnotic research is usually the wastage rate of Ss. Usually five people have to be tried

before one qualifies as an S. Very often large numbers of preliminary sessions are needed before an S is used in an experiment. The technique used in this study might promote the introduction of more psychological research of this nature because of the small wastage rate, the short period of training and the reliability of the procedure.

This investigator only made a first attempt to scale tasks in order of complexity. Three tasks are certainly not a complete scale. It remains for ingenious people to devise tests with low intercorrelations that go higher, lower, and in-between, in complexity. A more thorough test can then be made of the relationship between the complexity of a task and amount of improvement under hypnotic and post-hypnotic suggestion. Each investigator must be careful to use control Ss drawn from the same population. This precaution has been ignored too often in the past.

It is fascinating to speculate upon the possibilities that hypnosis can increase intellectual capacity, cortical functioning, etc. but it must be kept in mind that this may not be the explanation for the present results. We do not know enough about higher level tasks to really know what capacities it relates to in individuals. It is an interesting hypothesis, however, that hypnotic and post-hypnotic suggestion awaken some capacity in the individual which previously lay dormant. Certainly it is worthy of further investigation.

Glasner (49) recently has said after reviewing several learning experiments using hypnosis, in effect, that the use of hypnosis in the fields of social psychology and learning are fertile and virtually unexplored areas. It is surprising that more work has not been done in

these areas and so much work has been concentrated in psychotherapy and medicine. The experimenter is hopeful that this study will awaken more interest in people working in the field of learning and help launch a program of controlled experimentation in this area.

CHAPTER V

SUMMARY

An investigation was undertaken to ascertain the differential effects of hypnotic, post-hypnotic and waking suggestion on the learning of tasks varied in complexity. A fairly comprehensive review of the hypnotic literature was done with special emphasis placed on the area of hypnosis and learning. Past investigations in this area were evaluated and criticized in detail. All Ss were college students taken from first year psychology classes who volunteered to participate in the study. The study consisted of two separate experiments, the second a replication of the first with modification. Each experiment was preceded by a preliminary session during which time the potential hypnotic and post-hypnotic groups were put through a hypnotic procedure. If they were able to achieve post-hypnotic amnesia and carry out a post-hypnotic suggestion, they were used in the experiment proper. If they were not able to achieve this depth of trance, they were not used in the experiment. The waking suggestion group was seen for a preliminary session but hypnosis was not attempted. In the first experiment, four males participated as Ss in the hypnotic group, two males and two females in the post-hypnotic group, four males and one female in the waking suggestion group. A normal waking group of four males was also put through the experiment. They were given no preliminary session, however. In the second experiment, six males were used in the hypnotic group, three males and three females in the post-hypnotic group and four males and

two females in the waking suggestion group. No normal waking group was used.

Four series of tasks were administered with the normal waking state and suggestion state counterbalanced. Each series consisted of three tasks; a counting task, memory task and abstraction task. Each task was scored for the number of items that were attempted and also for the number of items that were correct. The hypnotic group performed the tasks twice in the normal waking state and twice under hypnosis following suggestion. The post-hypnotic group performed the tasks twice in the normal waking state without suggestion and twice in the waking state following post-hypnotic suggestion. The waking suggestion group performed the tasks twice in the normal state without suggestion and twice following waking suggestion. Standard percentage scores were calculated for each S on each task and for each measure.

✓ In the statistical analysis groups, tasks and types of scores were compared on both a magnitude and consistency basis. ✓ The major finding was that the hypnotic and post-hypnotic groups did significantly better under suggestion than the waking suggestion group. ✕ This was true for both experiments when analyzed separately and together. There was less variability in the second experiment because of improved design. The waking suggestion group did significantly more poorly under suggestion than in the normal waking state and the normal waking group performed at about a chance level when their raw scores were artificially converted into standard percentage scores. There did not seem to be any significant difference between the tasks for any group but there was a

tendency for attempted scores to be higher than correct scores in the hypnotic and post-hypnotic groups.

✓ No sex differences in performance were found and the hypnotic and post-hypnotic group did not perform significantly differently. There was chance correlation between improvement scores on the tasks for the correct measure, and a moderate correlation between improvement scores on tasks for the attempted measure for the hypnotic and post-hypnotic groups. The attempted measure was moderately correlated with the correct measure for these two groups. Chance correlation was found for normal scores across tasks which demonstrated that the three tasks measured different capacities.

There was no significant difference between the experimental and control groups in regard to performance in the normal waking state and amount of improvement under suggestion.

The theoretical implications and practical applications of the findings were discussed and proposals were made for further steps in research in this area. The efficiency of the hypnotic technique was mentioned and emphasis was placed on the need for rigorous experimentation in this area using adequate controls. It was also mentioned that before any sweeping conclusions or generalizations could be made a larger variety of tasks and age groups would have to be investigated.

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APPENDIX A



TABLE XXIV

RAW SCORES OF NORMAL GROUP WITH MEANS TO SHOW FATIGUE AND PRACTICE EFFECTS AND
DIFFERENCE BETWEEN THE FIRST AND FOURTH SERIES COMBINED
AND THE SECOND AND THIRD SERIES COMBINED

	Counting				Attempted Memory				Abstraction				Counting				Correct Memory				Abstraction			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	210	250	250	273	7	7	9	10	5	5	2	4	110	100	100	50	9	15	25	18	5	5	2	4
	115	150	152	177	9	15	11	18	5	7	7	7	115	150	152	177	27	45	33	52	5	6	7	7
	148	150	177	169	8	14	11	18	5	5	5	7	0	50	122	67	12	23	19	26	1	4	5	6
	223	228	250	242	7	12	10	15	3	6	6	8	123	178	100	192	18	30	26	30	3	4	4	4
Means	175	195	207	213	8	12	10	15	5	6	5	7	87	120	119	122	17	28	26	32	4	5	5	5
Means	1 & 4	2 & 3			1 & 4	2 & 3			1 & 4	2 & 3			1 & 4	2 & 3			1 & 4	2 & 3			1 & 4	2 & 3		
	387	402			23.0	22.2			11.0	10.8			209	238			48.0	54.0			8.8	9.3		

TABLE XXV

STANDARD PERCENTAGE SCORES OF PERFORMANCE DURING
NORMAL STATE IN FIRST EXPERIMENT

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
Hypnotic	45	27	54	20	27	54
	44	28	54	28	17	46
	33	23	58	23	22	58
	30	47	50	30	31	46
Means	38	31	54	25	24	51
Post-Hypnotic	40	78	63	25	67	42
	43	38	50	28	26	42
	27	32	33	20	17	29
	40	35	58	20	22	58
Means	38	46	51	23	33	43
Waking Suggestion	41	50	54	28	31	54
	34	42	58	19	27	58
	31	20	58	26	18	54
	51	28	67	31	21	58
	33	23	63	18	16	63
Means	38	33	60	20	23	57
Normal Waking	47	28	38	16	15	38
	30	43	58	30	43	54
	32	43	50	7	21	29
	48	37	50	28	31	33
Means	39	38	49	25	29	39

TABLE XXVI

STANDARD PERCENTAGE SCORES OF PERFORMANCE DURING
NORMAL STATE IN SECOND EXPERIMENT

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
Hypnotic	55	43	41	43	29	16
	49	45	59	38	27	44
	65	58	53	18	49	44
	61	33	41	56	21	28
	56	27	50	51	23	47
	52	33	50	47	27	44
Means	56	40	49	42	29	34
Post-Hypnotic	51	28	53	31	13	44
	35	43	25	33	27	25
	47	35	34	47	35	34
	38	32	53	28	19	31
	38	17	34	8	10	28
	43	68	53	38	45	53
Means	42	36	42	31	25	36
Waking Suggestion	53	58	59	53	49	53
	66	40	59	36	32	53
	61	42	38	56	28	28
	48	35	44	38	22	25
	61	65	38	49	47	28
	44	28	78	44	15	56
Means	56	45	53	46	32	41

TABLE XXVII

MANN-WHITNEY-WILCOXON RANK T TO TEST WHETHER THE CONTROL
SUBJECTS AND THE EXPERIMENTAL SUBJECTS PERFORM
DIFFERENTLY IN THE NORMAL STATE

	Attempted			Correct		
	Counting	Memory	Abstraction	Counting	Memory	Abstraction
First Experiment	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Trend for Higher Performance	Exp.	Exp.	Con.	Exp.	Exp.	Con.
Second Experiment	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Trend for Higher Performance	Con.	Con.	Con.	Con.	Con.	Con.

TABLE XXVIII

RAW SCORES OF INDIVIDUAL Ss FROM WHICH STANDARD
PERCENTAGE SCORES WERE CALCULATED -
HYPNOTIC GROUP

		Attempted												Correct											
		Counting				Memory				Abstraction				Counting				Memory				Abstraction			
First Experiment	200	259	329	250	8	12	12	8	7	7	9	6	100	109	29	100	24	32	32	24	7	7	8	6	
	213	217	221	263	8	10	7	12	7	7	6	7	163	167	121	63	12	18	13	20	6	6	5	6	
	150	150	150	177	5	10	6	9	7	7	7	7	100	50	50	127	13	30	16	27	7	7	7	7	
	142	148	150	200	10	16	12	24	7	6	6	7	42	148	150	150	18	30	26	49	5	6	5	7	
Second Experiment	254	287	300	300	9	11	13	17	7	8	3	6	204	162	200	225	19	27	27	34	4	4	1	1	
	275	233	250	315	12	15	12	18	10	10	9	13	250	183	200	240	18	27	21	30	7	6	8	10	
	324	366	375	328	15	28	17	20	8	10	9	9	25	166	125	150	41	80	35	48	5	9	5	4	
	250	305	300	318	7	8	12	14	8	8	5	8	250	280	275	293	9	12	24	26	4	5	3	5	
	300	350	375	263	9	13	9	7	8	12	9	8	300	250	350	213	23	39	19	19	8	11	8	7	
	310	246	277	375	9	10	10	13	11	8	8	11	225	246	227	300	23	20	28	27	8	7	7	8	

TABLE XXIX

RAW SCORES OF INDIVIDUAL Ss FROM WHICH STANDARD
PERCENTAGE SCORES WERE CALCULATED -
POST-HYPNOTIC GROUP

	Counting				Attempted Memory				Abstraction				Counting				Correct Memory				Abstraction			
	200	211	241	198	19	28	23	28	7	10	11	8	50	161	100	198	45	84	50	76	4	6	6	6
First Experiment	200	214	212	235	7	12	11	14	6	6	6	8	150	64	212	235	15	28	19	22	5	5	5	6
	150	152	164	120	10	16	11	9	4	7	6	4	100	152	164	100	20	20	24	11	3	4	4	4
	200	196	208	250	9	11	10	14	7	7	7	7	150	146	50	200	15	21	18	24	6	7	7	7
	275	263	225	235	6	8	6	11	7	10	7	10	100	125	125	210	6	16	12	17	7	10	6	7
Second Experiment	200	158	194	250	12	13	13	20	4	4	4	8	175	133	194	225	22	21	27	32	3	4	4	8
	219	250	263	250	8	16	10	13	4	8	7	7	219	250	263	250	24	48	30	39	4	7	7	7
	225	180	200	250	11	13	16	15	8	9	8	9	150	130	150	225	23	25	10	25	4	7	3	5
	175	208	225	209	5	6	5	5	4	6	7	7	50	50	25	25	7	16	9	11	4	5	4	5
	250	225	200	250	9	19	19	28	10	10	7	10	175	200	175	250	15	34	47	58	10	10	7	8

TABLE XXX

RAW SCORES OF INDIVIDUAL Ss FROM WHICH STANDARD
PERCENTAGE SCORES WERE CALCULATED -
WAKING SUGGESTION GROUP

					Attempted												Correct							
	Counting				Memory				Abstraction				Counting				Memory				Abstraction			
First Experiment	183	206	200	231	12	16	19	18	6	7	7	7	133	206	150	150	23	48	25	33	6	6	7	7
	121	172	164	200	7	14	11	17	6	7	7	8	71	72	114	100	13	26	23	29	6	7	7	6
	150	150	152	164	6	8	4	6	6	7	6	8	100	50	152	164	14	22	12	18	6	7	6	7
	213	255	250	255	9	10	7	14	5	7	9	8	200	155	150	255	9	24	13	18	4	7	7	7
	150	162	164	179	6	6	5	8	7	7	7	8	50	162	64	129	10	18	17	19	7	7	7	8
Second Experiment	254	256	266	275	13	18	16	22	10	11	8	9	254	256	266	275	27	40	44	62	9	11	6	8
	292	325	338	325	10	13	11	16	8	10	9	12	200	150	213	225	24	35	23	29	7	10	7	8
	275	306	325	337	7	11	9	8	5	8	4	7	250	256	275	312	17	20	17	34	3	5	4	6
	185	250	225	225	11	11	10	9	6	9	5	7	135	200	179	200	13	17	22	17	4	4	4	6
	300	300	282	310	11	18	22	28	5	8	4	7	225	225	232	260	23	42	40	62	3	5	4	6
	225	211	227	229	8	13	4	11	10	14	11	11	225	211	227	229	12	19	8	21	8	9	9	9

APPENDIX B

First Experiment-Counting Task-Form 1

Count the numbers in each row and record the total at the end of each row. Do not add the numbers, but merely count how many are in each row. Work as fast as you can.

9E4FDHDUR6S78M5YTH2T98Y882T28S8PAAP693B9N7A49993A1 _____

698W95T6N54G414NT9UE41AY468TSF944T294N7373TD72M634 _____

5RM2AEH6A78USS8EPN5N3SS1157283C4S35S46SEHG1SEBX482 _____

73AEL3239S1T6SC4A9EM9NRWRHSGS1N7EH6MHE5TW4D22679B _____

STFW93HAD61C92N44MC876495BS9H21E4AN6D72397723FY1CN _____

4Y684MAT737R9924B2YK49G4MA7S46HE9H972A4G49SH9754E _____

532T5613YTSRER8NH97R9819657NTNC4AE953NT3HLPGAELW6N _____

6E8A3D3W66SPMSK4495GH32EJ415297T9856NN3SFNA4T5AM42 _____

7E469H89S18AC737C55MEDE5372A18838U1363M4NC4E125N26 _____

1G8SCR76PA77T48TTEC42F899CFEPT3U8R9RRT669D9G538ERT _____

First Experiment-Memory Task-Form 1

string
circle
heaven
master
salary
cattle
dinner
pocket
school
office
farmer
spirit
senate
bridge
summer
empire
action
basket
island
tongue
stream
dollar
garden
thread
valley
beauty
minute
window
vessel
orange

First Experiment-Abstraction Task-Form 1

Complete the following. Each dash () calls for either a number or a letter to be filled in. Every line is a separate item. Take the items in order, but don't spend too much time on any one.

start here

- (1) 1 2 3 4 5 _
- (2) Z Y X W V U _
- (3) NE/SW SE/NW E/W N/ _
- (4) escape scape cape _ _ _
- (5) tot tot bard drab 537 _ _ _
- (6) 57326 73265 32657 26573 _ _ _ _ _
- (7) knit in spud up both to stay _ _
- (8) 81 -64 -49 36 25 -16 _ _
- (9) surgeon 1234567 snore 17635 rogue _ _ _ _ _
- (10) tar pitch throw saloon bar rod fee tip end plank _ _ _ _ _ meals
- (11) two w four r one o three _
- (12) 406 350 316 300 226 250 _ _ _ _ _

First Experiment-Counting Task-Form 2

Count the numbers in each row and record the total at the end of each row. Do not add the numbers, but merely count how many are in each row. Work as fast as you can.

M4325DC3NE57TWH3262AM1W12RWN6495ASDNF1ST7PTMAF6T7G _____

41EE8H631A97E4NIEHNI1D8TTE5A6326H1756BAS2WHHA8PSGA _____

E1NCN9UEY51HE13RA649CTN4NS62DTE8521ECVHLMY5DBWHA1N _____

75AC386H1481N4TAD23EY7ETA2988BNE8NE825T93EA72R738P _____

S6751E8E2AC79E596G52E7DCT7PS1881A5U1977C7A9H1TT3 _____

ET647RENFAEDS6TME9819951TA1ETCCTTN7T7NDSSNPF8ECEAE _____

1T3YQR55S239N26ERC75574961ST3HLS125314W9A6BU319E8T _____

7G65YT85NRNNA1S28P5E7K71413NAE6RAY5TN5H3A9653T71RD _____

A77CPTRIEE1EAE66D55H59RN393186SWA92A6H4UE2378EDN2D _____

13E5SD4F8AENG4Y8CH2716TN658291E5RR3H47RA37T8X9SE9A _____

First Experiment-Memory Task-Form 2

butter
doctor
ticket
cotton
lesson
prince
author
burden
powder
bottle
forest
worker
church
nature
finger
animal
season
potato
castle
palace
shadow
police
flower
harbor
coffee
nation
avenue
market
branch
yellow

First Experiment-~~Ab~~straction Task- Form 2

Complete the following. Each dash () calls for either a number or a letter to be filled in. Every line is a separate item. Take the items in order, but don't spend too much time on any one.

start here

- (1) white black short long down _ _
- (2) AB BC CD D _
- (3) 12321 23432 34543 456 _ _
- (4) oh ho rat tar mood _ _ _ _
- (5) A Z B Y C X D _
- (6) mist is wasp as pint in tone _ _
- (7) Scotland landscape scapegoat _ _ _ _ ee
- (8) 8 -11 15 -20 26 -33 _ _ _ _
- (9) tam tan rib rid rat raw hip _ _ _
- (10) 3124 82 73 154 46 13 _
- (11) lag leg pen pin big bog rob _ _ _
- (12) 54 32 18 16 6 8 _ _

Second Experiment-Counting Task-Form 1

Count the numbers in each row and record the total at the end of each row. Do not add the numbers, but merely count how many are in each row. Work as fast and as accurately as you can.

9E4FDHUR6S78M5YTH2T98Y88 _____	2T28S8PAAP693B9N7A49993A1 _____
698W95T6N54G414NT9UE41AY4 _____	68TSF944T294N7373TD72M634 _____
5RM2AEH6A78USS8EPN5N3SS11 _____	57283C4S35S46SEHQ1SER482 _____
73AE1A3239S1T6SCH49EM9NRW _____	RHSGS1N7EH6MHE5TW4D22679B _____
STFW93HAD61C92M44MC876495 _____	BS9H21E4AN6D72397723RY1CN _____
4Y684MAT737R9924B2YK49G4M _____	A7S46HE9H972A4G949SH9754E _____
532T5613YTSRER8NH97R98196 _____	57NTNC4AE953NT3HLPQAE1W6N _____
6E8A3D3W66SPMSK4495GH32EJ _____	415297T9856NN3SFNA4T5AM42 _____
7E469H89S18AC737C55MEDE53 _____	72A18838U1363M4NC4E125N26 _____
1G8SCR76PA77T48TTEC42F899 _____	CFEPT3U8R9RRT669D9G538ERT _____

Second Experiment-Memory Task-Form 1

1. string
2. circle
3. heaven
4. master
5. salary
6. cattle
7. dinner
8. pocket
9. school
10. office
11. farmer
12. spirit
13. senate
14. bridge
15. summer
16. empire
17. action
18. basket
19. island
20. tongue
21. stream
22. dollar
23. garden
24. thread
25. valley
26. beauty
27. minute
28. window
29. vessel
30. orange

Second Experiment-Abstraction Task-Form 1

Complete the following. Each dash () calls for either a number or a letter to be filled in. Every line is a separate item. Take the items in order, but don't spend too much time on any one.

start here

- (1) 1 2 3 4 5 _
- (2) Z Y X W V U _
- (3) NE/SW SE/NW E/W N/ _
- (4) escape scape cape _ _ _
- (5) numb number plum _ _ _ _ _
- (6) tot tot bard drab 537 _ _ _
- (7) 57326 73265 32657 26573 _ _ _ _ _
- (8) fare fair pale _ _ _ _
- (9) knit in spud up both to stay _ _
- (10) tldua adult tidma admit refta _ _ _ _ _
- (11) surgeon 1234567 snore 17635 rogue _ _ _ _ _
- (12) tar pitch throw saloon bar rod fee tip end plank _ _ _ _ _ meals
- (13) on one tone _ _ _ _ _
- (14) two w four r one o three _
- (15) 81 64 49 36 25 16 _ _
- (16) 406 350 316 300 226 250 _ _ _ _ _

Second Experiment-Counting Task-Form 2

Count the numbers in each row and record the total at the end of each row. Do not add the numbers, but merely count how many are in each row. Work as fast and as accurately as you can.

M4325DC3NE57TWH3262AMW13	_____	RWN6495ASDNF1ST7TTMAF6T7G	_____
L1KE8H631A97ELNDEHNLRD8TT	_____	E5A6326H1756BAS2WHHA8PSGA	_____
ELNCN9UEY51HE13RA649CTN4N	_____	S62DTE8521ECVHLMY5DBWHA1N	_____
75AC386R1481N4TAD23KY7ETA	_____	2988BNESME825T93EA72R738P	_____
S6751EHLER2AC79E596G52E7D	_____	CT7PS1881A5U1977C7A9H1TT3	_____
ET647RENFAEDS6TME9819951T	_____	A1ETCCTTN7T7NDSSNPF8ECEAE	_____
1T3YQR55S239N26ERC7557496	_____	1ST3HLS125314W9A6BU319E8T	_____
7G65YT85NRNNA1S28P5EFR714	_____	13NAE6RAY5TN5H3A9653T71RD	_____
A77CPTRAEELBAE66D55H59RN3	_____	93186SWA92A6HLUE2378EDN2D	_____
13E5SD4F8AENG4Y8CH2716TN6	_____	58291E5RRCH47RA37T8X9SE9A	_____

Second Experiment—Memory Task—Form 2

1. butter
2. doctor
3. ticket
4. cotton
5. lesson
6. prince
7. author
8. burden
9. powder
10. bottle
11. forest
12. worker
13. church
14. nature
15. finger
16. animal
17. season
18. potato
19. castle
20. palace
21. shadow
22. police
23. flower
24. harbor
25. coffee
26. nation
27. avenue
28. market
29. branch
30. yellow

Second Experiment-Abstraction Task-Form 2

Complete the following. Each dash () calls for either a number or a letter to be filled in. Every line is a separate item. Take the items in order, but don't spend too much time on any one.

start here

- (1) white black short long down _ _
- (2) AB BC CD D _
- (3) 12321 23432 34543 456 _ _
- (4) oh ho rat tar mood _ _ _ _
- (5) so son soon _ _ _ _
- (6) A Z B Y C X D _
- (7) mist is wasp as pint in tone _ _
- (8) hale hail rear _ _ _ _
- (9) Scotland landscape scapegoat _ _ _ _ ee
- (10) hsoer shore isgth sight lsaev _ _ _ _ _
- (11) tam tan rib rid rat raw hip _ _ _
- (12) 3124 82 73 154 46 13 _
- (13) cash crash peach _ _ _ _ _
- (14) lag leg pen pin big bog rob _ _ _
- (15) 8 11 15 20 26 33 _ _ _ _
- (16) 54 32 18 16 6 8 _ _