Hypnotic Hypermnesia with Differing Stimuli

by

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A thesis submitted to the Faculty of Graduate Studies in partial fulfillment of the requirements for the degree of Masters of Arts

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Abstract

Attempts to produce hypermnesia, improved recall, by using hypnosis, using non-meaningful material, such as nonsense material and unconnected word lists, have consistently been unsuccessful. However, when meaningful material (e.g., prose passages) has been used with a free recall format, hypermnesia effects have been demonstrated (Relinger, 1984).

More recently, Shields and Knox (1986) obtained hypnotic hypermnesia with word lists when subjects encoded words at a "deep" level, as defined by the levels-of-processing memory theory (Craik & Lockhart, 1972). This study attempted a partial replication of Shields and Knox (1986) work with word lists. Additionally, meaningful material, in the form of prose passages, was used in an attempt to elicit hypnotic hypermnesia.

Some hypnotic hypermnesia was exhibited with the word lists, but only with highly susceptible hypnotic subjects. Attempts to produce hypnotic hypermnesia using prose passages were unsuccessful.

Hypnotic Hypermnesia with Differing Stimuli

Hypermnesia has been described as "abnormally vivid or complete memory or recall of the past " (Webster's New Collegiate Dictionary,1976,p.563). Attempts to induce hypermnesia through the use of hypnosis have typically not sought results as dramatic as Webster's definition suggests; rather researchers have merely sought improved recall. Anecdotal accounts of improved memory caused by hypnotic induction can be found as early as 1895 (Dingwall, 1967). In the 94 years since the time of this early report, research in the area seems to have followed a cyclical pattern, with periods of high interest in hypnotic hypermnesia being followed by periods in which almost no research appears to have been done at all. The earliest well-documented period of interest in hypnotic hypermnesia occurred during the 1930's and 1940's.

Beginning Research:1920-1940

In all attempts to induce hypnotic hypermnesia, the subjects are either asked to learn or have already learned some type of material in the waking state. Then some subjects are hypnotized and asked to recall the material while the remainder of the subjects compose various control groups used in these studies. A significant improvement in recall by the hypnotized group relative to the control group or groups is taken as evidence of hypnotic hypermnesia.

One functional way to divide the research done in hypnotic hypermnesia is by the type of material that subjects were asked to recall. Relinger (1984),in his review of the research, divided the types of material typically used into three categories: (a) non-meaningful material, (b) meaningful material , and (c) attempts to duplicate forensic situations (usually simulated crimes) in the laboratory.

Early Studies Using Non-Meaningful Material

Attempts to enhance the recall of non-meaningful material are among the earliest mentioned in the psychological literature. This is also the area of research which has experienced the least amount of success. Non-meaningful material in this context refers to both nonsense material and words that are not organized in a meaningful manner.

Huse(1930), working with nonsense symbols to which nonsense syllable names were assigned, found that there were no significant differences between his hypnotized and control groups, in terms of recall, 24 hours after learning the material. Other studies of the 1930's and 1940's using nonsense material supported Huse's conclusion (Mitchell,1932; Rosenthal, 1944).

The second type of non-meaningful stimulus material is word pairs of the type that Young used in his 1925 study. Relinger (1984) mentioned the paired adjective-noun association learning tasks of Young's research as being the first to show that hypnosis did not induce hypermnesia with non-meaningful material.

Along similar lines, Rosenthal (1944) found that hypnosis did not generally enhance recall for what he described as lists of words not organized in a meaningful context. Rosenthal, however, did find the first instance of hypnosis improving recall with this type of material, but only under very specific conditions. A separate part of his study found that recall of nonsense syllables and random words improved when the material was learned under stress. Rosenthal labelled this stress condition "emotional tension".

Pascal's (1949) study was the only study of this period to show hypermnesia with non-meaningful material. This study is mentioned even though it did not involve the use of hypnosis; rather, a relaxation procedure was used that was very similar to a hypnotic induction.

Pascal found that a list of 18 nonsense syllables was recalled better by the subjects who were in the hypnosis-like relaxation group than by the subjects in the control group. No other study of this period either supported or replicated the Pascal study.

Early Studies Using Meaningful Material

Attempts to hypnotically enhance the recall of meaningful material also date back to the 1930's and 1940's. These attempts were typically more successful.

The earliest of these studies was undertaken by Stalnaker and Riddle in 1932. The material that they had their subjects recall was determined by the subjects. They asked their subjects to try to recall previously memorized material, initially with half their subjects hypnotized and half their subjects in the awake state. The recall material most frequently chosen was prose passages memorized as much as several years previously, usually from poems or the Bible. The subjects were then switched to the opposite condition from that in which they started and asked to recall the previously recalled passage. This sequence was repeated so that all subjects underwent an ABAB or BABA series of being hypnotized or in the awake state depending upon the state in which they began the experiment. Stalnaker and Riddle found that the subjects recalled significantly more material while hypnotized than while in the awake state.

Stalnaker and Riddle's study contained several methodological flaws. They did not have identical recall instructions in the two conditions, they did not check for how long prior to the experiment subjects had memorized the material involved, and they did not control for initial levels of learning. However, their results were supported by later studies.

White, Fox, and Harris (1940), in addition to finding no hypnotic enhancement to the recall of nonsense material, found that hypnosis did enhance the recall of both poetry learned during their experiment and the content of films shown to their subjects. Rosenthal (1944), in his multi-part experiment, showed hypnotic hypermnesia in his subjects who were asked to memorize a poem.

Research on hypnosis as it affects recall did not generate much interest in the 1950's, as reflected in the literature. There was one relevant study done by Sears in 1954. Sears showed hypnotic hypermnesia in his subjects using a display of common household objects which the subjects viewed while in the waking state , and were asked to recall while hypnotized and while awake. The early research is summarized in Figure 1.

Recent Research:1960-1987

Forensic Hypnosis

Research in hypnotic hypermnesia went through a period of reduced interest in the 1950's and the beginning of the 1960's , but underwent a resurgence of interest in the mid to late 1970's. The reason for this was mainly due to the third category of material used in hypnotic hypermnesia investigations, mentioned previously, forensic hypnosis. Although not investigated during the earlier cycle of hypnotic research, hypnotic enhancement of simulated forensic situations has become the area of hypnotic hypermnesia research that is currently most active.

The interest in this area and in all other areas of hypnotic hypermnesia research starting in the early 1960's was related to the increasing use of hypnosis by the police in attempts to improve the memory of eyewitnesses. As this use of hypnosis spread, as reflected by media accounts that span three decades (Barmann, 1960; Time, 1976; Newsweek, 1981), the tones of the respective articles shifted from unguarded

Non-Meaningful Material

• Nonsense Material

Study	Result
Huse (1930)	Failure
Mitchell (1932)	Failure
White, Fox & Harris (1940)	Failure
Rosenthal (1944)	Failure

• Unconnected Word Lists or Word Pairs

Young (1925)	Failure
Rosenthal (1944)	Qualified Failure
Pascal (1949) *	Qualified Success

* Relaxation procedure used

Meaningful Material

Stalnaker & Riddle (1932)	Success
White, Fox, and Harris (1940)	Success
Rosenthal (1944)	Success
Sears (1954) **	Success

** visual display rather than text used

Figure 1. Beginning Research Summary

optimism in the case of the 1960 article, to extreme pessimism twenty years later. This shift was, in part, due to a series of court challenges to the admissibility of evidence from hypnotized witnesses.

Research interest in the area of hypnotic hypermnesia was increased by the practical use of forensic hypnosis. This area of research is extensive and not directly relevant to the proposed study, therefore the studies specifically involving the enhancement of memory in simulated forensic settings will not be reviewed. The current research project involved an investigation of the encoding process that may produce hypnotic enhancement in the recall of two types of material, word lists and paragraphs. Basic hypnotic hypermnesia research underwent a renewal of interest when research in forensic hypnosis increased the viability of hypnosis as a research topic.

Recent Studies Using Non-Meaningful Material

The results of the early attempts to enhance the recall of non-meaningful material were negative when the research was repeated during the 1960's. Several experiments of this period working with nonsense syllables found no significant memory enhancement with the use of hypnosis (Rosenhan & London, 1963; Barber and Calverly, 1966; Dhanens, 1973).

However, Barber and Calverlys' (1966) results should be considered as evidence against hypnotic enhancement of the recall of nonsense syllables only with reservations. Their subjects learned a list of 12 nonsense syllables at the end of a regular classroom lecture. Two months later Barber and Calverley tested their subjects for recall while the subjects were either hypnotized or awake. Despite the fact that the highest average recall for their best group was only 0.9 syllables, thus indicating what would seem to be a very real floor effect, they proceeded with their experiment and concluded that hypnosis was ineffective in improving the recall of nonsense syllables. The floor effect would seem to suggest that no memory trace existed to be enhanced.

Despite the abundance of earlier evidence in the literature against hypnosis enhancing the recall of nonsense syllables, the most recent attempts to do so have reported success. Unfortunately, this work consists of three studies done by Augustynek (1977;1978;1979) in the Polish journals Studia Psychologica and Prace Psychologiczno-Pedigogiczne. In discussing these experiments, Shields and Knox (1986) stated that the available English translations do not make clear either the methods of the experiments or the details of Augustynek's findings.

Relinger (1984) made many of the same comments as Shields and Knox in his discussion of Augustynek's earlier 1977 study. Relinger stated that the translation of this study which he obtained listed a series of percentage gains in the recall of nonsense syllables shown by Augustynek's subjects, but at no point is it made clear which, if any, tests of significance were performed on the results.

Augustynek (1977, 1978) also claimed success in enhancing the recall of unconnected words. Unconnected words constitute another type of non-meaningful material, according to Relinger's classification system. In his experiments, Augustynek used lists of unconnected words, seemingly chosen at random, and gave his subjects a free recall test.

Recent research using various types of word lists showed the same pattern as the recent research with nonsense syllables. Again, there was some interest shown in the early 1960's. In this case, it was a study done by Das (1961) in which he found no significant differences between waking state and hypnotized recall when the material to be recalled was a list of paired associate words. Again, a recent study disputed the earlier findings.

Shields and Knox (1986) claimed success with, and introduced a new angle to, attempts to enhance the recall of word lists through the use of hypnosis. Instead of concentrating on what was being memorized, as previous research had, Shields & Knox (1986) looked at how it was being memorized. Shields and Knox's (1986) hypotheses were based on the memory research done by Craik and his associates on levels-of-processing memory theory (e.g., Craik, 1979; Craik and Lockhart, 1972; Craik and Tulving,1975).

This levels-of-processing theory proposes that the amount of meaning which a subject attends to when processing a stimulus determines the processing operation used to encode that stimulus and the "depth" to which that stimulus is processed and encoded, either "deep" or "shallow" levels. A superficial type of encoding, such as determining if a word has a certain letter in it, leads to "shallow" level processing. A more complex type of encoding, such as attending to the meaning of the word, leads to "deep" level processing.

It was the contention of Craik and his colleagues that material processed at a deeper level is remembered better than material processed at a shallow level.

Although the levels-of-processing theory has opponents on specific points, (e.g. Eysenck, 1978; Jacoby, Craik & Begg, 1979; Maki & Schuler, 1980), the contention that deeply processed material is more easily recalled than shallowly processed material has gained much research support (Bower & Karlin,1974; Craik and Tulving,1975; Elias & Perfetti,1973; Mistler-Lachmann,1975; Rosenberg & Schiller,1971).

Shields and Knox (1986), using levels-of-processing as their theoretical framework, investigated hypnotic hypermnesia in subjects who had attempted to memorize word lists under conditions intended to produce either shallow or deep levels of processing. The tasks assigned to the subjects to produce the differing levels of processing were from a study by Hyde and Jenkins (1969). Subjects were shown words and asked either to decide whether or not the letter "e" was in the word (shallow processing) or to assign the word to one of five categories: very pleasant, pleasant, neutral, unpleasant or very unpleasant (deep processing).

The three subject groups used in the study varied according to their level of hypnotic susceptibility and were: (a) a highly susceptible group of subjects who were hypnotized during recall, (b) a highly susceptibile group who were given relaxation/motivation instructions during recall, and (c) a low susceptibility group who were instructed to attempt to simulate hypnosis during recall.

Shields and Knox (1986) found that the hypnotized subjects recalled significantly more of the deeply processed words than did the control subjects. Recall of the shallowly processed words did not differ significantly between the three groups. In addition, the error rates of the hypnotized subjects were not significantly different than the error rates of the control subjects. Increased error rates had been reported in some of the previous research in this area (Orne, 1979).

A second experiment by Shields and Knox (1986) replicated the results of the first experiment with improved experimental controls, the most important of which was reducing the number of choices required by the deep processing task so that both the deep and shallow processing tasks involved only two choices to make them more equivalent.

While it would seem that these results conflict with the previous studies which attempted to induce hypnotic hypermnesia with non-meaningful material of this type, this is not necessarily the case. Part of the Shields and Knox (1986) findings corroborate the results of the previous research by showing that words that are processed and encoded at a shallow level are not recalled better by hypnotized subjects.

The Shields and Knox (1986) findings suggest that what determines whether or not hypnotic hypermnesia is produced using unconnected words as the stimuli is the type of processing that the subject performs. The necessary factor would seem to be that stimulus material must be processed and encoded at a deep level, according to Craik and his colleagues' definition of deep and shallow levels of processing. This hypothesis could explain some of the results that past research in the area has found.

In the past, hypnotic hypermnesia has been very difficult to induce with nonsense syllables and other non-meaningful material. According to the levels-of-processing theory, this kind of material is more difficult to process and encode at a deep level than is meaningful material. This might explain the results of experiments in this area with non-meaningful material such as word lists and word pairs. Materials of this nature are not always deeply processed, but as the work of Shields & Knox (1986) would suggest, subjects can be made to process and encode this material at a deep level.

Earlier research with non-meaningful material did not provide the subjects with instructions designed to promote deep level processing, and often subjects were not informed of forthcoming memory tests. In these cases, subjects who chose to use a memory scheme involving deep level processing could have been balanced by those who did not, thus confounding the results.

Also, Shields and Knox (1986) only obtained significant results with subjects who were highly susceptible to hypnosis. Deep level processing may interact in some, as yet unknown, way with hypnosis to produce recall, and may require high susceptibility to hypnosis to produce significant results.

In addition, an explanation for hypnotic hypermnesia that required deep level processing for encoding material would aid in explaining the generally more favorable results obtained in hypnotic hypermnesia studies that used as their stimuli meaningful material

(e.g., sentences and prose passages). This material is, theoretically, easier to process and encode at a deeper level.

Recent Studies Involving Meaningful Material

Hypnotic hypermnesia research involving meaningful material seemed nonexistent during the 1950s and 1960s. An experiment that revived research interest in the area (Cooper & London, 1973) tested subjects for recall of a paragraph on a rare chemical. Although they found some increase in recall among high susceptible subjects, the increase was not significant.

One possible shortcoming of the Cooper and London (1973) experiment was that the previous research that had shown hypnotic hypermnesia with prose had used a free-recall method to test subjects' recall, while Cooper and London used a short answer response type method. Relinger (1984) suggested in his review of the research that the short answer method of gauging recall may be too restrictive in investigating hypnotic hypermnesia, in that restricting recall response may interfere with the manner in which hypnosis improves recall.

Dhanens and Lundy (1975) investigated a number of factors that they believed had an impact on hypnotic hypermnesia, including the type of instructions given under hypnosis and the type of stimulus material to be recalled. They found that a significant hypermnesic effect was found with highly susceptible subjects who memorized short paragraphs and were given motivating instructions under hypnosis. They were told, while hypnotized, that their memories had been improved and that they could now remember everything.

An alternative method of attempting to produce hypermnesia is to use regression instructions. In this case the subjects would be told, while hypnotized, that they were returning to the time at which they studied the material. Dhanens and Lundy used a free recall format when testing their subjects' memories.

Augustynek (1977), in addition to working with nonsense syllables, found hypermnesic effects with hypnosis and stimulus material involving:
(a) meaningful text, (b) unrelated sentences, and (c) word lists. Augustynek reported memory improvement across all stimulus materials, but once again, difficulty in obtaining an English translation makes it impossible to determine the significance of his work or the methods employed in it.

DePiano and Salzburg (1981), in one of the more recent investigations of hypnotic hypermnesia using meaningful material as stimuli, found that hypnotized subjects recalled significantly more visually and orally presented stimulus material than did nonhypnotized subjects. They also looked at the effects of stress on recall. Defining stress by three different levels of arousal, DePiano and Salzburg found no significant effects with hypnosis and recall, in contrast to Rosenthal (1944). The two studies seem to differ significantly both in the type of stimulus material used (meaningful material vs. nonsense syllables) and in the question of whether Rosenthal's stressor of "emotional tension" was similar enough to DePiano and Salzburgs' physiological arousal so as to expect comparable results. Figure 2 summarizes the recent research.

In summarizing the conclusions of his review of the hypnotic hypermnesia literature, Relinger (1984) stated that, in general, hypnotic hypermnesia is seen when meaningful material is used as the stimulus, and when a free recall narrative format is used to test memory. He also wrote that the recall of nonmeaningful material is not enhanced by hypnosis. Relinger (1984) offered three possible explanations for the occurrence of

Non-Meaningful Material

- Nonsense Material

Study	Result
Rosenhan & London (1963)	Failure
Barber & Calverley (1966)	Failure
Dhanens (1973)	Failure

- Unconnected Word Lists or Word Pairs

Das (1961)	Failure
Shields & Knox (1986)	Success

Meaningful Material

Cooper & London (1973)	Failure
Dhanens & Lundy (1975)	Qualified Success
DePiano & Salzburg (1981)	Success

Figure 2. Recent Research Summary

hypnotic hypermnesia.

Theoretical Explanations

State Dependent Memory

The least supported hypothesis involves the use of the phenomenon of state-dependent memory to explain hypnotic hypermnesia. As employed by Relinger, this explanation could more accurately be termed mood-dependent memory. State-dependent memory research has shown that recall is superior when recall states are identical to the physiological state in which the encoding was done. Similarly, it has been found that recall is superior when it is attempted while in the same mood as that which existed at the time of encoding. Experiments (Bower, 1981; Bower, Gilligan, and Monteiro, 1981) have shown that subjects who learn word lists while sad or happy, recall more of those words if in the same mood state at recall.

Relinger (1984) sought to use this concept of mood-dependent memory to explain the vagaries of hypnotic hypermnesia by hypothesizing that meaningful material such as poetry or prose produces more emotion in the original learning situation than does nonsense syllables. He then suggested that this emotion can be effectively reproduced by hypnosis. As the hypnotized person is then in the same emotional state as he or she was when encoding the material, recall is enhanced. The data does not offer much in support of this explanation.

Relinger's statement that hypnosis recreates whatever emotion is engendered by the material in the original learning situation is offered without any empirical support. The only reason to believe that this occurred in hypnotic hypermnesia research would be if the hypnotists involved in all these experiments were using regression instructions to attempt to regress the subjects to the point of original learning. Yet at the beginning of his review, Relinger states the importance of distinguishing between instructions to induce hypermnesia (typically, suggestions of increased motivation while hypnotized), and what he calls the therapeutic technique of age regression. Most, if not all, of the studies showing hypnotic hypermnesia did not use the age regression technique, and in fact, did not use any instructions that might lead to emotions similar to those in the original learning situation being produced.

Another major criticism of this explanation is the concept of the prose or poetry typically involved in these experiments producing strong enough emotion in subjects to produce the kind of mood-dependent effects seen by Bower and his colleagues. The concept that Cooper and Londons' (1973) paragraph on a rare chemical could produce strong emotions in the reader is hard to believe. This assumption by Relinger seems to be without supporting data.

The Imagery Hypothesis

A second proposed explanation of hypnotic hypermnesia involves the effect of hypnosis on subjects' abilities to visualize. Research has suggested that hypnosis improves visual imagery (Hilgard, 1965; Kroeger & Fezler, 1976). Relinger suggested that the increase in memory found with the use of hypnosis may be due to hypnotized subjects improved abilities to produce imagery.

This hypothesis receives some support from a series of experiments performed by Crawford and Allen (1983) in which they found that hypnosis enhanced memory for visual information. In combination with the fact that memory for highly imageable words has been found to be superior to that for more abstract words (Paivio, 1971), Relinger concluded that it is no surprise that highly imageable material such as prose selections show hypermnesia with the use of hypnosis while much more difficult material to image, such as nonsense syllables, do not.

Meaningfulness/Cue Theory

The third theory mentioned by Relinger is similar to a theory proposed by Weitzenhoffer (1955). Weitzenhoffer proposed an explanation for hypnotic hypermnesia that involved the degree of meaningfulness of the material involved. Weitzenhoffer quantified the concept of degree of meaningfulness by describing it as being the number of implicit cue-producing responses attached to the material by the subject. More meaningful material had more responses associated with it, according to Weitzenhoffer, and in the learning situation, these responses become associated with the overt response and thus become a stimulus for the overt response. The more implicit (cue-producing) responses material possesses, the more cues are available to become stimuli for the overt response. Because of this, more meaningful material is recalled at a superior rate in the waking and hypnotized states as compared to the recall of less meaningful material. The reason why Weitzenhoffer hypothesized that hypnosis produces a hypermnesic effect was that he felt that stimulus generalization which interferes with recall was minimized under hypnosis.

This theory, reformulated by Relinger, is compatible with a more recent theory, that of Shields and Knox (1986), which is based primarily on the work of Craik and his colleagues. The levels-of-processing theory described by them (Craik, 1979; Craik & Lockhart 1972; Craik & Tulving 1975) has been shown empirically to explain why some material can be recalled across longer periods of time than other material. In the terms of the theory, material which is processed at a shallow level, because the encoding process was shallow, is not recalled as well as material which is processed using a procedure which produces deeper level encoding. Tasks involving semantic or affective judgments have been shown to lead to deeper level encoding than tasks involving structural or syntactic judgments.

Shields and Knox (1986) showed that deeper level processing of words was necessary for hypnotized subjects to show a significant hypermnesic effect relative to non-hypnotized subjects. Why this should be so is still not clear.

The basic levels-of-processing theory which divides all stored memories into either shallowly processed and encoded or deeply processed and encoded dimensions, is clearly insufficient to explain the full range of memory. Development of the levels-of-processing theory has introduced the concept of gradations of deep level processing, with the ideas of elaboration or "spread" of encoding, notably by Craik and Tulving(1975).

The most extensive work done in the area of elaboration as an explanation for depth of processing has been done by Anderson and Reder (Cermak & Craik, 1979, pp.385-403; Reder, 1979). According to them, depth of processing depends on the number of elaborations that a subject produces when encoding material. Elaborations are described as the thoughts and ideas generated by the subject that he or she associates with the material involved. The more elaborations generated, the more cues available in memory, and the more likely the material will be recalled. With this theoretical basis, tasks that lead to deeper encoding are those that cause more elaborations to be generated. This hypothesis is supported by the previous research, as it seems likely that asking subjects to determine whether or not a word makes them feel sad will lead to more elaborations than asking them to judge whether or not a word has an "e" in it.

If Anderson and Reders' theory of elaborations as an explanation for depth of processing is accepted, it can be used in an attempt to explain hypnotic hypermnesia in a way that is consistent with Relinger's (1984) reformulation of Weitzenhoffer's (1955) theory. Both Anderson and Reders' elaboration theory and Weitzenhoffer's implicit responses theory describe memory processes which sound very similar. Weitzenhoffer, however, did not describe his implicit responses as being affected by the encoding processes involved, a concept not introduced until levels-of-processing theory was advanced, years later. The similarity of the two theories is in their common idea that what happens is that material which has more cues associated with it is recalled better.

Anderson and Reders' theory does not deal directly with hypnosis and so does not offer an explanation as to why hypnosis may improve the recall of more deeply processed, highly elaborated material, and not do the same with more shallowly processed, less elaborated material. This could be for the reason Weitzenhoffer advanced, that hypnosis reduces the stimulus generalization, or in the terms of Anderson and Reders' theory that hypnosis reduces the confusion among redundant elaborations. Shallowly processed material would theoretically not be blocked from recall because of confusion among cues to the same degree as deeply processed material. Weitzenhoffer (1955) also states that hypermnesia occurs because the use of hypnosis increases the drive to recall correctly, but this is difficult to investigate directly.

An alternate explanation for the success of hypnosis in improving recall could combine the depth of processing explanation with the visual imagery explanation mentioned earlier. In such a combined explanation, depth of processing would explain the necessity for meaningful information, because if the material is not stored in such a way as to be deeply encoded, it will be stored for only a very short period of time. It would appear that only meaningful material can be easily deeply encoded, which also supports the elaboration explanation for levels-of-processing, as it seems unlikely that nonsense material would lead to the generation of a large number of elaborations by subjects.

As the evidence presented in favour of the visual imagery explanation for hypnotic hypermnesia has shown that visual imagery is improved while hypnotized, this could offer an explanation for how the information processed to a deeper level by the increased number of elaborations is retrieved. Encoded material with a large number of elaborations is likely to cause more vivid visual imagery than that material which has not as many.

In the same way, some of the evidence presented earlier for the visual imagery hypothesis offers support to the elaboration depth of processing theory. The finding which showed that more easily visualised words were recalled at a superior level to more abstract words offers support in that, typically, a word such as tiger will lead to more spontaneous elaborations than will the word justice.

Experiment 1

Statement of Purpose

The purpose of this study was to investigate cognitive processes that may lead to hypnotic hypermnesia. The design involved two different types of stimuli as well as two recall conditions.

The first experiment was a partial replication of the Shields and Knox (1986) experiment. Subjects were exposed to word lists, and asked to perform tasks on the words designed to produce deep or shallow level encoding. As in Shields and Knox (1986) experiment, the word lists consisted of 40 nouns. In addition, the words were selected for high and low imagery values. It was expected that high imagery, deeply processed words would be recalled more easily, in comparison to the other words, by the highly susceptible hypnotized subjects. Comparison groups were a low susceptible hypnotized group, and low and high relaxation groups.

Method

Subjects

Subjects were recruited from introductory psychology classes. By participating in the experiment, the subjects obtained course credit. Subjects were assigned to a particular stimulus condition, depending upon the book in which they chose to sign up for participation in the experiment. Subjects were unaware of the different stimulus conditions prior to the experiment.

Sixty-five subjects composed the group used in the word list condition, Experiment 1. This group consisted of 29 males and 36 females. The average age of the group was 19.2 years, with a range from 17 to 36 years. The subjects signed up for one of four groups. Two groups were randomly chosen to receive hypnosis instructions, while the other two received relaxation instructions. There were 33 subjects in the hypnosis group, 11 males and 22 females, while the relaxation group had 32 subjects, 18 males and 14 females. Although a total of 20 subjects signed up for each of the four groups, once absentee subjects and equipment failures were accounted for, there were 33 subjects in the hypnosis group and 32 in the relaxation group.

Material

The 40 words used in Experiment 1 were made into 35 mm slides. Half of the slides contained words that were easily imaged, while the other 20 slides contained words which have been found to be more difficult to image.

A second set of forty slides containing instructions was created. There were two different instructional slides. These slides asked the subjects to perform either a deep or a shallow processing task. The instructional slides were paired with and preceeded the word slides. Twenty slides instructed the subjects to answer a question about the meaning of the word ("Can you easily form a mental image of the following word ?"), the deep processing task. Twenty slides contained the shallow processing instructions, " Does the following word have an 'e' in it? "

The forty words that were used were selected to fulfill certain requirements. Half the words were nouns that are easily imaged, while the remaining twenty were nouns that have been found to be more difficult to image. All the words were checked to ensure that none of the four stimulus conditions contained words that were significantly more or less meaningful, on the basis of the Paivio, Yuille, and Madigan(1968) norms, which give values for both imagery and meaningfulness for 925 nouns. As an example, the selection of words that were given with the instructions leading to deep processing were checked to ensure that they were not consistently more meaningful than the words which were processed at a shallow level (Paivio, Yuille, & Madigan, 1968) (see Appendix A). The high and low imagery words were split into groups of ten to be paired with the processing tasks in a random manner.

The hypnotic induction was an audiotape of the standard 25-minute hypnotic induction found in Shor and Orne (1962). The relaxation tape was a 25-minute series of instructions in progressive relaxation, of the type found in Rathus and Nevil (1977). The hypnotic susceptibility scale used was the Harvard Group Scale of Hypnotic Susceptibility, Form A (Shor & Orne, 1962). The scale used to measure relaxation was a 12-point self-report scale.

Design and Procedure

Experiment 1 involved word lists as stimulus materials and was similar to the Shields and Knox (1986) study. All subjects were exposed to four stimulus conditions: high imagery words-deep processing, high imagery words-shallow processing, low imagery words-deep processing, and low imagery words-shallow processing.

Methodological improvements in this study controlled for social demand characteristics. Zamansky, Scharf, and Brightbill (1964) suggested that subjects who expected to be hypnotized and retested would suppress their initial performances in order to comply with inferred experimental demands. In order to eliminate any withholding effects, subjects were not told that a memory test was part of this experiment, either on the first or second recall test. By doing this, subjects could not react to inferred demand characteristics by withholding on the first recall test.

In addition, a relaxation group was used as a comparison/control group. Barber and Calverley (1966) pointed out the many problems inherent in comparing the recall of hypnotized subjects to the recall of a standard control group of subjects. These include the fact that recall may be improved by having one's eyes closed, hypnotized subjects typically spend more time in the experimental setting than nonhypnotized subjects and become better acclimatized, and also the fact that the typical set of motivating instructions given under hypnosis make no sense when given in the context of subjects being awake. By using relaxed subjects as a control group, time spent in the experimental setting was equalized, subjects naturally had their eyes closed, and it enabled them to be instructed, once they were relaxed, that they were able to remember everything.

The experiment was performed in a language laboratory so that subjects' recall tests could be individually audiotaped. Subjects were seated at long tables on which dividers had been set up so that each subject was in their own three-walled cubicle, and could see only the person sitting in the row in front of them through a plexiglass partition. Each row had six seats, and subjects were seated in every second seat. Every subject had their own tape recorder built into their table top, and a set of headphones complete with a microphone to enable the recording of the recall tests. The hypnosis and relaxation instructions were audiotaped and were played over the subjects headphones. A central console controlled all subjects' tape recorders.

Before the experiment, the subjects had the concept of imaging explained to them. They were given a response sheet with the numbers one to 40 on it, and the words "yes" or "no" beside each number. They were told that they would be rating a series of words using two different tasks. They were told that the first task involved rating the words for their imagery values. They were shown the instructional slide with the deep processing task on it ("Can you easily form a mental image of the following word ?"), and then a slide of the word "Tiger", and asked to mark their answer sheet, either yes or no. After they had finished, they were told that most people would have marked yes, as most people can form a mental image of a large yellow or orange striped cat, and add further details to that mental picture, such as sharp teeth and fierce claws, depending on what they have heard about tigers in their past. The word "justice" was then given as an example of a word for which it would be much more difficult to form a clear mental image.

Then the shallow processing task was explained to the subjects. They were shown a slide with the question "Does the following word have an 'e' in it ?" and asked to mark yes or no on their answer sheet when the word slide was projected. The next slide projected contained the word "Horn". Then the subjects were told that it was expected that they had circled no on their sheets, and that if the word had been "Bone" they would have circled yes. Twenty slides instructed the subjects to determine if the word had an " e " in it, the shallow processing task, while twenty slides contained the deep processing task. These processing tasks were similar to those used by Shields and Knox (1986).

Ten of the easily imaged words were shown following the projection of the instructions to perform the deep processing task. The other ten easily imaged words were paired with the instructional slides which requested the use of the shallow processing task. The 20 more difficult to image words were paired with the instructional slides in the same manner, ten words with the deep processing task, and ten words with the shallow processing task. The subjects were asked to circle yes or no on a response sheet they were given in response to the tasks they were asked to perform. The various pairs of slides were given to the subjects in a random order to control for any order effects. The instructional slides were shown for five seconds, while the word slides were shown for seven seconds.

Following presentation of all of the stimulus material, subjects were asked to perform a 60- second backwards counting task to eliminate any short term memory retention. They were asked to mentally count backwards from 300 by threes, and started off by being given the first four numbers, 297, 294, 291, 288. In order to make the subjects more comfortable with the combination headphone/microphone that would be used later on in the experiment to record their recall tests, the subjects were asked to put on their headphones at the beginning of the backwards counting task. Each subject had their own set of headphones and cassette recorder, which was controlled from a command unit at the front of the room.

At the completion of the backwards counting task, the subjects were told that their recall of the words would be tested. Subjects were instructed to say out loud all the words they could think of that had been shown to them on the slides. Their reponses were audiotaped, and they were given five minutes to recall as many of the words as they could.

The format of the experiment was the same for all 65 subjects to this point. As the language laboratory could hold only 20 subjects without overcrowding, the subjects were run in four groups of approximately 16 each. Subjects were signed up for the sessions in groups of 20, but by the time absentees and unusable data was accounted for, 65 remained. Two groups were in the hypnosis condition while two groups were in the relaxation condition.

For those subjects in the hypnosis groups a standard 25-minute audiotaped hypnotic induction was played after they had been given five minutes to recall as many of the target words as they could. Before the hypnotic induction, and following their initial recall test, the subjects were told of the true nature of the experiment and given some basic information about hypnosis. Any questions they had about hypnosis were then answered.

While hypnotized, the subjects were given motivational instructions. They were told, " Your memory has improved, and you can now recall all of the words you saw previously." They were then asked to verbally recall the words that they were exposed to, and their recall responses were again individually audiotaped. The second recall test also lasted five minutes. Subjects in the hypnosis recall groups were then brought out of hypnosis and asked to complete the Harvard Group Scale of Hypnotic Susceptibility: Form A (Shor & Orne, 1962) and a short questionnaire asking for some demographic information (See Appendix B).

The same procedure was followed with the 32 subjects in the comparison groups, except that a 25-minute set of audiotaped relaxation instuctions was heard following the initial recall test. Once relaxed, subjects were given the same motivational instructions that the hypnotized group received. They were told that their memory had improved, and that they could recall all of the words that they had seen previously. Then, while relaxed, subjects' recall of the stimulus material was recorded again.

After the subjects had recalled all the words that they were capable of recalling in five minutes, they were told that the recall test was complete, and allowed to orient themselves. They were then asked to fill out a short questionnaire which asked them if they had ever been hypnotized before, and if they felt that they had entered an hypnotic state while being relaxed. In addition, they were asked to rate how relaxed they felt they had been, on a 12-point scale, with 1 being not even slightly relaxed to 12 representing as relaxed as they could ever recall being.

This scale had no standardization data and had primarily face validity. It was used mainly as a method of identifying which of the subjects, following the relaxation instructions, felt they had become very relaxed, and those who felt they had not. These relaxation ratings were also used in the analysis of the results. The outline of Experiment 1 can be seen in Figure 3.

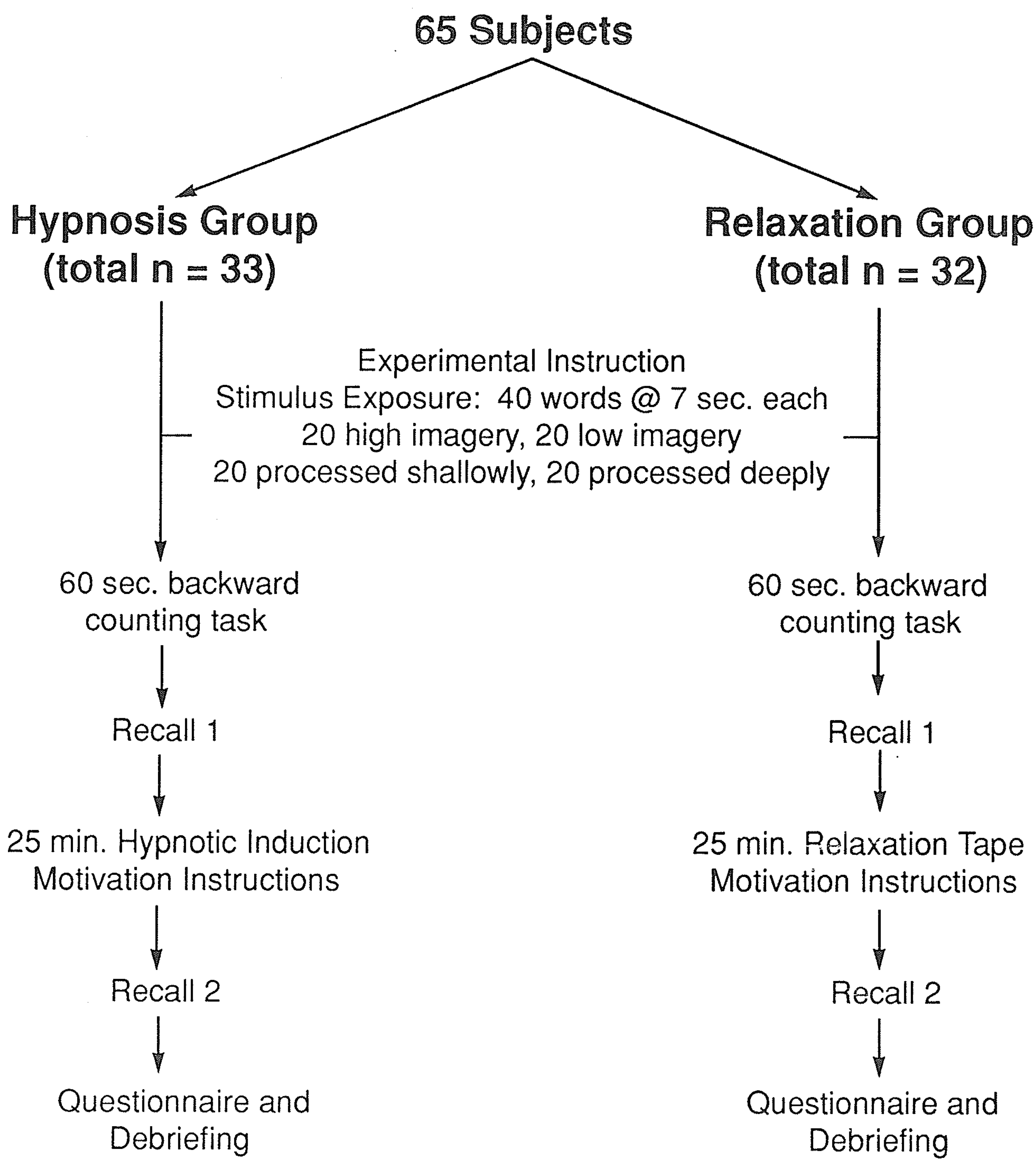

Figure 3. **Procedure Experiment 1 - Word Lists**

Results

Data Reliability Measures

The taped recall tests were hand scored and transferred to a computer data file. Twenty-five of the 65 tapes were chosen at random and both first and second recall tests were rescored by a second examiner. The number of agreements between the two scorers was converted to a percentage to obtain the interobserver reliability rating. The IOR for Experiment 1 was 97%.

The first analysis that was performed on the data was a repeated measures analysis of variance (ANOVA). This ANOVA was a 2 (hypnosis vs. relaxation) x 2 (first test vs. second test) x 2 (high vs. low imagery word values) x 2 (deep vs. shallow processing) repeated measures test. The first variable was a between-subjects variable, while the other three were within-subjects variables. First and second test group means can be seen in Table 1.

Full ANOVA tables for all analyses can be found in Appendix F. Only summary findings are discussed in the text. This first analysis found that high imagery words were recalled at a significantly higher rate than low imagery words across first and second tests, $F(1,63) = 28.44$, $p < .001$ (high imagery words $M = 4.65$, low imagery words $M = 3.19$).

Table 1

First and Second Test Recall Results

First Test:Word Recall-Pre-Experimental Baseline Memory Scores - Group Means (Maximum score possible=10)

Group	LS	HS	LD	HD
Hypnosis	.55	1.00	2.21	3.21
(std. dev.)	(.56)	(1.23)	(1.60)	(1.76)
Relaxation	.72	1.09	2.78	3.40
(std. dev.)	(.81)	(1.09)	(1.39)	(1.85)

Second Test:Word Recall - Post Manipulation Memory Scores - Group Means (Maximum score possible=10)

Group	LS	HS	LD	HD
Hypnosis	.39	1.15	2.64	3.73
(std. dev.)	(.61)	(1.06)	(2.09)	(1.79)
Relaxation	.59	1.25	2.88	3.69
(std. dev.)	(.84)	(1.05)	(1.36)	(1.94)

Note: LS=Low imagery, Shallow processing;
HS=High imagery, Shallow processing;
LD=Low imagery, Deep processing;
HD=High imagery, Deep processing

Also, deeply processed words ($\underline{M}$ = 6.14) were found to be recalled at a superior rate compared to shallowly processed words ($\underline{M}$ = 1.69) across first and second tests, $\underline{F}(1,63) = 195.66$, $\underline{p} < .001$. These significant findings were expected from previous research (e.g., Craik & Tulving, 1975; Paivio, Yuille & Madigan, 1968) and were seen throughout the following analyses. There were no overall group differences between the hypnosis and relaxation conditions, $\underline{F}(1,63) = 1.09$, $\underline{p} < .301$. Nor was there a difference between performance on the two testing occasions, $\underline{F}(1,63) = 3.43$, $\underline{p} < .069$. Additionally, there was no group by test time interaction, $\underline{F}(1,63) = .54$, $\underline{p} < .466$, revealing that the slightly superior performance of the relaxation group seen on the first recall test, as shown in Table 1, was nonsignificant. No other combination of factors in this ANOVA was found to be significant.

Two additional analyses examined the effects of hypnosis and relaxation on the data. In the first analysis, subjects in the hypnosis group were divided on the basis of a median split according to their scores on the Harvard Group Scale of Hypnotic Susceptibility (HGSHS) (Shor & Orne, 1962). Then, an analysis was performed on the data which was a 2 (High vs. Low Susceptibility) x 2 (High vs. Low imagery words) x 2

(Deeply vs. Shallowly processed words) ANOVA. The relaxation group was similarly divided on the basis of their scores on the relaxation scale, and the same ANOVA was performed on their data, substituting high and low perceived relaxation for high and low susceptibility. As the primary interest was to examine the recall of the groups after the experimental manipulation, only the data from the second test were used.

The ANOVA examining only the hypnosis group used a median split to divide the hypnosis group into high and low susceptible groups. The median of the group was at five on the 12-point Harvard scale, and the decision was made to include the subjects who had scored five on the scale with the high susceptible group in order to allow any results found with the high susceptible group to be as generalizable as possible. This resulted in a low susceptible group of 13 subjects, susceptibility equal to four or less, mean susceptibility of 3.1, being compared to a high susceptibility group of 20 subjects who all scored five or more on the susceptibility scale, mean susceptibility of 6.9. The results are shown in Table 3. When the ANOVA was performed, no main or interaction effects were found, other than the imagery and processing effects mentioned earlier.

Table 3

High vs. Low Susceptibility Groups: Second Recall Test (Group Means, Maximum=10)

Group	LS	HS	LD	HD
Low Susceptibility	.31	1.15	2.85	3.15
(std. dev.)	(.48)	(1.07)	(2.27)	(1.35)
High Susceptibility	.45	1.15	2.50	4.10
(std. dev.)	(.69)	(1.09)	(2.01)	(1.97)

The relaxation group was divided by a median split also, yielding a low perceived relaxation group of 21 (perceived relaxation under nine, mean rating of 6.9) and a high perceived relaxation group of 11 (perceived relaxation nine and over, mean rating of 9.9). Their results can be seen on Table 4. Again, the results of the ANOVA showed no significant effects involving group.

In considering the results of the analysis performed on the hypnosis group, it was seen that the low susceptible group performed better than the high susceptible group on the initial test of recall with the high imagery, deeply processed words. This difference was nonsignificant, but considering the large difference between the results of the two hypnosis groups on the second test with the deeply processed, high imagery words, it was felt that controlling for initial

Table 4

High vs. Low Relaxation Groups: Second Recall Test

(Group means, Maximum=10)

Group	LS	HS	LD	HD
Low Relaxation	.48	1.10	3.14	3.57
(std. dev.)	(.51)	(.94)	(1.32)	(1.72)
High Relaxation	.82	1.55	2.36	3.91
(std. dev.)	(1.25)	(1.21)	(1.36)	(2.39)

differences between the two groups was warranted. This analysis was a repetition of the previous ANOVA performed on the hypnosis group, while controlling for initial differences by using those differences as a covariate. First test results are seen in Table 5.

Table 5

High vs. Low Susceptibility Groups: First Recall Test

(Group Means, Maximum=10)

Group	LS	HS	LD	HD
Low Susceptibility	.31	.85	2.15	3.46
(std. dev.)	(.41)	(.90)	(1.52)	(1.39)
High Susceptibility	.70	1.10	2.25	3.05
(std. dev.)	(.57)	(1.41)	(1.68)	(1.99)

This analysis revealed a significant hypermnesic effect in precisely the location predicted. It showed that, when initial differences were controlled for, the high susceptible group recalled significantly more words, on the second recall test, than did the low susceptible group when high imagery, deeply processed words were considered, $F(1,30) = 8.98$, $p < .005$. Controlling for initial differences the adjusted group means were as indicated in Table 6.

Table 6

High vs. Low Susceptible Groups: Second Recall Test (Adjusted Group Means)

Group	LS	HS	LD	HD
Low Susceptible	1.50	1.90	2.50	1.72
High Susceptible	1.32	1.68	2.08	3.01

A similar treatment of the data from the relaxation group yielded no similar significant effects.

In an attempt to see if this apparent hypermnesic effect was also shown relative to the two relaxation groups, the high susceptiblity hypnosis group was compared to the high and low perceived relaxation groups using ANOVAs that used initial differences as a covariate. These ANCOVAs were similar to the previous ANOVAs in that they used group, imagery, and depth of processing as factors. These analyses were done cautiously, as the relaxation scale used has not been parametrically tested. In this study it was used primarily as a means of dividing the relaxation subjects into two groups, one group of which self reported more relaxation using the instructions than did the other group. In addition, the mean score for the high relaxation group on the relaxation scale was much higher than the mean score of the hypnosis group on the Harvard Susceptibility scale. While the significance of this factor is not possible to determine, as the scales are not directly comparable, it was felt that using an extreme high relaxation group would be the most effective way of controlling for the possibility that hypnosis produces hypermnesia in high susceptibles due to its relaxing effect.

The ANOVA that compared the high susceptible group to the low relaxation group using initial differences as a covariate found similar results to that shown earlier with the low susceptible group. The high susceptible group recalled significantly more high imagery words than did the low relaxation group, $F(1,38) = 5.52$, $p < .0242$. Controlling for initial differences, the adjusted group means were 4.0 for the low relaxation group and 4.8 for the high susceptible group for both processing categories of high imagery words. There was a trend towards significance with the high imagery, deeply processed words, with the low relaxations group mean of 2.3 comparing to the high susceptibles group mean of 3.2, but it was nonsignificant, F (1,38) = 3.60, $p < .065$. The adjusted group means can be seen in Table 7.

Table 7

High Susceptible vs. Low Relaxation Groups:

Second Recall Test

(Adjusted Group Means)

Group	LS	HS	LD	HD
Low Relaxation	1.49	1.77	2.43	2.34
High Susceptibility	1.36	1.75	2.19	3.16

Significant findings were shown with the ANOVA which compared the high susceptible group to the high relaxation group, controlling for initial differences by using them as a covariate. It showed that the high susceptible group recalled significantly more deeply processed words than did the high relaxation group, F (1,28) = 4.19, $p < .05$, across both imagery conditions. Combined adjusted group means were 4.4 deeply processed words recalled for the high relaxation group to 5.4 for the high susceptible group. Adjusted group means can be seen in Table 8.

Table 8

High Susceptible vs. High Relaxation Groups:

Second Recall Test

(Adjusted Group Means)

Group	LS	HS	LD	HD
High Relaxation	1.52	2.03	1.60	2.75
High Hypnosis	1.39	1.77	2.22	3.19

The preceding analyses examined the differences between the recall performances of the various groups after the experimental manipulation. The only analysis to examine the performance of the subjects across time was the very first ANOVA which compared only the entire hypnosis group to the entire relaxation group. As high susceptibility seems to be a prerequisite for hypnotic hypermnesia, the lack of significant results of that initial ANOVA is partially understood. In order to determine what effects hypnosis has on memory over time, it would seem to be necessary to compare the high susceptibility group to the low susceptiblity group across time. This analysis was undertaken, along with an analysis of the performance of the high and low relaxed groups across time. Rather than examining the differences between groups after the experimental manipulation, this set of analyses revealed within group changes in recall across time. The between group analysis undertaken initially was necessary in order to compare this research to previous research in the area. The within group analysis was expected to reveal more of the nature of the process of hypnotic hypermnesia.

For this purpose, a 2 (High vs. Low susceptibility) x 2 (Fist test recall vs. Second test recall) x 2 (Deeply processed vs. Shallowly processed words) x 2 (High imagery vs. Low imagery words) ANOVA performed. The group means produced by this analysis were the same as those shown in Tables 3 and 5. The analysis showed significant main effects for both imagery, $\underline{F}(1,31) = 18.07$, $\underline{p} < .001$, and depth, $\underline{F}(1,31) = 100.67$, $\underline{p} < .001$, but as explained in the earlier series of analyses,these effects were caused by the fact that, in general, high imagery words are recalled better than low imagery words, and deeply processed words are recalled better than shallowly processed words, across both group and time in this case, and does not reveal anything about the differential recall of the high and low susceptible subjects. As these main effects for depth and imagery were shown almost continuously throughout the following analyses, further discussion of them was unwarranted.

Two interaction effects were shown by this analysis that were related to the differential recall of the high and low susceptible subjects. The first was a significant three way interaction between susceptibility and time and imagery, $\underline{F}(1,31) = 9.06$, $\underline{p} < .005$. Examination of the group means presented in Tables 3 and 5 suggest that the highly susceptible subjects improved more from the first to the second recall test with the high imagery words, increasing from 4.15 to 5.25 words, while the low susceptible subjects improved more from first to second recall test with the low imagery words, increasing from 2.45 to 3.15 words.

Also shown in this analysis was a significant four way interaction, with susceptibility by time by depth by imagery interacting, $\underline{F}(1,31) = 9.31$, $\underline{p} < .005$. In order to fully interpret this complicated interaction, it was necessary to undertake the following subsidiary analyses.

First, a 2 (High vs. Low susceptibility) x 2 (First vs. Second recall test) x 2 (Deeply vs. Shallowly processed words) ANOVA was performed on the high imagery words only. A significant three way interaction, susceptibility by time by depth was shown, $\underline{F}(1,31) = 14.80$, $\underline{p} <.001$, when the high imagery words alone were analyzed. A similar analysis of the low imagery words showed no significant interaction effects. When the three way interaction for the high imagery words was further broken down using a 2 (High vs. Low susceptibility) x 2 (First vs. Second recall test) ANOVA on only the high imagery words, and using separate ANOVAs for the deeply and shallowly processed words, a significant two way interaction was seen, susceptibility by time, for the ANOVA that examined the deeply processed, high imagery words, $\underline{F}(1,31) = 9.85$, $\underline{p} < .004$. A similar significant effect was not seen with the ANOVA which examined the high imagery, shallowly processed words. In explaining the significant interaction effect seen, an examination of the group means in Tables 3 and 5 show that the high susceptible subjects showed improvement in their recall of the high imagery, deeply processed words across time, increasing from a mean of 3.05 words on the first recall test, to a mean of 4.10 words on the second recall test. The low susceptible subjects recall decreased from a mean of 3.46 words on the first recall test, to a mean of 3.15 words on the second recall test with the high imagery, deeply processed words. This line of the analysis suggests that these were significant changes.

Continuing to evaluate the significant four way interaction which resulted from the ANOVA which used susceptibility, time, depth of processing, and imagery as factors, a 2 (High vs. Low susceptibility) x 2 (First vs. Second Recall test) x 2 (High vs. Low imagery words) ANOVA was performed for both the deeply and the shallowly processed words separately. The ANOVA performed on the deeply processed words only showed a significant three way interaction, susceptibility by time by imagery, $\underline{F}(1,31) = 13.37$, $\underline{p} <.001$. There was no interaction effect found with the ANOVA performed on the shallowly processed words. To break down the three way interaction shown for deeply processed words, 2 (High vs. Low susceptibility) x 2 (First vs. Second recall test) ANOVAs were performed on the deeply processed words for the high and low imagery words separately. A similar effect for the deeply processed words was found as discussed in the previous paragraph, while the deeply processed, low imagery words produced no significant interaction effects.

The final approach to decomposing the four way interaction utilized a 2 (First vs. Second recall test) x 2 (Deeply vs. Shallowly processed words) x 2 (High vs. Low imagery words) ANOVA for both the high and low susceptible subjects separately. For the high susceptible subjects, there was a significant main effect for time, $\underline{F}(1,19) = 5.76$, $\underline{p} < .027$, which an examination of the means would suggest was simply recall scores increasing from first to second recall test. There was also a pair of significant two way interactions with the high susceptible subjects. The first was an interaction between time and depth, $F(1,19) = 12.76$, $p < .002$, reflected by the mean number of deeply processed words recalled increasing from a mean of 5.3 to 6.6 words across time, while the shallowly processed words recalled remain virtually unchanged, decreasing across time from 1.8 to 1.6 words recalled. The second two way interaction was between time and imagery, $F(1,19) = 8.88$, $p < .008$. Again, an examination of the group means, as seen in Tables 3 and 5, suggest that this interaction reflects the increase in mean number of high imagery words recalled from first to second test of 4.15 words to 5.15 words, while the mean number of low imagery words recalled from first to second test remained unchanged, at 2.95.

The same three way analysis for the low susceptible subjects showed a significant three way interaction between time, imagery, and depth, $F(1,12) = 6.88$, $p < .022$. To break down this interaction and aid in understanding it, two pairs of two way ANOVAs were performed on the data from the low susceptible subjects. The first pair were 2 (First vs. Second recall test) x 2

(High vs. Low imagery words) ANOVAs one performed on the deeply processed words, and one performed on the shallowly processed words. Only the ANOVA performed on the deeply processed words showed a significant time by imagery effect, $\underline{F}(1,12) = 6.00$, $\underline{p} < .031$. Examining the group means showed that for the low susceptible subjects, recall of high imagery, deeply processed words deceased from first to second test by a mean of 3.5 to 3.2 words, while recall of low imagery, deeply processed words increased from a mean of 2.2 to 2.8 words from first to second test. For the ANOVA with the shallowly processed words, there was no significant interaction effect. The second of the pair of two way ANOVAs were a pair of 2 (First vs. Second recall test) x 2 (Deep vs. Shallow processed words) two way tests, one test performed at each level of imagery separately. With the ANOVA that examined the high imagery words, a siginificant time by depth interaction effect was found, $\underline{F}(1,12) = 6.51$, $\underline{p} < .025$. Again, the decrease in recall of the low susceptibles with the high imagery, deeply processed words, mentioned previously, combined with an increase in the recall of the high imagery, shallowly processed words, from a mean of .85 words to 1.2 words across time, yielding a significant interaction effect. The ANOVA examining low imagery words found no significant interaction effect. As there were no significant two way interactions in the three way Time x Imagery x Depth ANOVA for the low susceptible subjects, the three way interaction would seem to be revealed by the series of two way ANOVAs as reflecting a combination of the decrease of the low susceptible subjects' recall of the high imagery, deeply processed words, while they increased their recall of both the low imagery, deeply processed words, and the high imagery shallowly processed words.

When the relaxation group was examined in a 2 (High vs. Low perceived relaxation) x 2 (First vs. Second recall test) x 2 (High vs. Low imagery words) x 2 (Deeply vs. Shallowly processed words) ANOVA, no significant main or interaction effects involving group or time were found. Relaxation was shown to have no significant effects on recall across time, or between groups.

An analysis was made of the number of intrusions made by each group, intrusions being words that were recalled and were not correct. As all previous tests had shown no violations of the homogeneity of variance rule among groups, the tests that were done could be performed. The data for the intrusions by the hypnosis and relaxation groups violated this rule, and so a nonparametric test was performed on the data. A Mann Whitney U test showed that the number of intrusions made by the hypnosis group (mean = 1.73, std. dev. = 2.27) did not differ significantly from the number of intrusions made by the relaxation group (mean = 1.47, std. dev. = 1.55) on the second test, two tailed probability = .77. This test was performed to answer the criticism that the reason for hypermnesic performance is that hypnotized subjects are more willing to make errors in recalling, and so come up with correct material due to the sheer volume of material recalled, while making many more mistakes. This test showed that the hypnotized subjects made no more mistakes while hypnotized than did the relaxed subjects while relaxed.

Discussion

The findings of Experiment 1 were marginally supportive of the hypothesis that hypnosis can produce hypermnesia with word lists. The unexpected variability of the outcome data in this study led to the consideration of alternate explanations for the hypermnesia effects as a function of imagery value and level of processing. In the case of Experiment 1, the word list portion of this study, the addition of the word imagery value variable introduced a factor that produced results that could not be predicted based on previous research findings.

Comparing the results of Experiment 1 directly to those of Shields and Knox (1986) is difficult for a number of reasons. The two most important ones lie in the differing criteria used for inclusion in the high susceptible hypnosis experimental groups used, and secondly, in the inclusion of an imagery variable as a dimension of memory under investigation in the first part of this experiment.

In the study done by Shields and Knox (1986), a minimum score of nine on the Harvard Group Scale of Hypnotic Susceptibility (HGSHS) (Shor & Orne, 1962) was required for a subject to be included in their high hypnotic susceptible groups. The random selection procedures in the current study did not produce a high hypnotic susceptible group comparable to groups that have been used in past hypnosis research. Instead, the sample in the present study determined high and low susceptibility groups using a median split method rather than by choosing an arbitrary range on the HGSHS such as nine and above as cutoff scores for inclusion in the high susceptibility group.

This resulted in the high susceptible group in Experiment 1 including subjects who scored as low as five on the scale of hypnotic susceptibity. The sampling decision to use a median split procedure affected the hypnosis condition such that it was expected that the results were a very conservative estimation of hypnotic hypermnesia.

The Shields and Knox (1986) results showing hypnotic hypermnesia with highly hypnotically susceptible people are limited in generalizability. The present study found that subjects who scored at or above nine on the HGSHS made up approximately 10 % of the sample of subjects, a very select group. Using high susceptible groups generated by the median split procedure allowed results obtained with the high susceptible groups to be generalized to a greater portion of the population than could the results from the Shields and Knox (1986) study. Also, none of the subjects in the present study were excluded entirely from the experimental group. This allowed a limited examination of the effects of hypnosis on memory across the entire range of hypnotic susceptibility, suggesting hypermnesia may be produced with a more liberally defined high susceptible group than used in past research.

The results of the first ANOVA which was performed on the data from Experiment 1, which showed no significant hypnotic hypermnesia, was consistent with previous research. Relinger (1984), in his review of the hypnotic hypermnesia literature, concluded that hypnotic hypermnesia was seen most consistently when subjects were highly susceptible to hypnosis. Finding hypnotic hypermnesia with the entire hypnosis group would have been contrary to Relinger's conclusions. The superiority of high imagery and deep processing in producing recall, as shown on the first ANOVA, were consistent with past research (e.g., Craik & Lockhart, 1972; Paivio, Yuille & Madigan, 1968).

It was expected in the present study that hypnosis would produce hypermnesia with high susceptible subjects. In fact, in Experiment 1, in the portion of the analysis which examined between group performance after the experimental manipulation, a significant finding was shown in the comparison of the high susceptible to the low susceptible hypnosis groups on their second recall tests when initial differences in memory scores were controlled. The Shields and Knox (1986) work led to the hypothesis that hypnotic hypermnesia would also be a function of the level of cognitive processing of the words with highly susceptible subjects. This expectation was only minimally present because of the difference between the high susceptible group of the Shields and Knox study, and the high susceptible group of the present study.

In fact, there was no significant hypermnesia effect attributable to the depth of processing manipulations alone when the high susceptible group was compared to the low susceptible group. The only significant hypnotic hypermnesia effects occurred with the high imagery, deeply processed words with the high susceptible group, when initial group differences were controlled for. The very low adjusted group mean seen for the low susceptible group with the high imagery, deeply processed words was a result of the adjustments made in the analysis, caused by both an increase in the number of HD words recalled by the high susceptible group, and a decrease in the number of HD words recalled by the low susceptible group, from first to second test.

This outcome appears to lend support to the combination theory of hypnotic hypermnesia, mentioned earlier. This theory, a combination of two theories offered by Relinger (1984), proposed that deep processing is necessary to encode the stimulus material to a depth sufficient for recall, and that high susceptibility to hypnosis, which theoretically improves imagery, is what enables the deeply processed stimuli to be retrieved. One study by Sutcliffe, Perry, and Sheehan (1970) found that the ability to form vivid mental images was consistently low among the low hypnotically susceptible, but varied from low to high among the high hypnotically susceptible. The outcome of Sutcliffe et. al. (1970) could help explain the results of the present study as our high and low susceptible groups did not show significant differences on the initial, pre-manipulation tests, possibly due to the mixture of imaging ability in the high susceptible group. Once hypnotized, however, it is possible that the imaging ability of the high susceptibility group was improved by hypnosis, enabling them to retrieve the deeply processed words. The low susceptibility group would not only gain no benefit from the hypnosis, they would also have lower imaging ability, in general.

When comparing all four groups in the between groups, post manipulation analyses, the finding that the high susceptible group recalled significantly more high imagery words overall than did the low relaxation group is more difficult to explain theoretically. Possibly, it was merely that hypnosis improves imaging ability for the high susceptibles more than relaxation does for the low relaxation group. But this might not be the entire answer, as a significant depth of processing effect was later shown when the high relaxation group was compared to the high susceptible group, and this effect was not seen with the low relaxation group. One possibility would be if imaging ability was the same among the high and low relaxation groups as it was among high and low hypnotic susceptibles. As much of the relaxation procedure involves the use of mental imagery, the low relaxation groups could conceivably be poor imagers, a viable, if untested, hypothesis. Thus, the recall of high imagery words would be likely to be superior with the high hypnosis group as they possess superior imaging skills and are using a procedure that improves imaging ability, hypnosis.

This hypothetical explanation is not a complete answer as it does not explain why a depth of processing by imagery by group interaction effect was not found with the low relaxed, or an imagery by group effect found with the low susceptible group. This would be expected, as the groups are being virtually equated on their ability to image mentally. In fact, when examined closely, it can be seen that the performance of the low relaxed and the low susceptible groups compared to the high susceptible group are virtually the same.

Most of the differences seen between the recall of the high susceptible group and the low relaxation group in terms of the imagery values of the words were found with the high imagery, deeply processed words, with the high susceptibles recalling more than the low relaxed. The recall of the high imagery, shallowly processed words was virtually identical, but somehow combined statistically to make the overall high imagery variable significant. There was a nonsignificant trend for the high imagery, deeply processed words to be recalled better by the high susceptible group compared to the low realxation group. When it is noted that the greatest part of the imagery main effect was caused by the high imagery, deeply processed words, it can be seen that the performance of the low relaxed group was virtually the same as that of the low susceptible group when both are compared to the high susceptible group.

The depth of processing effect seen between the high susceptibles and the high relaxation subjects on the second recall test showed superior recall of the deeply processed words by the high susceptibility group. One explanation could rely on possible group differences in imaging ability. If the high relaxation group were good imagers prior to the experiment, then the improvement in imaging ability gained by the high susceptible group under hypnosis which improved their recall could have been at least slightly minimized, perhaps enough so that it was no longer significant. In this case, the advantage that the high susceptible hypnotized subjects seem to have with deeply processed words, as shown in the Shields and Knox (1986) studies may have become apparent, now that comparison of recall results was no longer being obscured by a confounding imaging factor.

In all the comparisons on the second memory recall tests, the high susceptible group performed better than the other three groups with the high imagery, deeply processed words. In the cases of the two relaxation groups, one of the other word groups combined with the HD words to produce statistical significance. In the case of the high relaxation group, the LD words combined with the HD words producing a depth of processing effect. When the low relaxation group was compared to the high susceptible group, the HS words in combination with the HD words produced a statistical change, possibly lower variability in the combined group, to produce an imagery effect . It would still seem to remain that hypnosis interacts in some way with both imagery and processing in producing improved recall.

The results of the within group, across time analysis provided some clues as to how hypnosis produces hypermnesia. The results with the high susceptible group are quite clear. Hypnosis improved the recall of both the high imagery, and the deeply processed words across time. This would account for the fact that the between groups differences centred around the high imagery, deeply processed words. The results found with these analyses with the low susceptible subjects are more difficult to explain. Somehow, hypnosis seems to be interfering with the recall of the low susceptible subjects in very specific ways. Possibly, low susceptible subjects are made anxious by the hypnosis instructions, and this interferes with their recall. Relaxation was shown not to have any differential effects across time, or between groups.

Experiment 2

Statement of Purpose

The second experiment involved the same types of subject groups, and investigated the effects of hypnosis on the recall of prose material, classified as meaningful material under Relinger's (1984) system. Relinger (1984) concluded that it was necessary to use meaningful material as stimuli in order to produce hypnotic hypermnesia. Shields & Knox (1986) work with word lists showed that this was not absolutely the case. However, while the Shields & Knox results were significant, the improvements in recall they obtained were not extremely large, with the recall of their hypnotized subjects being improved by approximately ten per cent. It was expected that meaningful material would produce stronger evidence of hypermnesia.

This study looked at the recall of two different types of stimulus material, non-meaningful (Experiment 1) and meaningful (Experiment 2), in order to determine the effect of hypnosis on the recall of the two different types. Also, limited aspects of the stimuli in relation to recall were examined. Comparability of the recall of the two different types of stimuli is difficult, and only an investigative direct comparison was attempted.

Method

Subjects

Sixty-four subjects were used in Experiment 2, 20 males and 44 females. The average age of this group was 19.9 years, with a range in age from 17 to 42 years. As in Experiment 1, the word list condition, subjects participated in the experiment in one of four groups. Two groups received hypnosis instructions (totalling eight males and 24 females), and two received relaxation instructions (totalling 12 males and 20 females). Significant sex differences have not been reported in the hypnosis literature, therefore the sex ratio of subjects was not considered a constraint on the validity of this study's outcome.

Material

The stimulus material for Experiment 2 was a seventeen sentence paragraph that had been previously rated in a pilot study by a group of university students for both familiarity and interest level. The paragraph generated a wide range of ratings for both interest and familiarity, when pretested, on two seven-point scales. (see Appendix C)

The same language laboratory that was used in Experiment 1 was used in Experiment 2. Seating and audiotaping arrangements remained the same. Hypnosis and relaxation instructions remained the same.

Design and Procedure

In order to partially replicate the Shields & Knox (1986) study, 40 words were chosen for the word lists used in Experiment 1. While embedding the words from the word lists in the paragraphs was possible, in order to directly compare recall of the words in two different conditions, there were practical considerations which made this not feasible in this study.

A paragraph containing all 40 nouns would have been very lengthy, and considering the variety of nouns used, it is not likely that a coherent paragraph could have been devised. Order of presentation of the words was random with the word list groups, something that would not be possible in a coherent paragraph. However, comparisons of the effect of hypnosis on non-meaningful and meaningful material were attempted.

In Experiment 2 subjects were given a short paragraph, asked to rate it according to their familiarity with and liking for the subject matter, and then tested for recall at a later time. It was hypothesized that the high susceptible hypnotized subjects who liked and were familiar with the material would recall at a superior level to the other subjects.

Anderson and Reder (Cermak & Craik, 1979) laid some theoretical groundwork for this hypothesis by saying that someone who does not know what a dog or a chair is will have a tough time generating elaborations to remember dog and chair as a word pair. In contrast, it was hypothesized that subjects who were familiar with the concepts involved in the paragraph would have an easier time generating elaborations, and processing the material at a deeper level. The greater the number of elaborations, the greater will be the likelihood of hypnotic hypermnesia being shown, theoretically.

This hypothesis also received some support from the Cooper and London (1973) experiment. A group of subjects were removed from the Cooper and London study, as their scores were higher than the other subjects. The reason for their removal was that they were all chemistry students, and the paragraph used for recall concerned a rare chemical. It was hypothesized that their interest and familiarity in the content area combined to produce more elaborations and better recall.

The factor of interest was included in the study since it was felt that interest in the content of the paragraph would also cause the generation of more spontaneous elaborations during encoding.

When the subjects had assembled in the language laboratory, they were told that they would be asked to rate a paragraph for interest and familiarity. Four groups of approximately 16 subjects each were given five minutes to read the paragraph, and were then asked to fill out a short questionnaire, asking for their familiarity and interest ratings for the paragraph, and also for some demographic information (see Appendix D). After a 60-second backwards counting task, subjects were given a free recall test. This was an audiotaped recall test as in Experiment 1, and lasted five minutes. The backwards counting task was also identical to the task of Experiment 1.

The two groups who were in the hypnosis condition received the 25-minute hypnotic induction and were then asked to recall the paragraph while hypnotized. After being brought out of hypnosis, the subjects filled out the Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962). The comparison groups received the 25-minute audiotaped relaxation instructions and were asked to recall the paragraph while relaxed. Both the hypnosis and the relaxation groups received similar motivation instructions to those given in Experiment 1. They were told while hypnotized or relaxed " Your memory of the paragraph has become much clearer. You can now recall the entire paragraph." All four groups were also asked to fill out the demographic questionnaires that the groups in Experiment 2 filled out. An outline of Experiment 2 is shown in Figure 4.

Results

Data Reliability Measures

Twenty-five of the 64 tapes from Experiment 2, the paragraph recall portion of the experiment, were chosen at random and rescored by a second examiner. The maximum possible recall score was 17. Under the scoring system used, it was possible to be awarded half points for some of the sentences (see Appendix C). The scoring system awarded points if the idea of the sentence was recalled; verbatim recall was not required. The number of agreements between the two judges was converted to a percentage to obtain the IOR. The interobserver reliability rating was 91%.

In both Experiment 1 and 2, subjects in the relaxation groups were asked if they had ever been hypnotized prior to the experiment, and if they felt that they had become hypnotized during the course of the experiment. Only three subjects reported being hypnotized before, and none of the subjects said that they felt as if they had been hypnotized during the experiment.

The data from Experiment 2, which used the

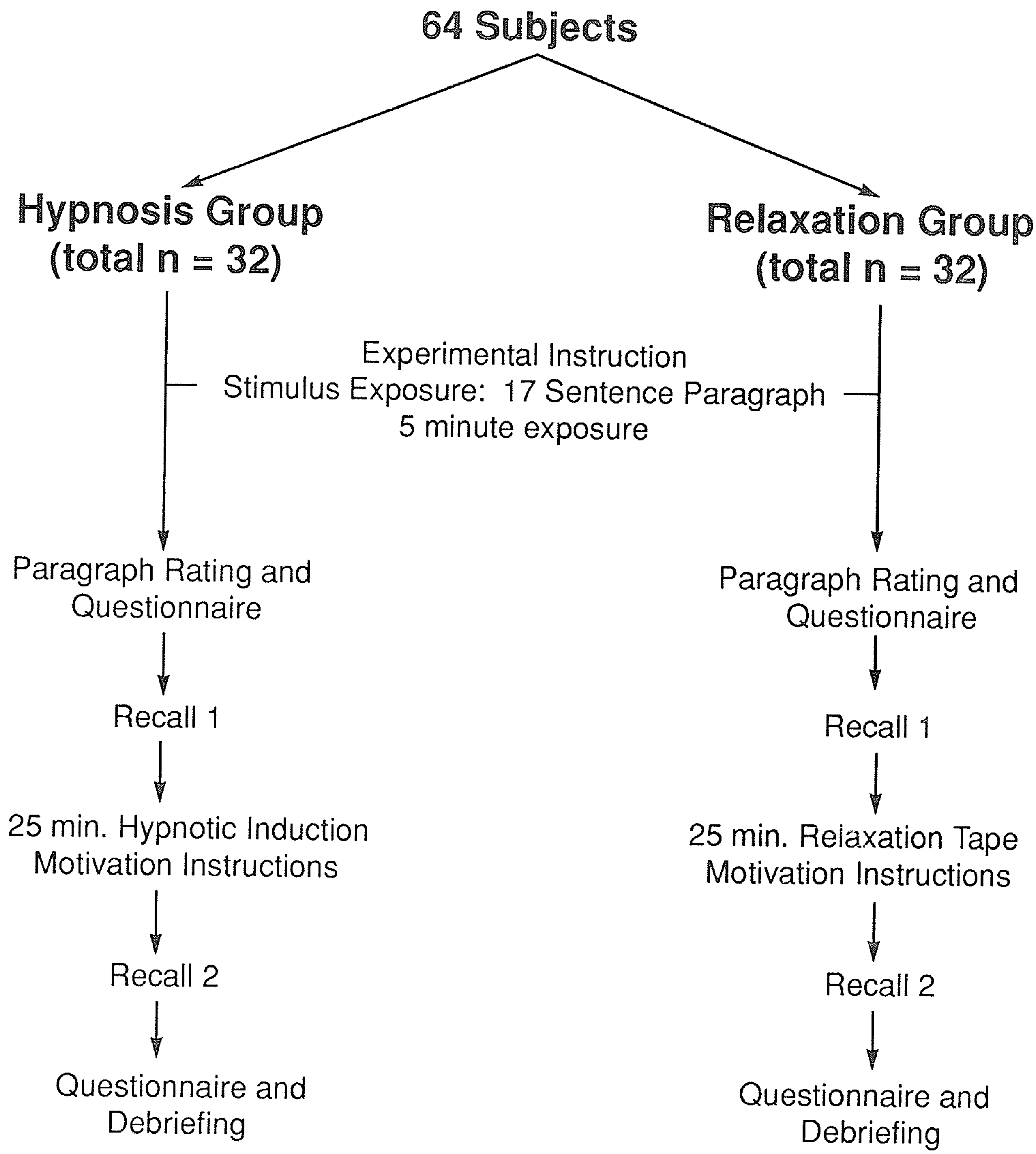

Figure 4. **Procedure Experiment 2 - Paragraph**

Table 6

Hypnosis vs. Relaxation Groups: First and Second Test Recall

Group	First Test	Second Test
Hypnosis (std. dev.)	8.17 (3.94)	8.81 (3.97)
Relaxation (std. dev.)	8.61 (2.92)	9.06 (3.03)

(Group means)

(Maximum score = 17)

paragraph as the recall material, are presented in Table 6. As in Experiment 1, the first test recall scores were pre-experimental baseline measures. The second test was the post manipulation measure.

An ANOVA was performed on the data. This was a 2 (hypnosis vs. relaxation) x 2 (first test vs. second test) ANOVA, with group as a between subjects variable, and time as a within subjects variable. Additionally, the subjects' interest and familiarity ratings were used as covariates in the analysis, to determine if they correlated with recall scores.

Both interest and familiarity scores ranged from one to seven, the extent of the scale. Interest ratings appeared to be normally distributed, with the largest number of subjects choosing four, the midpoint of the scale, and decreasing numbers choosing the more extreme values. Familiarity ratings were definitely skewed, with the majority of subjects choosing either one or two, the values which corresponded to extreme unfamiliarity with the subject matter of the paragraph.

Again, only summary statistics for the analyses performed are presented in the body of the text. Full tables are presented in Appendix G. The ANOVA did not show a significant group main effect, or a group by time interaction effect, but it did reveal a main effect for time, indicating that scores improved overall from the first to the second test, for both groups, $F(1,62) = 11.11$, $p < .001$. The level of the subjects interest and familiarity did not covary significantly with recall.

The two groups were then examined separately as they were in Experiment 1. The hypnosis group was examined separately, and was divided by means of a median split into high and low susceptible groups. The median of the hypnosis group was found to be at seven, and the median split yielded a low susceptible group of 15 subjects with scores of six or less and a mean score of 4.5, and a high susceptible group of 17 with scores of seven or more, and a mean of 8.8. An ANOVA using high vs. low susceptibility x first test vs. second test recall was performed. The group means were the following:

Table 7

High vs Low Susceptible Groups: First and Second Test Recall Results

Group	First Test	Second Test
Low Susceptible (std. dev.)	6.60 (3.92)	7.17 (3.82)
High Susceptible (std. dev.)	9.56 (3.50)	10.27 (3.61)

(Group Means)
(Maximum = 17)

The results of the ANOVA showed that the high susceptible group performed better on both tests overall than did the low susceptible group, shown by a group main effect, $F(1,30) = 5.49$, $p < .026$. Also, a significant effect for time was shown, with the improvement of the scores of both groups from the first to second test being significant, shown by a time main effect, $F(1,30) = 7.75$, $p < .009$. There was no group by time interaction effect, indicating that neither group performed at a superior level to the other group on either of the recall tests.

When the analysis was run again, looking only at the second test recall and controlling for the very large first test differences by using them as a covariate, there was no significant effect seen to be caused by susceptibility. Controlling for the large initial differences, the adjusted means for the two groups on the second test become 8.56 for the low susceptible group and 8.87 for the high susceptible group, suggesting that the differences on the second recall test were caused primarily by the differences on the first recall test, and not by any experimental manipulation.

When the relaxation group was examined in terms of high and low relaxation groups, a median split produced two groups of 16, as the median was found to be at 8.5. The low relaxation group had a mean score of 6.4, while the mean score for the high relaxation group was 9.8. The recall results were as follows:

Table 8

High vs. Low Relaxation Groups: First and Second Test Recall Results

Group	First Test	Second Test
Low Relaxation (std. dev.)	8.06 (2.59)	8.00 (2.69)
High Relaxation (std. dev.)	9.16 (3.21)	10.13 (3.06)

(Group Means)

(Maximum=17)

The initial ANOVA using this data had as its only significant finding that the groups differed from each other across time, revealed by a group by time interaction effect, $F(1,30) = 5.30$, $p < .028$. An examination of the group means suggested that the high relaxation group was recalling words at a significantly higher rate on the second test compared to the low recall group. A second ANOVA was performed which accounted for initial differences by using only the recall data from the second test, and using the first test recall data as a covariate. The adjusted means for the two groups were 8.49 for the low relaxed group, and 9.64 for the high relaxed group on the second test. The high relaxed subjects were found to have significantly higher recall on the second test than were the low relaxed subjects, $\underline{F}(1,30) = 6.48$, $\underline{p} < .016$.

An ANOVA was performed which compared all four groups to each other based on their second test recall scores while controlling for initial differences by using first test scores as a covariate. This was a 4 (High vs. Low susceptibility vs. High vs. Low relaxation) x 1 (Second recall test results) ANOVA which used initial differences as a covariate. No significant effects were found between groups. The adjusted group means were 8.3 for the low relaxation group, 9.4 for the high relaxation group, 8.8 for the low susceptible group, and 9.2 for the high susceptible group, for the groups' second test scores, when all four groups initial differences were controlled for.

Finally, an analysis of the intrusions made by each group was undertaken. The number of intrusions made by the hypnosis group (mean = 2.00, std. dev. = 1.55) was compared to the number of intrusions made by the relaxation group (mean = 2.66, std. dev. = 1.75) at the time of the second test. An ANOVA, 2 (Hypnosis vs. Relaxation) x 1 (Second Test Misses), revealed no significant differences.

Discussion

The results of Experiment 2, involving the recall of meaningful material, the paragraph, were less supportive of hypnotic hypermnesia than were the results of Experiment 1. The results of Experiment 2 suggest that it is of critical importance to use pre-matched control/comparison groups in hypnosis research. Relinger's (1984) finding that high susceptible subjects recall significantly more meaningful material while hypnotized is confounded if high susceptible subjects have better memory for meaningful material than do the control/comparison subjects before the experiment, as was seen in the present study.

All studies investigating hypnotic hypermnesia with a high susceptible group must either use a high susceptible group as a control group or be able to measure pre-test recall. Any experiment which uses meaningful material with a preselected high susceptible group may be likely to get misleading results if recall results are compared to a randomly sampled control/comparison group.

The only significant result obtained in Experiment

2 was an improvement in recall of the paragraph with the high relaxation group compared to the low relaxation group. Examining the four groups together, and adjusting for pretreatment differences, no group was seen to perform better than any other group. Upon re-examining the recall tests of the high and low relaxation group, it was seen that the low relaxation group was the only group that did not improve from the first to the second test. One possible explanation is that the low relaxation subjects were so uncomfortable with the relaxation instructions that it interfered with their recall.

A possible reason as to why significant results were not seen in Experiment 2 might be found in Experiment 1. The results of Experiment 1 suggested that imagery plays a very important role in hypnotic hypermnesia, to a degree unsuspected from the review of previous literature. An attempt was made to vary paragraph recall based on interest and familarity factors, but no attempt was made to manipulate imagery values, something that would now appear to be very important. An appraisal of the content of the paragraph suggests that it would not score very high for imagery values.

General Discussion

The analyses of the intrusions in both Experiment 1 and 2 would seem to support Shields and Knox (1986) in their contention that it is not the case that hypnotic hypermnesia is the result of fewer inhibitions to report whatever comes to mind, as some have claimed (e.g. Orne, 1979). All the tests on the data from the present study showed that hypnotized subjects did not make significantly more errors due to shifts in rates of response than did nonhypnotized subjects.

Future directions in research are numerous. Investigating the imaging abilities of both high and low relaxation subjects would answer some remaining questions. Repeating Experiment 1 with a sufficient number of subjects to be able to break up the groups into quartiles would give a truer replication of Shields and Knox (1986) results, and enable the determination of whether or not the effects seen in this study are linear in nature, or the function of a group in a particular range of hypnotic or relaxed ability.

Additionally, Experiment 2 should be repeated with a paragraph of high imagery value, possibly contrasted with one of low imagery value, to see if the imagery effects found in Part I can be replicated with meaningful material.

Even when hypermnesia was shown in Experiment 1, it was hardly of a dramatic nature. The improved recall ranged from 3/4 of a word to slightly over one word, an improvement of between 7 1/2 and 10 %. This was almost identical to the improvements reported by Shields & Knox (1986). In most cases where hypnosis is used to improve recall, any improvement is welcome. Hypnotic hypermnesia would appear to be an elusive phenomena that appears only under certain rigidly prescribed conditions.

References

Augustynek, A. (1977). Recalling in state of awareness and under hypnosis. Przeglad Psychologiczny, 20, 693-693-705.

Augustynek, A. (1978). Remembering under hypnosis. Studia Psychologica, 20, 256-266.

Augustynek, A. (1979). Hypnotic hypermnesia. Prace Psychologicznopedogogiczne, 29, 25-34.

Barber, T.X., & Calverley, D.S. (1966). Effects on recall of hypnotic induction, motivational suggestions and suggested regression: A methodological and experimental analysis. Journal of Abnormal Psychology, 71, 169-180.

Barmann, G.J. (1960). Solving crimes by hypnosis. Popular Mechanics, April, 106-109,234-236.

Bongartz, W. (1985). German norms for the Harvard group scale of hypnotic susceptibility, form A. The International Journal of Experimental and Clinical Hypnosis, 33 (2), 131-139.

Bower, G.H. (1981). Mood and memory. American Psychologist, 36, 129-148.

Bower, G.H., Gilligan, S.G. & Monteiro, K.P. (1981). Selectivity of learning caused by affective states. Journal of Experimental Psychology: General, 110, 451-470.

Bower, G.H., & Karlin, M.B. (1974). Depth of processing pictures of faces and recognition memory. Journal of Experimental Psychology, 80, 751-757.

Cermak, L.S., & Craik, F.I.M. (Eds.). (1979). Levels of processing in human memory. New Jersey: Lawrence Erlbaum Associates.

Cooper, L.M., & London, P. (1973). Reactivation of memory by hypnosis and suggestion. International Journal of Clinical and Experimental Hypnosis, 21, 312-323.

Craik, F.I.M., & Lockhart, R.S. (1972). Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behaviour, 11, 671-684.

Craik, F.I.M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology: General, 104, 268-294.

Crawford, H.J., & Allen, S.N. (1983). Enhanced visual memory during hypnosis as mediated by hypnotic responsiveness and cognitive strategies. Journal of Experimental Psychology: General, 112, 662-685.

Das, J.P. (1961). Learning and recall under hypnosis and in the wake state: A comparison. Archives of General Psychiatry, 4, 517-521.

DePiano, F.A., & Salzberg, H.S. (1981). Hypnosis as an aid to recall of meaningful information presented under three types of arousal. International Journal of Clinical and Experimental Hypnosis, 24, 383-399.

Dhanens, T.P. (1973). The effects of several hypnotic and waking suggestions on the recall of nonsense and contextual material. Dissertation Abstracts International, 33, 5546.

Dhanens, T.P., & Lundy, R.M. (1975). Hypnotic and waking suggestions and recall. International Journal of Clinical and Experimental Hypnosis, 23, 68-79.

Elias, C.S., & Perfetti, C.A. (1973). Encoding task and recognition memory: The importance of semantic encoding. Journal of Experimental Psychology, 99, 151-156.

Eysenck, M.W. (1978). Levels of processing: A critique. British Journal of Psychology,69, 157-169.

Hilgard, E.R. (1965). Hypnotic susceptibility. New York: Harcourt, Brace and World.

Huse, B. (1930). Does the hypnotic trance favour the recall of faint memories? Journal of Experimental Psychology, 13, 519-529.

Hyde, T.S., & Jenkins, J.J. (1969). Differential effects of incidental tasks on the organization of recall of a list of highly associated words. Journal of Experimental Psychology, 82, 472-481.

Hyde, T.S., & Jenkins, J.J. (1973). Recall for words as a function of semantic, graphic, and syntactic orienting tasks. Journal of Verbal Learning and Verbal Behaviour, 12, 471-480.

Jacoby, L.L., Craik, F.I.M., & Begg, I. (1979). Effects of decision difficulty on recognition and recall. Journal of Verbal Learning and Verbal Behaviour, 18, 585-600.

Kroeger, W.S. & Fezler, W.D. (1976). Hypnosis and behaviour modification: Imagery conditioning. Philadelphia: J.B. Lippincott.

Laurence, J., & Perry, C. (1982). Montreal norms for the Harvard group scale of hypnotic susceptibility, form A. International Journal of Experimental and Clinical Hypnosis, 30, 167-176.

Maki, R.H., & Schuler, J. (1980). Effects of rehearsal duration and levels of processing on memory for words. Journal of Verbal Learning and Verbal Behaviour, 19, 36-45.

Mistler-Lachman, J.L. (1975). Queer sentences, ambiguity, and levels of processing. Memory and Cognition, 3, 395-400.

Mitchell, M. (1932). Retroactive inhibition and hypnosis. Journal of General Psychology, 7, 343-358.

Orne, M.T. (1979). The use and misuse of hypnosis in court. International Journal of Clinical and Experimental Hypnosis,27, 311-341.

Paivio, A. (1971). Perceptual comparisons through the minds eye. Memory and Cognition, 3, 635-647.

Paivio, A., Yuille, J.C., & Madigan, S.A.(1968). Concreteness, imagery and meaningfulness values for 925 nouns. Journal of Experimental Psychology, 76, 1-25.

Pascal, G.R. (1949). The effect of relaxation upon recall. American Journal of Psychology, 62, 32-47.

Press, A. (1981, Oct.19). Hypnosis on trial. Newsweek, pp. 96.

Rathus, S. A., & Nevil, J. S. (1977). Behaviour therapy: Strategies for solving problems in living. New York: Doubleday.

Reder, L.M. (1979). The role of elaborations in memory for prose. Cognitive Psychology, 11, 221-234.

Relinger, H.R. (1984). Hypnotic hypermnesia: A critical review. American Journal of Clinical Hypnosis, 26, 212-225.

Rosenberg, S., & Schiller, W.J. (1971). Semantic coding and incidental sentence recall. Journal of Experimental Psychology, 90, 345-346.

Rosenhan, D., & London, P. (1963). Hypnosis in the unhypnotizable: A study in rote learning. Journal of Experimental Psychology, 65, 30-34.

Rosenthal, B.G. (1944). Hypnotic recall of material learned under anxiety and non-anxiety-producing conditions. Journal of Experimental Psychology, 34, 369-389.

Sanders, S. (1967). The effects of hypnosis on visual imagery. Dissertation Abstracts International, 30, 2936-B.

Sears, A.B. (1954). A comparison of hypnotic and waking recall. Journal of Clinical and Experimental Hypnosis, 2, 296-304.

Sheehan, P., & McConkey, K. (1979). Australian norms for the Harvard group scale of hypnotic susceptibility, form A. The International Journal of Clinical and Experimental Hypnosis, 27, 294-304.

Shields, I., & Knox, J. (1986). Level of processing as a determinant of hypnotic hypermnesia. Journal of Abnormal Psychology, 95, 358-364.

Shor, R.E., & Orne, E.C. (1962) The Harvard group scale of hypnotic susceptibility, form A:an adaptation for group administration with self-report scoring of the Stanford hypnotic susceptibility scale, form A. Boston,Mass.:Studies in Hypnosis Project, Harvard Medical School.

Shor, R.E., & Orne, E.C. (1963). Norms on the Harvard group scale of hypnotic susceptibility, form A. The International Journal of Clinical and Experimental Hypnosis, 11, 39-47.

Stalnaker, J.M., & Riddle, E.E. (1932). The effects of hypnosis on long-delayed recall. Journal of General Psychology, 6, 429-440.

Sutcliffe, J. P., Perry, C.W., & Sheehan, P.W. (1970). Relation of some aspects of imagery and fantasy to hypnotic susceptibility. Journal of Abnormal Psychology, 76, 279-287.

Webster's New Collegiate Dictionary. (1976). New York: G. & C. Merriam Co.

Weitzenhoffer, A.M. (1955). The influence of hypnosis on the learning process. Some theoretical considerations:II. Recall of meaningful material. Journal of Clinical and Experimental Hypnosis, 3, 148-165.

White, R.W., Fox, G.F., & Harris, W.W. (1940). Hypnotic hypermnesia for recently learned material. Journal of Abnormal and Social Psychology, 35, 88-103.

Young, P.C. (1925). An experimental study of mental and physical functions in the normal and hypnotic states. American Journal of Psychology, 36, 214-238.

Yuille, J.C., & McEwan, N.H.(1985). Use of hypnosis as an aid to eyewitness memory. Journal of Applied Psychology, 70, 389-400.

Zamansky, H.S., Scharf, B., & Brightbill, R. (1964). The effect of expectancy for hypnosis on prehypnotic performance. Journal of Personality, 32, 236-248.

Appendix A

Words used in the word list portion of the experiment (Experiment I):(Paivio et. al., 1968).

High Imagery

Word	Imagery Value	Meaningfulness Value
Abdomen (D)	6.00	4.75
Acrobat (D)	6.53	5.67
Army (D)	6.53	6.88
Alcohol (S)	6.47	6.08
Blood (S)	6.70	6.56
Car (D)	6.87	6.38
Chief (S)	6.07	6.08
Corner (S)	6.13	5.67
Doll (D)	6.17	6.12
Dollar (S)	6.50	6.48
Dress (D)	6.53	5.68
Elbow (D)	6.30	5.16
Engine (S)	6.33	6.08
Flesh (S)	6.13	5.84
Gentleman (S)	6.20	5.80
Juggler (D)	6.10	5.84
Keg (S)	6.40	4.84
Letter (D)	6.37	5.96
Maiden (S)	6.10	5.04

Appendix A(continued)

String (D)	6.20	5.29

Low Imagery

Word	Imagery Value	Meaningfulness Value
Ability (D)	2.67	5.60
Adversity (D)	2.80	5.06
Belief (S)	2.73	5.24
Chance (D)	2.50	5.61
Competence (D)	2.97	4.63
Deceit (D)	3.30	4.92
Democracy (S)	2.47	5.72
Effort (S)	3.33	5.75
Event (D)	2.90	5.04
Exclusion (S)	2.80	5.32
Explanation (S)	2.90	5.80
Gender (S)	2.90	5.41
Idea (S)	2.20	4.88
Intellect (D)	2.93	5.56
Interest (D)	3.13	5.52
Knowledge (S)	2.97	6.36
Mind (D)	3.03	5.88
Position (S)	2.97	6.24
Quality (D)	3.10	5.52

Appendix A (continued)

Welfare (S)	3.17	6.16

(D) = Deeply processed

(S) = Shallowly processed

Average Meaningfulness Values

High Imagery, Deeply Processed words = 5.77

High Imagery, Shallowly Processed words = 5.85

Low Imagery, Deeply Processed words = 5.33

Low Imagery, Shallowly Processed words = 5.68

Appendix B

Questionnaire and Instructions for Experiment 1

All answers will be kept strictly confidential, and you will be identified only by your student number. Please answer as completely as possible.

Student Number:

Age:

Sex:

Major, or ,if undeclared, what you think it might be:

Minor (if any):

G.P.A. (anticipated, if necessary):

Favorite subject in high school:

Most despised subject in high school:

Appendix C

Paragraph and scoring key used in Experiment 2:

SURINAM

Surinam is an overseas territory of the Netherlands. It is also called Dutch Guiana. Surinam lies on the northeastern coast of South America. It separates the two countries of Guyana and French Guiana. Brazil lies to the south of Surinam. Paramaribo is the capitol of the territory. It is also the largest city in the country. Surinam has a population of over half a million. Indian and Indonesian immigrants form the largest population groups. Dutch is the official language of Surinam. The two chief industries are agriculture and mining. Bananas and coffee are the principal agricultural exports. Surinam has large bauxite deposits that form the basis of their mining industry. Bauxite is used in the manufacture of aluminum. Surinam ranks behind only Jamaica in bauxite production. Surinam is governed under the constitution of 1950. A 21 member legislative council is elected every four years.

Scoring Key

Sentence	Scoring

1 Full point for name of country, territory and Netherlands. No half points.

2 Full point for Dutch Guiana. Pronunciation unimportant. No half points.

3 Correct location, full point. Coast, tip, side, corner all acceptable. No half points.

4 Pronunciation unimportant. One half point for either country.

5 Brazil south or below, Surinam north or above, all worth full mark. No half marks.

6 Correct pronunciation and fact of capitol for full mark. No half marks.

7 Largest city for full mark. No half marks.

8 Over, approximately, nearly, etc., half

a million for full mark. No half marks.

9 Indians and Indonesians for half mark; largest part of population, majority of pop. for half mark.

10 Official or main language, or language spoken and Dutch for full mark.

11 Agriculture and Mining for half mark. Main industry or resource or economic support for half.

12 Bananas or Coffee, half mark each.

13 Bauxite deposits and mining industry for full mark. No half mark.

14 Manufacture or production and aluminum for full marks. No half marks.

15 Behind Jamaica for full marks.

16 Governed, ruled, guided and constitution of 1950 for full marks. Half marks for constitution of

1950.

17 21 member council for half mark; election every four years for half mark.

Appendix D

Questionnaire and Instructions for Experiment 2

All answers will be kept strictly confidential, and you will be identified only by your student number. Please answer as completely as possible.

Please answer the following:

I found the paragraph to be interesting.

1 2 3 4 5 6 7

strongly disagree — strongly agree

I am familiar with the subject matter that the paragraph is about

1 2 3 4 5 6 7

strongly disagree — strongly agree

Student Number:

Age:

Sex:

Major, or ,if undeclared, what you think it might be:

Minor (if any):

G.P.A. (anticipated, if necessary):

Favorite subject in high school:

Most despised subject in high school:

Appendix E:

Raw Data for Experiment 1 and 2.

Experiment 1:

```
// JOB
//STEP1 EXEC SPSSX
//SYSIN DD *
SET WIDTH=80
DATA LIST / ID 1-7 SEX 8 AGE 9-10 GPA 11-12 RELR 13-14 HDA 15 HSA 16
             LDA 17 LSA 18 HDB 19 HSB 20 LDB 21 LSB 22 MA 23-24 MB 25
             GRP 26
VARIABLE LABELS ID "STUDENT NUMBER"
                SEX "SEX"
                AGE "AGE"
                GPA "GRADE POINT AVERAGE"
                RELR "HYPNOSIS OR RELAXATION RATING"
                HDA "HIGH IMAGERY DEEPLY PROCESSED WORDS:A"
                HSA "HIGH IMAGERY SHALLOW PROCESSED WORDS:A"
                LDA "LOW IMAGERY DEEPLY PROCESSED WORDS:A"
                LSA "LOW IMAGERY SHALLOW PROCESSED WORDS:A"
                HDB "HIGH IMAGERY DEEPLY PROCESSED WORDS:B"
                HSB "HIGH IMAGERY SHALLOW PROCESSED WORDS:B"
                LDB "LOW IMAGERY DEEPLY PROCESSED WORDS:B"
                LSB "LOW IMAGERY SHALLOW PROCESSED WORDS:B"
                MA "MISSES:A"
                MB "MISSES:B"
                GRP "EXPERIMENTAL GROUP"
VALUE LABELS SEX 1"MALE" 2"FEMALE"/
             GRP 1"HYPNOSIS" 2"RELAXATION"/
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END DATA
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Experiment 2:

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// JOB
//STEP1 EXEC SPSSX
//SYSIN DD *
DATA LIST / ID 1-7 SEX 8 AGE 9-10 GPA 11-12 INT 13 FAM 14 RAT 15-16
            TEA 17-19 TEB 20-22 MA 23 MB 24 GRP 25
VARIABLE LABELS ID "STUDENT NUMBER"
                SEX "SEX"
                AGE "AGE"
                GPA "GRADE POINT AVERAGE"
                INT "LEVEL OF INTEREST"
                FAM "LEVEL OF FAMILIARITY"
                RAT "HYPNOSIS OR RELAXATION RATING"
                TEA "FIRST TEST RESULTS"
                TEB "SECOND TEST RESULTS"
                MA "MISSES: FIRST TEST"
                MB "MISSES: SECOND TEST"
                GRP "TYPE OF GROUP"
VALUE LABELS SEX 1"MALE" 2"FEMALE"/
             GRP 1"HYPNOSIS" 2"RELAXATION"/

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6129500217356209125125112
6130536218006205065050122
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END DATA
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Appendix F-Statistical tables for analyses
in Experiment 1

Note: Tables are presented in the order in which the analyses appeared in the text.

1.) 2 Group (Hypnosis vs. Relaxation) x 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	274.40	63	4.36		
Constant	1987.62	1	1987.62	456.33	.000
Group	4.74	1	4.74	1.09	.301

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	67.45	63	1.07		
Time	3.68	1	3.68	3.43	.069
Group by Time	.58	1	.58	.54	.466

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	149.87	63	2.38		
Imagery	67.65	1	67.65	28.44	.000
Group by Imagery	1.41	1	1.41	.59	.444

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	206.96	63	3.29		
Depth	642.76	1	642.76	195.66	.000
Group by Depth	.32	1	.32	.10	.756

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	32.23	63	.51		
Time by Imagery	1.51	1	1.51	2.95	.091
Group by Time by Imagery	.01	1	.01	.02	.882

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	33.14	63	.53		
Time by Depth	3.34	1	3.34	6.36	.014
Group by Time by Depth	.72	1	.72	1.37	.246

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	186.90	63	2.97		
Imagery by Depth	3.35	1	3.35	1.13	.292
Group by Imagery by Depth	.45	1	.45	.15	.697

Tests involving 'Time by Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	31.03	63	.49		
Time by Imagery by Depth	.19	1	.19	.39	.537
Group by Time by Imagery by Depth	.03	1	.03	.06	.811

2.) 2 Susceptibility (High vs. Low) x 2 Imagery (High vs. Low Imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	106.92	31	3.45		
Constant	517.14	1	517.14	149.94	.000
Susceptibility	1.26	1	1.26	.37	.549

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	46.70	31	1.61		
Imagery	28.36	1	28.36	18.82	.000
Suscept. by Imagery	.36	1	.36	.24	.630

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	58.75	31	1.90		
Depth	192.80	1	192.80	101.73	.000
Suscept. by Depth	2.98	1	2.98	1.57	.219

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	70.50	31	2.27		
Imagery by Depth	1.02	1	1.02	.45	.509
Suscept. by Imagery by Depth	2.83	1	2.83	1.25	.273

3.) 2 Relaxation (High vs. Low) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA

Tests involving Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	62.71	30	2.09		
Constant	516.78	1	516.78	247.23	.000
Relaxed	.22	1	.22	.11	.747

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	48.28	30	1.61		
Imagery	19.90	1	19.90	12.36	.001
Relaxed by Imagery	2.71	1	2.71	1.68	.204

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	68.37	30	2.28		
Depth	147.87	1	147.87	64.88	.000
Relaxed by Depth	2.75	1	2.75	1.21	.281

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	43.22	30	1.44		
Imagery by Depth	.71	1	.71	.49	.488
Relaxed by Imagery by Depth	1.84	1	1.84	1.27	.268

4.) 2 Susceptibility (High vs. Low) x 2 Imagery (High vs. Low Imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using First test results as a covariate.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	51.25	30	1.71		
Regression	55.85	1	55.85	32.69	.000
Constant	11.55	1	11.55	6.76	.014
Susceptibility	.47	1	.47	.28	.602

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	20.17	30	.67		
Regression	24.30	1	24.30	36.14	.000
Imagery	1.35	1	1.35	2.01	.167
Suscept. by Imagery	5.34	1	5.34	7.95	.008

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	34.94	30	1.16		
Regression	26.37	1	26.37	22.64	.000
Depth	8.33	1	8.33	7.15	.012
Suscept. by Depth	2.53	1	2.53	2.17	.151

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	21.44	30	.71		
Regression	47.82	1	47.82	66.91	.000
Imagery by Depth	1.24	1	1.24	1.73	.198
Suscept. by Imagery by Depth	6.42	1	6.42	8.98	.005

5.) 2 Relaxation (High vs. Low) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using First test results as a covariate.

Tests involving Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	51.60	29	1.78		
Regression	11.11	1	11.11	6.24	.018
Relaxed	.01	1	.01	.01	.942

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	27.62	29	.95		
Regression	20.66	1	20.66	21.69	.000
Imagery	6.49	1	6.49	6.81	.014
Relaxed by Imagery	3.59	1	3.59	3.77	.062

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	22.52	29	.78		
Regression	45.85	1	45.85	59.05	.000
Depth	.70	1	.70	.90	.352
Relaxed by Depth	.59	1	.59	.76	.391

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.29	29	.84		
Regression	18.93	1	18.93	22.60	.000
Imagery by Depth	.18	1	.18	.22	.644
Relaxed by Imagery by Depth	1.76	1	1.76	2.10	.158

6.) 2 Group (High susceptible vs. Low relaxation) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using First test results as a covariate.

Tests involving Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	33.15	38	.87		
Regression	51.72	1	51.72	59.29	.000
Group	.32	1	.32	.37	.546

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.15	38	.64		
Regression	40.14	1	40.14	63.15	.000
Imagery	5.08	1	5.08	8.00	.007
Group by Imagery	3.51	1	3.51	5.52	.024

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	29.34	38	.77		
Regression	52.30	1	52.30	67.74	.000
Depth	7.17	1	7.17	9.29	.004
Group by Depth	1.68	1	1.68	2.17	.149

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.23	38	.64		
Regression	44.02	1	44.02	69.01	.000
Imagery by Depth	.05	1	.05	.09	.772
Group by Imagery by Depth	2.30	1	2.30	3.60	.065

7.) 2 Group (High susceptible vs. High relaxation) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using First test results as a covariate.

Tests involving Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	56.33	28	2.01		
Regression	31.10	1	31.10	15.46	.000
Group	.23	1	.23	.12	.737

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	29.10	28	1.07		
Regression	29.10	1	29.10	27.16	.000
Imagery	12.60	1	12.60	11.76	.002
Group by Imagery	.15	1	.15	.14	.711

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.95	28	.89		
Regression	51.78	1	51.78	58.12	.000
Depth	3.84	1	3.84	4.31	.047
Group by Depth	3.74	1	3.74	4.19	.050

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	27.44	28	.98		
Regression	37.41	1	37.41	38.17	.000
Imagery by Depth	2.53	1	2.53	2.59	.119
Group by Imagery by Depth	.00	1	.00	.00	.983

Within group, across time analyses:

8.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	178.31	31	5.75		
Constant	858.85	1	858.85	149.31	.000
Susceptibility	1.13	1	1.13	.20	.661

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	28.82	31	.93		
Time	3.16	1	3.16	3.40	.075
Suscept. by Time	.16	1	.16	.18	.678

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	71.37	31	2.30		
Imagery	41.61	1	41.61	18.07	.000
Suscept. by Imagery	.25	1	.25	.11	.746

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	92.87	31	3.00		
Depth	301.61	1	301.61	100.67	.000
Suscept. by Depth	.25	1	.25	.08	.776

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	10.82	31	.35		
Time by Imagery	.16	1	.16	.47	.499
Suscept. by Time by Imagery	3.16	1	3.16	9.06	.005

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	19.49	31	.63		
Time by Depth	2.45	1	2.45	3.90	.057
Suscept. by Time by Depth	1.99	1	1.99	3.17	.085

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	105.81	31	3.41		
Imagery by Depth	2.31	1	2.31	.68	.417
Suscept. by Imagery by Depth	1.13	1	1.13	.33	.570

Tests involving 'Time by Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	10.72	31	.35		
Time by Imagery by Depth	.64	1	.64	1.86	.183
Suscept. by Time by Imagery by Depth	3.22	1	3.22	9.31	.005

9.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using High imagery words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	153.97	31	4.97		
Constant	639.27	1	639.27	128.71	.000
Susceptibility	1.21	1	1.21	.24	.625

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	21.95	31	.71		
Time	2.38	1	2.38	3.37	.076
Suscept. by Time	2.38	1	2.38	3.37	.076

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	90.72	31	2.93		
Depth	178.34	1	178.34	60.94	.000
Suscept. by Depth	.16	1	.16	.05	.817

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	10.77	31	.35		
Time by Depth	.29	1	.29	.84	.367
Suscept. by Time by Depth	5.14	1	5.14	14.80	.001

10.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using Low imagery words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	95.72	31	3.09		
Constant	261.19	1	261.19	84.59	.000
Susceptibility	.16	1	.16	.05	.822

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	17.69	31	.57		
Time	.94	1	.94	1.65	.208
Suscept. by Time	.94	1	.94	1.65	.208

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	107.97	31	3.48		
Depth	125.58	1	125.58	36.06	.000
Suscept. by Depth	1.21	1	1.21	.35	.559

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	19.44	31	.63		
Time by Depth	2.80	1	2.80	4.46	.043
Suscept. by Time by Depth	.07	1	.07	.12	.736

11.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) ANOVA using High imagery, Deeply processed words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	170.81	31	5.51		
Constant	746.46	1	746.46	135.47	.000
Susceptibility	1.13	1	1.13	.20	.654

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	22.86	31	.74		
Time	2.17	1	2.17	2.94	.096
Suscept. by Time	7.26	1	7.26	9.85	.004

12.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) ANOVA using High imagery, Shallowly processed words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	73.87	31	2.38		
Constant	71.16	1	71.16	29.86	.000
Susceptibility	.25	1	.25	.10	.750

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	9.86	31	.32		
Time	.50	1	.50	1.58	.217
Suscept. by Time	.26	1	.26	.82	.371

13.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) ANOVA using the Deeply processed words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	228.72	31	7.38		
Constant	1089.19	1	1089.19	147.63	.000
Susceptibility	.16	1	.16	.02	.884

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	40.32	31	1.30		
Time	5.59	1	5.59	4.30	.047
Suscept. by Time	1.65	1	1.65	1.27	.269

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	129.97	31	4.19		
Imagery	31.76	1	31.76	7.57	.010
Suscept. by Imagery	1.21	1	1.21	.29	.595

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	14.80	31	.48		
Time by Imagery	.08	1	.08	.17	.687
Suscept. by Time by Imagery	6.38	1	6.38	13.37	.001

14.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) ANOVA using the Shallowly processed words only.

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	42.47	31	1.37		
Constant	71.27	1	71.27	52.03	.000
Susceptibility	1.21	1	1.21	.89	.354

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	7.99	31	.26		
Time	.02	1	.02	.09	.768
Suscept. by Time	.51	1	.51	1.97	.170

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	47.22	31	1.52		
Imagery	12.16	1	12.16	7.98	.008
Suscept. by Imagery	.16	1	.16	.10	.748

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	6.74	31	.22		
Time by Imagery	.73	1	.73	3.34	.077
Suscept. by Time by Imagery	.00	1	.00	.00	.982

15.) 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using High susceptible subjects only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	9.98	19	.53		
Time	3.03	1	3.03	5.76	.027

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	61.87	19	3.26		
Imagery	30.62	1	30.62	9.40	.006

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	77.37	19	4.07		
Depth	180.62	1	180.62	44.35	.000

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	6.47	19	.34		
Time by Imagery	3.02	1	3.02	8.88	.008

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	8.37	19	.44		
Time by Depth	5.62	1	5.62	12.76	.002

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	73.27	19	3.86		
Imagery by Depth	4.23	1	4.23	1.10	.308

Tests involving 'Time by Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	5.88	19	.31		
Time by Imagery by Depth	.62	1	.62	2.02	.171

16.) 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using Low susceptible subjects only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	18.85	12	1.57		
Time	.78	1	.78	.50	.495

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	9.50	12	.79		
Imagery	14.62	1	14.62	18.47	.001

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	15.50	12	1.29		
Depth	131.62	1	131.62	101.90	.000

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	4.35	12	.36		
Time by Imagery	.78	1	.78	2.15	.168

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	11.12	12	.93		
Time by Depth	.01	1	.01	.01	.921

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	32.54	12	2.71		
Imagery by Depth	.09	1	.09	.03	.861

Tests involving 'Time by Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	4.85	12	.40		
Time by Imagery by Depth	2.78	1	2.78	6.88	.022

17.) 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) ANOVA using Low susceptible subjects and Deeply processed words only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	28.27	12	2.36		
Time	.48	1	.48	.20	.660

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	32.27	12	2.69		
Imagery	8.48	1	8.48	3.15	.101

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	6.50	12	.54		
Time by Imagery	3.25	1	3.25	6.00	.031

18.) 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) ANOVA using Low susceptible subjects and Shallowly processed words only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	1.69	12	.14		
Time	.31	1	.31	2.18	.165

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	9.77	12	.81		
Imagery	6.23	1	6.23	7.65	.017

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	2.69	12	.22		
Time by Imagery	.31	1	.31	1.37	.264

19.) 2 Time (First vs. Second Recall Test) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using Low susceptible subjects and High imagery words only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	10.50	12	.87		
Time	.00	1	.00	.00	1.000

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	20.27	12	1.69		
Depth	69.23	1	69.23	40.99	.000

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	2.27	12	.19		
Time by Depth	1.23	1	1.23	6.51	.025

20.) 2 Time (First vs. Second Recall Test) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA using Low susceptible subjects and Low imagery words only.

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	12.69	12	1.06		
Time	1.56	1	1.56	1.47	.248

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	27.77	12	2.31		
Depth	62.48	1	62.48	27.00	.000

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	13.69	12	1.14		
Time by Depth	1.56	1	1.56	1.37	.265

21.) 2 Relaxation (High vs. Low) x 2 Time (First vs. Second Recall Test) x 2 Imagery (High vs. Low imagery words) x 2 Depth (Deeply vs. Shallowly processed words) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	93.98	30	3.13		
Constant	990.92	1	990.92	316.31	.000
Relaxation	.98	1	.98	.31	.580

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	38.36	30	1.28		
Time	.45	1	.45	.35	.558
Relax. by Time	.11	1	.11	.08	.776

Tests involving 'Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	77.44	30	2.58		
Imagery	24.72	1	24.72	9.58	.004
Relax. by Imagery	.81	1	.81	.31	.579

Tests involving 'Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	110.43	30	3.68		
Depth	278.88	1	278.88	75.76	.000
Relax. by Depth	3.41	1	3.41	.93	.344

Tests involving 'Time by Imagery' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	16.21	30	.54		
Time by Imagery	1.79	1	1.79	3.31	.079
Relax. by Time by Imagery	2.04	1	2.04	3.77	.062

Tests involving 'Time by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	11.40	30	.38		
Time by Depth	.25	1	.25	.65	.426
Relax. by Time by Depth	.25	1	.25	.65	.426

Tests involving 'Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	78.98	30	2.63		
Imagery by Depth	1.17	1	1.17	.44	.510
Relax. by Imagery by Depth	.98	1	.98	.37	.546

Tests involving 'Time by Imagery by Depth' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	16.23	30	.54		
Time by Imagery by Depth	.01	1	.01	.02	.881
Relax. by Time by Imagery by Depth	.86	1	.86	1.58	.218

Appendix G - Statistical tables for Experiment 2

1.) 2 Group (Hypnosis vs. Relaxation) x 2 Time (First vs. Second recall test) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	1466.02	62	23.65		
Constant	9608.45	1	9608.45	406.35	.000
Group	3.78	1	3.78	.16	.691

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	53.40	62	.86		
Time	9.57	1	9.57	11.11	.001
Group by Time	.28	1	.28	.33	.570

2.) 2 Susceptibility (High vs. Low) x 2 Time (First vs. Second recall test) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	798.45	30	26.62		
Constant	4495.58	1	4495.58	168.91	.000
Susceptibility	146.17	1	146.17	5.49	.026

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.98	30	.83		
Time	6.45	1	6.45	7.75	.009
Suscept. by Time	.08	1	.08	.09	.763

3.) 2 Susceptibility (High vs. Low) ANOVA
using only Second test recall data and First test recall data as a covariate

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	48.53	29	1.67		
Regression	363.87	1	363.87	217.46	.000
Susceptibility	.67	1	.67	.40	.531

4.) 2 Relaxation (High vs. Low) x 2 Time (First vs. Second recall test) ANOVA

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	479.96	30	16.00		
Constant	4996.72	1	4996.72	312.32	.000
Relaxation	41.44	1	41.44	2.59	.118

Tests involving 'Time' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	24.09	30	.80		
Time	3.29	1	3.29	4.09	.052
Relax. by Time	4.25	1	4.25	5.30	.028

5.) 2 Relaxation (High vs. Low) ANOVA
using only Second test recall data and First test recall data
as a covariate

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	45.34	29	1.56		
Regression	203.91	1	203.91	130.42	.000
Susceptibility	10.14	1	10.14	6.48	.016

6.) 4 Subgroup (High vs. Low susceptibility vs.High vs. Low
Relaxation) ANOVA using only Second test recall data and
First test recall data as a covariate

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	94.20	59	1.60		
Regression	567.44	1	567.44	355.39	.000
Subgroup	11.00	3	3.67	2.30	.087

7.) 2 Group (Hypnosis vs. Relaxation) ANOVA using "Misses" on Second recall test

Tests of Between-Subjects Effects.

Source of Variation	SS	DF	MS	F	Sig. of F
Within Cells	169.22	62	2.73		
Group	6.89	1	6.89	2.52	.117