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Hypnosis, Hypermnesia and Memory Distortion in Long Term Memory

by

Jerome Simon Ritt, B.A., B.A. Honours

A thesis submitted to

The Faculty of Graduate Studies and Research

in partial fulfillment of

the requirements for the degree of

Master of Arts

Department of Psychology

Carleton University

Ottawa, Ontario

September 1996

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**"HYPNOSIS, HYPERMNESIA AND MEMORY DISTORTION
IN LONG TERM MEMORY"**

Submitted by Jerome Simon Ritt, B.A., B.A. Honours
in partial fulfillment of the requirement for
the degree of Master of Arts

Thesis Supervisor

Chair, Department of Psychology

Carleton University

September 20, 1996

Abstract

Highly ($n = 30$), moderately ($n = 30$), and low ($n = 30$) hypnotizable participants were randomly assigned to hypnotic, mnemonic, or control treatments (3x3 design with total $n = 90$) to assess hypnotic hypermnnesia and hypnotic memory distortion using an event from long-term memory -the movie *Jaws* (Zanuck & Brown, 1976). Hypermnnesia was examined by using a free-recall task for events from the movie and coding these in a content analysis for number of units, accuracy and vagueness. Hypnotic high-hypnotizable participants recalled the most information and all participants were less accurate in the post-treatment recall trial. A content analysis of participants' descriptions of a true and confabulated scene revealed that participants used more descriptors and qualifiers in the true than the false scene. Mixed effects for hypnotizability and state instruction were observed but all participants accepted more false information at the end of the study in a true/false questionnaire than they did in a cued recall test which preceded it. Implications of the overall increase in acceptance of confabulated information across all participants independent of hypnotizability or state instruction are discussed.

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This thesis would not have been possible without the encouragement and assistance of many people. First and foremost I would like to acknowledge my late advisor Nicholas P. Spanos for believing in me and going to extraordinary lengths to encourage and support me. He taught me almost everything I have learned about experimental psychology and his absence will always be keenly felt. I would also like to thank my advisor John Logan who has played an instrumental role in the completion of this project and whose optimism and sound suggestions will always be remembered warmly. Lynn Giff has always been a wonderful and crucial source of advice and encouragement and I thank her deeply for her years of enthusiastic and unwavering support.

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that an individual is easily hypnotized. However, this may be an artifact as opposed to a genuine function of memory performance (Sheehan, 1988; Spanos & Coe, 1992). In other words, the knowledge that an individual has scored in the upper range on a hypnotizability scale may affect their performance independently of any effects that hypnosis may have through contextually driven role playing and expectations. Studies which have manipulated the hypnotic context (e.g., Barber & McConkey, 1992; Murrey, Cross, & Whipple 1992; Sheehan, Green, & Truesdale, 1992; Spanos & McLean, 1986a) have shown that shifting experimental demands significantly affects memory distortion reports. For example, Murrey, et al., (1992) found that participants offered a monetary reward for accurate performance rejected false information more often than participants not offered a monetary reward. Similarly, Spanos and McLean (1986a) hypnotized high hypnotizable participants and found that they reliably altered their memory distortion reports depending on experimental demands. Sheehan et al., (1992) manipulated experimenter/participant rapport by either providing praise or negative comments to groups of hypnotic and nonhypnotic participants. They found that negative appraisal reliably led to lower levels of hypnotic memory distortion reporting.

The common theme among these studies is that hypnotic memory responding, popularly thought to involve automatic access to involuntary mental

Hypnosis and Long Term Memory

Hypnosis has been conceived of as an automatic, invariant state with cognitive dissociations (e.g., Hilgard, 1977; Zamansky, 1986). This perspective has been called the special process view (Spanos & Chaves, 1989) because it accepts hypnotic responding at face value and views it as fundamentally different from normal everyday social behaviour. Special process theories explain hypnotic responding in terms of mechanistic forces or mental processes that, in some manner, displace the cognizing intending self and lead automatically to the generation of suggested responses. For instance, the special process view would explain acceptance of hypnotic memory distortion suggestions in terms of a participant passively experiencing "dissociations" among cognitive subsystems. Thus, one subsystem would be "aware" of the truth but others would not be.

An alternative approach is the social psychological position. This perspective views hypnotic responding as a state of enhanced relaxation where social-role and contextual factors significantly and substantially affect performance (Spanos & Chaves, 1989; Spanos & Coe, 1992; Wagstaff, 1991). In this view, participants are seen as motivated, sentient agents who retain control over their own actions, and who use contextual information to guide their responding in terms of the ends they believe are appropriate. Experimental evidence clearly

favours social-psychological explanations of hypnotic responding (see Spanos, 1986, for a review)

Similarly, human memory can be conceived of in two distinct and contradictory ways. It can be viewed as a metaphorical tape recorder, honestly and reliably recording input, or as a labile, reconstructive medium, subject to encoding and retrieval errors based on a myriad of personal and situational factors (Loftus, 1979; Loftus & Hoffman, 1989; Neisser, 1985). Research assessing long term memory has been varied if somewhat limited but one area that has received considerable attention is that of so called "flashbulb memory".

Brown and Kulik (1977) hypothesized that a "flashbulb" mechanism could explain the putative accuracy of intense memorial experiences. They argued that this special mechanism was triggered by an event exceeding criterial levels of surprise and consequentiality. This mechanism metaphorically "fired off a flashbulb" so that all of the particulars of an event were then recorded with perfect detail and clarity. Subsequent research has revealed that recall based on these powerful experiences is often inaccurate, with almost no relationship between confidence and accuracy (e.g., McCloskey, Wible, & Cohen, 1988; Neisser & Harsch, 1992).

Experimental evidence from hypnosis and memory research clearly favours the operation of agentic, or active, reconstructive processes in long term memory.

Thus, there is a common front among many hypnosis and waking memory researchers. In addition, interest in these areas has increased in recent years, fuelled by clinical and forensic situations where hypnosis has been prominently employed in order to enhance recall. While the evidence is mixed, it generally does not support the use of hypnosis as a means of improving retrieval. Furthermore, hypnosis may actually distort memory and be related to overconfidence in inaccurate recall (see McConkey, 1992, for a review).

A related concern is that hypnosis may enhance memory distortion. In this paradigm an attempt is made to implant misinformation in hypnotized participants at some point after exposure to a target event by hypnotic suggestion (Labelle, Laurence, Nadon, & Perry, 1990; Spanos & McLean, 1986a), subtle misinformation, often in the form of a written summary (Sheehan, Experiment 1, 1988; Sheehan & Statham, 1989), or leading questions (Barnier & McConkey, 1992; Sheehan, Garnett & Robertson, 1993; Sheehan & Statham, 1989). After exposure to misinformation its impact on recall and confidence is measured. Again, although the findings are not entirely consistent, it appears that hypnosis can play a limited role in memory distortion.

Similarly, experimental evidence reveals that hypnotizability may be positively related to misinformation acceptance. High hypnotizability reflects passing most or all suggestions on standardized hypnotizability scales indicating

that an individual is easily hypnotized. However, this may be an artifact as opposed to a genuine function of memory performance (Sheehan, 1988; Spanos & Coe, 1992). In other words, the knowledge that an individual has scored in the upper range on a hypnotizability scale may affect their performance independently of any effects that hypnosis may have through contextually driven role playing and expectations. Studies which have manipulated the hypnotic context (e.g., Barnier & McConkey, 1992; Cross, & Whipple 1992; Sheehan, Green, & Truesdale, 1992; Spanos & McLean, 1986a) have shown that shifting experimental demands significantly affects memory distortion reports. For example, Murrey, et al., (1992) found that participants offered a monetary reward for accurate performance rejected false information more often than participants not offered a monetary reward. Similarly, Spanos and McLean (1986a) hypnotized high hypnotizable participants and found that they reliably altered their memory distortion reports depending on experimental demands. Sheehan et al., (1992) manipulated experimenter/participant rapport by either providing praise or negative comments to groups of hypnotic and nonhypnotic participants. They found that negative appraisal reliably led to lower levels of hypnotic memory distortion reporting.

The common theme among these studies is that hypnotic memory responding, popularly thought to involve automatic access to involuntary mental

realms, is easily and reliably altered by manipulating social demands. In the next section, hypnotic memory research will be divided into studies that compare hypnotic and non-hypnotic treatments on memory enhancement and studies that involve assessing the influence of hypnosis and hypnotizability on misinformation acceptance. These are two critical areas of research for the proposed study. I will examine the findings in both of these areas and then describe the present study which was designed to investigate the effects of hypnosis on long-term memory and its effects on memory distortion.

Hypnosis and Hypermnesia

Historically, anecdotal claims that hypnosis can enhance memory are not uncommon (Wagstaff, 1989). However, research that has measured memory enhancement by comparing hypnotic and waking conditions has yielded conflicting results. In this section the varied findings and related issues will be discussed.

Dhanens and Lundy (1975) performed an early study in which they tested recall in high and low hypnotizable participants using a biographical sketch. After three presentations of a 184 word description, participants were asked to write down everything they could remember. Session 2 was scheduled one week later when participants were randomly assigned to one of six conditions: (a) hypnosis

with regression, (b) hypnosis with motivation, (c) regression, (d) motivation, (e) relaxation, and, (f) control. Specifically, participants in the regression groups were asked to imagine going back in time and to experience the room where they were originally exposed to the learning material as though they were once again in it. Participants in the motivation groups were asked to make a real effort and to try as hard as they could to remember everything possible. Control participants were asked to leave the experimental room for 30 minutes and upon returning were asked to recall everything with no additional instructions. Again, the participants' task was to recall everything they could from the biographical sketch. Dhanens and Lundy hypothesized that hypnotic treatment would enhance recall and that both motivation and regression instructions would be intrinsically related to hypnotic and non-hypnotic recall.

Dhanens and Lundy (1975) found that high hypnotizable participants who were in the hypnosis with motivation group recalled significantly more information than the high hypnotizable control group (mean gain score of 4.33 vs. 1.30 items; *F* ratio and alpha level not reported). They also found that the high hypnotizable participants in the hypnosis with motivation group performed significantly better than the high hypnotizable participants in the relaxation group and the low hypnotizable participants in the hypnosis with motivation group. The

authors concluded that highly hypnotizable participants benefited from hypnosis with motivating instructions.

Perhaps more interesting and certainly more prescient were the patterns of improvement in the recall of high and low hypnotizable control groups between sessions 1 and 2. Specifically, the high hypnotizable control group had a mean gain score of 1.30, whereas the low hypnotizable control group had a mean gain score of 3.30, a trend that was almost significant. In other words, high hypnotizable and low hypnotizable control groups seemed to be performing differently, independent of the treatments.

Dhanens and Lundy (1975) hypothesized that perhaps expectations accounted for this trend. A social psychological explanation (Barnier & McConkey, 1992; Spanos & McLean, 1986a), would argue that it was the *context* of the hypnotic situation which accounted for these trends. Dhanens and Lundy do not provide a detailed description of their procedure so it is impossible to know if participants were aware of the various treatment groups. However, if high and low hypnotizable participants were aware of the various conditions, then the expectations drawn from this knowledge might account for the findings in their study. Specifically, high hypnotizable participants may not have performed as well in the control condition because they knew that they were highly responsive to hypnotic procedures. Thus, when hypnosis was not offered they may have made

only minimal efforts in recall. Conversely, low hypnotizable participants, unaffected by hypnotic treatment, would have had no reason to avoid doing their best when hypnosis was not offered. In fact, in some cases low hypnotizable participants have been shown to perform worse when treated with hypnosis than in a control condition (Jones & Spanos, 1982). Indeed, this trend was observed as low hypnotizable control participants performed nominally better than low hypnotizable participants in all other conditions except the motivation group.

Dhanens and Lundy (1975) indicated that mean performance levels between high and low hypnotizable participants in session 1 did not differ significantly, but they did not provide the actual means. Thus, it is impossible to see if the trends in session 1 performance were matched in session 2. In other words, it is impossible to rule out random group differences whereby these trends were matched in both trials. To summarize, this study found a memory enhancing effect for hypnosis but only with high hypnotizable participants in a motivation condition. More importantly, it identified a trend, albeit not conclusively, whereby high and low hypnotizable participants react differentially to hypnotic memory enhancing instructions.

Stager and Lundy (1985) attempted to further delineate the effects of hypnosis for participants in a memory task. They employed a visual memory task consisting of a 15 minute movie with high and low hypnotizable participants.

Participants viewed the movie and returned one week later for two recall sessions. In session 1 all participants were asked 40 prepared questions with 15 s to reply to each. In session 2 participants received either waking or hypnotic instructions, with waking participants given a filler task to equalize the time delay due to the hypnotic induction. Then, all participants were presented with the same 40 prepared questions with 15 s to reply to each. All participants were informed that they would find it easier to answer the questions on the second trial.

Stager and Lundy (1985) found an effect for trials, with improved performance across trials. There was also an effect for hypnotizability with high hypnotizable participants recalling a greater number of items than low hypnotizable participants across the two recall trials. The interactions were also informative. Stager and Lundy found that high hypnotizable participants increased their recall scores across the two trials more than low hypnotizable participants, and a three-way interaction where high hypnotizable participants who received hypnosis as their treatment increased their recall scores from trial 1 to trial 2 while low hypnotizable participants who received hypnosis actually lowered their recall scores from trials 1 to 2. In terms of error scores, the authors found a main effect for trials with errors increasing for all participants between trials 1 and 2.

A significant benefit for hypnosis in high hypnotizable participants was observed for recall of a short movie in this study. However, this may be partly due to the fact that low hypnotizable participants treated with hypnosis sometimes react counter to the suggestions (Jones & Flynn, 1989). Indeed, the recall performance of low hypnotizable participants actually declined with a hypnotic treatment in Stager and Lundy's (1985) experiment. The other important finding was that high hypnotizable participants recalled more than low hypnotizable participants across all conditions. Although the recall scores of high hypnotizable participants reliably increased due to the hypnotic treatment, their scores, on average, were already higher than scores of low hypnotizable participants. In order to test the hypothesis that their sample of high hypnotizable participants had greater intellectual ability than the low hypnotizable participants, the authors compared the Scholastic Aptitude Test scores (Educational Testing Service, 1971, cited in Stager & Lundy, 1985) of their two groups. They noted no significant differences between high and low hypnotizable participants on these measures and did not elaborate further on this difference.

One possible explanation for the higher overall scores of high compared to low hypnotizable participants is the positive relationship between hypnotizability and absorption. Absorption has been defined as the, "...full commitment of available perceptual, motoric, imaginative and ideational resources to a unified

representation of the attentional object" (Tellegen & Atkinson, 1974, p. 274).

Watching movies has face validity in terms of absorption as it requires sustained, involved attention. This has been confirmed empirically through the research of Tellegen and Atkinson who included watching movies as a measure on the Absorption (ABS) scale (1974). However, as de Groh (1989, p. 53) has pointed out, research has shown that the Pearson correlation between absorption and hypnotizability is generally in the .30 range only a moderate relationship. Also, the research done in deriving the ABS scale was done partly by employing questions which were positively related to hypnotizability. Thus, it is uncertain whether the ABS scale is measuring imaginative involvement or the situationally specific interests of high versus low hypnotizable individuals (de Groh, 1989). In other words, positing that high hypnotizable individuals perform better than low hypnotizable individuals on memory tasks that typically elicit a high degree of absorption is problematic because it is uncertain whether the ABS scale is a cognitive measure of imaginativeness or a list of activities which high hypnotizable individuals endorse.

To summarize, Stager and Lundy (1985) found that hypnosis improved recall in high hypnotizable participants, but scrutiny of the findings leaves the supposed ameliorative effects of hypnosis open to question. One way to delineate this issue further was to replicate Stager and Lundy's procedure.

Lytle and Lundy (1988) performed a partial replication of Stager and Lundy (1985) in order to test their finding of a positive effect for hypnotic treatment with high hypnotizable individuals. They employed the same design, including the same movie as the stimulus, and departed from the original study only by splitting the original 40 open ended questions into 20 open ended and 20 multiple choice questions. The multiple choice questions provided participants with four choices for each question, including the correct response and a "don't know" option.

Lytle and Lundy (1988) performed the same basic analyses as Stager and Lundy (1985) and found a similar pattern of results, with the crucial exception of finding no benefit for hypnotic treatment, even with high hypnotizable participants. The analysis of correct scores revealed that accuracy increased across trials, that multiple choice scores were greater than free recall scores, and that high hypnotizable participants recalled information more accurately than low hypnotizable participants. Moreover, high hypnotizable participants increased their correct scores more from trial 1 to trial 2 than low hypnotizable participants. There was also a three-way interaction for hypnotizability, question format, and trials. Further analyses indicated an increase from trial 1 to trial 2 in the scores of high hypnotizable participants on the multiple choice format with no increase for the low hypnotizable participants. Clearly, these findings seem to be driven by the

preference of high hypnotizable participants for the multiple choice format of questions. High hypnotizable participants may outperform low hypnotizable participants on multiple choice questions because they provide cues which are crucial if an individual prefers to guess a response rather than not answering.

The analyses on incorrect scores indicated three main effects: (a) there were more errors on trial 2 than on trial 1, (b) free recall responses contained more errors than multiple choice responses, and, (c) high hypnotizable participants made more errors than low hypnotizable participants. There was a three-way interaction among hypnotizability, question format, and trials. Analyses revealed there was a trial 1 to trial 2 increase only for the free recall questions with high hypnotizable participants. In other words, high hypnotizable participants made more errors than low hypnotizable participants when they did not have the opportunity to select an answer but rather had to remember one without cues. The findings from incorrect and correct scores point to the preference of high hypnotizable participants for a multiple choice format where guessing allows a greater likelihood of correct answers than a free recall format.

There were two essential findings from this study. First, there were no significant effects of the hypnotic treatment, even for high hypnotizable participants. Lytle and Lundy (1988) acknowledge that this is difficult to reconcile in light of the positive effects noted for hypnosis with high hypnotizable

participants in Stager and Lundy (1985), and comment that, "... memory improvement found in any hypnotic context is far from robust" (p. 331). Lytle and Lundy hypothesized that since hypnotizability seems to positively affect accuracy and distortion, it is perhaps the context of hypnosis rather than hypnosis itself which accounts for differences in performance. Second, the three-way interactions for correct and incorrect responses are informative. Recall that high hypnotizable participants performed more accurately in a multiple choice format and less accurately in a free recall format than low hypnotizable participants. One interpretation of this finding is that high hypnotizable participants were more willing to guess than low hypnotizable participants. When cues were available, as in the multiple choice format, this was advantageous. However, in a free recall format, where there were no memory cues, guessing led to a greater error rate.

Within hypnosis research, the response criterion shift hypothesis asserts that both accuracy and inaccuracy are increased in hypnosis as a result of a hypnotic participant's greater willingness to guess (Klatzky & Erdelyi, 1985; Whitehouse, Dinges, Orne, & Orne, 1988). However the results of Lytle and Lundy (1988) do not support this hypothesis. Instead, their results point toward a positive relationship between hypnotizability and a more liberal response threshold. In other words, high hypnotizable individuals may be more willing to offer responses than low hypnotizable individuals.

An attempt to untangle this issue has been made by the inclusion of a mnemonic group along with the traditional control group in hypnosis studies in order to control for the guided imagery effects which may lead to a laxer response criterion. Typically, both hypnotic and mnemonic procedures utilize instructions aimed at encouraging participants to reinstate the contextual elements that were present during the target event. Hypnotic procedures often employ the video camera metaphor, asking participants to "zoom in" and "freeze-frame" on specific details. Similarly, mnemonic procedures generally ask participants to reinstate the context in their mind and move backwards and forwards through the sequence of events and adopt different perspectives. The use of a mnemonic group for comparison acts as a control for "reinstating the context effects" and thus rules out any advantages in recall that guided imagery instructions might produce in hypnosis. The next two studies reviewed in this section include mnemonic groups for comparison. The first employs a conventional laboratory design while the second departs from some of the usual laboratory controls by employing police personnel as experimenters and emphasizing procedures congruent with typical forensic settings.

Nogady, McConkey and Perry (1985) employed 60 black and white line drawings, projected onto a screen, as the stimuli for their participants. They tested high and low hypnotizable individuals in three conditions: (a) hypnotic induction,

(b) mnemonic or imagination instructions, and, (c) control. Nogrady et al. comment that the mnemonic group was employed, "to parallel the hypnosis condition in terms of the contextual demands placed on participants and to provide them with an imagination strategy to use in their recall attempts" (p. 196). In order to measure performance they asked participants to remember as many of the items as they could and to rate their confidence for each item. Participants were provided with six recall trials. The first two trials were the same for all participants. Following this, participants were treated according to their experimental condition and exposed to two more recall trials. After this, hypnotic participants were awakened and given a suggestion for post-hypnotic hypermnnesia, mnemonic participants were given an explicit instruction for hypermnnesia, and control participants did not receive any hypermnnesia instructions. All participants were then administered the final two recall trials.

Nogrady et al. (1985) found that both correct and incorrect responses increased across trials. Neither state instruction nor hypnotizability had significant effects on correct or incorrect responses. Analysis of confidence ratings indicated that high hypnotizable participants increased their confidence ratings for correct responses across recall trials whereas low hypnotizable participants decreased their ratings across trials. Thus, high hypnotizable participants seemed to become more confident in their correct responses. There were no significant

overall effect of confidence ratings for incorrect responses. However, an examination of incorrect responses in which participants mistakenly chose the highest level of confidence ("very sure") indicated a three-way interaction in which high hypnotizable participants in the hypnosis condition confidently rated more incorrect items as correct on the last three recall trials than any other group.

Nogrody et al.'s (1985) results indicated that hypnosis neither helped nor hindered recall. However, hypnotizability was reliably implicated in the confidence data. High hypnotizable participants became more confident about their correct answers across trials and high hypnotizable participants in the hypnosis condition indicated greater (mistaken) confidence about their incorrect answers than low hypnotizable participants in the latter three recall trials. To broaden the generalizability of the reported findings, a study with greater ecological validity is now reviewed.

Geiselman, Fisher, MacKinnon and Holland (1985) also employed a mnemonic control group, but in an applied forensic situation. Geiselman et al. compared recall performance in hypnotic, mnemonic, and a standard (control) police-style interview. Ecological validity was emphasized by employing participants unselected for hypnotizability, and by employing a movie of a violent crime, selected from police force training films as target stimulus. Participants were then questioned by experienced law-enforcement individuals approximately

48 hours later. The questioners had license in terms of choosing a preferred hypnotic induction and setting time limits for participants' responses. Geiselman et al. collapsed information derived from free recall and follow-up questioning into three categories: correct, incorrect, and confabulated. They found that the hypnotic and mnemonic groups recalled more accurate material than the control group. The number of incorrect and confabulated responses did not differ significantly among treatment groups. Confidence ratings were not recorded due to the emphasis on ecological validity.

The major finding of this study was that there was an equivalent benefit from hypnotic and mnemonic treatments, which were superior to a control procedure. Further, this study confirms the findings of more controlled laboratory experiments that indicate that hypnosis generally does not confer any special enhancing effects on accurate recall.

One final issue of relevance for this section are the effects of multiple recall trials. It has been established that multiple recall trials lead to a reliable hypermnesia curve (e.g., Erdelyi & Kleinbard, 1978; Payne, 1987). But a relevant question within hypnosis research is: Are hypermnesia effects across multiple recall trials equivalent for hypnotic and non-hypnotic treatments? Dinges, Whitehouse, Orne, Powell, and Orne (1992) argued that hypnotic treatments maybe useful in improving recall, but in a way that differs from waking recall trials

Specifically, they hypothesized that hypnosis had not conclusively produced significant hypermnesia effects in previous research: because there had been an insufficient number of recall trials. Dinges et al. hypothesized that if there were several hypnotic recall trials, that ameliorative effects would emerge from hypnosis compared to waking procedures. The authors were clearly of a credulous perspective (Sutcliffe, 1960) with regard to hypnotic hypermnesia as they asserted that the use of hypnosis in psychotherapy helps patients, "...come to terms with emotions and autobiographical experiences that they are otherwise consciously unable to remember or disclose." (Dinges et al., 1992, p. 1139). Thus, the authors tested the experimental hypothesis, derived from their clinical experience, that after making several effortful attempts to remember forgotten material, hypnotized participants would retrieve more information than a similar group of nonhypnotic participants.

The stimuli in Dinges et al.'s (1992) experiment were 40 black-and-white slides of common objects. All participants observed the stimuli and then wrote down the names of all the objects they could recall seeing. In all trials a forced recall procedure was employed where participants were told to recall all of the items they could and when they could not remember any more items to draw a line under the last entry. They were then to fill the remaining blank spaces with their best guesses until the total reached 40 items. If a participant felt that a

guessed item was an actual item (i.e. a remembered item) they were asked to put a check mark beside it. The advantage of this procedure was that it controlled for possible variation due to different levels of responding. That is, if hypnotic or highly hypnotizable participants had higher levels of recall, it would not have been because of a laxer criterion for responding.

All participants viewed the stimuli and performed a waking recall trial. Participants were then asked to return one week later at which time a second waking (baseline) trial was administered following the procedure of the previous trial. Then, the experimental treatments were introduced with equal numbers of high and low hypnotizable participants in each condition. Hypnotic participants received a hypnotic induction and suggestions aimed at helping them remember the slides. Control participants received a reaction time task to match the time required for the hypnotic induction of the hypnotized participants. Five consecutive trials were administered after which hypnotic participants were awakened and all participants performed one final recall trial.

An equivalent hypermnesia effect was observed across conditions, indicating no benefit due to hypnosis or hypnotizability. In fact, hypnotic participants actually remembered significantly fewer new items across hypnotic trials than control participants, but were slightly, though not significantly, better at intertrial retention, compared to waking participants. At the very least this conflicts with

the authors hypothesizes that hypnosis bestows retrieval enhancement properties.

In terms of confidence ratings, high hypnotizable participants were more confident in their erroneous answers than low hypnotizable participants, and low hypnotizable participants in the hypnosis condition also were similarly more confident in their incorrect responses. These findings document the liabilities associated with hypnotic recall procedures compared to waking procedures.

Dinges et al. (1992) then investigated the possibility that hypnosis may aid recall after waking memory had reached asymptote. Thus, in their second experiment they employed the same procedure as in Experiment 1, employing high and low hypnotizable participants, but reversed the treatment order in session 2: All participants received the waking recall treatment until the final recall trial, trial 8. At this time they were hypnotized and given suggestions for enhanced recall of the original stimuli. There was no control group.

Dinges et al. (1992) found no increase in recall on trial 8, but did find a significantly greater number of confidently reported inaccurate items, compared to the preceding trials. The authors computed separate correlations for correct and incorrect recall with hypnotizability by trial for trials 3 through 8. None of these values were significant except for the correlation between incorrect recall and hypnotizability on trial 8 ($r=.33, p<.05$). Thus, hypnotizability was positively

related to incorrect recall and high hypnotizable participants were the most likely to generate confident errors.

To summarize the data on hypnosis as a procedure for memory enhancement, Dhanens and Lundy (1975) and Stager and Lundy (1985) found that hypnosis improved recall in high hypnotizable participants. Geiselman et al. (1985) found that hypnotic and mnemonic groups performed equivalently, and recalled more accurate material than a control group. Nogrady et al. (1985), Lytle and Lundy (1988), and Dinges et al. (1992) found no beneficial effects for hypnosis on recall. In fact, in Experiment 2, Dinges et al. found that hypnosis increased inaccurate recall and confident errors. Further, the positive results noted above for hypnosis failed to replicate. Thus, support for hypnosis as an effective procedure for producing hypermnesia, even among high hypnotizable participants, is weak. One possible explanation for the inconsistent findings has been posited by McConkey (1992). He has suggested that when beneficial effects are observed from hypnosis it may be due to the memory enhancing effects of restoring the context of the target event. This hypothesis has received general support because studies which have employed mnemonic restructuring conditions have generally found equivalent memory enhancement between hypnotic and mnemonic conditions (e.g., Geiselman et al., 1985; Nogrady et al., 1985; see McConkey, 1992, for a review).

There is limited support for a positive relationship between accurate recall and hypnotizability. Dhanens and Lundy (1975) found that high hypnotizable participants treated with hypnosis and motivating suggestions performed better than all other groups. Similarly, Stager and Lundy (1985) found that high hypnotizable participants had a greater number of correct responses than low hypnotizable participants, but in this case it was partly because the accuracy of low hypnotizable participants treated with hypnosis declined significantly between the baseline trial and trial 2. One explanation for this is the counterdemand effects of hypnosis on non-hypnotizable participants (Jones & Flynn, 1989). That is, in some experimental contexts, some low hypnotizable participants, especially those with negative beliefs about hypnosis, actually perform counter to hypnotic suggestions to defy the hypnotist.

Support for the hypothesis that hypnotizability is positively related to both accurate and inaccurate recall, as well as confidence, came from Lytle and Lundy (1988). They found that high hypnotizable participants performed better than low hypnotizable participants, especially in the multiple choice format, and that high hypnotizable participants made more errors than low hypnotizable participants, especially in the free recall format. Similarly, Nogrady et al. (1985) found that high hypnotizable participants tended to increase both their correct and incorrect recall across trials. Confidence data from Nogrady et al. (1985)

indicated that hypnotizability was positively related to correct and incorrect responses. In Dinges et al. (1992), confidence was positively related to inaccurate recall for high hypnotizable participants. Also, there was an effect on confidence from treatment where low hypnotizable participants in the hypnosis group made more confident errors than low hypnotizable participants in the waking condition.

Although there is some superficial support for hypnosis as a means to facilitate recall, this support is fleeting when the majority of studies are examined closely. A similar situation is revealed when the putative effects of hypnosis are examined in relation to the creation of pseudomemories.

Hypnosis and Memory distortion

As discussed, the evidence on hypnotic hypermnesia is mixed but generally negative. Another historical claim involving hypnosis and memory phenomena is that hypnosis can produce memory alterations or false memories. These claims have received qualified support among contemporary hypnosis researchers (e.g., Laurence, Nadon, Nogrady, & Perry 1986; McCann & Sheehan, 1988; Spanos & McLean, 1986a), although the explanations underlying memory distortion reports remain theoretically split. The social psychological position (e.g., Murrey et al., 1992; Spanos, 1994; Spanos & McLean, 1986a, 1986b) maintains that observed memory distortion effects can be accounted for by misinformation acceptance or

reporting biases. This position views pseudomemory acceptance as participants willingly incorporating information provided by suggestions into a convincing hypnotic performance. Conversely, the special state view explains reports of pseudomemory as evidence of cognitive dissociation (e.g., Labelle et al., 1990; Laurence et al., 1986; Zamansky, 1986). Both theoretical positions would predict that high hypnotizable participants in a hypnotic treatment would produce the greatest memory distortion effects. However, the social psychological position would predict that the changes are easily reversible depending on the context. This position has received experimental support (Barnier & McConkey, 1992; Spanos & McLean, 1986a).

Although it is obviously crucial to disentangle the underlying processes of experimental pseudomemory creation, this research also serves as a junction point between cognitive and social psychological research because in some ways, the methodological and theoretical debates in this area reflect philosophical debates regarding reasonable criteria for "voluntary" activity (Jones & Flynn, 1989). On a more applied level this research is relevant in forensic and clinical applications due to the controversial nature and uses of memory reports elicited in hypnosis (see McConkey, 1992, for a review of hypnosis in forensic applications, and, Loftus, 1993, for a review of hypnosis in clinical applications).

The experimental induction of hypnotic memory distortion can be accomplished in several ways, and individual studies often employ more than one means to do so. Some of these are: (a) direct pseudomemory suggestion during hypnosis which precedes, or is administered during the memory test (e.g., Labelle et al., 1990; Laurence et al., 1986; Spanos & McLean, 1986a); (b) the interpolation of subtle misinformation, often by way of either written or audiotaped summary, between the target event and the memory test (also known as the "Loftus procedure") (e.g., Murrey et al., 1992; Sheehan, 1988); and (c) the use of misleading questions in the memory test (e.g., Barnier & McConkey, 1992; Sheehan, Statham, & Jamieson, 1991b; Sheehan et al., 1993).

The first type of hypnotic memory distortion induction, direct suggestion, is a powerful way to manipulate high hypnotizable participant's reports (Spanos & McLean, 1986a). But, hypnotic suggestions are generally ineffective with non-hypnotizable participants (Jones & Flynn, 1989). Thus, if one wanted to examine the effects of memory distortion on a population that included participants of all hypnotizability levels direct suggestion would be ineffective. The second means, subtle interpolation, has been used extensively in waking memory research but its conclusions have been questioned recently. Positive misinformation effects may indicate that misinformation has overwritten or impaired the original information (Loftus, 1979; Loftus, Donders, Hoffman, &

Schooler, 1989), or it may simply indicate that the original information was not encoded (Belli, 1989; McCloskey & Zaragoza, 1985; Zaragoza & Koshmider, 1989; see Loftus & Hoffman, 1989, for a review). This problem of interpretation also exists when employing the third type of hypnotic memory distortion induction, leading questions. However, leading questions allow a stronger manipulation of social psychological variables, a crucial element in the social psychological understanding of hypnotic performance. Within this view, demand characteristics are viewed as a primary motivator. Also, as mentioned, leading questions are a manipulation which participants of both high and low hypnotizability levels are responsive to (Barnier & McConkey, 1992; Sheehan et al., 1993). What follows is a review of some of the literature in which pseudomemory creation has been attempted and that employed participants with both high and low levels of hypnotizability. These studies compare the frequency and confidence associated with pseudomemory reporting with that of accurate memory reporting.

In 1988, Sheehan performed an integrated series of studies to assess the effects of hypnosis and hypnotizability on recall employing the misinformation paradigm of Loftus (1979). In this paradigm, participants are first exposed to an event, then receive new, misleading information which is subtly embedded in a summary about the event and finally, take a memory test for the event. The

memory test or "Loftus questionnaire" is composed of forced-choice alternatives pairing the actual item with its misinformation counterpart. Loftus found that compared to those exposed to neutral postevent information, participants exposed to misleading postevent information performed more poorly on tests of recall. This reliable finding has come to be known as the misinformation effect or Loftus effect, which can be defined as the decline in accuracy of recall following unobtrusive exposure to misleading information.

In Experiment 6, Sheehan (1988) employed high and low hypnotizable participants, and hypnosis and waking conditions. The stimuli were 50 slides depicting a robbery. First, all participants viewed the slides and were then hypnotized and subtly exposed to three items of misinformation during hypnosis. Sheehan compared accuracy and confidence between groups with the Loftus questionnaire (recognition performance) and free recall. The Loftus questionnaire is composed of questions which ask participants to choose between two-item forced-choice alternatives. For the critical questions the alternatives are an actual stimulus item and a misinformation item. This pairing results in a very sensitive measure of accuracy because the misinformation item is given maximum exposure in the recall task (i.e. there are only two alternatives). Thus, this test offers the greatest likelihood of finding a significant effect from misinformation exposure (Zaragoza & Koshmider, 1989) .

There were no reliable effects of accuracy in the Loftus questionnaire.

Sheehan (1988) hypothesized that the failure of the misinformation to affect accuracy may have been due to the relatively long delay between the misinformation presentation and memory test in this experiment (about 60-70 minutes). This delay was partly due to the testing of free recall prior to recognition performance, which was done to avoid colouring free recall performance by the recognition alternatives. In free recall, high hypnotizable participants performed less accurately than low hypnotizable participants. This meant that hypnotizability was a liability for accurate recall. Sheehan also found that high hypnotizable participants indicated greater confidence than low hypnotizable participants on the Loftus questionnaire. In other words, hypnotizability was positively related to confidence, independent of accuracy. To summarize, there were no advantages in accuracy from hypnotic treatment. Also, hypnotizability was positively associated with confidence, though not with accuracy, on the recognition test.

Sheehan, Garnett and Robertson (1993) compared hypnotic and waking instruction, cue level, and hypnotizability in a two session study to assess their effects on accuracy and confidence for recall of a videotape. They counterbalanced free recall with a series of eight leading questions. Four of these suggested correct answers and four suggested incorrect answers. The leading and misleading

questions suggested information based on minor details, such as a gate number in an airport, and whether a character was wearing a hat. Also, half of the questions in each group were high cue structure, the other half low cue structure. Cue structure was defined in terms of how strongly a question was 'pulling a yes' in pre-testing. The authors predicted that high hypnotizable participants in the hypnosis condition would accept the most false information via high cue structure questions.

In the first session, participants were exposed to a two minute video stimulus and then either hypnotized (hypnosis group) or not (control group). Participants were then counterbalanced between a free recall procedure and the leading questions. As indicated, the leading questions were composed of equal numbers of leading false and leading true questions, and equal numbers of questions were of high and low cue structure. The second session, one week later, repeated the measurement procedure of the first session in order to assess whether performance would degrade over time.

Sheehan et al. (1993) scored items of information from free recall reports as either correct or distorted. Separate analyses at Session 1 and 2 on amount of correct and incorrect information by hypnotizability, treatment or cue structure revealed no effects. Thus, all the analyses focused on the responses to the leading questions. The authors performed a combined analysis of leading correct and

incorrect questions in Session 1 and this revealed a main effect for cue structure, with participants accepting *low* cue structure questions more often than high cue structure questions. They also found that high hypnotizable participants accepted more low cue structure questions than low hypnotizable participants.

An analysis across both trials examined participants' responses to misleading questions. This analysis revealed main effects for hypnotizability, level of cue structure, and trials. First, high hypnotizable participants accepted more false suggestions than did low hypnotizable participants. Second, low cue structure produced a higher rate of acceptance of false information than did high cue structure. Finally, there was more acceptance of false information over time. The findings for hypnotizability and trials were in the predicted direction. However, the findings for cue structure were not. Sheehan et al. (1993) indicated these latter findings were in the opposite direction to that found in pilot testing and speculated that perhaps it may have been due to the extra linguistic demands placed on participants in high cue structure questions. They cited the work of Clark (1978, cited in Sheehan et al., 1993) and proposed that their results may have been due to low cue structure questions requiring fewer bridging assumptions. A social psychological explanation is that despite having done pilot testing, their high cue structure questions were simply too high in cue structure. In other words, they were so pointed in the direction of the "preferred" answer that participants

felt that it would be inappropriate as good, honest participants to accept them and thus refused them.

The confidence data from Session 1 misleading questions indicated main effects for hypnotizability and cue structure. High hypnotizable participants were significantly more confident in their answers than low hypnotizable participants, and all participants were more confident in their responses to low cue structure questions. The same pattern of results was observed with the combined session 1 responses (correct and incorrect responses), with the addition that high hypnotizable participants were more confident on low cue structure questions than low hypnotizable participants.

Sheehan et al. (1993) hypothesized that highly hypnotizable participants in the hypnosis condition would be most influenced by the high cue structure questions. They found that hypnosis had no reliable effects on participant's responses. Also, while they found that hypnotizability was positively related to the acceptance of misleading information, high hypnotizable participants were most responsive to low cue structure, not high cue structure questions. The overall trend of this study was that high hypnotizable participants were more likely than low hypnotizable participants to accept leading information independently of state instruction and the timing of the recall test. The final study reviewed further identifies the contextual variables alluded to in the Sheehan et al. study.

Barnier and McConkey (1992) tested high and low hypnotizable participants in a hypnosis or waking condition in order to assess the relative contributions of hypnotizability and hypnosis to acceptance of false information. A crucial feature of this study was that they also manipulated the context or experimental demands on participants across recall trials. The stimulus was a story of a woman carrying home groceries who has her wallet stolen by a man. This story was composed of 23 colour slides projected on a screen for participants to view. The man had a mustache, but he was not wearing a scarf, and the woman's groceries did not contain flowers. These were the three items which were specifically tested, the first leading correct and the latter two leading incorrect.

Following a baseline recall trial, Barnier and McConkey (1992) treated participants based on their experimental allocation, and then asked all participants to recall each slide in their mind's eye. Then, the experimenter subtly suggested the information through three leading questions while video-recording the responses. After each response, regardless of whether it was positive or negative, the experimenter continued in the attempted memory distortion creation. Following this session, a second experimenter played back the videotape, and asked participants to describe their phenomenological experiences and to describe their memory for each of the three suggestions in turn. For the final trial, the second experimenter implied that the study was now over and while adopting an

informal manner, told participants that some of the items suggested were misleading. Participants were then informally asked again if they remembered the suggested items.

Analyses indicated that more hypnosis participants than control participants correctly reported remembering the true suggestion, on the final trial. Condition did not reliably affect responses for the two false suggestions. There was a significant effect for hypnotizability on trials 1 and 2, the two formal testing trials. Specifically, high hypnotizable participants reported that they remembered the false items more than low hypnotizable participants. In terms of confidence ratings, participants were more confident about their accurate responses, and there were no effects from either hypnosis or hypnotizability.

In the final trial, when the context was informal, the positive relationship between hypnotizability and pseudomemory reporting disappeared. This suggests that context and hypnotizability may interact. However, there are at least two possible interpretations. One is that high hypnotizable participants actually changed their memories in line with experimental suggestions (Reed, Kirsch, Wickless, Moffitt & Taren, 1995). In other words, they may have taken the suggestion and transformed it into a personal representation and then expanded on it in a personally meaningful way to become their "new" memory. When faced with the altered demands of the final trial, their changed report reflected this new

memory. A second possibility is that high hypnotizable participants are simply more responsive to the perceived demand characteristics of the testing session than low hypnotizable participants, who are not as willing to accept information they do not recall. Thus, high hypnotizable participants report in the direction of experimental demands, whatever they are, more so than low hypnotizable participants. Research supports the second explanation (Ritt, 1993, 1995; Burgess, 1995).

To summarize, Barnier and McConkey (1992) found that hypnotizability was positively related to pseudomemory reporting, but only in a formal experimental context. In addition, they found no relationship between state instruction and pseudomemory reporting.

In general, research on hypnotic pseudomemory indicates that hypnotizability is positively related to misinformation acceptance and state instruction has no reliable effects on misinformation acceptance. Sheehan (1988) found that high hypnotizable participants performed less accurately than low hypnotizable participants in free recall and that hypnotizability was positively related to confidence. Sheehan et al. (1993) also found that high hypnotizable participants accepted more false information than did low hypnotizable participants and that they were significantly more confident in their answers than low hypnotizable participants. Similarly, Barnier and McConkey (1992) found

that high hypnotizable participants remembered more false items than low hypnotizable participants in the two formal testing trials. However, this relationship disappeared in the informal context of the final testing trial. These findings are the common trend within hypnotic pseudomemory research, but not the consistent trend (McConkey, 1992), as two recent studies (Sheehan, et al. 1991a, 1991b) have shown a positive misinformation effect for hypnosis as well as hypnotizability.

In the present study I attempted to further delineate the effects of hypnosis and hypnotizability on hypermnesia and memory distortion by using stimuli from participants' long term memory. Hypnotic hypermnesia and memory distortion studies have generally examined recall of temporal stimuli anywhere from a few minutes to a few weeks after presentation. The proposed study will add a long term memory data set to the accumulating data on hypnotic hypermnesia and memory distortion.

The Present Study

The purpose of the present study was to assess the effects of hypnosis and hypnotizability on accurate recall and misinformation acceptance using an event from permastore (Bharick & Phelps, 1987) or long term memory. The first part of the study assessed the effects of these factors on participants' overall recall. The

second part assessed whether these factors affect acceptance of misleading and confabulated information.

A second unique feature of the present study is the stimulus to be recalled. Although there has been research on the accuracy of long term memory (e.g., flashbulb memory, Neisser & Harsch, 1992; autobiographical health memory, Loftus, Smith, Klinger, & Fiedler, 1992), there has not been a systematic study of the effects of hypnosis and hypnotizability on long term recall of a vivid and salient film. Films have been used in many studies of memory (e.g., Stager & Lundy, 1985; Lytle & Lundy, 1988; Geiselman et al., 1985), but always as a stimulus viewed in a laboratory, anywhere from minutes to a few weeks before memory testing. In the proposed study a film that has not been seen for at least five years was used as the stimulus. Mass testing performed in November 1993 (see Appendix A) revealed that *Jaws* (Zanuck & Brown, 1976) was among the most frequently cited movies seen by introductory psychology students, but not in at least five years. Previous research has indicated that emotional content in recall material provides for greater recall than non-emotional target material (e.g., Strongman & Russell, 1986). *Jaws* was clearly a frightening and vivid film and is thus a good choice as the stimulus film.

In addition to hypnosis, a mnemonic and a control condition was employed, similar to that used in Nogrady et al. (1985). It was hypothesized that

in the free recall part of the study memory performance would be equivalent for participants in all three treatment groups as each group would be provided with a detailed rationale concerning why their respective procedure would be likely to enhance recall. In terms of misinformation acceptance it was hypothesized that high hypnotizable participants would accept and elaborate on false information more than low or medium hypnotizable participants. Since previous research indicates that state instruction generally has no effect on either memory enhancement or misinformation acceptance, it was hypothesized that the present experiment would show a similar equivalency for state instruction.

Hypotheses

Hypermnesia

- H1:** Recall would be equivalent on the baseline trial across hypnotizability levels.
- H2:** The hypnotic and mnemonic groups would show equivalent recall post-treatment and these two groups would show superior recall compared to the control group.
- H3:** Hypnotizability would be positively related to overall quantity and negatively related to accuracy.

Memory distortion

- H4:** State instruction would have no effect on either acceptance nor elaboration to the false information.
- H5:** Hypnotizability would be positively related to false information acceptance.
- H6:** Hypnotizability would be positively related to confidence in correct as well as incorrect answers.
- H7:** Hypnotizability would be positively related to acceptance of confabulated statements and elaboration on confabulated (memory distortion) information.

Method

Participants

Ninety Carleton University introductory psychology students participated in a 2 session study. Participants were selected based on the criterion that they had seen the movie *Jaws* (Zanuck & Brown, 1976), but not seen it in at least five years. All participants were screened for hypnotizability using the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Stam & Bertrand, 1983). An equal number of high ($n=30$), medium ($n=30$), and low ($n=30$) hypnotizable participants were selected on the basis of their Objective score (CURSS: O) on this scale. All participants received course credit for their participation.

Procedure

All participants were recruited on the basis of their mass testing response to the question whether they had seen the movie *Jaws* (Zanuck & Brown, 1976) at least five years ago (see Appendix A). Session 1 was comprised of hypnotizability testing. An equal number of high, medium and low hypnotic participants were randomly assigned to one of the three treatment groups, hypnotic induction ($n=30$), mnemonic restructuring ($n=30$), and control ($n=30$).

At the beginning of Session 2, participants were asked once again whether they had seen the movie *Jaws* (Zanuck & Brown, 1976) and if so, how long ago. All participants were then asked to read over the experimental consent form for the first part of the experiment, a free recall session (Appendix B). After completion of the informed consent form, all participants were asked to recall everything they could about the movie (Appendix C). Then, a second probe was administered. These responses were audiotaped.

Following this, participants were given experimental consent forms depending on their experimental allocation (see Appendices D, E, F). After completion of these, the hypnotic induction and mnemonic restructuring group were administered their treatments (Appendices G, H) and the control group was read a statement concerning the ameliorative effects of multiple recall trials (Appendix J). Then, the same procedure that was used in the first recall trial was followed--all participants were asked to recall everything they could about the movie *Jaws* (Zanuck & Brown, 1976), followed by a probe for any additional information. Following this second free recall trial, participants were administered a structured interview with cued recall questions from two different scenes (Appendices I, K). The first scene was based on an emotionally and graphically vivid scene, from the first third of the movie, where a young boy is attacked by a great white shark. Participants were given a brief description of the scene and then

asked to recall everything they could about this scene. Following a probe for any additional information there were six questions based on details from the described scene. Of these, half were true and the other half misleading. Each question was followed by a probe for confidence in which participants were asked to rate their level of confidence in the accuracy of their responses using a 7-point scale that ranged from 0 (not at all confident) to 6 (extremely confident). Then, a confabulated (false) scene was described about a man fishing from the beach with a rod and reel. Participants were asked to recall everything they could about this scene and then a second probe for any additional information was administered. Following this, participants were asked three questions about the scene. For each response item, participants were asked to rate their level of confidence in the accuracy of their responses using the same 7-point scale that ranged from 0 (not at all confident) to 6 (extremely confident).

Upon completion of the structured interview, all participants responded to a series of true or false statements (Appendix L). Of these an equal number were true, misleading and confabulated. The true and misleading statements were based on minor details from the movie such as statements regarding the name of a character's boat and whether individual characters had scars on their bodies. The confabulated statements were based on the false scene presented to participants

earlier in the interview. The same confidence scale was employed with ratings for each questions recorded.

Upon completion of the structured interviews and true or false questions, participants were debriefed (Appendix M) concerning the hypotheses of the experiment and given experimental credit.

Free Recall

The audiotaped recall sessions were transcribed for content analysis. One of the first tasks required in a content analysis is the establishment of a unit of analysis. Derived from the research of Moffitt et al. (1982), the unit of analysis was based on grammatical principles and was defined as any simple sentence and the independent clauses within compound sentences. Complex sentences were defined as one unit unless they were composed of more than one independent clause in which case each independent clause, along with its concomitant subordinate clause(s) was counted as one unit. Units were scored on both accuracy and vagueness on a 3-point scale as follows: (1) Accurate/Specific; (2) Somewhat accurate but somewhat inaccurate/Somewhat specific but somewhat vague; and (3) Inaccurate/Vague. All content analyses performed in this study were done by employing experimental computer software designed by Alan Moffitt.

Cued Recall

The audiotaped cued-recall sessions were transcribed for content analysis. The cued recall transcriptions consisted of the two recall trials from the true scene and the two recall trials from the contabulated scene. For each scene participants were asked to recall all they could about the scene which was followed by a queue of "Give me more information about that scene."

Based on the work of Burgess (1994), the cued recall transcriptions were scored for the total number of "descriptors" that each participant used in his or her description for each recall trial. Descriptors were any words or phrases that described the scene in more detail, for example, if a participant said: "His (1-pt.) **boots** (1-pt.) were **brown** (1-pt.) and I can remember him **going in** (1-pt.) the **water** (1-pt.) **up to his waist** (1-pt.). It **wasn't** (1-pt.) as **nice** (1-pt.) a **day** (1-pt.) as **the other days**, (1-pt.) a **bit** (1-pt.) **overcast** (1-pt.)

The second dependent variable was the number of qualifiers participants used (Perlini, 1991). Qualifier scores were simply a count of all of the qualifications that participants gave in their reports. For example if a participant said: "**I think** (1-pt.) I remember that the police chief had sunglasses, **he might** (1-pt.) have been shouting at the bathers but **I'm not sure**, (1-Pt.). A potential source of error was that participants may have used a

qualifier but may have not been qualifying their recall. The use of a qualifier might merely reflect a speaking style. However, if this occurred amongst some participants it was thought that it would occur in a random way across the independent variables.

Results

Overview

Results from the present study are presented in three parts. Part I contains the results of the content analysis on the free recall data. Part II contains two sections; the first details the results of the content analysis for the true and false scenes, the second contains the analyses for the dichotomous true, misleading and confabulated leading questions, and their concomitant confidence ratings, asked of all participants. Part III is also divided into two sections. The first part describes the analyses of the true/false questionnaire and the associated confidence ratings. Like the cued recall questions, the true/false questionnaire was composed of three types of questions--true, false and confabulated, and the associated confidence ratings for each question. The second part describes the results of two simplified signal detection analyses comparing d' -levels and β -levels, first across the true/false data and then for the

true/confabulated data. For most of the analyses hypnotizability and treatment comprise the between participants variables and trials comprises the within participants variable. Unless otherwise stated the alpha level adopted for statistical significance was $\alpha = .05$, and post hoc pairwise comparisons employed the Tukey's HSD procedure (Howell, 1987).

Free Recall

Free recall recollections were audio-taped, transcribed and scored by the author. A sample of 10% of the transcriptions was scored by a second trained rater. Ratings were done for accuracy and vagueness. Both raters did their ratings without knowledge of any of the details pertaining to individual participants. Both the accuracy and vagueness scales were 3-point scales leading to a truncated range for calculation of interrater agreement. Thus, scores for each rater were averaged across each participant to derive a single combined mean score for each participant. The interrater value derived from this procedure was $r = .72$ which was considered quite good in light of the complexity of scoring free recall details and the truncated range of the two scales.

Next, the distributions of the four recall trials were examined. Many of the second recall trials at pre- and post-treatment contained no information. An examination of these frequencies indicated equivalence among the independent

variables. Thus, in order to minimize the effect of cells with no information, and to make the analyses simpler, the two pre- and post-treatment recall trials were combined to form one baseline and one treatment trial. An examination of the distributions for number of units, accuracy and vagueness showed nonnormal distributions. Thus, the distribution for number of units was corrected with a logarithmic transformation, the accuracy and vagueness distributions were corrected with a $\log(X_i + 1)$ transformation (Howell, 1982).

To assess whether the experimental groups were equivalent at baseline a 3x3 MANOVA (Hypnotizability: high, medium, low X State Instruction: hypnosis, mnemonic, control) was performed on the number of recall units, mean accuracy and mean vagueness from the content analysis data. None of the multivariate *F*-tests approached significance, indicating that the groups were equivalent at baseline. It was hypothesized that participants would be able to recall and recognize many details from the movie (Bharick, Bharick, & Wittlinger, 1975; Bharick & Phelps, 1987). An examination of the descriptive statistics indicated that mean recall at baseline was almost 40 information units ($M=38.77$, $SD=37.16$) which was considered quite good since stimulus exposure occurred at least five years prior to the testing sessions.

To assess the effects of the experimental variables on the number of recall units a 3x3x2 mixed ANOVA (Hypnotizability X State instruction X

Trial, pre and post) was performed on the free recall data. The analysis yielded a three-way interaction, $F(4, 81) = 6.72, p < .001$ (see Figure 1). Since examining all possible interactions would inflate the probability of Type I error unacceptably it was decided that only the simple simple effects across trials would be analyzed. These analyses yielded four significant effects. First, there was a significant simple simple effect across trials by medium hypnotizability $F(1, 87) = 8.97, p < .01$. Examination of the means indicated that medium hypnotizable participants in the mnemonic condition recalled significantly more information after treatment ($M=1.61, SD=.29$), than at baseline ($M=1.33, SD=.25$). The same pattern occurred across trials for low hypnotizable participants in the hypnotic condition, $F(1, 87) = 7.42, p < .01$ (baseline recall $M=1.32, SD=.23$; treatment recall $M=1.57, SD=.38$) and across trials for high hypnotizable participants in the hypnosis condition $F(1, 87) = 7.14, p < .01$ (baseline $M=1.68, SD=.27$; treatment $M=1.93, SD=.29$). Thus, participants at both of these conditions recalled more information units post- than pre-treatment. The final significant simple simple effect was across trials restricted to the hypnosis condition for medium hypnotizable participants, $F(1, 87) = 8.97, p < .01$. However, in this case, participants produced less information after treatment ($M=1.26, SD=.70$) than at baseline ($M=1.55, SD=.29$).

A 3x3x2 mixed ANOVA (Hypnotizability X Treatment X Trials) on accuracy scores revealed a significant main effect for Trials, $F(1, 79) = 17.66, p < .001$. An inspection of the means indicated that accuracy declined across trials (baseline accuracy $M = .42, SD = .06$; treatment accuracy $M = .44, SD = .06$). It should be noted that the original accuracy scale was a 3-point scale with "1" indicating greatest accuracy and "3" indicating least accuracy. A similar analysis of vagueness revealed no significant effects.

To summarize, there was a significant interaction with hypnotizability, treatment and trials on overall recall such that mnemonic treatment, medium hypnotizable and hypnotic treatment, low and high hypnotizable participants recalled more information from pre- to post-treatment. Conversely, hypnotic treatment, medium hypnotizable participants recalled less from pre- to post-treatment. The analysis of accuracy indicated a statistically significant effect for trials in which accuracy declined from pre- to post-treatment.

Figure 1 Free Recall Information Units

Baseline Free Recall of Information Units

Treatment Free Recall of Information Units

Cued Recall

Content Analysis

Recall that within the structured interview a true and a completely false scene were described to participants who were then given two trials in which to describe all that they could remember from these scenes. These recollections were transcribed and scored. A sample of 10% of the transcriptions were scored for descriptors and qualifiers by a second trained rater. Interrater reliability for descriptors was 82% and for qualifiers was 94%.

As with the free recall data, many of the second recall trials within each pair were empty. An examination of these frequencies indicated equivalence among the independent variables. Thus, as in the free recall data, the two trials from each scene were combined to make one recall trial each from the true and confabulated scenes. Preliminary inspection of the dependent variables revealed nonnormal distributions: square root transformations ($\sqrt{Xi + .5}$; Howell, 1987) were applied to correct for this deviation from normality. Analysis of these two dependent variables was done separately because the qualifier distribution contained a substantial amount of missing data ($n=32$). This was because during coding for qualifiers, all reports which contained neither descriptors nor qualifiers were scored as "no content" or missing value in order to distinguish these reports from those with content that simply did not contain any qualifiers. This coding step was not

necessary for descriptors as the meaning of a "0" score for descriptors was unambiguous and not confounded.

A 3x3x2 mixed ANOVA (Treatment x Hypnotizability x Scene: true, false) on descriptor scores revealed a main effect for scene, $F(1, 81) = 61.93, p < .001$. An examination of the means revealed that participants used significantly more descriptors for the true scene ($M=5.08, SD=2.16$) than for the false scene ($M=2.90, SD=1.88$). None of the other effects or interactions approached significance. It is worth noting that although participants used fewer descriptors for the confabulated scene than the true scene (in fact $n=30$, 33.3% of the sample used none), 68.3% ($n=41$) of those who described the confabulated scene used 10 or more descriptors. Thus, a substantial number of participants went into a fairly detailed account of a scene that never occurred.

As indicated above, 32 cases were left out of the analysis for qualifier scores. Of these missing cases 27 were uniquely from the false scene, three were common to both scenes, and two were uniquely from the true scene. An examination of the missing values indicated that they were distributed randomly between groups (hypnotizability and treatment).

A 3x3x2 mixed ANOVA (Treatment x Hypnotizability x Scene) was conducted on qualifier scores. A significant main effect for scene, $F(1, 49) = 4.86$,

$p < .05$, indicated that participants used more qualifiers in the true scene ($M = 1.68, SD = .72$) than for the confabulated scene ($M = 1.47, SD = .72$).

To summarize, participants used more descriptors for the true scene than the confabulated scene, although 45.6% of the total sample used 10 or more descriptors for it. In addition, participants used more qualifiers in the true scene than the confabulated scene.

Dichotomous Questions

Recall that in the structured interview participants were asked questions about the true scene and the completely false or confabulated scene. Questions regarding the true scene were composed of three that were leading true and three that were leading false about details from a salient and frightening scene from the first third of the movie. The three confabulated questions were from the completely false scene. Each question was coded as "1" for correct and "0" for incorrect. Specifically, for the confabulated questions, participants' answers were scored as correct if they indicated they did not remember the confabulated information. Conversely, if a participant stated "yes" (i.e. that they did remember the false information) this answer was scored as incorrect. The values obtained for each question were summed, resulting in a maximum value of 3.

A 3x3x3 mixed ANOVA (Hypnotizability: high, medium, low X State instruction: hypnosis, mnemonic, control X Question type: true, misleading, confabulated) was performed on participants' responses to the dichotomous cued recall questions. A significant main effect for question type was observed, $F(2, 162) = 63.48, p < .001$. Pairwise comparisons revealed that participants were significantly more accurate (i.e. rejecting of false information) for the questions from the confabulated scene ($M=2.16, SD=.87$) than they were for the leading questions from the true scene ($M=.89, SD=.69$). Similarly, the misleading questions from the true scene ($M=1.88, SD=.86$) were also answered more accurately than the leading true questions. It is interesting to note that despite the fact that participants answered the questions from the confabulated scene with the greatest accuracy, that 56.7% of participants ($n=51$) indicated that they remembered at least one detail from the scene that never occurred.

A significant two-way interaction was observed for hypnotizability and question type, $F(4, 162) = 2.53, p < .05$ (see Figure 2). This interaction was examined further using simple main effects analyses. Significant simple main effects were found at all three levels of hypnotizability within question type: low hypnotizability by question type $F(2, 174) = 39.39, p < .001$; medium

Figure 2 Cued Recall Accuracy by Hypnotizability

hypnotizability by question type $F(2, 174) = 14.76, p < .001$; and high hypnotizability by question type $F(2, 174) = 12.44, p < .001$. Pairwise comparisons revealed the same pattern within each level of hypnotizability. Participants performed significantly more accurately with the leading questions from the confabulated scene than with either the leading false or leading true questions from the true scene. There were no significant differences between the leading true and leading false groups across levels of hypnotizability.

The final significant simple main effect was that of hypnotizability within the leading true questions, $F(2, 87) = 4.17, p < .05$. Pairwise comparisons revealed that participants at medium ($M = 1.03, SD = .67$) and high hypnotizability ($M = 1.03, SD = .72$) performed significantly better than low hypnotizable participants ($M = .60, SD = .62$) on the true leading questions.

A critical question within hypnosis research concerns the confidence expressed in accurate information. To this end, mean confidence levels were calculated for each question type. Thirty-six participants did not answer at least one of the three questions correctly in each question type and were thus left out of the analysis. A 3x3x3 mixed ANOVA (Question type X Hypnotizability X State instruction) was performed on the remaining 54 participants' confidence ratings to correctly answered questions and a significant main effect for question type was observed, $F(2, 90) = 6.84, p < .01$. Pairwise comparisons revealed that participants

had significantly more confidence in their correct answers to leading true questions ($M=3.35$, $SD=1.18$) than to both the misleading questions ($M=2.49$, $SD=1.80$), and the questions from the false scene ($M=2.30$, $SD=1.99$).

A two-way interaction between treatment and question type was also observed, $F(4, 90) = 4.53$, $p < .01$ (see Figure 3). Simple main effect analyses indicated a significant simple effect at control treatment by question type. Pairwise comparisons revealed that control participants had significantly higher confidence ratings to the true leading questions ($M=3.46$, $SD=1.46$) than they did to either the misleading ($M=1.89$, $SD=1.79$) or the false scene questions ($M=1.31$, $SD=1.60$).

A significant simple main effect was also found at confabulated scene questions at treatment $F(2, 51) = 5.93$, $p < .01$. Pairwise comparisons revealed that hypnotic participants were significantly more confident ($M=3.59$, $SD=1.75$) than either mnemonic participants ($M=1.96$, $SD=1.92$) or control participants ($M=1.31$, $SD=1.60$). Thus, for the questions from the confabulated scene, hypnotic participants were the most confident in their correct answers.

Much of the controversy surrounding the confidence expressed in hypnotic elicitations concerns confidence in inaccurate information. Thus, mean confidence levels for incorrect replies were calculated for each participant. Forty-nine

Figure 3 Correct Confidence Ratings by Treatment

participants were eliminated from the analysis because they did not answer at least one of the three questions incorrectly in each question type. A 3x3x3 mixed ANOVA (Hypnotizability X State instruction X Question type) on the remaining 51 participants' yielded no significant effects. However, there was a trend toward significance for question type $F(2, 64) = 2.87, p = .064$. An examination of the means indicated that participants were nominally most confident in their inaccurate responses to false questions ($M = 3.65, SD = 1.29$), followed by confabulated questions ($M = 3.35, SD = 1.19$), and true questions ($M = 2.79, SD = 1.89$).

To summarize, participants were most accurate to questions from the confabulated scene, followed by the leading false questions from the true scene and finally by the leading true questions from the true scene. However, over half of all participants (56.7%) indicated that they remembered at least one detail from the confabulated scene.

There was an interaction of hypnotizability by question type in which participants within each level of hypnotizability responded in the same manner. Within each hypnotizability level, participants responded more accurately to questions from the confabulated scene than to the leading false and leading true questions from the true scene. There was a significant

interaction between leading true questions and hypnotizability such that high and medium hypnotizable participants responded more accurately than low hypnotizable participants. This indicates a slight advantage for those who are hypnotizable in terms of accurate recall for the true information.

In terms of confidence ratings to correctly answered questions, a significant two-way interaction revealed two simple main effects. First, that control participants were significantly more confident in their answers to leading true questions than to leading false or confabulated questions. Second, for confabulated questions, hypnotic participants were significantly more confident than both mnemonic or control participants in their correct responses. Analyses of confidence ratings to incorrectly answered questions revealed no significant effects but a trend toward significance for question type with participants more confident in their responses to false questions than to confabulated or true questions.

True/False Analyses

True/False Questionnaire.

Recall that the True/False questionnaire was administered after the cued recall questions in order to assess the extent to which the leading questions were incorporated into participants' recall of the film. In order to blend the questions from the confabulated scene and thus minimize their individual salience, the five confabulated questions were originally mixed in with 11 true and nine false questions related to details from the movie. In order to analyse this data proportions based on accurate responses from all 11 true, nine false, and five confabulated were calculated. It was noted that seven cases had missing values but these cases were spread roughly equivalently amongst the hypnotizability and treatment variables. A 3x3x3 (Hypnotizability X State instruction X Question type, true/false/confabulated) mixed ANOVA was performed on accurate responses. It revealed a main effect for question type, $F(2, 148) = 83.27, p < .001$. Pairwise comparisons revealed that true questions ($M = .59, SD = .16$) were answered with significantly greater accuracy than were false questions ($M = .39, SD = .17$) or confabulated questions ($M = .19, SD = .25$). Also, false questions were answered with significantly greater accuracy than were confabulated questions. It is worth noting that answering confabulated questions with the least accuracy indicates a high degree of false information acceptance. In this case, 56.6% of

participants indicated that they recalled at least one of the five details from the completely false scene.

As in the cued recall analyses, mean confidence levels to accurately answered questions were calculated. Forty-three cases were eliminated from the analysis because these participants failed to answer at least one of the questions correctly from each of the question types. A 3x3x3 (Hypnotizability X Treatment X Question type) mixed ANOVA was performed on the remaining 47 participants' confidence scores to correctly answered questions. A main effect for question type was observed, $F(2, 76) = 33.35, p < .001$. Pairwise comparisons revealed that participants were significantly more confident in their correct answers to the leading true questions ($M=3.56, SD=1.31$) than they were to either the leading false questions ($M=2.72, SD=1.43$), or the confabulated questions ($M=1.94, SD=1.22$). Also, participants were significantly more confident in their answers to the false questions than to the confabulated questions.

To assess if there were effects on misplaced or inaccurate confidence, mean confidence levels to inaccurately answered questions were calculated. In this case 14 cases were eliminated from the analysis because these participants failed to answer at least one of the questions in each question type incorrectly. A 3x3x3 Hypnotizability X State instruction X Question type) ANOVA was performed on the remaining 76 participants' confidence ratings to incorrectly answered

true/false questions. The main effect of question type was significant, $F(2, 134) = 14.65, p < .001$, as was the main effect of treatment, $F(2, 67) = 3.43, p < .05$ (see Figure 4). For question type, pairwise comparisons revealed that participants were significantly more confident in their inaccurate responses to leading false questions ($M=3.34, SD=1.17$) than to leading true questions ($M=2.59, SD=1.25$). Similarly, participants were more confident in their inaccurate responses to the confabulated questions ($M= 3.07, SD= 1.44$) than to the leading true questions. For the significant treatment effect pairwise comparisons revealed that participants in the hypnosis condition rated their confidence higher ($M=3.39, SD=1.03$) than did participants in the control condition ($M=2.55, SD=1.10$). The mean confidence rating for the mnemonic condition ($M=3.11, SD=1.04$) failed to differ significantly from either the hypnotic or control conditions.

To summarize, participants answered the confabulated questions on the true/false questionnaire with the least accuracy. In terms of accurate confidence ratings, participants were *least* confident in their correct answers to the confabulated questions. Thus, when participants correctly rejected the confabulated information they were less confident about these rejections than

Figure 4 True/False Incorrect Confidence Ratings

they were to their other correct answers. For confidence ratings to incorrectly answered questions, participants were most confident in their inaccurate responses to leading false questions, but they were also significantly more confident in their incorrect answers to the confabulated questions than to their incorrect answers to the leading true questions. Finally, hypnotic participants had significantly greater confidence in their inaccurate responses than control participants. Thus hypnosis was a liability here as it led to unjustified confidence.

Signal Detection Analyses.

In order to assess sensitivity and response bias on hypnotizability and state instruction, two simplified signal detection analyses of d' and β were conducted. In the first, "hits" were calculated from the correctly answered true questions, and "false alarms" from incorrectly answered false questions (MacMillan & Creelman, 1991). The second analysis was done by calculating a second pair of values for d' and β using the same true questions for the hit rate and calculating the false alarm rate from the confabulated questions.

A 3x3 MANOVA (Treatment X Hypnotizability) was performed on d' and β levels derived from the true and misleading (false) questions (MacMillan & Creelman, 1991). A significant multivariate main effect was revealed for

treatment, (Pillais = 2.54, $p < .05$). Inspection of the univariate F -tests revealed that β -levels were significantly different across treatment groups $F(2, 81) = 5.06$, $p < .01$ (see Figure 5). Pairwise comparisons revealed that both the hypnotic group ($M = -.46$, $SD = .33$) and the mnemonic group ($M = -.38$, $SD = .36$) had significantly more bias than the control group ($M = -.16$, $SD = .43$).

A separate 3x3 MANOVA (Treatment X Hypnotizability) was performed on d' and β -levels derived from the confabulated questions because there were seven missing cases amongst these cases. There were three missing cases in both the hypnotic and mnemonic treatment, and one from the control group. Once again, a significant multivariate effect emerged for treatment (Pillais = 3.00, $p < .05$). An examination of the univariate F -tests indicated that neither dependent variable was significant at the chosen alpha of .05. However, there was a trend toward significance for β -levels, $F(2, 74) = 2.30$, $p = .107$. An examination of the means indicated that the pattern amongst the three treatment means for β -scores was similar here to the previous analysis with the true/false combination. There was greater bias in the hypnotic ($M = -.81$, $SD = .56$) and mnemonic groups ($M = -.88$, $SD = .68$) than in the control group ($M = -.54$, $SD = .55$).

Figure 5 β -values by Treatment

It is important to note that these β -scores were derived from a sample of only five scores per participant. Such a small sample of scores obviously impacts negatively on statistical power and is viewed as a tentative pattern which was demonstrated more conclusively with the larger sample of false questions available in the previous analysis. However, taken together, it seems reasonable to infer that hypnotic and mnemonic treatment groups adopted a laxer criterion than the control participants when responding to the false and confabulated questions in the true/false questionnaire.

Discussion

Overview

Results obtained in the present experiment support the hypothesis that a range of factors including hypnotizability and state instruction are positively associated with memory reports. This discussion will be divided into three parts, the first reviewing the findings related to hypnotic hypermnnesia, the second looking at the findings related to hypnotic memory distortion and finally a conclusion with suggestions for future research.

Hypnotic Hypermnesia

In the current study baseline responding was measured immediately prior to treatment. A control group was employed in order to control for the effects of multiple recall trials. It was hypothesized that baseline responding would be equivalent across hypnotizability levels. This hypothesis was supported as there were no differences among these groups on the baseline analysis. It was also hypothesized that hypnotic and mnemonic treatment groups would have equivalent recall and that their recall would be of greater quantity than the control group. This hypothesis received some support as hypnotic and mnemonic participants recalled roughly similar amounts in free recall. However these two groups did not exhibit greater recall than control participants. However, there was a three-way interaction for quantity of recall by hypnotizability by state instruction by trials. Hypnotic high-hypnotizable participants, hypnotic low-hypnotizable participants and mnemonic medium-hypnotizable participants produced more recall units from pre- to post-treatment. To some extent, these findings are in line with the hypothesis predicting that hypnotic and mnemonic treatments would increase recall quantities. These effects also agree with the basic thrust of previous research which has generally shown that hypnotic and imagery procedures may lead individuals,

especially those who are highly hypnotizable, to recall more material than they would have if these procedures were not used (McConkey, 1992). Conversely, hypnotic medium-hypnotizable participants produced *fewer* recall units from pre- to post-treatment. One is left without a clear explanation for this finding other than speculation that perhaps some feature of the original encoding situation might account for the unusual findings. For example, Shields and Knox (1986) asked high hypnotizable participants in hypnotic and waking groups to either process a list of words deeply or at a shallow level and found that hypnotic participants had superior recall compared to nonhypnotic participants, but only in the deeply processed memory group. Perhaps the hypnotic medium hypnotizable group in this study had not encoded the movie stimulus at a deep level and this prevented them from a superior quantity of recall after imagery instructions. In fact, Shields and Knox have suggested that level of processing factors may partly account for the mixed findings in the literature regarding hypnotic hypermnesia. Clearly more research is required to investigate this issue.

The final hypermnesia hypothesis was that hypnotizability would be negatively related to accuracy. This hypothesis was not supported as the only significant effect on accuracy was that it declined from pre- to post-treatment, as was observed by Stager and Lundy (1985). Waking memory research has

shown that when individuals are asked to recall events the accuracy of recall varies inversely with the amount of detail requested. For example, Loftus et al. (1992) asked individuals to recall their spouses' history of visits to physicians over the past year. They observed an effect on accuracy by the level of detail in recall requested of participants in which participants' accuracy varied inversely with how demanding the recall task was. Not a surprising finding, but relevant inasmuch as it illustrates what may have occurred across free recall trials in this study. Implicit in all of the state instructions (and explicit in the control instructions) was that participants should be able to produce more information in the second recall trial. Perhaps participants responded by shifting their response criterion toward a less critical standard. Also, perhaps the nature of the encoding situation may be implicated in these unusual findings. It is possible that participants' original processing of the stimulus event was highly variable. In other words, it is possible that the wide range of conditions under which participants may have viewed the film may have led to widely divergent levels of processing of it and that this factor may have confounded measurement of accuracy across hypnotizability and state instruction (Shields & Knox, 1986).

To summarize, this study found a pattern of effects in free recall which supports both the response criterion shift hypothesis (Klatzky & Erdelyi,

1985) and conceptualizations of hypnotic hypermnesia which emphasise both hypnotizability and state instruction (Lytle & Lundv, 1988). It should also be noted that an emerging consensus within hypnotic and non-hypnotic hypermnesia research seems to be placing greater emphasis on the nature of the to-be-remembered material, the nature of participants' original level of processing of that material (McConkey, 1992; Shields & Knox, 1985) and the implicit demand characteristics of the experimental design in accounting for (hypnotic) hypermnesia effects. Thus, more research is required to directly assess how frightening films are originally encoded and how factors like hypnotizability and state instruction affect their recall. For although all participants had not seen the film in at least five years, exactly how long it had been since they had seen it, their age when they saw it, and the general conditions surrounding the original encoding situation were not measured.

Hypnotic Memory Distortion

Content Analysis

It was hypothesized that state instruction would not affect acceptance of confabulated information but that hypnotizability would be positively related

to it. The analyses indicated that there were no effects on descriptors as a consequence of either hypnotizability or state instruction. Thus, high hypnotizability was not associated with greater elaboration to the confabulated scene. In fact, the only significant effect was by scene type in which participants used more descriptors in the true scene than the false scene. This was not surprising as the descriptive statistics indicated that almost all participants (94.4%) had three or more descriptors from the true scene, whereas only 67% of participants recalled the false scene. However, despite the greater number of descriptors in the true scene it is worth emphasising that 67% of participants produced descriptors about a completely false scene and almost half (45.6%) of the total sample described the confabulated scene with 10 or more descriptors. Although the number of descriptors used was not affected by state instruction or hypnotizability the finding that a substantial number of participants described the confabulated scene in some detail points to how highly susceptible memory is to suggestion regardless of these factors.

The other finding in this content analysis was that the number of qualifiers employed by participants for the true scene was greater than those employed for the false scene. Qualifiers were not affected by either hypnotizability or state instruction. Recall that this analysis was performed on the 58 participants who provided at least one descriptor in each of the true and

confabulated scenes. Thus, the smaller number of qualifiers in the confabulated scene compared to the true scene was not the product of an analysis which included participants who had neither descriptors nor qualifiers in their recall of either the true or false scenes. One interpretation of this finding is that perhaps more qualifiers were used by participants in the true scene because respondents were effortfully attempting to retrieve real memories and the greater number of qualifiers reflects their difficulty in doing so. Conversely, for the confabulated scene, participants used fewer descriptors because their recall was based on imagination and was therefore not as memorially challenging. Unfortunately, confidence ratings for these open ended recall scenes were not taken but if the interpretation of fewer qualifiers in the false scene is correct, it seems as if confidence ratings would have shown less confidence in recollections from the false scene than the true scene.

Question Accuracy

Dichotomous Question Accuracy.

The first direct measure of accuracy occurred with the cued recall questions after free recall. There was an effect for question type in which participants were most accurate in their replies to questions from the confabulated scene, and least accurate in their responses to leading true

questions from the true scene. Leading false questions from the true scene fell in the middle of this distribution. A similar effect was noted across each level of hypnotizability and question type such that low, medium and high hypnotizable participants were each more accurate in their replies to the confabulated questions than to either the leading true or leading false questions. Thus, there was sufficient doubt amongst respondents within each level of hypnotizability to the information from the confabulated scene that they were able to respond "no" to these questions and answer them more accurately than the questions which were leading true from a scene in the actual film. From these results it might seem as if participants were fairly good at distinguishing the "real" information from the confabulated. Thus, it is important to reiterate that 56.7% of participants ($n=51$) indicated that they remembered at least one of the three details presented from the scene that never occurred.

The other significant effect in this first cued recall session was that high and medium hypnotizable participants had superior accuracy on the true leading questions compared to control participants. None of the original hypotheses addressed this issue. We hypothesized that hypnotizability would be positively related to leading false information acceptance and confabulated information acceptance but made no predictions regarding leading true

information. However, similar effects have occurred intermittently in previous research (e.g., Lytle & Lundy, 1988) indicating an occasional advantage in recall to those individuals who are responsive to hypnosis.

True/False Questionnaire Accuracy.

The true/false questionnaire scores were derived by combining the accurate responses that each participant made into a mean score for each type of question. Since there were more true (11) than false (9) and more false than confabulated (5) questions, the proportions formed were not from equal numbers of questions. It is possible that the five confabulated questions comprised too small a sample to compare against the other question types. It is also possible that the respondents found both the true and false questions very difficult and that this partly accounts for the lower accuracy scores observed from these questions. These possibilities seem remote but cannot be ruled out entirely until more controlled replications are performed to address these issues directly. With that in mind, an interesting shift in accuracy effects was noted in the true/false questions. When participants were tested for accuracy for the second time, the pattern of correct answers was almost inverted. Participants now answered leading true questions most accurately, followed by leading false questions from the true scene, and finally the

confabulated questions. Thus, it would seem that the simple act of repeating the information from the confabulated scene was sufficient to lead to greater acceptance of it. In fact, 56.6% of participants indicated that they recalled at least one of the five details from the completely false scene.

A subtle experimenter effect in this second recall trial which would have pressured participants to "agree" with the experimenter does not seem to be a plausible explanation because individuals faced with a true/false test generally expect rough parity between the proportion of true and false questions (in actual fact there were 11 true questions and 14 false questions). Thus, logically, participants would not have felt pressured to respond "true" to all of the questions.

Another explanation might be that perhaps the results could be accounted for as mere demand characteristics, or as a function of compliance. But there is no reason to expect that either of these factors would have exerted a greater influence in the true/false questionnaire than in the yes/no cued recall trial which preceded it. It is also important to note that the shift toward inaccuracy with the confabulated questions was not just a relative phenomenon (i.e. it was not just because all questions were answered with less accuracy). In the cued recall part of the study mean accuracy for the confabulated questions as a proportion was .72, whereas in the true/false it fell to .19.

Finally, an objection based on question length could be entertained. In the true/false questionnaire a calculation of the mean number of words per question type indicated that the confabulated questions were composed of fewer words ($M=10.2$, $SD=4.15$) than either the true ($M=15.27$, $SD=4.41$) or false ($M=20.22$, $SD=12.07$) questions. Loftus and Bell (1988) demonstrated that mock jurors were more likely to believe mock witnesses who spoke in greater detail than those who spoke with lessor detail. In this case, the confabulated questions were the shortest length and yet participants rated these as true more than either the leading false or leading true questions. Thus, the higher acceptance rate for the confabulated questions cannot be blamed on their greater amount of detail. If an effect from question length had emerged, it should have been in the opposite direction. Thus, the shift in accuracy away from the confabulated questions remains a compelling finding.

Confidence Ratings

Dichotomous Question Confidence Ratings.

Participants had greater confidence for correctly answered leading true questions than to either the misleading or the confabulated questions in cued recall. Thus, overall participants were most confident in their "yes" answers to the leading true questions. This effect was more pronounced amongst control

participants than for hypnotic or mnemonic participants. One might argue that this connotes demand characteristics whereby participants indicated greater confidence to the answers in which they indicated "yes" because it implied agreeing with the experimenter. However, among the correctly answered confabulated questions, hypnotic participants were more confident than either mnemonic or control participants to their "no" answers. Thus, an effect in which participants are most confident in answers which "agree" with the experimenter does not seem plausible as hypnotic participants were most confident in answers which "disagreed" with the experimenter. There were no significant confidence effects for incorrectly answered questions to the cued recall questions. We hypothesized that there would be a positive relationship between hypnotizability and confidence across both correctly and incorrectly answered questions. This hypothesis was not sustained and the treatment effect which was observed was for correctly answered leading true questions in which control participants had the greatest confidence. Thus, neither hypnotizability nor hypnotic treatment had confidence inflating effects for the cued recall questions.

To review, participants were most accurate in their answers to confabulated questions and least accurate in their answers to leading true questions. However, their confidence ratings were in the opposite direction.

Participants were most confident in their correct answers to leading true questions and least confident with their correct confabulated responses. This pattern of being least confident in correct answers to confabulated questions perhaps foreshadowed the shift of participants to being least accurate in their replies to confabulated questions in the final recall trial.

True/False Confidence Ratings.

For confidence ratings to the correctly answered true/false questions (trial 2) there was again an effect for question type whereby participants were more confident in their correct responses to true questions than they were to either the false or confabulated questions. Thus, participants' confidence in the true/false questionnaire matched their accuracy. They were both most accurate and most confident about their correct answers to leading true questions and least accurate and least confident about their correct answers to the confabulated questions. In other words, participants erred by accepting the information from the confabulated scene at the highest rate and rated their confidence in their correct rejection of this information lowest. This strengthens the arguments made earlier asserting that the second recall trial seems to have led to a greater acceptance of confabulated information as both accuracy to the confabulated questions and confidence in correctly answered

confabulated questions was significantly lower than it was amongst the other two question types.

A look at confidence ratings for incorrectly answered questions indicated that hypnotic participants were more confident than control participants. Mnemonic participants failed to differ from either the hypnotic or control treatments. It was hypothesized that hypnotizability would be positively related to confidence ratings. That hypothesis was not supported, instead, hypnotic treatment was reliably associated with greater confidence in incorrectly answered questions. Once again, although a treatment effect was not hypothesized, it is not unique (e.g. Nogrady, McConkey & Perry, 1985; Wagstaff, 1982).

In addition participants were more confident in their incorrect answers to both the leading false and the confabulated questions than they were to the true questions. Recall that for the confabulated questions, incorrect confidence ratings represented the rating given to a question which was accepted as "true". Thus, in this analysis as well as the true/false accuracy and confidence in correctly answered true/false, participants indicated a high degree of acceptance for the information from the confabulated scene in the final recall trial. This analysis adds the final piece of evidence to the argument made

earlier that during the course of the experimental sessions participants seemed to develop greater acceptance of the false scene.

Signal Detection Analyses

Aside from measuring accuracy and confidence to questions, an alternative means of assessing performance is by measuring sensitivity and bias. This technique allows independent measures of sensitivity and bias to be calculated and in this study, provided valuable insight. These analyses indicated a significant effect of bias by treatment for the true/false questions. There was also a near significant effect of bias from the true/confabulated questions by treatment. Both analyses indicated the same pattern of treatment effects, with participants in the hypnotic and mnemonic groups exhibiting greater bias than participants in the control groups. Thus, the signal detection analyses provide tentative evidence that the hypnotic and mnemonic memory instructions led to the adoption of laxer response criteria. In addition, no beneficial effects on participants' sensitivity were derived from the recall strategies which were suggested in the hypnotic and mnemonic treatments. However, these findings--especially the findings for sensitivity--must be viewed tentatively as the amount of data used to calculate these values was very small. In addition, the calculation of values for d' were derived based on single-point

response-operating curves which only provide a rough estimate of sensitivity (Macmillan & Creelman, 1991). Nonetheless, the analyses of d' and β provide useful if tentative information about treatment effects from hypnotic and mnemonic instructions.

Conclusion

The current study was the first hypnotic hypermnesia/hypnotic memory distortion study to use a verifiable stimulus event from perastore or long term memory (Bharick & Phelps, 1987). Although the analyses in this study revealed some intriguing findings, a less equivocal interpretation awaits replications which incorporate measures to account for the original encoding environment. Thus, future research should attempt to quantify exactly how long ago the film was viewed, and get as much detail on the contingencies of the original encoding environment as possible. Specifically, the degree of distraction versus absorption would logically impact on the quantity and accuracy of recall. For example, a person who viewed the film in a movie theatre and was absorbed in it from beginning to end without interruption should have superior recall compared to a person who viewed the stimulus on television with a group of friends who engaged in conversation throughout the film. In some ways this issue parallels the findings of Bharick (1984) who

found that students who were graded "A" in Spanish classes taken more than five years ago had better recall of the material than those who were originally graded "C". Of course this comparison is not a perfect analogy because an individual's ability to recall the contingencies of the stimulus situation is probably correlated with their recall of the stimulus event itself. Nonetheless, the measurement of this related information would allow more reliable interpretations of hypnotic hypermnnesia and memory distortion. With these points in mind I would like to conclude with a brief comment on the findings of this study.

The major hypnotic hypermnnesia finding of this study was that hypnotizability and state instruction interacted across trials in free recall on quantity of recall so that high-hypnotizable hypnotic participants recalled more information post-treatment than any other group. Also, in the cued recall questions, medium and high hypnotizable participants answered leading true questions more accurately than low hypnotizable participants. Thus, this study found that hypnotizability and hypnosis interacted positively in relation to quantity of recall, and that hypnotizability was positively related to accuracy to leading true questions in cued recall.

In terms of confidence ratings, mixed effects were observed: (a) Hypnotic participants were more confident than either the mnemonic or

control groups in their correct answers to confabulated questions in the cued recall session; (b) hypnotic participants were more confident in their incorrect answers than the control participants in the true/false questionnaire. The common element here is that in both instances hypnotic participants asserted significantly greater confidence than control participants. In the first instance this was justified, in the second it was not. This confidence effect has been observed before and as a consequence, many hypnosis researchers (*eg.*, Wagstaff, 1991; Zelig & Beidleman, 1981) assert that it is grounds for regarding hypnotic recall with caution.

The major memory distortion finding of this study was that participants seemed to increase their acceptance of the confabulated scene during the experimental session. Initially, participants responded in a relatively limited fashion to the open ended request for information from the false scene. In fact, one third of participants stated that they could not remember anything from the false scene. However, by the end of the experimental session participants indicated a preference for the confabulated information by endorsing the scene details from the false scene more than the information from the true scene.

This final finding beckons beyond the boundaries of hypnotic responding. Although it is obviously worthwhile to disentangle the effects of hypnotizability

and state instruction on different recall tasks, this research also serves as a junction for cognitive and social psychological approaches to memory research. This is so because implicit within these research questions are the methodological and theoretical questions on the nature of memory and the factors which affect it.

Nisbett and Wilson (1977) address these and related issues within the context of how one accesses higher order cognitive processes. They detailed a series of studies which seem to indicate that in many routine and experimental situations, individuals have very limited insight into what has motivated their actions. These studies indicate that individuals are often unaware of what stimuli have affected their responses. Nisbett and Wilson conclude that individuals base their causal reports on what they believe are "a priori" theories of what motivates a particular response. Thus, if stimuli are not salient or familiar, they may not be part of a report of motivating factors.

In the study above, participants' confusion and uncertainty were probably considerable. Particularly for the false scene, participants were presented with a perfectly plausible event although in reality nothing remotely similar to this description occurred in the film. However, the event which was described fit within the context of the movie and was clearly easy to imagine. The findings in this study indicate that at the beginning of the study participants dealt with the request to recall a non-real scene by producing less

information than they did for a real scene, but by the conclusion of the study their "recollection" of this scene had "improved" substantially.

Perhaps Nisbett and Wilson's (1977) arguments can be applied to the memory distortion noted in this study. Maybe some participants integrate false information into their memory of an event and are unaware of the exact operation of this process. This does not mean that this process is irreversible or that people are unable to distinguish where information comes from. However, it does mean that sometimes it may be difficult to do either.

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PRECISION^{SM} RESOLUTION TARGETS

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Appendix A Mass Testing Questionnaire

Name or initials: _____

Phone number: _____

Please indicate your gender: Male _____ Female _____

Please indicate the year of your birth: _____

Below is a list of movie titles. In each case please indicate whether or not you saw each movie, how many times you saw it, and your best estimate of the year in which you last saw it. If you can't remember whether or not you saw a movie please circle NO

MOVIE SEEN	SAW IT	HOW MANY TIMES	DATE LAST
An Officer and a Gentleman	YES NO	_____	_____
Blade Runner	YES NO	_____	_____
E.T.	YES NO	_____	_____
2001: A Space Odyssey	YES NO	_____	_____
The Exorcist	YES NO	_____	_____
Jaws	YES NO	_____	_____
Grease	YES NO	_____	_____
Trading Places	YES NO	_____	_____
The Sound of Music	YES NO	_____	_____
Spartacus	YES NO	_____	_____
Apocalypse Now	YES NO	_____	_____
Raiders of the Lost Ark	YES NO	_____	_____
Animal House	YES NO	_____	_____
Butch Cassidy and the Sundance Kid	YES NO	_____	_____
The Accused	YES NO	_____	_____
The Shining	YES NO	_____	_____
One Flew Over the Cuckoo's Nest	YES NO	_____	_____
The Right Stuff	YES NO	_____	_____
Carrie	YES NO	_____	_____
Raging Bull	YES NO	_____	_____
My Fair Lady	YES NO	_____	_____
The Abyss	YES NO	_____	_____

Mary Poppins	YES	NO	_____	_____
Pinocchio	YES	NO	_____	_____
Lady and the Tramp	YES	NO	_____	_____
Snow White	YES	NO	_____	_____
Cinderella	YES	NO	_____	_____
101 Dalmatians	YES	NO	_____	_____
Silence of the Lambs	YES	NO	_____	_____
Total Recall	YES	NO	_____	_____
Dead Calm	YES	NO	_____	_____
Cape Fear	YES	NO	_____	_____
Thelma and Louise	YES	NO	_____	_____
Fried Green Tomatoes	YES	NO	_____	_____
Fatal Attraction	YES	NO	_____	_____
Dances With Wolves	YES	NO	_____	_____

In the spaces below please list the titles of the 5 movies you most enjoyed as a child before you were 14 years old. In addition, please indicate how often you saw each movie and your best estimate of the year in which you last saw each movie.

TITLE	HOW MANY TIMES	YEAR LAST SEEN
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

Appendix B Informed Consent Free Recall

The following people are involved in this research project and may be contacted at any time: Jerry Ritt, Bill Blois (Research Personnel, 788-2600, ext. 2683) and/or, Dr. Nicholas Spanos (Faculty Supervisor, 788-2600, ext. 2682). Should you have any ethical concerns about this study then please contact Dr. Lise Paquet (Chair, Department of Psychology Ethics Committee, 788-2600, ext. 2692) or, Dr. W. Jones (Chair, Department of Psychology, 788-2600, ext. 2648).

We are interested in the nature and quality of long-term memories. Before you agree to participate in this experiment, we would like you to be aware of the procedure involved.

In today's session, you will be administered a series of questionnaires designed to assess your memory acquisition style and certain personality characteristics. None of the questions are meant to cause any embarrassment and your responses will be kept strictly confidential. Following the completion of the questionnaires you will be asked to recall everything that you can about the movie "Jaws". We would like to tape record your recall. This tape recording will only be used for the purposes of determining your recall and will be treated confidentially.

I, the undersigned, am aware that my participation in this study is voluntary and if, for any reason and at any time, I wish to leave the experiment, I may do so without explanation and without penalty.

Furthermore, I am aware that the data gathered in this study are confidential and anonymous with respect to my personal identity.

I have read the above form and I consent to participate in this study.

Participant's Signature

Date

Investigator's Signature

Appendix C Free Recall Instructions

In today's session you will be asked to recall all that you can about the movie "Jaws". You have been selected because you indicated in Mass Testing that you saw the movie Jaws at least 5 years ago. In this session you will simply be asked to recall all you can about the movie. I would like to tape record your recall.

Okay, Please close your eyes. I would like you to recall everything that you can remember about the movie Jaws. Take as much time as you need and recall in as much detail as you can remember.

Okay. Take the next few moments and try to recall anything else about the movie

Appendix I Structured Interview for Hypnotic/Mnemonic Conditions

I would like you to recall everything that you can *now* remember about the movie Jaws. Try to recall the movie from beginning to end in as much detail as you can. **Imagine a mental TV screen on which the movie will appear. With this mental TV screen you can zoom in and freeze scenes as you desire.** Describe the movie from beginning to end in as much detail as you can as you see it on your mental screen.

Okay. Take a few moments and try to recall anything else about the movie.

Okay. That's fine.

Cued Recall Scene 1

The following scene occurred in the movie. The police chief believes there may be a shark in the water and is at the beach watching the bathers. In the water are children and one in particular is on an inflated air mattress. This child is attacked.

- O1) With your mental TV camera zoom in on the child who is attacked. Describe that scene in as much detail as you can recall as you see it on your mental TV screen..

Give me more information about the scene.

How confident are you in the accuracy of your recall?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T1) Zero in on the inflated air mattress on which the boy was riding when he was attacked. Can you remember the air mattress?

_____ Yes If No _____ then go to T1a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T1a) What do you remember about this scene?

Appendix E Informed Consent Mnemonic Condition

The following people are involved in this research project and may be contacted at any time: Jerry Ritt, Bill Blois (Research Personnel, 788-2600, ext 2683) and/or; Dr. Nicholas Spanos (Faculty Supervisor, 788-2600, ext. 2682). Should you have any ethical concerns about this study then please contact Dr. Lise Paquet (Chair, Department of Psychology Ethics Committee, 788-2600, ext. 2692) or; Dr. W. Jones (Chair, Department of Psychology, 788-2600, ext. 2648).

We are interested in the effects of cognitive mnemonic restructuring on the retrieval of long-term memories. Before you agree to participate in this experiment, we would like you to be aware of the procedures involved.

In today's session, you will be administered a guided mnemonic restructuring procedure that will aid in the retrieval of long term memories. Specifically this procedure will be focussed on revivifying your recall of the movie "Jaws". We would like to tape record your recall. This tape recording will only be used for the purposes of determining your recall and will be treated confidentially. After this free recall session you will be asked specific questions about the movie. First you will be asked to recall specific scenes from the movie, then you will be asked a series of True or False questions about scenes from the movie.

This session will take approximately 1 hour. At the end of this session you will be fully debriefed and will receive experimental credit for your participation.

I, the undersigned, am aware that my participation in this study is voluntary and if, for any reason and at any time, I wish to leave the experiment, I may do so without explanation and without penalty.

Furthermore, I am aware that the data gathered in this study are confidential and anonymous with respect to my personal identity.

I have read the above form and I consent to participate in this study.

Participant's Signature

Date

Investigator's Signature

Appendix F Informed Consent Control Condition

The following people are involved in this research project and may be contacted at any time: Jerry Ritt, Bill Blois (Research Personnel, 788-2600, ext. 2683) and/or: Dr. Nicholas Spanos (Faculty Supervisor, 788-2600, ext. 2682). Should you have any ethical concerns about this study then please contact Dr. Lise Paquet (Chair, Department of Psychology Ethics Committee, 788-2600, ext. 2692) or: Dr. W. Jones (Chair, Department of Psychology, 788-2600, ext. 2648).

We are interested in the effects of multiple trials on the retrieval of long-term memories. Before you agree to participate in this experiment, we would like you to be aware of the procedures involved.

In today's session, you will be asked to recall everything you can about the movie "Jaws". We would like to tape record your recall. This tape recording will only be used for the purposes of determining your recall and will be treated confidentially. After this free recall session you will be asked specific questions about the movie. First you will be asked to recall specific scenes from the movie, then you will be asked a series of True or False questions about scenes from the movie.

This session will take approximately 1 hour. At the end of this session you will be fully debriefed and will receive experimental credit for your participation.

I, the undersigned, am aware that my participation in this study is voluntary and if, for any reason and at any time, I wish to leave the experiment, I may do so without explanation and without penalty.

Furthermore, I am aware that the data gathered in this study are confidential and anonymous with respect to my personal identity.

I have read the above form and I consent to participate in this study.

Participant's Signature

Date

Investigator's Signature

Appendix G Hypnosis Condition Instructions

Okay. In this next phase of the study I will again ask you to recall the movie *Jaws*. First, however I will administer a hypnotic induction procedure and instructions aimed at enhancing your ability to remember the movie. You see human memories are stored in neural traces. Newer traces can interfere with older ones and lead to memory failures. This is called retroactive interference. However, it is important to realize that memory failures are rarely due to a failure to store the original information. With the aid of hypnosis, however, you can retrieve memories from even very old neural traces.

Memory traces are activated when we recreate the environment that was present during the initial experience. For instance, if you visit some place you haven't been to since childhood, you are likely to be flooded with old memories that you thought had been completely forgotten. In this case the place you visited caused a reactivation of memories associated with that place. These memories reactivated other memories with which they were associated and so on. It is not necessary to physically travel back to old places in order to reactivate old memories. The same effect can be achieved by mentally recreating old environments. In other words, by imagining and thinking about a particular experience during hypnosis, and by using hypnosis to mentally recreate the feelings and emotions you felt during a specific experience you will be able to reactivate these memories and get a continuous record of even the smallest details. In other words, hypnosis enables people to relive earlier experiences. After you have been hypnotized I will ask you to tap into your natural abilities by imagining a mental TV screen on which the movie will appear. I will ask you to recall and describe the movie from beginning to end in as much detail as you can as you see it on your mental TV screen.

Once you are primed in this way to reactivate your memories of the movie "*Jaws*", I will ask you to visualize a mental TV screen, and you will be able get close ups of the specific scenes which I will describe. I will ask you to focus on specific areas such as individuals clothing and ask you what you see.

Hypnotic Induction

Close your eyes. Your ability to be hypnotized depends on your willingness to cooperate. It has nothing to do with your intelligence. As for your willpower, if you want to, you can pay no attention to me and remain awake all the time. On the other hand, if you pay close attention to what I say, and follow what I tell you, you can easily fall into an hypnotic sleep. Hypnosis is nothing fearful or mysterious. It is merely a state of strong interest in some particular thing. In a sense, you are hypnotized whenever you see a good show, and forget you are part of the audience, but instead feel part of the story. Your cooperation, your interest, is what I ask for. Your ability to be hypnotized is a measure of your willingness to cooperate. Nothing will be done that will in any way cause you the least embarrassment.

Now relax and make yourself entirely comfortable. Relax completely. Relax every muscle of your body. Relax the muscles of your legs. Relax the muscles in your arms. Make yourself perfectly comfortable. Let yourself be limp. Relax more and more, more and more. Relax completely. Relax completely. Relax completely.

Your legs feel heavy and limp, heavy and limp. Your arms are heavy, heavy, heavy as lead. Your whole body feels heavy, heavier. You feel tired and sleepy, tired and sleepy. You feel drowsy and sleepy, drowsy and sleepy. Your breathing is slow and regular, slow and regular.

You feel pleasantly drowsy and sleepy as you continue to listen my voice. Just keep your thoughts on what I am saying. You are going to get much more drowsy and sleepy. Soon you will be deep asleep, but you will have no trouble hearing me. You will not wake up until I tell you to. Remember that the dangers of hypnosis are a myth. Nothing will be done that is in any way harmful to you. I shall now begin to count. At each count, you will feel yourself going down, down, down, into a deep, comfortable, a deep, restful sleep. A sleep in which you will be able to do all sorts of things I ask you to do. One--you are going to go deeply asleep...two--down, down, into a deep, sound sleep...Three--Four--more and more, more and more asleep...Five--Six--Seven--you are sinking, sinking, into a deep, comfortable, a deep, restful sleep. Nothing will disturb you. Pay attention only to my voice and the things I tell you...Eight--Nine--Ten--Eleven--Twelve--deeper and deeper, always deeper sleep...Thirteen--Fourteen--Fifteen. You will always hear me clearly no matter how deeply asleep you may be...Sixteen--Seventeen--deep asleep. Nothing will disturb you. You are going to experience many things that I will tell

you to experience...Eighteen--Nineteen--Twenty. Deep asleep. You will not awaken until I tell you to do so. You will wish to sleep and have the experiences I shall presently describe.

You are feeling comfortable, relaxed, thinking of nothing, nothing but what I say, your eyes are closed, comfortably closed, you are thinking of nothing, nothing but what I say, your arms and legs are heavy, your arms and legs are heavy and you are relaxed. The muscles of your face, arms and legs are relaxed, your whole body is relaxed. Drift deeper. It feels as though you are going backward into the darkness, backward into the darkness, and as you go backward into the darkness you feel more and more comfortable, more and more relaxed, you are listening absolutely nothing, concentrating only on my voice, listening only to my voice, you are feeling comfortable and relaxed, comfortable and relaxed, and you are in a deep, sound sleep--a deep, sound sleep--fully prepared to respond to and experience what I will ask you to do.

Go To Hypnotic/Mnemonic Structured Interview and then True/False Questionnaire, and then Wake-Up Procedure

Wake-Up Procedure

You are going to wake up in a few minutes. You will feel refreshed, wide awake, and in a good mood. I will count from five to one, and with each count, you will be more fully awake. Five...starting to awaken...four more and more awake...three...still more and more awake...two...becoming more and more awake...one...wide awake. Open your eyes...wide awake.

Appendix H Mnemonic Condition Instructions

Okay. In this next phase of the study I will again ask you to recall the movie *Jaws*. First, however I will assist you by explaining how to use a guided mnemonic restructuring procedure. This procedure will enhance your natural ability to remember the movie. You see human memories are stored in neural traces. Newer traces can interfere with older ones and lead to memory failures. This is called retroactive interference. However, it is important to realize that memory failures are rarely due to a failure to store the original information. With the aid of mnemonic restructuring, however, you can retrieve memories from even very old neural traces.

Memory traces are activated when we recreate the environment that was present during the initial experience. For instance, if you visit some place you haven't been to since childhood, you are likely to be flooded with old memories that you thought had been completely forgotten. In this case the place you visited caused a reactivation of memories associated with that place. These memories reactivated other memories with which they were associated and so on. It is not necessary to physically travel back to old places in order to reactivate old memories. The same effect can be achieved by mentally recreating old environments. In other words, by imagining and thinking about a particular experience during guided cognitive restructuring, you can mentally recreate the feelings and emotions you felt during a specific experience and be able to reactivate these memories and get a continuous record of even the smallest details. In other words, guided cognitive restructuring enables people to relive earlier experiences. During the guided cognitive restructuring I will ask you to tap into your natural abilities by imagining a mental TV screen on which the movie will appear. I will ask you to recall and describe the movie from beginning to end in as much detail as you can as you see it on your mental TV screen.

Once you are primed in this way to reactivate your memories of the movie "*Jaws*", I will ask you to visualize a mental TV screen, and you will be able get close ups of the specific scenes which I will describe. I will ask you to focus on specific areas such as individuals clothing and ask you what you see.

Go To Hypnotic/Mnemonic Structured Interview and then True/False Questionnaire

Appendix I Structured Interview for Hypnotic/Mnemonic Conditions

I would like you to recall everything that you can *now* remember about the movie *Jaws*. Try to recall the movie from beginning to end in as much detail as you can. **Imagine a mental TV screen on which the movie will appear. With this mental TV screen you can zoom in and freeze scenes as you desire.** Describe the movie from beginning to end in as much detail as you can as you see it on your mental screen.

Okay. Take a few moments and try to recall anything else about the movie.

Okay. That's fine.

Cued Recall Scene 1

The following scene occurred in the movie. The police chief believes there may be a shark in the water and is at the beach watching the bathers. In the water are children and one in particular is on an inflated air mattress. This child is attacked.

- O1) With your mental TV camera zoom in on the child who is attacked. Describe that scene in as much detail as you can recall as you see it on your mental TV screen..

Give me more information about the scene.

How confident are you in the accuracy of your recall?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T1) Zero in on the inflated air mattress on which the boy was riding when he was attacked. Can you remember the air mattress?

_____ Yes If No _____ then go to T1a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T1a) What do you remember about this scene?

- M1) Just before the boy is attacked a man is throwing a wooden twig into the water for his dog to fetch. Zoom in on the dog. Can you remember the collie swimming in the water to retrieve the twig?

_____ Yes   If No _____ then go to M1a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

- M1a) What do you remember about this scene?

- T2) Zero in on police Chief Brody as he sits on the beach looking out for a shark. Zero in on police Chief Brody's wife as she massages the chief's shoulders. Can you remember the Chief's wife massaging his shoulders?

_____ Yes   _____ No

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T3) Look at the children who are playing in the water next to the boy who is attacked. Can you remember the football that floats on the water as the boy is attacked?

_____ Yes   If No _____ go to T3a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T3a) What do you remember about this scene?

- O2) Describe what the shark looks like and what it does as it attacks the child.

How confident are you in your answer?

0	1	2	3	4	5	6
not at all					very	
confident					confident	

M3) Zero in on the police chief as he jumps into the water trying to rescue panicking bathers. Can you remember the chief pulling bathers out of the water?

_____ Yes   if No _____ go to M3a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all					very	
confident					confident	

M3a) What do you remember about this scene?

T4) Zero in on the mother of the boy who is eaten by the shark. Zoom in on her face, notice that she is wearing wire-rim glasses, look carefully, can you remember the glasses.

_____ Yes   if No _____ go to T4a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all					very	
confident					confident	

T4a What do you remember about this scene?

M4) Okay, now zoom in again on the mother of the boy who is eaten by the shark. Look at her head and face. can you remember her blond hair?

_____ Yes if No _____ go to M4a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M4a) What do you remember about this scene?

Cued Recall Scene 2

The following scene occurred in the movie. A man is fishing from the beach with a rod and reel. He is wearing high rubber boots and walks into the water almost to his waist. The shark attacks and drags him into the ocean.

O1) With your **mental TV camera** zoom in on the fisherman who is attacked. Describe that scene in as much detail as you can recall as you see it on your mental TV screen.

Give me more information about the scene.

O2) Zero in on the hat the fisherman was wearing when he was attacked by the shark. Can you remember the fisherman's hat? (If yes) describe it.

M1) The fisherman comes out of a small shack near the water's edge. Can you remember the wooden exterior of the shack?

_____ Yes   If No _____ then go to M1a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M1a) What do you remember about this scene?

M2) Zero in on the fisherman. Can you remember his tan fisherman's vest?

_____ Yes   If No _____ then go to M2a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

~~M2a)~~ M2a) What do you remember about this scene?

M3) Watch the fisherman. Can you remember him jerk forward when the shark grabs onto his fishing line?

_____ Yes   If No _____ then go to M3a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M3a) What do you remember about this scene?

M4) The fisherman left a cooler on the beach with beer in it. Zero in on the cooler, can you remember the beer cans in the cooler?

_____ Yes

If No _____ then go to M4a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M4a) What do you remember about this scene?

Appendix J Control Condition Instructions

Okay. In this session I would like you to once again recall everything that you can about the movie Jaws.

First, however, I would like to explain some things about human memory. Human memories are stored in neural traces. Newer traces can interfere with older ones and lead to memory failures. This is called retroactive interference. However, it is important to realize that memory failures are rarely due to a failure to store the original information. Instead the problem is usually due to a failure in retrieval. It has been shown that a second retrieval trial generally allows one to retrieve more information.

Appendix K Structured Interview for Control Condition

Please close your eyes. I would like you to recall everything that you can remember about the movie Jaws. Take as much time as you need and recall in as much detail as you can remember.

Okay. Take the next few moments and try to recall anything else about the movie.

Cued Recall Scene 1 (*Control Condition*)

The following scene occurred in the movie. The police chief believes there maybe a shark in the water and is at the beach watching the bathers. In the water are children and one in particular is on an inflated rubber mattress. This child is attacked.

O1) Focus on the child who is attacked. Describe that scene in as much detail as you can recall.

Give me more information about the scene.

How confident are you in the accuracy of your recall?

0	1	2	3	4	5	6
not at all						very
confident						confident

T1) There was a rubber mattress on which the boy was riding when he was attacked. Can you remember the rubber mattress?

_____ Yes If No _____ then go to T1a

How confident are you in your memory of the air mattress?

0	1	2	3	4	5	6
not at all						very
confident						confident

T1a) What do you remember about this scene?

- M1) Just before the boy is attacked a man is throwing a wooden twig into the water for his dog to fetch. Can you remember the collie swimming in the water to retrieve the twig?

_____ Yes   If No _____ then go to M1a

How confident are you in your memory of the collie fetching the twig?

0	1	2	3	4	5	6
not at all						very
confident						confident

- M1a) What do you remember about this scene?

- T2) Zero in on police Chief Brody as he sits on the beach looking out for a shark. Zero in on police Chief Brody's wife as she massages the chief's shoulders. Can you remember the Chief's wife massaging the his shoulders?

_____ Yes   _____ No

How confident are you in your memory of the Chief's wife massaging his shoulders?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T3) Remember the children who are playing in the water next to the boy who is attacked. Can you remember the football that floats on the water as the boy is attacked?

_____ Yes   If No _____ go to T3a

How confident are you in your memory of the football?

0	1	2	3	4	5	6
not at all						very
confident						confident

- T3a) What do you remember about this scene?

O2) Describe what the shark looks like and what it does as it attacks the child.

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M3) Remember the police chief as he jumps into the water trying to rescue panicking bathers. Can you remember the chief pulling bathers out of the water?

_____ Yes   if No _____ go to M3a

How confident are you in your memory of the police chief pulling bathers out of the water?

0	1	2	3	4	5	6
not at all						very
confident						confident

M3a) What do you remember about this scene?

T4) Remember the mother of the boy who is eaten by the shark. Remember her face, notice that she is wearing wire-rim glasses, look carefully, can you remember the glasses?

_____ Yes   if No _____ go to T4a

How confident are you in your memory of the mother's wire rim glasses?

0	1	2	3	4	5	6
not at all						very
confident						confident

T4a) What do you remember about this scene?

M4) Okay, now remember again the mother of the boy who is eaten by the shark. Recall her head and face, can you remember her blond hair?

_____ Yes   if No _____ go to M4a

How confident are you in your memory of her blond hair?

0	1	2	3	4	5	6
not at all						very
confident						confident

M4a) What do you remember about this scene?

Cued Recall Scene 2 (*Control Condition*)

The following scene occurred in the movie. A man is fishing from the beach with a rod and reel. He is wearing high rubber boots and walks into the water almost to his waist. The shark attacks and drags him into the ocean.

O1) Remember the fisherman who is attacked. Describe that scene in as much detail as you can remember.

Give me more information about the scene.

O2) Remember the hat the fisherman was wearing when he was attacked by the shark. Can you remember the fisherman's hat? (If yes) describe it.

M1) The fisherman comes out of a small shack near the water's edge. Can you remember the wooden exterior of the shack?

_____ Yes   If No _____ then go to M1a

How confident are you in your memory of the wooden exterior of the shack?

0	1	2	3	4	5	6
not at all						very
confident						confident

M1a) What do you remember about this scene?

M2) Zero in on the fisherman. Can you remember his tan fisherman's vest?

_____ Yes

If No _____ then go to M2a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M2a) What do you remember about this scene?

M3) Watch the fisherman. Can you remember him jerk forward when the shark grabs onto his fishing line?

_____ Yes

If No _____ then go to M3a

How confident are you in your answer?

0	1	2	3	4	5	6
not at all						very
confident						confident

M3a) What do you remember about this scene?

M4) The fisherman left a cooler on the beach with beer in it. Zero in on the cooler, can you remember the beer cans in the cooler?

_____ Yes

If No _____ then go to M4a

How confident are you in your memory of the beer cans in the cooler?

0	1	2	3	4	5	6
not at all						very
confident						confident

M4a) What do you remember about this scene?

Appendix L True/False Questions

1. The name of the town where the movie *Jaws* takes place is Amity Island.
2. When Chrissy's body is found it is identified on the beach by her severed head.
3. When the first shark is caught, Mrs. Kintner, the mother of the boy who was attacked at the beach, approaches Chief Brody at the dock and embraces him.
4. Matt Hooper (the scientist shark-expert) suspects the first shark caught is not "Jaws" because its tail is too small.
5. The fisherman wore hip waders as he walked into the water.
6. The name of Quint's boat is ORCA.
7. Police Chief Brody had two children, a boy and a girl.
8. The fisherman wore a tan fisherman's vest.
9. Chief Brody suspects the mayor wants to keep the beach open partly because he doesn't have any children of his own to worry about.
10. Matt Hooper (the scientist shark-expert) came from a poor family and put himself through school on a scholarship.
11. Chief Brody grew up near the water and loved the sea.
12. The fisherman wore a hat.
13. Hooper dove under the water to explore a half sunken boat. When he shined his light into the hull a head rolled into view. Hooper became so frightened that the mask to his oxygen tank fell off and he swallowed sea water which he later coughed up.
14. Chief Brody gave his son a sailboat for his birthday.
15. At one point, the shark attacks a man in a small rowboat and his severed leg falls to the ocean floor.

16. "Jaws" pulled on the fisherman's fishing line and pulled him into the water.
17. Two men tried to catch the shark by using the holiday roast of one of their wives.
18. After the fisherman was attacked his cooler full of beer remained on the shore unattended.
19. Both Quint and Hooper have scars on their bodies from shark attacks.
20. Quint smashes the 2 way radio when Brody attempts to reach the Coast Guard for help.
21. Hooper injects Jaws with 20cc of strychnine.
22. Towards the end of the movie the shark leaps onto the sinking boat and swallows Quint alive.
23. Near the end of the movie Chief Brody kills the shark by shooting the compressed air canister in its mouth.
24. After the shark is killed a large number of sea-gulls descend upon its carcass.
25. After the shark is killed Brody and Hooper swim ashore on a piece of the boat supported by 2 barrels.

Appendix M Debriefing

A good deal of evidence now suggests that human memory is expectancy driven and reconstructive in nature. It has been found that people recall inaccurately and fill gaps in memory by recalling what they expect happened or what they believe must have happened.

There has been substantial research done on the accuracy of short term memory but limited laboratory research on the accuracy and confidence in recall of long term memories. We used the movie "Jaws" because it was an important and vivid movie seen by many students at least 5 years ago. Some of the information described during the cued recall questions may not have actually occurred in the movie. It was important to do this to be able to compare accuracy and confidence in long term memory.

Frequently, the elicitation of "pseudomemories" or false memories involves the use of hypnotic procedures to enhance recall. A great deal of current controversy concerns whether hypnotic procedures bias recall and/or enhance confidence in inaccurate recall to a greater extent than do nonhypnotic procedures. Consequently, one purpose of this study was to compare hypnotic and nonhypnotic procedures in the elicitation of, and degree of confidence placed in both true and false memory reports. Therefore we had two experimental groups (hypnotic suggestion and non-hypnotic suggestion i.e. mnemonic restructuring) and one control group (no suggestion).

Another purpose of this study was to examine the relationship between hypnotizability and the generation of false memories. We did this by using individuals already tested for hypnotizability.

We very much want to thank you for your participation in this psychological study. If you have any questions about this experiment the following people are involved in this research project and may be contacted at any time: Jerry Ritt, Bill Blois (Research Personnel, 788-2600, ext. 2683) and/or; Dr. Nicholas Spanos (Faculty Supervisor, 788-2600, ext. 2682). Should you have any ethical concerns about this study then please contact any or all of the following faculty members:

Dr. N. Spanos, ext. 2683, Loeb A307 (Faculty Supervisor)

Dr. L. Paquet, ext. 2692, Loeb A533 (Chair of the Ethics Committee)

Dr. W. Jones, ext. 2648, Loeb B559 (Chair of the Psychology Department)

END

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