THE EFFECT OF HYPNOSIS AS AN
INTERVIEW TECHNIQUE ON EYEWITNESS MEMORY

by

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ABSTRACT

Seventy-two hypnotically susceptible students witnessed a videotape of a simulated bank robbery. One week later observers were interviewed in one of three "states": hypnotized, relaxed, or waking. Half the students in each of these groups received imagery instructions similar to those employed by police hypno-investigators; the remainder were instructed to use a reconstructive memory technique. Each witness answered 47 questions pertaining to the videotaped bank robbery and the "live" context of the viewing room. Five of these questions contained misinformation intended to lead the respondent into giving the wrong answer. After the interview, students attempted a photo identification task. Overall recall accuracy for both the video and "live" aspects of the critical event was high. Hypnosis had no effect on memory for details of the event, nor were hypnotized students more susceptible to the misleading information. The type of memory technique interacted with recall state to affect both the number and the proportion of errors contained in responses. This interaction differed for the video and "live" aspects of the event, suggesting limited generalization of memory for recorded events to real life situations. Confidence was significantly related to both accuracy of choice and amount of information recalled during the interview, but no such relationship was found for number or proportion of errors.
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THE EFFECT OF HYPNOSIS AS AN INTERVIEW TECHNIQUE ON EYEWITNESS MEMORY

Consistently since the turn of the century, researchers have been demonstrating the unreliability of eyewitness memory (Binet, 1900; Muensterberg, 1908; Stern, 1939; Whipple, 1909, 1912). In a classic experiment, Muensterberg staged a shooting for an unsuspecting group of students to witness. Two weeks later, they were asked to recall as many of the details of the incident as they could remember. Their written reports were analyzed to determine what proportion of their statements were incorrect. Muensterberg found that error rates ranged from a low of 26% to a high of 80% per report. Subsequent investigators have confirmed and elaborated this pattern of results. Using a similar experimental paradigm, Buckhout (1974) found that approximately 75% of statements made by witnesses were incorrect, while Clifford (1979) reported slightly lower error ratios, between 65 and 70%. The results of these and other experiments have led to the current view among psychologists that eyewitness memory is generally very poor.

The fact that eyewitness memory can be fallible has practical and theoretical consequences of such importance that the issue warrants further investigation. In practical applications, eyewitness fallibility poses serious problems for police investigators and for the courts, both of whom are dependent on eyewitness descriptions for the identification of suspects. In a legal setting, the most serious error in memory is the incorrect identification of a suspect by an eyewitness. This is
especially worrisome because "eyewitness identification is often the most convincing and decisive source of evidence in a criminal case" (Leippe, Wells & Ostrom, 1978, p. 345). The British Home Office was so concerned with this problem that it commissioned Lord Devlin to lead an enquiry into the area of eyewitness identification and its legal implications. In 1976, The Home Office published the results of Devlin's investigation; among other things, he advised:

that the trial judge should be required by statute...to direct the jury that it is not safe to convict upon eye-witness evidence unless the circumstances of the identification are exceptional or the eye-witness is supported by substantial evidence of another sort (p. 150).

Unfortunately for the accused, the effect of being wrongly identified by an eyewitness can be serious. There are numerous examples in both the legal and psychological literature of cases where mistaken identification resulted in conviction, imprisonment and even execution of innocent people (see, for example, Brandon & Davies, 1973; Buckhout, 1974; Goldstein, 1977; Loftus, 1979; Wall, 1965; Woocher, 1977; Yarmey, 1979b). Nor has the situation improved in recent years -- eyewitness testimony remains troublesome for the courts today.

In addition to the practical concerns noted above, there are also theoretical issues arising from an enquiry into the fallibility of eyewitness memory. This is because any rationale that attempts to explain errors in memory will also reflect something about the way in which memory is presumed to work. There are two competing approaches to psychological models of memory that characterize research in the area: the "exact copy" or trace theory, and the reconstructive theory. Trace theory is by no means new: it has been entertained, in one form or another, for
centuries, from Aristotle (in De Anima) to modern psychologists such as Paivio (1971) and Tulving (1974). Trace theory emphasizes the mental structure of memory. Two aspects of the theory are relevant here: first, the assumption that aspects of the event are stored somewhere in the brain and, second, that there is a one-to-one correspondence between a physical stimulus in the environment and the trace laid down in memory, much like the way in which a videotape portrays real-life actions. One writer has described the process this way: "Because the perceptual apparatus works in a cybernetic fashion much like a giant computerized videotape recorder, the plethora of information perceived by the sensory system is recorded and stored in the brain at a subconscious level" (Reiser, 1976, p. 40). Proponents of the theory offer a variety of reasons for memory errors. For example, there may be obstacles to retrieving the stored information; that is, the details are there but they are only partially accessible, perhaps blocked by negative emotions. Another possibility is that there may be an actual decay of the memory trace itself, perhaps due to chemical changes in the brain. Opposing trace theory is the reconstructive theory, which focuses on memory processes rather than structure. It proposes that memory is composed of abstract representations of the world (cf. Henderson, 1903) or conceptual schemas (cf. Bartlett, 1932). Proponents of this approach assume that remembering is "not the re-excitation of innumerable fixed, lifeless and fragmentary traces...(but) an imaginative reconstruction..." (Bartlett, 1932, p. 213). According to this perspective, an individual actively reconstructs memories from conceptual schemas in accordance with his or her prior knowledge and understanding of the event. In this way, a person's recollection of the details of an
incident can be influenced by a variety of factors operating both during and after initial observation of the event, and these factors can affect the accuracy of the person's memory. For instance, a witness could incorrectly perceive some details of the incident, such as a suspect's facial features due to poor lighting conditions. Or, he/she could incorporate into memory misinformation contained in interview questions. Thus, these two models of memory predict differences in the way errors can arise in eyewitness reports. Examining the kinds of errors an eyewitness makes can yield an insight into which theory is a more accurate reflection of the way in which memory works. The present research was concerned, in part, with implications of these two theoretical interpretations.

During the last decade, eyewitness memory has received considerable attention from memory researchers, and justifiably so. Unfortunately, previous investigators have not looked for ways of eliciting better reports; they have chosen, instead, to concentrate on the weaknesses of memory (e.g., Buckhout, 1974; Clifford, 1979). In particular, Elizabeth Loftus has investigated the extent to which witnesses can be induced to make errors by exposing them to either suggestive or deliberately misleading post-event information (Loftus, Altman & Geballe, 1975; Loftus, Miller & Burns, 1978; Loftus & Palmer; 1974, Loftus & Zanni, 1975; Miller & Loftus, 1976). Her conclusions regarding the malleability of memory have helped to promote the widespread belief that eyewitness memory is hopelessly inaccurate. Such wholesale skepticism has recently been challenged by some researchers (e.g., Wells, 1978; Yuille, 1980) who feel the negative aspects of eyewitness memory have been overstated. Using experimental materials and procedure developed by Loftus, Yuille (1983)
showed a slide sequence of a pedestrian-motor vehicle accident to observers. These witnesses were later asked to provide a written description of the incident. Analysis of the reports yielded data concerning both the quantity and quality of information provided. Yuille reported that, on the whole, eyewitness descriptions of the incident were fairly accurate; that is, of the total number of details reported by the observers, only 30% of them were incorrect. This is in marked contrast to the high error ratios of 65 to 75% reported by Buckhout and Clifford. Results such as these suggest that, in some instances, eyewitness memory may not be as fallible as once suspected. This discrepancy regarding the recall abilities of witnesses highlights the need for further research that resolves the conflict. The study reported here was designed to provide further information on this contentious issue by examining how well observers perform as eyewitnesses.

Although it may be useful, for theoretical reasons, to construct situations in which witnesses are coerced into giving inaccurate testimony, as much of the previous research has done, too much emphasis on the fallibility of memory can lead to an unbalanced picture of eyewitness capability. The current negative view of eyewitness memory is possibly more a reflection of the design of the experimental situation than of the capabilities of witnesses to accurately recall the details of an incident. What is needed is research that focuses on specific ways to improve memory. This type of research would have both practical and theoretical value. The criminal justice system would greatly benefit from any technique that enhanced memory and produced more accurate eyewitness reports. Research of this kind would also be advantageous to memory
theorists, since examination of successful techniques would yield insights into the underlying memorial processes. Yet, as noted earlier, few researchers have examined eyewitness memory from this more positive perspective. The current research was undertaken to fill this gap.

Subjects in this study were recruited from undergraduate psychology classes at the University of British Columbia. They were shown a videotape of a simulated bank robbery that is used by some banks to train new tellers. In the videotape, two men can be seen entering the bank. One acts as the principal robber who obtains the money from the bank teller; the other acts as his accomplice. The main bank robber is visible to the viewers for the majority of the 90 second videotape. One week after viewing the video, the students were asked a series of questions which measured their memory for details of the incident. An interval of one week between observing the videotape and being interviewed was considered appropriate since it approximated real-life situations in which there is usually some delay, from a few hours to several weeks, between an individual witnessing a crime and being questioned by the police. One week was chosen as an average time delay that would normally occur. The questions were patterned after the type used by the Vancouver Police Department in their interviews with eyewitnesses. They were, for the most part, fairly objective in that they probed for details of the incident without leading the witness. For example, instead of asking whether the bank robber had a beard or moustache, the interviewer asked "Did he have any facial hair?" In this way, this experiment was able to measure how accurately students could remember the details of a complex event, such as a bank robbery. It was designed specifically to provide conditions under
which eyewitnesses would give the most accurate reports. Although errors were examined, the major emphasis of the study was to determine the optimum method of interviewing eyewitnesses.

One memory-improving technique that is gaining widespread acceptance by police forces is the use of hypnosis to question witnesses about the details of a crime. This practice raises several issues of interest to psychologists. Two of these provided the major focus for the present research. The first involves the supposition that hypnosis does, in fact, improve recall and that, as a consequence, it is an effective interrogation tool. As will be discussed in some detail below, this interpretation of the existing anecdotal and experimental literature on hypnosis is highly questionable. Thus, one of the primary objectives of this research was to test whether hypnosis actually does enhance eyewitness memory. After viewing the videotape of the bank robbery, one group of subjects was hypnotized before being interviewed. Two other groups of students served as controls -- these observers were not hypnotized during the interview. It was predicted that if hypnosis is an effective memory aid, the students who had been hypnotized would respond more accurately to the interview questions than those who had not. Anecdotally, it is often the case that peripheral information, such as a licence plate number, is recalled under hypnosis when it has not otherwise been remembered. Comparable aspects were included in this study so that this issue could be investigated. For example, a phone number for repair service was taped onto the video machine, clearly visible to the students. At each session the assistant experimenter made a passing comment to the students while getting the video machine operational, to
the effect that she hoped the machine wouldn't break down. This was an attempt to get the subjects to notice the phone number without explicitly directing their attention to it and so, hopefully, constituted a difficult item to remember. This allowed a comparison to be made of the ability of hypnotized subjects to accurately recall the number. If significantly more subjects in the hypnosis group were able to remember the phone number, this would provide support for the trace theory of memory and justify the use of hypnosis as an interrogation tool.

A second concern of this study relates to the fact that the use of hypnosis is based on the assumption that memory works according to trace theory. As Putnam (1979) suggests, the detective who uses hypnosis as an investigative tool has, implicitly "expressed an exact copy theory of memory which assumes that information is stored accurately and that forgetting is the result of an inability to retrieve the information" (p. 439). Hypnosis is seen as a way of removing the obstacles blocking successful retrieval of the stored information, thereby allowing suppressed information to return to conscious awareness. This belief in the trace theory of memory has important implications for the way in which interviews with eyewitnesses are conducted. This was the second concern of this study. If a rigorous interpretation of trace theory is assumed, there is little danger that a witness would be susceptible to leading questions. In fact, in cases of memory loss, interview questions would be worded so as to contain key words capable of providing associations for those temporarily inaccessible details. On the other hand, if memory is a reconstructive process, the way in which a witness is questioned can have a marked effect on the elicited response. If witnesses showed a tendency
to incorporate information contained in interview questions into their recall of the incident, this would provide support for the reconstructive theory of memory. Thus, a second aim of this research was to examine the way in which interview questions could affect the accuracy of eyewitness memory.

There has been a good deal of research into the way in which the wording of a question can influence the respondent's answer. In the early part of this century, Binet (1900) and Muscio (1916) established that posing deliberately leading questions to witnesses could have hazardous results. Since then, researchers have consistently shown that accuracy declines as the structure and specificity of questions increases (e.g., Gardner, 1933; Marquis, Marshall & Oskamp, 1972; Marshall, 1969; Marston, 1924; Snee & Lush, 1941). For example, Lipton (1977) reported that completely unstructured testimony from observers produced greater accuracy than testimony elicited through open-ended, leading or multiple-choice questions. Even varying just one word in a sentence can influence the response. For example, Harris (1973) asked subjects one of two questions, either "How tall was the basketball player" or "How short was the basketball player?" He found that students estimated the player as being significantly shorter (by approximately 10") when the latter form of the question was used. Loftus & Zanni (1975) varied use of the articles "the" and "a" in questions posed to witnesses. They found that observers interviewed with "the" questions were more likely to say they had seen something, such as broken glass, when it had not actually been present. Loftus & Palmer (1974) reported a similar pattern of results using numerical estimates of vehicle speeds. What this body of research
indicates is that the form of the question can, indeed, influence the answer that is received. Respondents appear to be answering questions using any information available to them, even if it is embedded in interview questions, to reconstruct their memory of the event.

During the last decade, Elizabeth Loftus has explored this matter further by investigating the issue of suggestibility. In numerous studies, Loftus has deliberately given observers misleading information, embedded in a questionnaire, which witnesses completed after watching an event. Using this paradigm, Loftus has repeatedly found support for the reconstructive position in that the post-event misinformation supplied to witnesses was subsequently incorporated into their memory of the details of the incident (Loftus, Miller & Burns, 1978; Loftus & Palmer, 1974). She has suggested that the misinformation actually changes the person's memory.

Not all researchers agree with Loftus on the effects of misleading information, nor with her interpretation of the memorial processes involved (e.g., Dodd & Bradshaw, 1980; Read, Barnsley, Ankers & Whishaw, 1978; Yuille, 1983). Dodd & Bradshaw examined the effects of manipulating the credibility of the source of the misleading information. Using the Loftus paradigm, they found that erroneous information contained in leading questions was "remembered" by students if no mention was made of the source of the presupposition or it was attributed to a neutral source. However, if the source of the misleading information were shown to be biased, as in the case of testimony regarding a car accident given by the driver who caused it, subjects did not incorporate the erroneous information into their recall of the event. This situation should not
arise if memory is truly being distorted by the wording of the questions. Dodd & Bradshaw argue that "the wording of a sentence may 'distort the memory' only when the presuppositions are introduced as though they come from heaven, or at least when there is no source who might be presumed to have complex intentions" (p. 696). They also point out that most laboratory experiments exclude such important variables as intentions of the "speaker" that are usually considered in everyday verbal exchanges, thus jeopardizing the ecological validity of memory experiments modeled after Loftus' paradigm.

As noted earlier, Yuille (1983), using the Loftus materials, found that witnesses were fairly accurate in their recall of the incident, in that 70% of the details they remembered were correct. In this study, he also examined the observer's degree of susceptibility to misinformation supplied to them using the Loftus questionnaire. Yuille failed to find as high a degree of susceptibility as Loftus had reported. In fact, the effect of the misinformation was negligible when it related to a detail which was very salient to the scene (the type of traffic sign at the corner of the accident) but was more noticeable when it concerned a trivial aspect (the colour of a passing car); even so, this effect was still not as pronounced as previously reported by Loftus. Yuille interpreted these results as supporting the reconstructive view that witnesses used the information in the questionnaire to fill in the gaps in their memory of the incident, but only for details previously unattended. He was able to ascertain whether a subject had attended to the detail by first obtaining a written description of the incident before introducing the misinformation. It should be noted that this is a variation of the
usual Loftus procedure, whereby observers do not have an opportunity to give a free recall of the incident before being exposed to misinformation. He found that students who mentioned either the traffic sign or the colour of the passing car in their written reports were not affected by the misleading information. While his interpretation differs from Loftus' contention that observers actually change, or amend, their memory due to the misinformation, it is consistent with the general view that memory operates according to reconstructive processes rather than according to trace theory.

This theoretical controversy was examined in this study by embedding misinformation in five of the 47 interview questions posed to observers after they had witnessed the videotaped bank robbery. The questions were misleading in that they presupposed the presence of a fairly trivial attribute, such as a hat or a watch. For example, one question concerning the main bank robber asked: "Did you notice if his gloves were leather?" when, in fact, he was not wearing gloves. An affirmative answer to this question would be considered to be incorrect; however, if the witness answered in the negative or was unsure, the experimenter would then ask directly "Was he wearing gloves?" The other misleading questions were treated in a similar manner. It was predicted that, if the trace theory were correct, subjects would be resistant to the erroneous information, because the incorrect details would not be capable of providing an association to a memory trace that didn't exist. However, if memory were indeed a reconstructive process, then subjects should make more errors when answering these questions than the other more objective ones since they would use the erroneous details in their reconstruction of the event.
From this experimental design, it would also be ascertained whether hypnotized witnesses were more susceptible to the misleading information than those who were not hypnotized. There is considerable confusion on this matter. Sheehan & Tilden (1983) found that hypnotized individuals were no more suggestible than non-hypnotized controls; however, they did find that all students made more errors when exposed to misleading questions. Other studies have supported the notion that hypnosis greatly increases suggestibility. For example, Putnam (1979) showed 16 students a videotape of a car-bicycle accident and later asked them 15 questions about the incident. Of these, six were leading questions similar to those used by Loftus (1974; 1977; Loftus, Miller & Burns, 1978) in that the definite article "the" was used instead of "a" in a question such as "Did you see a stop sign?" It is believed that questions using "the" presume the presence of the object, in this case a stop sign, and so lead the witness into believing the object was present when it really wasn't. Subjects in the hypnosis condition made significantly more errors when answering the leading questions than did subjects in the non-hypnosis group. However, there were no differences between groups in the accuracy of responses to the objective questions. Using a similar experimental design, Zelig & Beidleman (1981) replicated Putnam's results. Wagstaff (1982) employed a task involving memory for faces, and found that hypnotized individuals made more errors and had fewer correct identifications, than a non-hypnotized control group. The results of these studies have lead to the widespread belief that "subjects are more suggestible in the hypnotic state and are, therefore, more easily influenced by the leading questions" (Putnam, 1979, p. 444).
If this conclusion is valid, it has important implications for the way in which hypno-investigators conduct interviews with eyewitnesses. Extreme care will have to be taken to ensure that their questions are completely objective, and do not lead the witness in any way. Unfortunately, the issues remains controversial due to some methodological problems in the previously cited studies. Putnam's sample size of 16 subjects, 4 per condition, was too small for any reliable conclusions to be drawn. Further, nearly half of the 15 questions asked about the incident in the Putnam study, and one-third of those in the Zelig & Beidleman (1981) experiment, were misleading. Such a large number of misleading questions makes the interview situation in this study artificial. Finally, the format of the Zelig & Beidleman interview may have confounded the results. First, all of the 15 objective questions were multiple-choice, in contrast to the 5 misleading questions which required yes/no responses. Second, all the multiple-choice questions were asked first, following by all the misleading questions. Finally, the correct response for all of the misleading questions was "no". Thus, the fact that hypnotized students made more errors replying to these questions could be explained by their preference for saying "yes" and not by the fact that they were more suggestible to the misleading information. These obvious methodological difficulties casts some doubt on the validity of Zelig & Beidleman's conclusions. The present experiment sought to overcome these methodological weaknesses by obtaining information from a total of 72 students, 24 in each of the three different interview states (hypnotized, relaxed or alert). The interview consisted of 47 questions, only 5 of which were misleading, and these were interspersed throughout
the entire interview session.

The possibility that hypnotized witnesses are more susceptible to leading questions becomes a matter of some concern when one considers that the situation often arises whereby the hypnotized person is very slow to answer questions and, when the response is finally made, it is either monosyllabic or consists of very few words. This reluctance of some witnesses to talk a great deal during hypnosis results in the investigator obtaining a very abbreviated account of the incident. This is the main problem facing the hypno-investigator: how is he or she going to elicit a more complete description from the witness? In practice, most investigators avoid deliberately leading questions (e.g., was his hair brown?) if a more objective form of the question can be used (e.g., what colour was his hair?). This is fine for simple attributes like hair or eye colour, but how would the investigator probe for details about the presence of a watch? If the question "was he wearing any jewellry?" is used, the mere mention of the word "jewellry" could lead the highly suggestible hypnotized witness to believe there was a piece of jewellry present. The large body of research investigating the effects of the form of the question on accuracy of response supports this concern. Of course, if a rigorous interpretation of trace theory is assumed, then probing for more specific details, even through the use of leading questions, should not be particularly worrisome. The reluctance of hypno-investigators to using leading questions to obtain more information reveals a rather curious inconsistency between belief in the trace theory and actual interviewing practice. By contrast, proponents of the reconstructive theory would be concerned that any witness, not just those under hypnosis,
would be influenced by misinformation contained in interview questions.

Use of the videotaped bank robbery as the critical event for students to witness in this study provided an opportunity for two additional aspects of the eyewitness situation to be examined. First, how well could observers identify one of the actors from a photo spread of coloured pictures or "mugshots", and, second, how confident were students in the accuracy of their choice? Previous investigators have reported that eyewitness identifications conducted under similar laboratory conditions are not particularly reliable, although the identification rate is usually above that expected by pure chance. For example, Leippe, Wells & Ostrom (1978) found that following a staged theft, 35% of witnesses made false identifications from a photo spread while 35% made no choice at all. There is disagreement in the literature as to the strength of the relationship between correct identification of a "suspect" and a high rating of confidence. Some researchers report a positive association (e.g., Brigham, Snyder, Spaulding & Maass, 1982; Egan, Pittner & Goldstein, 1977; Lindsay, Wells & Rumpel, 1981; Malpass & Devine, 1980; Powers, Andriks & Loftus, 1979; Wells, Lindsay & Ferguson, 1979) while others report a very weak or even negative correlation between these measures (e.g., Brown, Deffenbacher & Sturgill, 1977; Buckhout, 1974; Clifford & Scott, 1978; Gorenstein & Ellsworth, 1980; Leippe, Wells & Ostrom, 1978; Wells, Lindsay & Tousignant, 1980; Yarmey, 1979a). In this study, this issue was examined by asking the students to point to the main bank robber if they saw his picture in a photo spread of eight mugshots after they had been interviewed by the experimenter. If they did not see his picture, they were to indicate that he wasn't there. The instructions were worded in
this manner because it has been shown that telling a witness that the suspect is definitely in the lineup leads to significantly more false identifications than saying the suspect may or may not be there (Hall & Ostrom, 1975). It was felt that the procedure employed here would reduce any pressure students might feel to make an identification merely because they were asked to do so by the experimenter. Following the identification task, students were asked to rate how confident they were in the accuracy of their choice. Thus, these procedures provided an opportunity to determine, first, the students' overall ability to correctly identify the main bank robber from a photo spread and, second, the relationship between rate of correct identification and degree of confidence. Another reason for including the identification task in this study is that past research in hypnosis has failed to examine whether first describing a "suspect" under hypnosis would affect subsequent identification. That is, would hypnosis facilitate accurate identification, or maybe increase a subject's confidence that his/her choice was accurate? Thus, use of the identification task also allowed an examination of the effects of hypnosis on identification rate and confidence.

As noted earlier, a general objective of this research was to investigate ways of improving memory and, more specifically, to ascertain the efficacy of hypnosis as a memory aid. The claim that hypnosis improves memory is, indeed, contentious. Most accounts of anecdotal events assert that hypnosis does enhance memory. Reiser (1976) claimed that since 1970, when the Los Angeles Police Department began "using
hypnosis as an adjunct in specific criminal cases involving homicide, kidnap and rape", there has been "an approximate 60% increment of success over traditional interrogation techniques" (p. 36). Similarly, Kroger & Douce (1979) indicated that hypnosis improved recall in 60% of their cases. Typical anecdotal accounts usually claim that under hypnosis witnesses have been able to describe assailants much better, or remember significant details about vehicles, such as make, colour and licence plate numbers, than they were able to using conventional interrogation techniques. Raginsky (1969) reported that, after two short hypnotic sessions, one witness was capable of recalling the cause of an aircrash which had eluded him during two years of questioning using more orthodox methods. Several other writers have cited further instances when questioning a witness under hypnosis led to the emergence of valuable information that helped solve the case (e.g., Hanley, 1969; Kroger & Douce, 1979); Reiser, 1974; 1976; Reiser & Nielson, 1980; Schafer & Rubio, 1978).

On the other hand, the results of hundreds of psychological experiments conducted during the last 60 years, only a few of which were direct investigations of eyewitness memory, do not substantiate this claim that hypnosis improves memory. In fact, researchers still disagree conceptually as to whether a "hypnotic state" exists. Some claim hypnosis is a state of altered consciousness (e.g., Hilgard, 1973) while others contend that it is an artifact of the situation elicited by the motivating pressures of the task (e.g., Barber, 1969) or produced because the subject enters into role-playing with the experimenter (e.g., Sarbin & Coe, 1972).
Not surprisingly, this theoretical conflict is reflected in the research reporting the effects of hypnosis on memory. There have been relatively few experiments that directly investigated the effects of hypnosis using an eyewitness paradigm. Most have not supported the notion that hypnosis aids memory. The studies by Putnam (1979) and Zelig & Beidleman (1981) mentioned earlier in connection with the issue of heightened suggestibility for hypnotic recall also revealed that hypnotized witnesses did not recall more information than non-hypnotized controls in response to neutral questions, nor did they answer with greater accuracy. Methodological problems inherent in these studies have been previously discussed. Sanders & Simmons (1983) presented both a lineup recognition as well as a structured recall task to hypnotized and non-hypnotized students. They also attempted to lead the witnesses into false identification and incorrect answers. Five of the ten structured recall questions were misleading. They found no benefit of hypnosis in either task; in fact, they reported that hypnosis suppressed accuracy due to susceptibility to misleading implications. One exception to this general pattern was the study by DePiano & Salzberg (1981) who found that hypnosis enhanced recall of the incidental aspects of an event. A methodological difficulty with this study should be noted, in that DePiano & Salzberg failed to report error rates. Thus, while the hypnotized students recalled more information than a control group, it could be that they also made more errors. It is particularly important to compare accuracy rates due to the claim by some researchers that hypnosis increases errors (e.g., Putnam, 1979; Wagstaff, 1982). The inconclusive
evidence of the past research investigating hypnotic memory enhancement of eyewitnesses was one reason for the research reported here.

By far the majority of previous studies has investigated the effects of hypnosis on learning and memory. The results from this body of research are, at best, inconclusive, yet it is from this literature that proponents of hypnosis make the interpretation that hypnosis improves eyewitness memory. One of the reasons for the confusion is that much of this research is characterized by poor methodological procedures, as outlined in some detail below. The present experiment was specifically designed to avoid these methodological flaws. The following review of some of the previous experiments will serve the dual purpose of presenting typical findings reported in the literature as well as illustrating the problems of control encountered in hypnosis research.

A number of different approaches have been taken to determine whether hypnosis improves memory. Many of the early experimenters age-regressed subjects to a previous point in time, encouraging them to relive an experience in the hopes that memory for the event would be more vivid and, hence, more accurate. In a study typical of this kind of research, True (1949) regressed 50 students to Christmas day and their birthday at ages 10, 7 and 4. Each subject was asked to name on what day of the week these two specific events fell, for each age. He reported that 93% of the answers were correct at age 10, with similar higher-than-chance percentages reported for the other two ages. In another study, As (1952) regressed a single subject back to a time when he knew a foreign language. This subject was tested for his memory of the language during
several sessions. As reported that the subject always had better recall during hypnosis than he had in a waking state. Unfortunately, since there was no control for order effects in that hypnotic recall always followed waking recall, the results reported by As can be questioned on methodological grounds. Nevertheless, age-regression studies such as those cited have often been interpreted as providing evidence that hypnotic regression facilitates retrieval of memories which subjects had previously been unable to recall.

Subsequent attempts to replicate these results have been remarkably unsuccessful. When Best & Michaels (1954) regressed five subjects to two past birthdays, nine out of ten times the subject misidentified the day of the week on which the birthday had fallen. Using the same task, both Reiff & Scheerer (1959) and Barber (1961) were unable to obtain the high percentage of correct responses obtained by True. Further, Sarbin (1950) compared the test performance of nine adults regressed to age 8 with their performance on the same intelligence test when they were actually 8 years old. None of the subjects showed the same mental age as they had on the original test.

Most of the age regression studies reporting memory enhancement have serious methodological flaws. Experimenters using a within-subject design often fail to counter-balance hypnotic and waking recall. This is an absolutely necessary control since some researchers (e.g., Erdelyi & Becker, 1974; Erdelyi & Kleinbard, 1978) have shown that memory improves with repeated attempts at recall. Further, as Barber (1961) has noted, the performance of age-regressed subjects should be compared to that of
subjects receiving regression suggestions without hypnotic induction. When Barber (1961) instructed alert subjects to regress to an earlier age, all differences in recall ability between the groups disappeared. Other researchers who have provided additional methodological controls for the effects of experimenter bias and level of subjects' motivation have found no increase in recall which could be attributed to hypnotic age regression (Leonard, 1965; Wall & Lieberman, 1976). It is appropriate to conclude that the age regression studies do not offer conclusive support for the notion that recall is improved through the use of hypnosis.

Other researchers have attempted to enhance memory by leaving subjects with a post-hypnotic suggestion of improved performance. In an experiment representative of this approach, Hammer (1954) tested nine subjects on a total of 25 cognitive tasks, including learning meaningful prose and nonsense syllables. Each subject was tested twice in a normal state and twice after being hypnotized and receiving post-hypnotic suggestions of improved ability. Subjects performed most of these tasks more proficiently after hearing the post-hypnotic suggestion. Other researchers have reported similar improvements in reading ability, concentration, study habits and acquisition and retention of material (Eisele & Higgins, 1962; Illovsky, 1963; Krippner, 1963; Lodato, 1964; McCord, 1956; McCord & Sherrill, 1961; Sears, 1955, 1956). All of these experimenters concluded that the post-hypnotic suggestion led to better memory or performance.

As with the age regression studies, all of the research examining the effects of post-hypnotic suggestions on memory lacks a crucial
methodological control. The performance of hypnotized subjects should have been compared to a control group who had not been hypnotized but who had received motivating suggestions for improved performance (Barber, 1965b). It could be that the suggestions alone, and not the hypnotic induction, produced the facilitating effect. Barber & Calverley (1966) included such a control condition when they tested 90 subjects for memory of material learned two months previously. They varied the state of the subject (hypnotic or waking) and the type of recall instructions (motivation, regression to the time of original learning, or no instructions at all) and found no memory improvement in any of the conditions. These results are in accordance with those obtained by Lyon-James (1957) and Leonard (1963) both of whom employed a similar experimental design (cited in Barber & Calverley, 1966).

Another, more indirect, approach some researchers have taken is to examine the effects of hypnosis on the acquisition of material. In these studies, subjects are usually presented material while in a hypnotic state; recall is then attempted in either a waking or a hypnotic state. As an example of this type of study, Rosenhan & London (1963) presented nonsense syllables to 16 "good" and 16 "poor" hypnotic male students, in waking and hypnotic conditions. Students were separated into the two categories on the basis of their scores on a hypnotic susceptibility scale. They found that learning performance of the low susceptible subjects was greatly increased if they attempted recall in a hypnotic state while the performance of the highly susceptible subjects in this condition decreased slightly. These results were interpreted as
indicating that hypnosis facilitates learning for the less susceptible subjects but somehow impairs it for the very susceptible.

Barber (1965b) offered another interpretation, suggesting that the large gains shown by "poor" subjects under hypnosis may have been due to their learning considerably less in the waking condition than the "good" subjects. Thus, when the poor students attempted recall under hypnosis, their performance reached the normal level. Whether or not Barber's supposition is correct, it is still unclear why the "poor" subjects benefitted the most from the induction when they were the ones who, as indicated by their performance on the hypnotic susceptibility scale, were supposed to be less affected by hypnosis.

The majority of researchers investigating the effects of hypnosis on the acquisition of material have not found consistent differences between the recall of waking and hypnotic subjects. Young (1925) assessed the acquisition and retention of both meaningful words (adjective noun associates) and nonsense syllables presented in a normal waking state, during hypnosis or in a simulated hypnotic condition. Although there was a slight improvement in memory for meaningful childhood events, Young concluded that overall there were no clear-cut differences in recall among the three conditions. Similar results were obtained by Gray (1934), Eysenck (1941), Das (1961), Schulman & London (1963) and, more recently, Swiercinsky & Coe (1970), all of whom reported no differences in recall between waking and hypnotic subjects.

Much of the above cited research relates only tangentially to the issue of whether hypnosis improves eyewitness memory, since, as noted
earlier, the majority of these experiments dealt with such material as nonsense syllables. A few studies have examined this assumption more directly by allowing subjects to observe material in a waking state and obtaining recall under hypnosis or some other state. Again, results from these studies are mixed, with methodological shortcomings precluding any firm assertion that the hypnotic induction leads to an improvement in memory. For example, Sears (1954) allowed 24 subjects a 30 second glimpse of a table containing a large number of objects. They attempted recall of the items in several sessions, each subject recalling first while awake and then after a hypnotic induction. Sears found that subjects always recalled more items when they were in a hypnotic trance than in the normal waking state. However, since he did not counterbalance the order of waking and hypnotic recall, his findings remain questionable.

In other, more methodologically sound, studies, improved recall has sometimes been reported using hypnosis. Stalnaker & Riddle (1932) compared waking and hypnotic recall of poetry and prose that had been learned several years previously. They reported that hypnosis produced a significant improvement in memory for both types of passages. In a similar type of study, White, Fox & Harris (1940) found that hypnosis facilitated recall for poetry but not for paired-associates or pictures. Similarly, Rosenthal (1944) found a slight improvement due to hypnosis. He presented meaningful and nonsense material to 13 students who showed medium to high hypnotic susceptibility. Recall was first assessed in a waking state, and then in counter-balanced hypnotic and waking states. The same suggestions for recall were given in both conditions. In three
out of four experiments, no significant differences were found in the amount or type of material recalled by subjects in both conditions. In one experiment, though, hypnotized subjects recalled more than waking subjects, but the effect was obtained only for the meaningful material. Finally, Dhanens & Lundy (1975) attempted to control for the effects of degree of susceptibility, motivating instructions, and state of the subject. Improved recall was found only for subjects recalling the meaningful material in the hypnosis plus motivation condition.

On the other hand, a number of researchers comparing waking and hypnotic recall have failed to find a significant effect due to hypnosis. Huse (1930) presented waking subjects with nonsense syllables and tested each person for recall in both waking and hypnotic conditions. He found no advantage for hypnotic recall. Similar results have been obtained by Barber & Calverley (1966), Cooper & London (1973) and Mitchell (1932).

In many of the studies reported above, variables other than hypnosis have not been properly controlled and have confounded the results. For example, the type of material which subjects were required to recall ranges from sterile nonsense syllables to potentially emotion-laden childhood events. In the majority of cases where hypnosis did not improve memory, nonsense syllables served as the stimuli to be remembered (e.g., Barber & Calverley, 1966; Cooper & London, 1973; Das, 1961; Huse, 1930; Rosenthal, 1944; Schulman & London, 1963; White, Fox & Harris, 1940; Young, 1925). As stimuli, nonsense syllables are particularly unsuitable because they are generally poorly remembered. For example, consider the Barber & Calverley (1966) experiment in which students were presented with
12 nonsense syllables. When recall was assessed two months later, the average number of syllables remembered was less than 1. Memory for such trivial material is notoriously poor, so perhaps it is not too surprising that hypnosis is not an effective memory aid in these situations. When improvement for hypnotic recall has been reported, in most instances subjects were asked to recall more meaningful or better organized material, such as poetry, prose passages, Morse code, etc. (e.g., As, 1962; Eisele & Higgins, 1962; Dhanens & Lundy, 1975; Hammer, 1954; Sears, 1954; True, 1949; Stalnaker & Riddle, 1932; White, Fox & Harris, 1940). While we know from previous research that memory is best for meaningful material (see, for example, Hyde & Jenkins, 1969; Craik & Jacoby, 1975), what remains in question is why hypnosis may be a selective enhancer of memory, effective in one situation but not in another.

Perhaps hypnosis is effective only when there is an emotional component that is added to a meaningful event for the subject. In anecdotal cases where hypnosis has been reported as improving memory (e.g., Hanley, 1969; Reiser, 1974, 1976; Reiser & Nielson, 1980; Schafer & Rubio, 1978), the witnesses were emotionally upset and thus the emotional associations may have interfered with attempts to remember important details. In such cases, Dorcus (1960) has suggested that hypnosis aids recall by overcoming the emotional blocking. An alternative interpretation is to suggest that hypnosis allows the subject to achieve a state of deep relaxation, reducing tension and anxiety caused by emotions associated with the event. While it is obviously unethical to upset subjects in an experimental setting to empirically test this assumption, the possibility
still remains that hypnosis may not be of any aid to memory in cases where there is little emotional involvement on the part of the witness. This could explain the confusion in results reported from experiments conducted within a laboratory setting.

The successful use of hypnosis as a memory aid reported in the anecdotal literature cannot be ignored. Perhaps hypnosis is beneficial only when a more real-life, or meaning-laden, context is provided in contrast to the relatively artificial laboratory situation. While viewing a simulated crime in a laboratory setting is not as emotionally involving as witnessing a real-life incident, the experience is probably more meaningful to subjects than involving them in learning nonsense syllables or paired-associates. Further, the laboratory can simulate real-life eyewitness situations fairly well: in both settings, people are not instantly aware of their role as an eyewitness, nor are they entirely certain of what details they will be asked to remember later. For these reasons, the eyewitness paradigm was considered to be well-suited for investigating the effects of hypnosis on memory. Another advantage of this paradigm is the fact that witnesses can be questioned about both the observed event (such as a videotape of a bank robbery) and the real life situation in which the event occurred (such as the appearance of the experimenter showing the videotape). The study reported here monitored any differences in recall ability between videotaped and "live" events. Approximately half of the interview questions concerned the videotaped bank robbery; the remainder dealt with such aspects of the laboratory setting as the layout of the laboratory room where students observed the
critical event and the appearance of the experimenter who showed the students the videotape. In order to avoid any problems that might come from the same person showing the videotape, and hence witnessing it, and subsequently asking questions about the event, two different experimenters were used, one to show the videotape and one to interview students. This also provided an opportunity to ask for additional information about the experimenter who ran the videotape of the bank robbery. In this way, it could be determined whether hypnosis enhanced memory for live events only.

There is yet another component of the hypnotic situation that might play a role in enhancing recall that has not been explored experimentally. This is the strategy by which the subject attempts to remember the material. As noted earlier, victims or eyewitnesses who have suffered some emotional trauma in connection with a crime often find it painful to recall details of the event. Because of this, hypnoinvestigators on police forces commonly employ an imagery technique which, as they see it, allows the person to become an impassive, emotionally detached observer of the incident. Using this strategy, a witness is asked to imagine a television screen on which he or she can watch the event unfold. While this technique may be useful in defusing an emotional situation, it also may capitalize on the use of imagery to improve recall. A large body of data exists (summarized in Paivio, 1971; 1983) showing that imagery helps recall. In cases where memory is enhanced during hypnosis, it may be that the imagery instructions given to the person are responsible for the improvement and not the hypnotic state. The present research examined this possibility by providing half
the subjects with imagery instructions. For comparison purposes, it was desirable to give some kind of memory instructions to students that would be comparable to the imagery condition but which did not involve imagery per se. An obvious choice was the guided memory technique used by Malpass & Devine (1981). This method involved asking eyewitnesses to remember not only the details of the event they had observed but also their feelings and reactions concerning the day in question. Malpass & Devine found that this guided memory procedure enhanced accuracy of identification from a photospread without biasing memory for the critical event. In this study, then, half the students were given reconstructive recall instructions which required them to recreate their personal circumstances, such as mood, clothing, etc., surrounding the observed event. This technique appeared to be an appropriate motivational and temporal control for contrast with the imagery witnesses.

It is obvious from the foregoing review of research that no clear decision can be made concerning the efficacy of hypnosis as a memory aid, due to methodological problems of the previous research. In fact, Barber (1969) has been extremely critical of much of the previous research which utilized a non-hypnosis group as the appropriate control for the hypnotic group. He has suggested that the standard hypnotic inductions (such as the one contained in Stanford Hypnotic Susceptibility Scale: Form C, Weitzenhoffer & Hilgard, 1962) include within them a number of variables that are confounded with the hypnotic state. For example, he and his colleagues have shown in a number of studies (summarized in Barber, 1969) that when controls are provided for such factors as task-attitude,
task-expectation and task-motivation, any discernible differences attributed to hypnosis completely disappear. Barber's analysis of the existing research on hypnosis is particularly important in highlighting methodological weaknesses inherent in earlier studies. Clearly, the control group to which hypnosis is compared is of critical importance in isolating the aspect of hypnotic induction responsible for bringing on the hypnotic state, which in turn may or may not enhance recall. While it is tempting to conclude (as has Barber, 1969) that methodological weaknesses in much of the past research negate any facilitation of memory due solely to hypnosis, this criticism cannot be extended to all studies reporting hypnotic memory improvement (e.g., Dhanens & Lundy, 1975).

Examination of a number of popular hypnotic inductions reveals that most place a heavy emphasis on suggestions to the subject to relax. Rosenthal (1944) and Dorcus (1960) have both proposed that relaxation is the key component of hypnosis that facilitates memory. Results from studies seeking physiological differences between various states of consciousness tend to support this notion. It is possible to distinguish between hypnotic and waking subjects on measures of skin temperature and peripheral vasodilation (Reid & Curtsinger, 1968; Timney & Barber, 1969). However, no differences have been found between relaxed and hypnotized subjects on such measures as EEG, EMG, heart rate, respiratory rate or GSR (Coleman, 1976; Morse, Martin, Furst & Dubin, 1977; Paul, 1969; Peters & Stern, 1973; Tebecis, Provins, Farnback & Pentony, 1975; Walrath & Hamilton, 1975). These findings suggest there is an extremely close association between hypnosis and relaxation, leading Edmonston (1972) to
advocate that the relaxation component can, and should, be "experimentally separated from the hypnotic element" (p. 220).

There has been just one study attempting to do this. As mentioned earlier, Dhanens & Lundy (1975), using a within-subject design, found a significant improvement for hypnotic recall of meaningful material; however, their control group of relaxed subjects showed no significant improvement in memory. No other researcher has provided a control for the relaxation component when assessing hypnotic recall. Consequently, the present experiment was designed to overcome this methodological shortcoming. In this study, the recall abilities of hypnotized students were compared to the performance of relaxed subjects, and these in turn were contrasted with a waking, alert group typical of the standard eyewitness memory paradigm. Subjects were relaxed by requiring them to alternately tense and then relax different muscle groups throughout their entire body. This technique is quite different both in procedure and word content from the relaxation suggestions contained in standard hypnotic inductions. Thus, it appeared to be an ideal way of inducing a state of deep relaxation in the subject while ensuring that it did not mimic the hypnotic procedure too closely. Obviously, if the relaxation procedure was very similar to a typical hypnotic induction, it could be argued that the subjects in this study who were supposed to be relaxed were, in actual fact, hypnotized and no differences would be expected to occur between groups.

As most of the major elements of the current experiment have now been mentioned, a brief summary is now presented in order to give the reader a
clear picture of the design of the study. This investigation involved showing 72 students a complex event for them to observe. The event was a videotape of a simulated bank robbery, which lasted approximately 90 seconds. One week after viewing the videotape, students were interviewed by the experimenter in one of three "states": hypnotized, relaxed, or alert. Half the students in each group used the reconstructive memory technique; the remainder used imagery. Five of the 47 interview questions attempted to mislead the students. The remainder were more objective and measured students' memory for details of both the videotaped bank robbery and the laboratory setting. After the interview, witnesses were requested to identify the main bank robber from a photo spread of eight coloured photographs and to rate their level of confidence in the accuracy of their choice.

The complexity of the hypnotic experimental situation is well illustrated by the numerous methodological problems encountered by previous researchers. Because of this complexity, several other factors had to be considered in the present study. One of the most important of these was the issue of the students' susceptibility to hypnosis. In this study, students were randomly assigned to the experimental and control groups, in accordance with proper experimental procedure (e.g. Campbell & Stanley, 1966). This meant that all subjects had to be susceptible to being hypnotized; otherwise, the situation most certainly would have arisen whereby an individual resistant to hypnosis would be assigned to the hypnosis group. Obviously, attempts to hypnotize these students would have failed, making their results meaningless. Thus, all prospective
subjects had first to be screened for their hypnotic susceptibility before they could observe the critical event. The instrument used to do this was the Creative Imagination Scale, constructed by Wilson & Barber (1978). This test of hypnotic responsiveness was preferred over other existing scales because it fit the constraints of the present situation. The first limitation had to do with the nature of the population from which subjects were drawn. All subjects in this study were university students between the ages of 18 and 25. Other susceptibility scales (such as the Harvard Group Scale of Hypnotic Susceptibility, Shor & Orne, 1962; the Barber Suggestibility Scale, Barber, 1965a) are worded in a very authoritarian manner, in that the test items imply that the subject is under the experimenter's control (cf. Barber & Wilson, 1979; Wilson & Barber, 1978). These susceptibility scales were felt to be unsuitable for use with young university students who, it was feared, might resist the experimenter's suggestions if worded in such authoritarian tones. By contrast, the CIS consists of ten very permissively worded suggestions that guide, but do not control the subject's thinking, feeling and imagining along various themes, including arm heaviness, hand levitation, age regression, and so on.

The second limitation posed by this particular experimental situation concerned time constraints. Due to the need for pre-testing students for hypnotic susceptibility, subjects for this study were recruited from introductory psychology classes, where testing for suggestibility could occur in large groups. This requirement, however, precluded the use of such scales as the Barber Suggestibility Scale, since it can be
administered to only one person at a time; the CIS, on the other hand, can be administered to either individuals or large groups. In this study, then, entire classes of up to 120 students were screened for their susceptibility to hypnosis using the CIS.

Finally, the use of the CIS averted a problem posed by the other screening instruments, like the Harvard Group Scale of Hypnotic Susceptibility, which require a trance induction to be administered to subjects before giving them the test suggestions. Obviously, for ethical reasons, subjects about to be hypnotized must be fully informed of the procedure and their consent must be obtained prior to their participation. But providing information about hypnosis to the students, and leading them through a hypnotic induction, before measuring their susceptibility might have affected performance on the subsequent suggestibility test. Further, the inductions contained in such susceptibility scales as the Harvard Group Scale of Hypnotic Susceptibility take from 45 minutes to one hour to complete. The CIS avoids this situation because it can be administered without the prior induction of a hypnotic state and requires a maximum of 30 minutes to complete. Therefore, it was considered to be an ideal scale with which to measure the hypnotic susceptibility of students in this experiment.

Another problem encountered by researchers of hypnosis is the extreme difficulty of ascertaining just how hypnotized the subject actually is. Besides showing a general relaxation of facial muscles, the subject gives no other overt physical clues to indicate to the hypnotist that he or she has entered the hypnotic state nor how deep the trance is. Investigators
have constructed a variety of measures that attempt to determine the depth of the hypnotic trance. This is necessary for two reasons. First and most obvious, the researcher must establish that the induction has had the desired effect of leading the individual into a hypnotic state; otherwise, the effects of hypnosis are not being studied. Accounts of individuals describing their trances have alerted researchers to a second concern. This is that the depth of the trance can fluctuate during the hypnotic session (cf. Tart, 1979). So not only do researchers need to establish at the outset that the person is, indeed, in a hypnotic state, but they also should determine periodically throughout the session how deep the trance is.

There are two general ways in which hypnotic depth can be measured. First, it can be ascertained by the experimenter according to how well the subject responds to suggestions, such as arm levitation or inability to open the eyes. Items on the Harvard Group Scale of Hypnotic Susceptibility, the Stanford Hypnotic Susceptibility Scale and the Barber Suggestibility Scale all challenge the subject in this manner. The more the subject is willing to comply with the sensations offered by the hypnotist, the deeper the trance is assumed to be. Another approach to measuring hypnotic depth requires the subject to estimate, at points throughout the hypnotic session, his or her depth of trance along a calibrated scale. Numerous scales of varying magnitudes have been developed for this purpose. For example, subjects rate themselves from 0 to 100 on the LeCron Scale (LeCron, 1953), from 1 to 10 on the Harvard Discrete Scale (O'Connell, 1964), and from 0 to 4 on the Brief Stanford
Scale (Hilgard & Tart, 1966). While the self-report scales are quick, convenient and non-reactive in that they do not appear to alter the depth of hypnosis (cf. Tart, 1979), they are not open to independent verification as are the objective tests. On the other hand, the behavioural measures are too authoritarian for use with potentially resistant subjects, such as university students, and their use may affect the subject's depth of trance. Despite their differences, a high correlation between behavioural and experiential scores has been reported (Tellegen, 1979).

The present study used both objective and subjective measures to ascertain hypnotic depth. One item from the Barber Suggestibility Scale, the Hand Lock suggestion, was used as the objective measure. In this test, the experimenter suggests to the subject that his/her intertwined fingers are locked together like steel and that they won't come apart no matter how hard the subject attempts to unlock them. The subject passes the test if he or she cannot unlock their fingers after 15 seconds of effort. This test of hypnotic depth was administered only to the students in the hypnosis group to ascertain whether the hypnotic induction had succeeded in inducing a state of hypnosis in these subjects.

The subjective measure involved having the students provide a self-report of their "mental" state using a 36-point scale patterned after one used by the Vancouver Police Department. This scale was chosen over the previously mentioned self-report scales in order to simulate as closely as possible the methods by which a "real" eyewitness under hypnosis would be interrogated by the police. Accordingly, the Vancouver
Police were consulted and their procedure adapted to fit this experimental situation. The self-report technique was used because, as Tart (1979) has stressed, it is necessary to determine how deep a trance the hypnotized subject has achieved. In this study, then, the students provided a rating of their mental state at the beginning of the interview and again half-way through. If the individual's rating indicated that he or she was in a very light trance, the experimenter spent one or two minutes guiding the subject back into a deeper state of hypnosis. A light trance was indicated by a rating between 1 and 12, a medium state between 13 and 24, and a very deep trance between 25 and 36. Acceptable ratings, as suggested by the police, ranged between 18 and 26. Students in both the relaxed and awake conditions were required to give these self-reports as well, for two reasons. First, it was in keeping with the design of the experiment, whereby the only thing allowed to vary between conditions was the hypnotic induction or relaxation exercises and the Hand Lock item from the Barber Suggestibility Scale. So this procedure provided good methodological control. Second, it also provided information on how successful the relaxation exercises had been in inducing a state of deep relaxation in the subjects in that group, and how wide awake subjects in the alert group were.

Edmonston (1981) has asserted that no distinction can be made between physiological and behavioural measures of relaxed and hypnotized individuals, nor between their self-reports of their experiences. If this is true, then there should be little difference between these subjects' scores on an inventory measuring typical hypnotic experiences. Such an
inventory has been constructed by Field (1965). It consists of 38 statements describing hypnotic sensations (for example, "I felt apart from everything else") to which the subject responds either True or False. These 38 items on Field's inventory correlate at the .01 level with measurements obtained from students using the Harvard Group Scale of Hypnotic Susceptibility, Form A (Shor & Orne, 1965). An adapted version of this inventory was completed by all students following the identification task. The inventory was reduced from 38 items to 33 because five of them made direct references to hypnosis (for example, "I was in a medium hypnotic state, but no deeper"), making their use in the non-hypnosis groups unsuitable. Thus, subjects in this study answered True or False to a total of 33 items of Field's Inventory of Hypnotic Depth (1965) which deals with feelings of unawareness, automaticity and compulsion. Inclusion of this task provided another assessment of the overall depth of hypnosis experienced by students in the experimental group. Perhaps more important, it also allowed a comparison between the experiences of relaxed subjects to the hypnotized ones. If Edmonston (1981) is correct in assuming that relaxation is a large part of hypnosis, then the relaxed and hypnotized subjects should have similar high scores on the inventory while the alert subjects should obtain low scores.

Although the use of the videotaped bank robbery as the critical event for students to witness had several advantages, as noted earlier, it also had a major drawback -- namely, it was too brief in duration, lasting a mere 90 seconds. Subjects observing the videotape during pilot testing seemed uncomfortable that the initial task was so brief. This was
reflected in such comments as "Is that all you want us to do?" This response indicated the need for a filler task for subjects to perform after they had witnessed the bank robbery during the second part of the experiment. The Associative Memory test of the Comprehensive Abilities Battery (Hakstian & Cattell, 1975) appeared to be an appropriate filler activity, for two reasons. First, this test requires approximately ten minutes to administer (including a short practice session), so it stretched the duration of the second part of this experiment; these sessions lasted anywhere from 20 to 30 minutes, depending on the number of subjects in the group. Second, the test provided a rough measurement of memory ability. The CAB in general measures 20 primary cognitive abilities, with "general memory capacity" being determined by three tests: the Associative Memory test, the Meaningful Memory test, and the Span Memory test. Hakstian & Cattell (1974) have demonstrated that all of these tests are good discriminators of ability to commit material to memory. However, the test of memory span was considered inappropriate for the purposes of this study because it measures digit span and is presented auditorily. The other two tests differ "primarily in the meaningfulness of the long-term association formed" (Hakstian & Cattell, 1978, p. 663). The Associative Memory test involves the rote memorization of 14 design and number pairings, while the Meaningful Memory test involves memorizing 20 noun-descriptor pairs. While the latter test, as its name suggests, is more meaningful, it is possible that the noun-descriptor pairs might act like information in Loftus' post-event questionnaire by adding extra information and confusing subjects about the details of the bank robbery.
Therefore, the Associative Memory test seemed the best filler task for subjects to perform in that it provides a measure of memory ability but would probably not interfere with details of the critical event. This task, then, provided an opportunity to determine if there is a relationship between performance on the CAB Associative Memory test and accuracy of eyewitness reports.

Despite the various methodological controls employed in this experiment, it was still possible to have factors other than the independent variables influence the results. Previous researchers have identified several sources of artifact that can contaminate experimental results, such as the expectations of the experimenter (Rosenthal, 1966), the subject's awareness of the experimenter's intent (McGuire, 1969) and the concern of the subject that he or she is being evaluated (Rosenberg, 1969). The hypnotic situation is particularly sensitive to sources of artifact (summarized in Barber, 1969). In an effort to identify some of the factors that might influence a subject's performance in this study, a post-experimental questionnaire consisting of seven questions was completed by all subjects as the last task of the experiment. One question asked the students to rate to what extent they felt pressured by the experimenter into doing what was asked during the interview. Some researchers have suggested that the behaviour attributed to the "state of hypnosis" is elicited by the motivating pressures of the task (e.g., Barber, 1969). Others disagree, contending that the standard hypnotic instructions are not nearly constraining as some "control" instructions, such as Barber's (1969) Task Motivational Instructions (e.g., Sheehan &
Dolby, 1974). Responses to this question, then, would indicate the degree to which subjects felt pressured to comply with the experimenter and whether hypnotized students felt more or less pressure than those in the control groups. A second question asked if the subject found it difficult to speak during the interview. This was prompted by the experimenter's personal experiences with hypnosis as well as the reports of students participating in the pilot study, several of whom mentioned they found it an effort to speak. This question, then, addressed the possibility that brief or incomplete answers may be due to this difficulty in speaking rather than faulty memory. It also allowed a comparison to be made between the subjective experiences of hypnotized and relaxed students, as Edmonston (1972; 1981) has suggested. Two questions determined the subject's previous hypnosis and deep relaxation exercises. This provided an opportunity to determine whether previous experience with either hypnosis or deep relaxation affected performance during the interview. Another question asked subjects whether they had seen the assistant experimenter during the week between their observing the videotape (which she had showed them) and their interview with the experimenter. Because the assistant experimenter was an undergraduate student at U.B.C., as were all the subjects, it was quite possible that some subjects might see her during the intervening week. Since several of the interview questions concerned details of her physical appearance, it was important to establish whether some subjects had had a second opportunity to notice her appearance. Finally, two questions addressed the strategy by which students had been requested to remember the videotaped event. One
required students to rate how successful they felt they had been in using the memory technique, while a second question asked for any comments on the memory strategy. It was hoped that these questions would provide an insight into whether subjects were actually able to utilize the memory technique as instructed by the experimenter.
METHOD

Subjects:

Seventy-two undergraduate students were recruited as volunteers from introductory psychology courses at the University of British Columbia. The experiment was described to potential subjects as one investigating the relationship between memory and imagination. No reference was made to hypnosis at this time. Students were first screened for hypnotic susceptibility in group sessions using the Creative Imagination Scale (CIS) constructed by Wilson & Barber (1978). Approximately 1,000 students were screened using this procedure. Only subjects scoring 21 or over (approximately 50% of the population) were approached to participate in this study. Scores in this range indicate medium to high susceptibility to hypnotic induction. Since a number of previous researchers have failed to find any significant sex differences in terms of hypnotic susceptibility (e.g., Barber, 1969; Cooper & London, 1966; Kihlstrom, Evans, Orne & Orne, 1980), no attempt was made to test equal numbers of males and females. Altogether, 51 females and 21 males participated in the study. Immediately following the preliminary screening session, students were informed that if they continued to participate in this experiment, they may be hypnotized at some later point. Approximately half of these students indicated after the screening session that they did not wish to continue with the experiment.

Testing was completed on a total of 76 students; however, the results of four students were subsequently discarded from data analysis for
various reasons. In reply to a question concerning the colour of the carpet in the laboratory, one subject indicated that he was green/red colourblind. Another student mentioned she arrived late for the videotape session and so had not seen the whole of the bank robbery. Finally, two women indicated they had previously worked as bank tellers and had seen the videotaped bank robbery during their training.

**Materials:**

Students observed a videotape of a simulated bank robbery, used by the Royal Bank for training new tellers. A copy of the film was provided by the Vancouver Police Department, who produced it in conjunction with the Bank. The opening scene shows customers waiting in a crowded bank. After a few seconds, viewers can see two men enter the bank. One of them proceeds to push his way past the waiting customers to the teller's wicket, while the other, armed with a sawed-off shotgun, guards the entrance. The principal bank robber aims a revolver at the teller and passes her a note demanding money. After the teller hands over the money, the two men flee the scene. The entire sequence lasts for approximately 90 seconds, with the principal bank robber visible for the majority of the time.

A total of 47 questions were asked of the students during the interview (see Appendix A). They were patterned after a form used by the Vancouver Police Department to obtain suspect descriptions from eyewitnesses. Forty-two questions were objective; that is, they were of the form "What colour was his hair? What was he wearing?" However, five
of the questions were misleading in that they presupposed the presence of an attribute, such as a hat or a watch (e.g., "Did you notice if his gloves were leather?"). Thirty of the 47 questions pertained to the videotaped bank robbery; the remaining questions concerned the laboratory setting and the physical appearance of the assistant experimenter. The order in which these questions were asked was counter-balanced across conditions so that half the students were asked for details of the videotape first and the remainder were first questioned about the laboratory setting.

All subjects completed a slightly modified version of Field's (1965) Inventory Scale of Hypnotic Depth (see Appendix B). This consisted of 33 statements which the subject rated as True or False (e.g., "Time stood still"). Of the 38 statements listed by Field as correlating with the Harvard Group Scale of Hypnotic Susceptibility, Form A (Shor & Orne, 1965) at the .01 level, five were discarded because they were specific to the hypnotic situation and could not be used in the comparison groups (e.g., "During the final 'Countdown' to wake me up I became more deeply hypnotized for a moment").

The post-experimental questionnaire consisted of seven questions (see Appendix C). One asked if subjects found it difficult to speak during the interview; one ascertained whether the subject had seen the assistant experimenter during the intervening week. Another requested subjects to rate the amount of pressure they felt during the experimental situation, while two determined the subject's previous experience with hypnosis and deep relaxation exercises, if any. Finally, one question measured how
well the subject felt he or she had been able to use the memory technique.

Subjects were asked to identify the principal bank robber from a photospread consisting of eight photographs (see Appendix D). These pictures, taken with a Polaroid camera, showed only the head and shoulders of the individual. The seven men chosen to be the foils closely resembled the bank robber in terms of age, sex, race, hair length, colour, and texture, facial features, and presence of facial hair. Each photograph was assigned a number from 1 to 8, which was recorded on the bottom of the picture.

Procedure:

The experiment was conducted in three stages. First, subjects were screened for their hypnotic susceptibility using the CIS. This procedure required approximately 30 minutes to administer and score. Students scored their responses to the ten test items of the CIS on an answer sheet distributed to them by the experimenter. At the end of this session, students were informed that if they continued to participate in this experiment, they may be hypnotized later on. Those who objected to this were asked to indicate so on their answer sheets; the others wrote down a phone number where they could be contacted. These sessions continued until 76 medium to highly susceptible subjects were recruited for the experiment.

Subject volunteers meeting the criterion score of 21 or more reported to the laboratory in small groups to observe the videotape. The assistant experimenter briefly described the purpose of the experiment as
investigating the relationship between memory and power of imagination. Subjects were asked to pay close attention to the videotaped bank robbery. After watching the taped incident, the students participated in a filler activity consisting of the 14-item Associative Memory test of the Cognitive Abilities Battery (Hakstian & Cattell, 1975).

One week later, subjects were conducted to a different room where they were interviewed individually by the experimenter. Subjects were randomly assigned to conditions, with the restriction that the mean CIS scores for the six groups were approximately equal. Mean group scores ranged from 26.750 to 27.000 out of a possible score of 40.

All students reclined in a comfortable chair. They were informed that the purpose of the interview was to obtain information about the events of the previous week. Subjects about to be hypnotized read an information sheet on the effects of hypnosis. All students were then instructed on how to provide self-report ratings of their mental state using a procedure developed by the Vancouver Police Department. As used by the police, this procedure requires the individual to rate his or her depth of hypnosis on a 36 point scale. One to 12 indicates a light hypnotic state, 13 to 24 a medium trance and 25 to 36 a deep state of hypnosis. The hypnotized subjects in this study used this procedure to rate their state; however, the relaxed and waking subjects used a somewhat altered scale, in that the end points were re-named in keeping with their situation. Relaxed students rated their state of relaxation in the same manner as the hypnotized students, with the words "state of relaxation" substituted for "state of hypnosis". However, for subjects questioned in
an alert state, 1 to 12 represented feeling wide awake, 13 to 24 slightly sleepy and 25 to 36 intense feelings of sleepiness and drowsiness.

Instructions to the students then varied, depending upon group membership:

**Hypnosis**: Subjects were hypnotized by the experimenter using a standard induction requiring approximately 15 minutes. This induction emphasizes feelings of relaxation and heaviness, and encourages eye closure (for a summary of suggestions contained in this induction, see Appendix E). Subjects were then asked to rate their depth of hypnosis. Following this, subjects participated in one item of the Barber Suggestibility Scale (see Appendix F). All subjects successfully completed this item.

**Relaxation**: Subjects listened to 20 minutes of progressive relaxation exercises provided on a tape made by Dr. Bryan Hiebert. These exercises require subjects to alternately tense and relax different muscle groups throughout the body, beginning with the right hand and ending with the feet (for a partial transcript, see Appendix G). This tape makes no reference to the possibility of entering a state of hypnosis or sleep.

**Waking**: These subjects received no extra instructions.

Before questioning the students, the experimenter provided instructions regarding which recall strategy they should use during the interview. Students using the reconstructive technique were asked to spend a few minutes recalling the circumstances surrounding the events of the previous week, for instance, how they were feeling, what they were wearing, etc. (see Appendix H). The imagery technique required that subjects imagine the laboratory incident as if it were on videotape and
could be "played" back on a giant television screen inside their heads. It was suggested that the subject would be able to freeze the videotape, enlarging any area of the screen so as to focus on small details that might otherwise escape detection (see Appendix H). When the students indicated they understood these instructions, they were requested to rate their mental state using the self-report technique outlined above.

Following this, the experimenter obtained information about the events of the previous week by asking subjects the 47 interview questions. Half way through the interview, all students were requested to, again, give a self-rating of their state. All answers were recorded in writing by the Experimenter. After the interview, subjects in the hypnosis condition were awakened by the experimenter.

Finally, the students were asked to identify the principal bank robber if they saw his picture among the photospread of eight mugshots; if not, they were to let the experimenter know he wasn't there. Students indicated their degree of confidence in the accuracy of their choice on a 7 point scale (1 = not very confident, 7 = very confident). Subjects then completed the altered version of Field's (1965) Inventory of Hypnotic Depth and the post-experimental questionnaire, and were de-briefed.
RESULTS

During the final phase of this study, information was obtained from each subject regarding the three main issues investigated by this experiment. The first concerned the efficacy of hypnosis as an aid to eyewitness memory. Responses to the interview questions served as the measure of memory for the critical event. A combination of both structured and open-ended questions was used to elicit details from the students. One person was hired to score all the interviews. As a check for reliability, a second individual randomly scored some of the interviews. Interrater reliability was .95, showing a high degree of consistency between independent judges. The responses to the 42 objective questions were analyzed to reveal the total number of details reported and how many of these statements were incorrect. Answers to the five misleading questions were scored differently, and are reported separately below.

Student responses fell into one of two categories: descriptive details or sequential statements. The former refer to objects and their attributes (such as weapons or notes), descriptions of people, clothing, etc., while the latter involve the events of the videotape, what happened and in what sequence. A similar procedure for scoring such subjective data has been employed by Yuille (1983). For each participant, then, two scores (total number of details and number of errors) as well as an accuracy rating in terms of percentage incorrect were obtained on both descriptive and sequential dimensions for all responses to the 42
interview questions. Responses relating to the videotaped event were combined with those referring to the "live" event to yield an overall measure of memory performance. The means and standard deviations for these recall scores are presented in Table 1. Analysis of variance tests performed on each of the three sets of scores produced no significant main effects for interview method or memory technique, nor was there any interaction between these two variables. That is, hypnotized, relaxed and waking students recalled the same amount of information and made the same number of errors, for both descriptive and sequential aspects of the video and "live" event. Similarly, there was no main effect for memory technique. This is surprising since the literature would lead one to predict that imagery would produce better recall than the reconstructive method. What does emerge from these scores is the finding that memory for both the videotape and "live" event was fairly good, averaging 74.3% accuracy. When the misleading questions were included, the accuracy rate dropped slightly to 72.8%. This rate is consistent with that reported by Yuille (1983) and, as such, is far higher than those reported previously in the literature (for example, Buckhout, 1974; Clifford, 1979).

Although no significant main effects or interaction were obtained from the analyses of the total recall scores, further analysis seemed warranted. For example, one of the reasons for including questions about the assistant experimenter and the laboratory room in this study was to allow a comparison of memory for the details of the videotape with those pertaining to the "live" event. This comparison would determine whether the pattern of recall differed depending on the type of detail remembered.
Table 1

Means & Standard Deviations
For Total Recall Scores For Both Video & "Live" Events

<table>
<thead>
<tr>
<th></th>
<th>Total Number Details Reported</th>
<th>Total Number Errors</th>
<th>Percentage Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recon</td>
<td>Imagery</td>
<td>Recon</td>
</tr>
<tr>
<td>Hypnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>47.500</td>
<td>48.083</td>
<td>11.583</td>
</tr>
<tr>
<td>S.D.</td>
<td>8.733</td>
<td>5.213</td>
<td>3.450</td>
</tr>
<tr>
<td>Group Mean</td>
<td>47.792</td>
<td></td>
<td>12.583</td>
</tr>
<tr>
<td>Relaxation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>48.583</td>
<td>52.417</td>
<td>13.583</td>
</tr>
<tr>
<td>Group Mean</td>
<td>51.000</td>
<td></td>
<td>13.125</td>
</tr>
<tr>
<td>Waking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>48.417</td>
<td>50.917</td>
<td>12.250</td>
</tr>
<tr>
<td>S.D.</td>
<td>8.240</td>
<td>6.908</td>
<td>2.768</td>
</tr>
<tr>
<td>Group Mean</td>
<td>49.667</td>
<td></td>
<td>11.959</td>
</tr>
</tbody>
</table>
Accordingly, the responses were divided into two categories: one concerning videotape details and the other regarding the "live" event. Results of this comparison are presented below.

**Comparison of Memory for Video Versus "Live" Details**

More questions were asked concerning the videotape than about the assistant experimenter and laboratory setting. Therefore, the only possible comparison that could be made to test for differences between the two was proportion of errors to total details reported. Accordingly, a 3 x 2 x 2 analysis of variance test was performed on the ratio of mistakes to total details recalled. No significant main effects for interview method or memory technique were noted; however, the three-way interaction was significant, \( F(2,66) = 6.955, p = .002 \) (see Appendix J, Table 1).

A simple effects test was conducted comparing the within-subject error proportions for video and "live" details. Only one of these comparisons showed a significant difference, \( F(1,66) = 6.434, p < .05 \). Relaxed subjects, using the reconstructive memory technique, made a higher proportion of errors when recalling details about the videotape than they did when reporting details about the laboratory setting (\( \bar{X} = 31.404 \) versus \( \bar{X} = 22.418 \)). Although other tests did not reach significance, a similar trend emerged for waking and hypnotized students using the imagery technique. That is, these students showed a tendency to make more errors proportionally on videotape details versus "live" details. This pattern of memory performance raises the possibility that there are distinct differences in the way people recall events they see on a videotape and the manner in which they remember details about their surroundings.
Because such differences emerged in the pattern of recall of video versus "live" events, further analysis of the memory scores within each category of detail type seemed appropriate. Results of these tests are presented below, first for the video event, then for the "live" event.

**Recall of Video Event**

The means and standard deviations for overall performance for recall of the videotaped event are presented in Table 2. It can be seen from this table that the hypnotized students did not report a greater number of details (both correct and incorrect) than either their relaxed or waking counterparts. Nor did the two memory techniques produce different levels of recall. However, consistent with the results reported earlier, there was an interaction between interview method and memory instruction in the total number of errors contained in the students' responses, $F(2,66) = 4.507, p = .015$ (see Appendix J, Table 2). The hypnotized participants made more errors using imagery than the reconstructive memory instructions. The reverse was true for the relaxation group. That is, relaxed students using reconstruction made more errors than those using imagery. Students questioned in the waking state differed very little in the number of errors they made, whether they used imagery or reconstruction. This same pattern of interaction emerged when the proportion of errors to total recall was calculated, $F(2,66) = 5.779, p = .005$ (see Appendix J, Table 3). The fact that hypnosis yields less accurate recall in conjunction with imagery is in direct opposition to the claims of many hypno-investigators.

In order to examine the locus of this interaction, the memory scores
Table 2

Means & Standard Deviations

For Recall Scores For The Video Event

<table>
<thead>
<tr>
<th></th>
<th>Total Number Details Reported</th>
<th>Total Number Errors</th>
<th>Percentage Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recon</td>
<td>Imagery</td>
<td>Recon</td>
</tr>
<tr>
<td>Hypnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>30.917</td>
<td>30.750</td>
<td>7.083</td>
</tr>
<tr>
<td>S.D.</td>
<td>5.282</td>
<td>2.989</td>
<td>2.610</td>
</tr>
<tr>
<td>Relaxation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>32.167</td>
<td>34.917</td>
<td>10.000</td>
</tr>
<tr>
<td>S.D.</td>
<td>5.781</td>
<td>5.807</td>
<td>3.885</td>
</tr>
<tr>
<td>Waking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>31.500</td>
<td>32.833</td>
<td>7.583</td>
</tr>
<tr>
<td>S.D.</td>
<td>5.300</td>
<td>5.289</td>
<td>2.125</td>
</tr>
</tbody>
</table>
reported in Table 2 were separated into the following six categories comprising the events of the videotape:

1) descriptive details of the main thief;
2) sequential details of the main thief;
3) descriptive details of the accomplice;
4) sequential details of the accomplice;
5) descriptive details of the teller; and
6) descriptive details of the bank setting.

For each of these categories, analysis of variance tests were conducted on the total details reported, the number of errors contained in these responses, and finally the proportion of errors to the total details given. In total, then, eighteen separate analysis of variance tests were conducted on the component scores. No differences were noted in total number of details reported in any of the groups. However, the same pattern of interaction between memory technique and interview method noted earlier was obtained for the number of errors contained in the descriptions of the main thief, $F(2,66) = 3.542, p = .035$ (see Appendix J, Table 4). That is, hypnotized students using imagery made more errors than those using the reconstructive memory technique, whereas relaxed students showed the reverse pattern.

Since the total amount of information reported by the students was equal in all groups but differences appeared in the number of errors contained in those statements, it is not surprising that the same pattern of interaction was reflected in various error proportions. These occurred for:
1) descriptions of the principal thief, $F(2, 66) = 5.748, p = .003$ (see Appendix J, Table 5); and
2) descriptions of the bank, $F(2, 66) = 3.374, p = .040$ (see Appendix J, Table 6).

While it appears that the pattern of correct recall was consistent in responses to many of the interview questions, it failed to emerge in reports of the sequence of events for either the main thief or his accomplice, or in descriptions of the teller.

Besides the interactive effects of interview method and memory technique, one further difference in recall was noted for details of the video event. There was a tendency to make more errors when describing peripheral details, such as the bank, than when recalling more salient items. Examples are presented in Table 3. Compare the average error rate of 29.174% for responses concerning the principal bank robber who was the main focus of attention to that of 44.329% for the bank, a more peripheral aspect of the videotape. Clearly, the more central the detail, the less likely it will be recalled incorrectly.

Analysis of the responses to the interview questions concerning the telephone number posted on the video machine is consistent with this observation. Not one of the 72 students recalled the seven digits correctly. In fact, the majority of participants did not even remember seeing the number, although it was in plain view to everyone and explicit reference to it had been made by the experimenter. Further, of the 26 students who did acknowledge its presence but couldn't recall the digits, only 7 of these were hypnotized, compared to 8 relaxed and 11 waking
### Table 3

Percentage Of Errors Reported

About Three Aspects Of The Video Event

<table>
<thead>
<tr>
<th>Description of Main Thief</th>
<th>Description of Teller</th>
<th>Description of Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recon Imagery</td>
<td>Recon Imagery</td>
<td>Recon Imagery</td>
</tr>
<tr>
<td>Hypnosis</td>
<td>24.280</td>
<td>35.280</td>
</tr>
<tr>
<td>Relaxation</td>
<td>37.096</td>
<td>24.941</td>
</tr>
<tr>
<td>Waking</td>
<td>26.622</td>
<td>26.827</td>
</tr>
<tr>
<td>Mean</td>
<td>29.174</td>
<td>37.095</td>
</tr>
</tbody>
</table>
participants. Far from enhancing memory for this peripheral detail, as is often claimed, hypnosis produced the fewest number of students who recalled anything. Thus, it appears that hypnosis had no effect at all on retrieving this piece of peripheral information.

This pattern of results for recall of the video event suggests that relaxation and hypnosis combine in entirely different ways with the memory techniques. More specifically, when hypnosis is used to question an eyewitness about the details of a crime, the memory technique that elicits the most accurate recall is not imagery, as the police use, but the reconstructive technique. However, there is no evidence that hypnosis improves memory at all.

**Recall of "Live" Events**

The differences in effects of interview method and memory technique on recall of the video event were not observed for memory of the "live" event. Means and standard deviations for overall memory for details of the "live" event are presented in Table 4. As with the video event, there were no differences in total amount of information, both correct and incorrect, reported; however, neither were there any differences among the six groups in the number of errors contained in their reports or in the error ratio.

As with recall of the video event, the components of the total "live" event memory score were analyzed separately. A total of six analysis of variance tests were conducted on two aspects of the "live" event: the description of the assistant experimenter and the description of the laboratory room where the videotape had been shown. Only one test
Table 4
Means & Standard Deviations For
Recall Scores For The "Live" Event

<table>
<thead>
<tr>
<th></th>
<th>Total Number Details Reported</th>
<th>Total Number Errors</th>
<th>Percentage Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recon</td>
<td>Imagery</td>
<td>Recon</td>
</tr>
<tr>
<td>Hypnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.583</td>
<td>17.333</td>
<td>4.500</td>
</tr>
<tr>
<td>Relaxation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.417</td>
<td>18.500</td>
<td>3.583</td>
</tr>
<tr>
<td>S.D.</td>
<td>3.528</td>
<td>3.233</td>
<td>1.505</td>
</tr>
<tr>
<td>Waking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.917</td>
<td>18.083</td>
<td>4.667</td>
</tr>
</tbody>
</table>
produced a significant interaction, and that occurred for the total number of errors made by students in their descriptions of the laboratory room, $F(2,66) = 3.703, p = .030$ (see Appendix J, Table 7). Here, subjects questioned in the waking state made the least number of errors ($\bar{X} = 1.417$) when using imagery, while participants using reconstruction made the most mistakes ($\bar{X} = 2.417$). Relaxed students showed the opposite trend (2.250 versus 1.833), while hypnotized participants made the same number of mistakes, regardless of memory technique. This is a different pattern of results than that obtained for the videotape details, and raises the question of the extent to which results from simulated events, such as the videotape of the bank robbery, can be generalized to recall of "live" events.

A summary of the results to this point indicates three main findings. First, hypnosis did not aid students in the amount of information they recalled about either the video or "live" event. Second, there is a consistent interaction between interview method and memory instruction that affects both number and proportion of errors contained in witnesses' reports of the simulated bank robbery. It appears that hypnosis in conjunction with the reconstructive memory instructions produces more accurate recall than relaxation, but this pattern is reversed when imagery is used as a memory technique. In this case, relaxation yields the most accurate memory. This finding has implications for police investigators who routinely combine hypnosis and imagery during their interrogation of eyewitnesses. Finally, striking differences emerged in the pattern of recall of video versus "live" events.
Misleading Questions

A second issue addressed by this study was the question of whether hypnotized students would be more susceptible to misleading questions than control subjects. Recall that embedded in the 47 interview questions posed to each student were five that were designed to mislead the participant into giving the wrong answer. These responses were treated differently than those given to the objective questions, because some students were either hesitant or unwilling to give a simple "yes" or "no" answer, even after continued probing by the experimenter. Consequently, responses to these questions were coded as "incorrect", "correct", or "didn't know", the latter two categories indicating that the student had resisted the misinformation in the leading questions. Table 5 shows the overall pattern of responses to the five misleading questions. Entries in this table are frequency scores for responses to all five of the misleading questions; that is, each group of 12 students had a total of 60 responses distributed among the three categories. A chi-square analysis performed on these data was not significant ($\chi^2(10) = 9.516$, $p > .05$), indicating there were no differences in degree of susceptibility between hypnotized, relaxed or alert students in responding to the misleading questions. This finding is not consistent with those reported by Putnam (1979), Wagstaff (1982) and Zelig & Beidleman (1981).

On the other hand, in accordance with Sheehan & Tilden (1983), all students in this study were prone to making more errors in answering the misleading questions than the neutral ones. When exposed to misleading information, the error ratios ranged from a low of 32% to a high of 56%,
Table 5
Pattern of Responses to Misleading Questions

By Interview Method and Memory Technique

<table>
<thead>
<tr>
<th>Memory Technique</th>
<th>Recon.</th>
<th>Imagery</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>30</td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td>Incorrect</td>
<td>22</td>
<td>31</td>
<td>53</td>
</tr>
<tr>
<td>Didn't Know</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>Relaxation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>24</td>
<td>29</td>
<td>53</td>
</tr>
<tr>
<td>Incorrect</td>
<td>27</td>
<td>24</td>
<td>51</td>
</tr>
<tr>
<td>Didn't Know</td>
<td>9</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>Waking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>34</td>
<td>26</td>
<td>60</td>
</tr>
<tr>
<td>Incorrect</td>
<td>16</td>
<td>23</td>
<td>39</td>
</tr>
<tr>
<td>Didn't Know</td>
<td>10</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>60</td>
<td>120</td>
</tr>
</tbody>
</table>
averaging 46% for all groups. This is almost twice that reported for recall of both the video and "live" events elicited by the more objective questions.

Photo Identification

The ability of students to correctly choose the main bank robber's picture constituted the third aim of this study, and was tested by the identification task at the end of the interview. Table 6 lists the pattern of photograph choices by interview method and memory technique. Of the 72 students completing this task, a total of 30, or 41.67%, indicated that they thought the target picture was not in the photospread. This ratio compares favourably with that reported by Wells, Lindsay & Ferguson (1979) who found that only 21% of their students made no identification given similar instructions (see also Yuille, 1983). Although the bank robber's picture was present, the high percentage of students exhibiting such caution in identifying the bank robber was considered to be a positive trend in light of findings by previous researchers.

As can be seen from Table 6, 12 of the remaining 42 students, or 28.57%, chose the correct photograph. This figure is well above that expected by chance (12.5%) for an 8-item photospread. It could be argued that the functional size of the photospread was only 7, since no one chose photograph number 1 (see Wells, 1978). This increases the chances of picking any one picture to 14.3%. Even so, the students in this study chose the correct photograph at twice as high a rate as expected by chance. From the table it can be seen that equal numbers of hypnotized,
Table 6

Pattern of Choices From Photospread
By Interview Method and Memory Technique

<table>
<thead>
<tr>
<th></th>
<th>Correct</th>
<th>Incorrect</th>
<th>Not There</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Imagery</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td><strong>Relaxation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Imagery</td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td><strong>Waking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Imagery</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td><strong>Grand Totals</strong></td>
<td>12</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>
relaxed and waking students made the correct photo identification. Thus, it appears that recalling a person's appearance under hypnosis does not have any effect on subsequent identification.

In order to determine the relationship between level of confidence and accuracy of photo identification, students were asked to rate how confident they felt in the accuracy of their choice on a 7 point scale, with 1 indicating not very confident and 7 representing very confident. These subjective ratings ranged from a low of 1.0 to a high of 6.0, with a mean of 3.75. Using data from 71 students (1 subject was dropped due to missing data), the correlation between degree of confidence and accuracy of identification was very low, $r(71) = .162$, $p > .10$, and non-significant. This is consistent with some of the previous findings reported in the literature (for a review, see Deffenbacher, 1980).

However, there is a complication in computing a correlation coefficient between confidence and correct identification rate in this study because students had three ways of responding to the task: they could choose the "correct" picture; they could pick an "incorrect" photograph; or they could abstain from choosing any picture by saying "not there". The last two responses, technically speaking, are incorrect since the picture of the main bank robber was present in the photospread. The above non-significant correlation of .162 was derived by using just such a classification procedure. But it could be argued that the consequences of "identifying" the wrong man from a photospread are far more serious than those arising from not choosing anyone, and so perhaps these two responses should not be treated as similar. If those students responding "not
there" are excluded from the analysis, the correlation coefficient is of moderate strength and is significant, $r(42) = .310, p < .05$. Thus, for students who choose a picture from the photospread, the more confident ones tend to have made the correct choice. This finding adds weight to the growing body of evidence showing that there is, indeed, a meaningful relationship between confidence and identification accuracy.

One further correlation coefficient between accuracy and confidence was computed to see if those students who chose the wrong picture were more confident than those who refused to make an identification. This correlation was moderately strong and significant, $r(59) = .632, p < .01$, but the relationship was in the opposite direction to that reported above. That is, the more confident participants tended to be those choosing an incorrect photograph. That the less confident students were those who did not make any identification is not particularly surprising when one considers that the "not there" response, by its nature, provided those who were particularly unsure with the opportunity to avoid making an error.

What emerges from these results is the finding that individuals who identify someone from a photospread, either correctly or incorrectly, are fairly confident that their choice is accurate, whereas those refusing to make an identification are less sure that they are correct. Further, if the opportunity to abstain from choosing a picture is explicitly given in the instructions, a large number of students will exercise caution in this task.
Several other post-hoc analyses were performed on the information collected from the students. In particular, a number of Pearson Product Moment Correlation coefficients were computed to test for significant relationships between various components of memory in this study. The results of these tests are presented below.

**Correlation Analysis**

The test of Associative Memory, measured by the MA portion of the CAB, provided an opportunity to assess the relationship between performance on the standard memory test and ability to give accurate eyewitness descriptions or to correctly identify the principal bank robber from the photospread. A total of 33 Pearson Product Moment Correlation coefficients were computed between a subject's score on the CAB and the various components of memory for the critical event elicited by the interview questions. It should be noted that, of this number of computations, two correlations are expected to be significant purely by chance. In fact, three of these did reach significance. A high score on the CAB had a small, but significant, relationship to the following measures of memory: total number of errors recalled about the "live" event, $r(72) = .2064, p = .041$; error ratio in statements made concerning appearance of assistant experimenter, $r (72) = .2227, p = .030$; and error ratio in all statements made concerning the "live" event, $r (72) = .2267, p = .028$. These associations are counter-intuitive, since one would expect that good performance on one measure of memory ability, the CAB test, would be mirrored by good performance on the other measure, in this case a low error ratio in recalling details. That the direction of
relationship is opposite to expectations is puzzling. If it is not due to chance, then it suggests that the standardized test is measuring an aspect of memory which is unrelated to the memory process that operates in eyewitness situations. Nor was the CAB score associated with performance on the identification task. Two correlation coefficients were calculated, one using all 72 students and the other excluding those who said "not there". Both of these coefficients were very small, \( r(72) = .021 \), and \( r(42) = -.011 \), respectively. Thus, there is no meaningful relationship between performance on the CAB and ability to perform as an eyewitness.

A similar number of Pearson Product Moment Correlation coefficients was calculated to determine whether high susceptibility to hypnosis, measured by the CIS, was significantly correlated with eyewitness memory or identification. As with the CAB, most correlation coefficients were very small and failed to reach significance. The only one to do so was for answers of "don't know" to the misleading question, \( r(72) = -.3633 \), \( p = .002 \). Why high susceptibility to hypnosis is associated with a disinclination to answer "don't know" to misleading questions is unclear and is most likely due to chance.

What did emerge from the correlation analyses was the finding that confidence on the identification task was related to memory for the critical event. These correlation coefficients are presented in Table 7. Only the recall scores of those students who made a choice, either correct or incorrect, from the photospread were used in these calculations; those who said "not there" \( (n = 30) \) were excluded from the analyses. Examination of these findings yields some interesting results, in that the
TABLE 7
Pearson Product Moment Correlation Coefficients
Between Confidence on Photo Identification
Task and Recall Scores*

<table>
<thead>
<tr>
<th>Descriptive Details</th>
<th>Total No. of Details</th>
<th>Total No. of Errors</th>
<th>Percentage Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Thief</td>
<td>r .3870</td>
<td>p (.006)</td>
<td>-.0639</td>
</tr>
<tr>
<td>Sequential Details</td>
<td>r .2211</td>
<td>p (.082)</td>
<td>-.1928</td>
</tr>
<tr>
<td>Main Thief</td>
<td>r .2054</td>
<td>p (.099)</td>
<td>-.1064</td>
</tr>
<tr>
<td>Descriptive Details</td>
<td>r .0801</td>
<td>p (.309)</td>
<td>-.1596</td>
</tr>
<tr>
<td>Accomplce</td>
<td>r .2624</td>
<td>p (.049)</td>
<td>.1837</td>
</tr>
<tr>
<td>Descriptive Details</td>
<td>r .1953</td>
<td>p (.111)</td>
<td>-.1061</td>
</tr>
<tr>
<td>Bank</td>
<td>r .3224</td>
<td>p (.020)</td>
<td>.0328</td>
</tr>
<tr>
<td>Des. &amp; Seq. Details</td>
<td>r .4137</td>
<td>p (.004)</td>
<td>-.1668</td>
</tr>
<tr>
<td>Total Video</td>
<td>r .4024</td>
<td>p (.005)</td>
<td>-.0561</td>
</tr>
<tr>
<td>Descriptive Details</td>
<td>r .4296</td>
<td>p (.003)</td>
<td>-.0414</td>
</tr>
<tr>
<td>Experimenter</td>
<td>r .4781</td>
<td>p (.001)</td>
<td>-.1619</td>
</tr>
<tr>
<td>Laboratory Room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Des. &amp; Seq. Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Live&quot; Event</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Des. &amp; Seq. Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video &amp; &quot;Live&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes only those students who made a choice from photospread (n=42)
more confident students tended to report more details. Total recall of both videotape and "live" details, excluding the misleading questions, was significantly correlated with confidence in the accuracy of choice from the photospread, \( r(42) = .4781, p = .001 \). This association was reflected in both the video \( r(42) = .4137 \) and "live" \( r(42) = .4296 \) aspects of the critical event, and in the various components of these recall scores (see Table 7). However, this association did not hold for the number of errors committed, or in error ratios. Thus, confidence and proportion of errors correlated \(-.1668\) for video details, and \(-.0414\) for the "live" event. It appears that students who provide more information about an incident, the details of which may not necessarily be correct, are likely to be more confident about their picture choice on the identification task.

**Hypnotic Depth**

Hypnotic depth was assessed by both objective and subject methods. Students in the hypnotic condition were challenged with the Hand Lock item from the Barber Suggestibility Scale. Since all students passed this test, it was assumed that they were successfully hypnotized.

A second measure of trance depth was obtained by having all participants complete an amended version of Field's (1965) Inventory of Hypnotic Depth at the end of the interview. Means and standard deviations of scores obtained on the 33-item inventory are presented in Table 8. As can be seen from this table, the average score for hypnotized students was marginally higher than that obtained by relaxed participants (18.625 versus 18.250), whereas the mean score for waking students was lower (13.875). An analysis of variance test revealed a significant main effect
Table 8
Means and Standard Deviations for Amended Version
of Field's Inventory of Hypnotic Depth
By Interview Method & Memory Technique

<table>
<thead>
<tr>
<th>Memory Technique</th>
<th>Reconstruction</th>
<th>Imagery</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>16.333</td>
<td>20.917</td>
<td>18.625</td>
</tr>
<tr>
<td>S</td>
<td>4.942</td>
<td>4.055</td>
<td>4.421</td>
</tr>
<tr>
<td><strong>Relaxation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>17.888</td>
<td>18.667</td>
<td>18.250</td>
</tr>
<tr>
<td>S</td>
<td>3.996</td>
<td>4.830</td>
<td>4.336</td>
</tr>
<tr>
<td><strong>Waking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13.000</td>
<td>14.750</td>
<td>13.875</td>
</tr>
<tr>
<td>S</td>
<td>6.135</td>
<td>6.298</td>
<td>6.080</td>
</tr>
</tbody>
</table>
for method of interview, $F(2,66) = 6.377, p < .01$ (see Appendix J, Table 8). Although there was a significant main effect, a post-hoc comparison of means by the Tukey method indicated that the differences in scores depended on memory technique as well as interview method. First, hypnotized students using imagery and all relaxed subjects scored higher than waking students using either memory technique. This is the expected finding if the inventory is, indeed, measuring depth of hypnosis. Second, hypnotized students using imagery scored higher than hypnotized subjects using reconstruction. Why the memory technique appeared to affect depth of hypnosis is not immediately apparent. However, the lack of any differences arising between relaxed and hypnotized students does add support to Edmonton's (1981) contention that relaxation is a large component of the hypnotic state.

As for providing an assessment of the actual depth of hypnosis experienced by students in the experimental group, the mean of 18.625 obtained for all hypnotized participants in this study is not as high as one might have expected on a 33-item questionnaire. Field reported that his subjects obtained an average score of 14.54, with a standard deviation of 9.05. However, because the inventory administered in this experiment consisted of fewer items, only 33, comparison of scores obtained on these two scales is difficult.

Twice during the interview all participants were requested to rate their "mental" state using a 36-point scale. These ratings are reported in Table 9. The two self-report scores were averaged to obtain one score for each participant. For the hypnotized students, this rating provided a
Table 9

Average of Two Self-Report Ratings
By Interview Method & Memory Technique

<table>
<thead>
<tr>
<th>Memory Technique</th>
<th>Reconstruction</th>
<th>Imagery</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypnosis</td>
<td>19.21</td>
<td>20.96</td>
<td>20.08</td>
</tr>
<tr>
<td>(n = 24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>22.75</td>
<td>22.71</td>
<td>22.78</td>
</tr>
<tr>
<td>(n = 24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waking</td>
<td>15.08</td>
<td>13.64</td>
<td>14.39</td>
</tr>
<tr>
<td>(n = 24)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
subjective measure of hypnotic depth. As a group, hypnotized students obtained a score of 20.08, which represented a moderate state of hypnosis. Of these 24 students, 6 scores indicated the subject was in a light trance; that is, they reported an average rating of between 10 and 16, which was below the recommended level of 18 suggested by the Vancouver police. Examination of the responses of these students indicated that their recall of the critical event did not differ from other hypnotized students who had given higher ratings; in fact, their scores for total recall of the event tended to be higher than the group mean. Nor were these students prone to making more errors -- if anything, they made fewer errors than those students with higher ratings of hypnotic depth. Perhaps these six students minimized the depth of their trance. Their low self-report ratings did not predict to any degree a low score on the amended inventory of hypnotic depth. In fact, two of these six subjects obtained a score of 24 on the inventory, which is fairly high. The relaxed participants reported a mean state score of 22.73, suggesting that the relaxation exercises had been fairly successful in inducing a state of deep relaxation in these students. As expected from the labelling of the end-point of the scale, students in the alert group rated themselves lower than hypnotized or relaxed participants. The average rating of 14.39 for this group indicates that they were experiencing some feelings of drowsiness. It is difficult to make meaningful comparisons between these group self-report ratings, because each scale was designed to measure a different state in each group. The purpose of the self-reports was to determine whether the hypnotic induction and relaxation exercises were
successful in producing the intended effects, and these results indicate that they were fairly successful.

**Post-Experimental Questionnaire**

Responses to the post-experimental questionnaire were examined in an attempt to identify some of the factors that might have influenced an individual's performance in this study, especially in the hypnosis groups. They are presented in the order in which they occurred on the questionnaire.

**Question 1:** Answers to this question were coded as "yes", indicating that the student had experienced some difficulty in speaking, or "no", representing little or no effort in speaking. As expected, hypnotized students had greater difficulty as a group in speaking during the interview than waking students ($\chi^2(5) = 16.936, p < .005$). Curiously, only those hypnotized students using the reconstructive memory technique showed this tendency; those using imagery were evenly split between the two responses. There is no suitable explanation for why the memory technique should affect ease of speaking. While hypnotized and waking students did differ in their ratings of the amount of effort required to speak, there was no significant correlation between amount of information recalled and effort in speaking ($r(72) = -.088, p > .05$). Thus, it appears that brief or incomplete answers cannot be attributed to a person's difficulty or hesitancy in speaking.

**Question 2:** Seven students thought they may have seen the assistant experimenter at some time during the intervening week. They were distributed fairly evenly among the six groups, and examination of their
descriptions of the assistant experimenter did not reveal any major advantage in amount recalled or errors committed despite their having seen the assistant on a second occasion.

**Question 3:** Four students indicated they had been hypnotized, or had attempted to be hypnotized, previously; however, none of these students had been assigned to the hypnosis group. All of the students in the hypnosis condition, then, were similar in having had no prior experience with hypnosis.

**Question 4:** Over half of the students in this study (n = 41) reported having previous experience with either deep relaxation exercises or TM. These were distributed fairly evenly among the three different interview conditions, with both hypnosis and waking groups consisting of 15 students each who had done deep relaxation exercises or TM before, and the relaxed condition consisting of 11 such subjects.

**Question 5:** The extent to which each subject felt pressured by the experimenter during the interview into doing just what was asked was assessed on a 5 point scale, with 1 indicating "a lot of pressure" and 5 indicating "no pressure". Ratings ranged from 3 to 5 and group means are presented in Table 10. Examination of this table reveals very little difference between the three groups. The hypnotized subjects experienced only a slight amount of pressure (\(\bar{X} = 4.417\)), almost as little as did the waking group (\(\bar{X} = 4.478\)) and slightly less than the relaxed students (\(\bar{X} = 4.25\)). Assuming the students were able to accurately assess the amount of pressure they experienced, it appears that any behavioural differences exhibited by the hypnotized students is not attributable to the motivating
Table 10

Ratings of Amount of Pressure Experienced
By Interview Method & Memory Technique

<table>
<thead>
<tr>
<th>Memory Technique</th>
<th>Reconstruction</th>
<th>Imagery</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypnosis</td>
<td>4.583</td>
<td>4.250</td>
<td>4.417</td>
</tr>
<tr>
<td></td>
<td>(n = 12)</td>
<td>(n = 12)</td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>4.167</td>
<td>4.333</td>
<td>4.250</td>
</tr>
<tr>
<td></td>
<td>(n = 12)</td>
<td>(n = 12)</td>
<td></td>
</tr>
<tr>
<td>Waking</td>
<td>4.182</td>
<td>4.750</td>
<td>4.478</td>
</tr>
<tr>
<td></td>
<td>(n = 11)</td>
<td>(n = 12)</td>
<td></td>
</tr>
</tbody>
</table>
pressure of the experimenter, as suggested by Barber (1969).

Questions 6 & 7: Success in using the memory technique was rated by students on a 7 point scale, with 1 representing not very well, and 7 indicating very well. Values ranged from a low of 2 to a high of 7, and group means are reported in Table 11. Most subjects had a moderate amount of success in employing the memory strategy, with the overall mean of 4.868. Those students using imagery reported a slightly higher success rate, 4.944 versus 4.792 for the reconstructive method. The very small difference between these means suggests that students were able to utilize both memory techniques equally well, and that any differences in recall between strategies could not be attributed to the ineffective utilization of one technique over the other. Comments from students on the memory technique elicited by question 7 supported this interpretation.
Table 11

Ratings of Ability to Use Memory Technique
By Interview Method

<table>
<thead>
<tr>
<th>Memory Technique</th>
<th>Reconstruction</th>
<th>Imagery</th>
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<td>Hypnosis</td>
<td>4.625</td>
<td>4.625</td>
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<tr>
<td>Relaxation</td>
<td>4.792</td>
<td>5.083</td>
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<tr>
<td>Waking</td>
<td>4.958</td>
<td>5.125</td>
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<tr>
<td>Mean</td>
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DISCUSSION

Does hypnosis improve eyewitness memory? One of the main concerns of this study was to address this contentious issue. The results in this instance were clear -- hypnosis was of no aid at all to witnesses recalling details of the video event. Hypnosis did not increase the amount of information that individuals were able to remember, nor did it increase the accuracy of those reports. This was not due to a ceiling effect; the accuracy rate for individuals in the waking groups averaged 74.9%, providing ample opportunity for hypnosis to enhance memory. In fact, only those hypnotized students using the reconstructive memory instructions were able to match the performance of the waking students; those individuals employing imagery were slightly less accurate than the non-hypnotized controls. This situation runs counter to the notion among many hypno-investigators that hypnosis aids memory, especially when accompanied by imagery instructions. Thus, there was no evidence from this study to support the forensic use of hypnosis as an interrogation technique with eyewitnesses.

Although the results of this study are consistent with past laboratory investigations of the effects of hypnosis on eyewitness memory, it could be that hypnosis enhances memory only in more real life situations. This would explain the numerous anecdotal reports whereby questioning under hypnosis is claimed to have produced such valuable details as licence plate numbers. However, the evidence from the present study does not support this possibility either. When recalling details
about the "live" aspects of this experiment, hypnotized students showed the same level of recall as the control students. Nor did they make fewer errors; in fact, hypnotized individuals had the highest error rate, averaging 26.2%, compared to an average of 24.7% for the relaxation groups and 23.2% for the waking groups. While these differences were not statistically significant, the trend that emerges here offers no substantiation to the claim that hypnosis aids memory for "live" events.

There is one explanation which may account for the failure of hypnosis to aid memory in research of this type. Real life situations cannot be fully re-enacted in the laboratory because the simulation of such events, of necessity, lacks the emotional component of natural experiences. This poses a dilemma. Hypno-investigators believe that hypnosis, in conjunction with imagery, removes the emotional blocks to memory that result from traumatic experiences, such as witnessing a crime. But it could be argued that hypnosis will prove effective only when there is a high degree of emotionality surrounding the observed event. Yet the ethics of scientific research prevent the investigator from subjecting volunteers to such emotionally disturbing situations, and rightfully so. While some researchers have attempted to arouse their participants by showing as the critical event stress-provoking films of accidents (e.g., Zelig & Beidleman, 1981) or surgical procedures (e.g., DePiano & Salzberg, 1981), it can still be argued that momentary stress created in the comfortable surroundings of the laboratory cannot possibly mimic the emotions felt during unexpected, potentially life-threatening situations. Thus, it may be that the investigations of the effects of
hypnosis on eyewitness memory undertaken in controlled laboratory conditions will have restricted ecological validity.

The possibility that the conclusions drawn from laboratory research may have limited application to real life situations gains support from the present study. The pattern of recall noted for videotape details was not mirrored by memory of the "live" event. In the case of the video event, students questioned in the waking groups showed no effect for the type of memory technique they used, while relaxation and hypnosis interacted with this variable to produce reliable differences in recall. Imagery instructions increased errors in recall of the video event when used in combination with hypnosis, but lowered errors in conjunction with relaxation. One might conclude from these results that there may not be as close an association between hypnosis and relaxation as some researchers have speculated (e.g., Edmonston, 1972; 1981). The pattern of recall was entirely different for details of the "live" event. While there were few differences that were statistically significant, the trend to emerge was the opposite of that observed for the video event. Why the pattern of recall would take one form for the video event and a different one for the "live" event is not immediately apparent. Any post-hoc explanations that could be concocted would offer little insight into the phenomenon observed here. Further research is required to examine this issue more specifically.

A second major concern of this study addressed the issue of susceptibility to misinformation. No support was found for the suggestion that hypnosis heightens susceptibility to leading questions. The
hypnotized students in this study did not make more errors in responding to the misleading questions than their non-hypnotized counterparts. Dodd & Bradshaw (1980) have suggested that questions designed to lead the responder will be effective only when the source of the misinformation is clearly non-biased. Could this explain why hypnotized students did not show increased susceptibility to the misleading questions? This possibility is highly unlikely given the tendency for all students, whether hypnotized or not, to make nearly twice as many errors when answering the leading questions versus the more objective ones. Thus, the misinformation did have an effect on students' responses; however, it did not have a differential effect on hypnotized individuals. This situation highlights the need for all interrogators to use only objective questions during an eyewitness interview.

In addition to practical concerns, this situation has implications for theoretical models of memory as well. The fact that all students displayed a tendency to incorporate erroneous information from the misleading questions into their memory is entirely consistent with the reconstructive model of memory. Trace theory neither predicts, nor offers a satisfactory explanation for these results. Further, responses to the question regarding the posted telephone number offer no support for trace theory. Given the claims of some hypno-investigators (e.g., Reiser, 1976) that memory works like a videotape, recording every detail at a subconscious level which can be accessed by hypnosis, it is curious why none of the students, particularly those under hypnosis, could correctly recall the telephone number. One might argue that the students in the
Experimental groups were not adequately hypnotized, and so the hypnotic enhancement of memory would not be evident. Yet the various assessments of hypnotic depth made throughout the experiment do not give credence to this possibility. Without independent assessments of hypnotic depth, such as those provided in this research, there is a danger for this type of argument to fall into circularity; that is, to use hypnotic facilitation of memory as both the expected outcome of the induction and a measurement of its success.

A third area in which hypnosis could have affected performance involved the photo identification task. Again, no differences were observed among the six groups in rate of correct identification of the main bank robber from the photospread. It appears that recalling the man's appearance under hypnosis had no effect on subsequent identification. The corollary of this is also important to note: hypnosis did not hinder performance on the identification task either. The hypnotized students were no more likely to select an incorrect picture from the photospread than the non-hypnotized controls. Thus, no benefits at all could be attributed to hypnosis in the present study. It neither facilitated nor harmed eyewitness memory in terms of susceptibility to misinformation or identification from a photospread.

Much of the previous research on eyewitness memory has emphasized its fallibility (e.g., Buckhout, 1974; Clifford, 1979) or its malleability (summarized in Loftus, 1979), resulting in a rather bleak estimation of eyewitness performance. The results of this study are not in accordance with this dismal record. Accurate recall for the events of the videotape
averaged between 69 and 78% for the six groups, with slightly higher rates for the "live" event, between 73 and 81%. Although there is room for improvement, these accuracy rates represent a fairly good level of performance, in contrast to previous reports. Much of the poor performance reported in the experimental literature can be linked to constraints of the experimental design. For example, use of forced-choice questions, generally requiring a yes/no response, restrict the range of possible responses and does not completely tap the participant's memory of the critical event. In this study, the questions were modeled after police interrogation procedures — most were open-ended, allowing the respondents the opportunity to provide as much or as little information as they wished, or to qualify their answers. Especially with the misleading questions, the interview was designed so that the "yes", and particularly the "no", responses were followed by other more explicit questions attempting to determine more accurately the students' memory for specific details. Another constraint of the experimental situation relates to the importance attached to trivial aspects of an event. That is, questions regarding unimportant details of an observed scene are given equal, if not more, weight with questions of central concern. When roughly half the questions asked during an interview contain misinformation about non-salient aspects of an event observed some time ago, it is not too surprising that the memory scores of witnesses are generally quite low. Much of the previous work in eyewitness memory reflects this situation. But is this truly representative of the typical eyewitness? The results of the present study suggest that when recall procedures are constructed
to facilitate recall and to allow witnesses the freedom to control their responses, memory can be quite good. Perhaps memory researchers who are interested in extending their laboratory findings to practical situations, such as the court room, should take care to construct their experimental designs so as to more accurately reflect real life practices.

The correlational analysis revealed some interesting relationships. First, a small but statistically significant relationship was observed between confidence on the photo identification task and accuracy. As noted earlier, there is a good deal of confusion surrounding this issue. Why there is such variation among studies is unclear. Perhaps expansion of the response categories of the photo identification task, permitting the witness to make no identification, removes those who are most uncertain and who, if forced to make a choice, would pick an incorrect picture thereby clouding the association between accuracy and confidence. The present findings also provide additional information regarding the confidence ratings. Those students who were more confident on the photo identification task provided more information about the critical event than those who were less confident, but accuracy was not associated with confidence to any degree. Future research that considers personality traits may provide some insight into the nature of this relationship.
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List Of Interview Questions

**Main Bank Robber**

1. How old was he?
2. How tall was he?
3. About how much do you think he weighed?
4. What kind of build did he have?
5. What colour was his hair?
6. How long was his hair?
7. Can you describe what kind of hair he had?
8. What colour were his eyes?
9. How would you describe his face?
10. What kind of complexion did he have?
11. Did he have any distinguishing facial features?
12. What was he wearing?
13. Did he have anything in his hands?
   (if reply is gun, ask what kind?)
14.* Did you notice if his gloves were leather?
   (if reply is no, ask "was he wearing gloves?")
15. What did he do?
16. What did he say?
17. What is the most distinguishing thing you can remember about him?
18. Is there anything else you can remember about him that I haven't
    asked?

**Accomplice**

19. What did he look like?
20. What kind of clothes was he wearing?

21.* Did you notice what colour his hat was?
   (if unsure, ask if he was wearing a hat?)

22. What did he do?

**Bank Teller**

23. What colour hair did she have?

24. How long was her hair?

25. How would you describe her face?

26. What kind of clothes was she wearing?

27.* Which wrist was she wearing her watch on?
   (if reply is don't know, ask if she was wearing a watch?)

28. Were you able to read her name on the nameplate on the counter?
   What was it?

**Bank In General**

29. How many people were waiting in line for a teller?

30. What did the note that the bank robber gave to the teller say?

**Laboratory Room**

31. How many other people were in the room with you, besides the experimenter?

32. Can you describe what the room looked like?

33.* What was the floor like?
   (if reply is a carpet, ask if it was green?)
34. Do you remember seeing a phone number on the video machine? What was it?

35. About how long did the videotape of the bank robbery last?

Assistant Experimenter

36. Did she introduce herself? What was her name?

37. How old was she?

38. About how tall was she?

39. What colour hair did she have?

40. How long was it?

41. What type of hair did she have?

42.* Were the frames of her glasses square or round?

43. How would you describe her face?

44. Did she have any distinguishing facial features?

45. What kind of complexion did she have?

46. What kind of clothes was she wearing?

47. Was she wearing any jewellery? What?

*Misleading questions.
APPENDIX B
Amended Version Of Field's Inventory

Scale Of Hypnotic Depth

We are interested in the sensations you might have felt during this session. Please read the following statements and answer T if you think the statement is TRUE OR MOSTLY TRUE or F if you think the statement is FALSE OR MOSTLY FALSE.

T OR F

1. Time stood still.

2. My arm trembled or shook when I tried to move it.

3. I felt dazed.

4. I felt aware of my body only where it touched the chair.

5. I felt I could have tolerated pain more easily during the experiment.

6. I could have awakened any time I wanted to.

7. I was delighted with the experience.

8. The experimenter's voice seemed to come from very far away.

9. I tried to resist but I could not.

10. Everything happened automatically.

11. Sometimes I did not know where I was.

12. It was like the feeling I have just before waking up.

13. When I came out I was surprised at how much time had gone by.

14. I was able to overcome some or all of the suggestions.
15. During the experiment I felt I understood things better or more deeply.

16. At times I felt completely unaware of being in an experiment.

17. I did not lose all sense of time.

18. It seemed completely different from ordinary experience.

19. Things seemed unreal.

20. Parts of my body moved without my conscious assistance.

21. I felt apart from everything else.

22. It seems as if it happened a long time ago.

23. I felt uninhibited.

24. At times I felt as if I had gone to sleep momentarily.

25. I felt quite conscious of my surroundings all the time.

26. I could not have stopped during the things the experimenter suggested even if I tried.

27. It was a very strange experience.

28. I felt amazed.

29. From time to time I opened my eyes.

30. I couldn't stop movements after they got started.

31. I had trouble keeping my head up all during the experiment.

32. My mind seemed empty.

33. It seemed mysterious.
Post-Experimental Questionnaire

We are interested in your reactions to this second part of the experiment. Please answer the questions in the space provided. If you require more room, please use the back of the sheet.

1. Did you find it was an effort for you to speak or to answer the questions? If so, please explain.

2. Did you see the woman who showed you the videotape at any time during the intervening week?

3. Have you ever been hypnotized before?

4. Have you ever done deep relaxation exercises before?

5. Please rate to what extent you felt pressured by the Experimenter during the interview: (circle the appropriate number)

   1 very much pressure into doing just what was asked
   2 quite a lot of pressure into doing just what was asked
   3 a moderate amount of pressure into doing just what was asked
   4 only slightly pressured into doing just what was asked
   5 not at all pressured into doing just what was asked
6. Please rate how successful you were in following the experimenter's instructions on the technique to use in remembering the event:

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not very  very
well    well

7. Do you have any comments on the memory technique you used?
Black & White Reproduction of the Coloured Photospread

Note: Photo No. 5 is the target picture.
Partial Transcript Of Hypnotic Induction

"Breathe deeply, settle comfortably in the chair...Raise your right arm, look at your thumbnail. Now direct your gaze past your thumbnail to a spot on the wall. You will notice things getting blurry, your eyes may feel like closing. When it is comfortable to do so, allow your eyes to close (keep repeating suggestions of heavy eyes and to close eyes until subject closes them).

"Imagine that you have sandbags placed on your arm, that it's getting heavier and heavier, it's coming down closer and closer to your lap (keep doing this until arm comes down to lap). Don't allow your arm to touch your lap until you're comfortable and ready to relax even further.

"Now focus your attention on your neck. If you notice any tension in your neck, just release it. Imagine the tension flowing down your arms, and out through your fingers. If there is any tension in your chest, release it. Let yourself become completely relaxed, allow the tension to flow out through your toes. Your breathing evenly, regularly, your body is free of tension, feeling relaxed and comfortable.

"Allow yourself to readjust in your chair, to be completely comfortable. If you have to, you can be alert and wide awake. But right now, just enjoy feeling relaxed. If you hear any outside noises, you can pay attention to them if you want, or you can ignore them so that you can become more and more relaxed, and you can go deeper and deeper.

"Some people find it helpful to imagine a staircase with 10 steps."
They imagine themselves walking down this staircase. With each step they take, they become more and more relaxed, more and more comfortable, they go deeper and deeper. The more relaxed you are, the deeper you can go. I'm going to count from 1 to 10. Imagine to yourself such a staircase, and that you're going to walk down the steps. Remember, the more relaxed you are, the deeper you can go. So let's take that first step...1...more and more relaxed...2....more and more comfortable (count up to 10 with suggestions of relaxation, comfortableness and going deeper after each count).

"Now you're at the bottom of the staircase. That's fine. Some people find it helpful to imagine to themselves a place where they've been very relaxed and peaceful. It could be skiing, sailing or lying on the beach. Recreate such a place in your mind now. Allow yourself to re-experience the sensation of relaxation -- it's so peaceful and calm. Can you feel the sun on your skin? Maybe the wind? Enjoy any sights you can see, or sounds you can hear. (More suggestions to enjoy this place and the opportunity of relaxing). That's fine.

"(Deepening technique) To help you go even deeper, imagine you are gazing at the centre of a whirlpool. As you focus your attention on the centre, you can see the water swirling gently at the edges. As you look at the centre, feel the water pulling you deeper and deeper. The longer you look, the deeper you can go. Go as deep as you want, knowing you are in full control. That's fine."
APPENDIX F
Hand Lock Suggestibility Item

From Barber's Suggestibility Scale

"(Student's name), I'd like you to clasp your hands together tightly, and interlace your fingers. Put them in your lap. (if done correctly, say "that's right"). Now concentrate on your hands and hold them together as tightly as you can. (BEGIN TIMING). Imagine that your hands are two pieces of steel that are welded together so that it's impossible to get them apart. They're stuck, they're welded, they're clamped tightly shut. When I ask you to pull your hands apart they'll be stuck and they won't come apart no matter how hard you try. They're stuck together just like two pieces of steel that are welded together. You feel as if your fingers were clamped in a vise. Your hands are hard, solid, rigid! The harder you try to pull them apart the more they will stick together! It's impossible to pull your hands apart! The more you try the more difficult it will become. Try to pull your hands apart (end 45 seconds) but you'll find you can't because they're like steel. (WAIT 5 SECONDS) Try harder, you can't. (WAIT 10 SECONDS).

You can unclasp your hands now."

TO SCORE: Pass if incomplete separation after 15 seconds.
"This tape is to teach you deep muscle relaxation. If you practice, you can learn to relax at will, to put yourself into a very pleasant and comfortable state known as deep relaxation. I'd like you to start by loosening any tight clothing and finding a comfortable position, and then closing your eyes. This method works by teaching you to identify tension in various parts of your body and then to identify the opposite of that tension, which is deep relaxation.

"I'd like you to clench your right hand into a fist, clench your right hand into a fist and just think about the tension in your right hand. Feel the knuckles becoming white with tension and then let it relax. Notice the contrast between the tension and the relaxation. Once again, clench your right hand into a fist and study the tension in your right hand, and then let it relax. Notice the pleasant contrast between tension and relaxation. Now clench your left hand into a fist and study the tension in your left hand, then let it relax. Notice the contrast between tension and relaxation. Once again, clench your left hand into a fist and study the tension in your left hand. Then let it relax, just let it go loose, and limp, and relaxed.

"Now bend your right hand at the wrist and point your fingers up to the ceiling. Study the tension in your right wrist and forearm, and then let it relax, and feel the contrast between tension and relaxation. Once again, bend your right hand at the wrist and point your fingers up to the ceiling, feel the tension in your right wrist and
forearm, and then let it relax, noting the contrast between tension and relaxation. Now bend your left hand at the wrist, point the fingers up to the ceiling, and then let it relax. Just go loose, and limp, and very relaxed. Once again, bending your left hand at the wrist, pointing your fingers up to the ceiling, study the tension in your wrist and forearm, and then let it relax. Notice the contrast between tension and relaxation.

"Now I'd like you to flex both of your bicep muscles by drawing your hands up to your shoulders. Bring your hands up to your shoulders, flex both of your bicep muscles. Study the tension in your biceps and then let them relax. It isn't necessary to tense your muscles so much that you get a cramp, only just to tense them enough so that you can feel the tension. Once again, flexing your bicep muscles, bringing both hands up to the shoulders, then let them relax, just go loose, and limp, and relaxed.

"Now shrug your shoulders up to your ears, study the tension in your shoulders and the base of your neck, and then let your shoulders relax. Notice the pleasant contrast between the tension and the relaxation. Once again, shrug your shoulders up to your ears, study the tension in your shoulders and the base of your neck, and then just let them relax, just sag down loose and limp and very relaxed.

"Now wrinkle up your forehead by raising your eyebrows up to the top of your head. Study the tension in your forehead and then let it relax. Once again, raising your eyebrows up to the top of your head, study the tension in your forehead and then let it relax, let your forehead become more and more smooth, more and more relaxed.
"Now close your eyes very tightly, study the tension around your eyes and the bridge of your nose, squint your eyes tightly. Study the tension and then let them relax. Once again, squint your eyes very tightly, study the tension around your eyes and the bridge of your nose, and then let them relax, let them relax and just lightly close.

"Now make a big smile as if to touch both ears, study the tension in your cheeks and your mouth, then let it relax, feeling the contrast between tension and relaxation. Once again, making a big smile as if to touch your ears, study the tension in your mouth and your cheeks, and then let it relax, noticing the pleasant contrast between tension and relaxation.

"Now I'd like you to press your tongue up against the roof of your mouth, and study the tension inside your mouth, and then let it relax. Once again, pressing your tongue up against the roof of your mouth, study the tension inside your mouth, then let it relax.

"Bury your chin in your chest, study the tension in the front of your neck and your chin, and then let it relax. Notice the contrast between the tension and the relaxation. Once again, bury your chin in your chest, study the tension in your chin and the front of your neck, then let it relax, feeling the pleasant contrast between tension and relaxation.

"Now I'd like you to press your head back against the back of the chair or the bed or whatever, study the tension in the back of your neck, and then let it relax. Once again, pressing your head back, study the tension in the back of your neck, then let it relax, let those muscles go loose and limp and relaxed. Feel that relaxed feeling now in
your forehead, your forehead is becoming more and more smooth, more and more relaxed, and that relaxed feeling spreading down from your fact, your eyes relaxed, your cheeks relaxed, your mouth relaxed, your jaw and your chin relaxed, that relaxation flowing down into your neck, down into your shoulders, down into your biceps, your forearms relaxed, that relaxed feeling spreading down through your wrists and into your hands, all the way down to the tips of your fingers. Very warm and very relaxed.

"Now take a deep breath and hold it. Take a deep breath and study the tension in your chest, and then let it relax. Once again taking a deep breath and holding it, study the tension in your chest, and then let it relax. Let your breathing become more and more regular, more and more relaxed. More relaxed with every breath.

"Now tighten up your tummy muscles, study the tension in your abdomen, then let those muscles relax. Once again, tensing the stomach muscles, study the tension in the stomach, then let them relax, feeling that pleasant contrast between tension and relaxation.

"Now tighten up your buttock muscles, study the tension in your buttocks, and then let them relax. Once again, tighten up your buttock muscles, study the tensions and let them relax. Let that feeling of deep relaxation spread down into your buttock muslces.

"Now tighten up your thighs, study the tension in your thighs, and then let them relax. Once again, tighten up your thighs, study the tension in your thighs, then let them relax, go loose and limp and relaxed.

"Now point your toes toward your face, study the tension in your
lower legs, then let them relax. Once again, pointing your toes towards your face, study those tensions, and then let them relax.

"Now point your toes away from your face, study the tension in your lower legs and your ankles, and then let them relax. Once again, pointing your toes away from your face, study the tension in your ankles and your lower legs, then let them relax, feeling that pleasant contrast between tension and relaxation.

"Now curl up your toes, curl them up inside your shoes or whatever, and study the tension in your feet and your toes, and then let them relax. Once again, curl up your toes and study the tension in your feet and your toes, and then let them relax. Let that feeling of relaxation flow down into your feet and down into your toes.

"Now, to help you relax even further, I'm going to review the different muscle groups that we've relaxed and as I mention each one, they will become even more relaxed than they are now. As I mention each muscle group, it will relax even further than it already is....Your fingers relaxed, your hands and your wrists relaxed, your forearms relaxed, your biceps relaxed, and that relaxed feeling flowing up into your shoulders, along the back of your neck, your forehead becoming more and more smooth, more and more relaxed, relaxation spreading down through your face, let your eyes relax, your cheeks and your mouth relax, your jaws and your chin relax, the front of your neck relaxed, that relaxed feeling spreading down into your chest, your breathing more and more regular, more and more relaxed. Relaxation spreading down through your stomach, round the sides and up and down your spine, down into your hips and buttocks, flowing down into your thighs and your
calves relaxed, your shins and ankles relaxed, deep relaxation flowing down into your feet, all the way down to the tips of your toes, relaxation coursing through your veings, bathing your whole body, peaceful, tranquil feeling of relaxation."
Instructions To Participant On Use Of The
Reconstructive Memory Technique

"In this part of the experiment, I'm going to ask you some questions about what happened last week. Before I do this, I'd like you to spend a few minutes recalling the circumstances surrounding the events of last week. We have found that reconstructing these circumstances can improve your memory of specific details. So I would like you now to begin imagining yourself on the day of the experiment, and how you felt about being in the experiment. (If student's eyes not closed, instruct him/her to close them.) Picture yourself going back in time to when you saw the videotape last week. Think back to the day of the experiment. Tell yourself what day of the week it was.... Imagine how you got to school that day... Think of what the weather was like... Try to remember at what time of the day you were supposed to go to the experiment... Remember how you were feeling just before you went into the room... Were you nervous....stressed....happy....or maybe tired.... Think of the room where you saw the videotape.... When you can remember these details, I'd like you to nod your head (wait for head nod). Good. As you think about the room and remember how you were feeling, it will begin to come back to you more and more clearly and you will be able to experience it as though it were happening right now; as though you were there right now and you were experiencing it for the first time."
APPENDIX I
"In this part of the experiment, you're going to be asked questions about what happened last week. We have found that forming a mental image of an event can improve your memory of specific details. I'm going to give you some instructions that will help you to remember. This technique involves (closing your eyes and, FOR AWAKE STUDENTS ONLY) imagining what you want to remember pictured on a television screen. First, I'd like you to imagine that you are sitting in a comfortable chair, maybe like the one you are sitting in now, and that in front of you is a T.V. screen, perhaps like the one on which you watched the videotape last week. Imagine yourself turning on the screen. Now imagine you can see yourself coming to the lab today, walking with me down the stairs to the basement of this building, then down the hallway to this room. When you can see this on your T.V. screen I'd like you to nod your head (WAIT FOR HEAD NOD). In this way, you could see what the walls in the hallway looked like, if there were anything on the walls, and you could see the glass doors we came through to get to this room. This is how I would like you to remember what happened last week in the first part of this experiment. Just imagine that you can see everything that happened unfolding on the screen before you. And you'll find that you can control how fast or how slowly things move on the screen, so that if you wanted you could freeze the action on the screen to enlarge the picture to pick up any details you might otherwise have missed."
Table 1

Analysis of Variance For Percentage of Errors in Total Details Reported

Interview Type X Memory Technique X Type of Event

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>149.484</td>
<td>2</td>
<td>74.742</td>
<td>0.688</td>
<td>0.506</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>38.203</td>
<td>1</td>
<td>38.203</td>
<td>0.352</td>
<td>0.555</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>320.391</td>
<td>2</td>
<td>160.195</td>
<td>1.474</td>
<td>0.236</td>
</tr>
<tr>
<td>Error</td>
<td>7171.500</td>
<td>66</td>
<td>108.659</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Event</td>
<td>89.063</td>
<td>1</td>
<td>89.063</td>
<td>1.183</td>
<td>0.281</td>
</tr>
<tr>
<td>Interview X Event Type</td>
<td>9.750</td>
<td>2</td>
<td>4.875</td>
<td>0.065</td>
<td>0.937</td>
</tr>
<tr>
<td>Memory Technique X Event Type</td>
<td>13.031</td>
<td>1</td>
<td>13.031</td>
<td>0.173</td>
<td>0.679</td>
</tr>
<tr>
<td>Interview X Memory Technique X</td>
<td>1047.375</td>
<td>2</td>
<td>523.688</td>
<td>6.955</td>
<td>0.002</td>
</tr>
<tr>
<td>Error</td>
<td>4969.875</td>
<td>66</td>
<td>75.301</td>
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Table 2

Analysis of Variance For Total Number of Descriptive & Sequential Errors Reported About Videotape Event
Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>11.361</td>
<td>2</td>
<td>5.681</td>
<td>0.793</td>
<td>0.457</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>0.501</td>
<td>1</td>
<td>0.501</td>
<td>0.070</td>
<td>0.792</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>64.582</td>
<td>2</td>
<td>32.291</td>
<td>4.507</td>
<td>0.015</td>
</tr>
<tr>
<td>Error</td>
<td>472.836</td>
<td>66</td>
<td>7.164</td>
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</tr>
</tbody>
</table>
Table 3

Analysis of Variance For Percentage of Errors
In Details Recalled About
Videotape Event
Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
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<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>50.766</td>
<td>2</td>
<td>25.383</td>
<td>0.334</td>
<td>0.717</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>3.328</td>
<td>1</td>
<td>3.328</td>
<td>0.044</td>
<td>0.835</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>877.500</td>
<td>2</td>
<td>438.750</td>
<td>5.779</td>
<td>0.005</td>
</tr>
<tr>
<td>Error</td>
<td>5010.453</td>
<td>66</td>
<td>75.916</td>
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</tr>
</tbody>
</table>
Table 4

Analysis of Variance for Number of Descriptive Errors Reported About Main Bank Robber

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>8.361</td>
<td>2</td>
<td>4.181</td>
<td>1.658</td>
<td>0.198</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>0.347</td>
<td>1</td>
<td>0.347</td>
<td>0.138</td>
<td>0.712</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>17.861</td>
<td>2</td>
<td>8.931</td>
<td>3.542</td>
<td>0.035</td>
</tr>
<tr>
<td>Error</td>
<td>166.417</td>
<td>66</td>
<td>2.521</td>
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</tr>
</tbody>
</table>
Table 5

Analysis of Variance for Percentage of Errors of Descriptive Details Reported About Main Bank Robber

Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>234.469</td>
<td>2</td>
<td>117.234</td>
<td>0.837</td>
<td>0.438</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>1.828</td>
<td>1</td>
<td>1.828</td>
<td>0.013</td>
<td>0.909</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>1610.813</td>
<td>2</td>
<td>805.406</td>
<td>5.748</td>
<td>0.005</td>
</tr>
<tr>
<td>Error</td>
<td>9248.500</td>
<td>66</td>
<td>140.129</td>
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</tbody>
</table>
Table 6

Analysis of Variance For Percentage of Errors
In Descriptive Details About Bank Setting
Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
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<th>Mean Squares</th>
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<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>2091.094</td>
<td>2</td>
<td>1045.547</td>
<td>0.925</td>
<td>0.401</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>278.766</td>
<td>1</td>
<td>278.766</td>
<td>0.247</td>
<td>0.621</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>7623.422</td>
<td>2</td>
<td>3811.711</td>
<td>3.374</td>
<td>0.040</td>
</tr>
<tr>
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<td>74565.625</td>
<td>66</td>
<td>1129.782</td>
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</tr>
</tbody>
</table>
Table 7

Analysis of Variance For Number of Errors in Descriptions of Laboratory Room
Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
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<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>0.194</td>
<td>2</td>
<td>0.097</td>
<td>0.109</td>
<td>0.897</td>
</tr>
<tr>
<td>Memory Technique</td>
<td>0.500</td>
<td>1</td>
<td>0.500</td>
<td>0.563</td>
<td>0.456</td>
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<tr>
<td>Interview X Memory Technique</td>
<td>6.583</td>
<td>2</td>
<td>3.292</td>
<td>3.703</td>
<td>0.030</td>
</tr>
<tr>
<td>Error</td>
<td>58.667</td>
<td>66</td>
<td>0.889</td>
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</tbody>
</table>
Table 8

Analysis of Variance For Amended Version of Field's Inventory of Hypnotic Depth

Interview Method X Memory Technique

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview Method</td>
<td>334.750</td>
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<td>167.375</td>
<td>6.377</td>
<td>0.010</td>
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<tr>
<td>Memory Technique</td>
<td>102.721</td>
<td>1</td>
<td>102.721</td>
<td>3.914</td>
<td>0.050</td>
</tr>
<tr>
<td>Interview X Memory Technique</td>
<td>45.861</td>
<td>2</td>
<td>22.931</td>
<td>.874</td>
<td>0.050</td>
</tr>
<tr>
<td>Error</td>
<td>1732.168</td>
<td>66</td>
<td>26.245</td>
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