

MEMORY ENHANCEMENT TECHNIQUES FOR INTERVIEWING  
VICTIMS AND WITNESSES OF CRIME

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# Witness Memory Enhancement

## About the Authors

The principal investigators for this project were Dr. R. Edward Geiselman and Dr. Ronald P. Fisher. Dr. Geiselman is Associate Professor of Psychology at the University of California, Los Angeles, and Dr. Fisher is Associate Professor of Psychology at Florida International University, Miami. These researchers have co-authored six articles on police interview techniques: Three in police science journals, two in professional research journals, and one in a law review journal. In addition, they have given numerous talks on the Cognitive Interview technique at psychological and law-enforcement conferences, and at universities. Drs. Geiselman and Fisher have independently conducted related research projects, yielding over 60 publications, that include: The interaction between memory encoding and retrieval operations, reproductive versus constructive processes in memory recall, and the relation between hypnotic and waking forgetting.

Co-authors David P. MacKinnon and Heidi L. Holland played integral roles in the conduct and analysis of the experiments reported herein. At the time of this report, Mr. MacKinnon was a graduate student in the Department of Psychology, UCLA, and Ms. Holland was an undergraduate in the Department of Psychology, UCLA.

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# Witness Memory Enhancement

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## ABSTRACT

The purpose of this research was to develop and evaluate methods for maximizing the completeness and accuracy of eyewitness reports. Experiment 1 compared the effectiveness of three interview procedures for optimizing eyewitness memory performance: (1) the Cognitive Interview based on memory retrieval methods from current memory theory, (2) the forensic hypnosis interview, and (3) the standard (control) police interview. These methods were evaluated empirically under controlled, yet realistic circumstances. Subjects viewed police training films of simulated violent crimes and were questioned individually in interactive interviews 48 hours later by experienced law-enforcement personnel. Both the cognitive and hypnosis procedures elicited significantly more correct information from the subjects than did the standard police interview. The amount of incorrect or confabulated information did not differ across the three interview conditions.

Experiment 2 replicated the memory-enhancement qualities of the Cognitive Interview with non-student, lesser educated witnesses. Experiment 3 evaluated each of the constituent parts of the Cognitive Interview independently and showed that each method is useful and should be retained in the Cognitive Interview procedure. Experiment 4 assessed the effectiveness of the Cognitive Interview when misleading questions are asked. It was found that the Cognitive Interview reduced the probability that the misleading questions would affect the eyewitness report. Thus, the Cognitive Interview is a viable memory-enhancement technique that is effective, efficient, and an alternative to forensic hypnosis.

## STATEMENT OF THE PROBLEM

According to the Rand Corporation's (1975) study of the investigative process, the single most important determinant of whether a case will be solved is the information supplied by the witness or victim of a crime. Thus, a critical component of effective law enforcement is the ability of police investigators to obtain accurate and detailed information from eyewitnesses. In addition, one experienced judge has stated that incorrect eyewitness identifications have led to more inaccuracies of justice than all other factors combined (Sobel, 1972). It is ironic that although the quality of a witness's or victim's report is of paramount importance in solving criminal cases, police investigators often have minimal guidance in developing effective interview techniques to facilitate memory retrieval. According to the Rand Corporation's survey, more than half of the police departments that were polled reported that they had no formal training whatsoever for newly appointed investigators. The typical investigator must rely on the limited interview techniques acquired during the initial recruitment training, on-the-job experience, and intuitions. While it is true that laws enacted to protect constitutional rights have altered interview procedures, the techniques for eliciting information from witnesses has remained basically unchanged for several decades.

Police investigators attempt to maximize the accuracy of eyewitness reports by conducting the interview in a relaxed, comfortable environment (Leonard, 1971). Implicit in this approach is the belief that a relaxed, willing observer will generate extensive and reliable memories of the original event.

However, eyewitness reports are known to be incomplete, unreliable, partially constructed (confabulated), and malleable during the questioning procedure (Clifford & Hollin, 1982; Loftus, 1975, 1979; Loftus, Miller, & Burns, 1978; Wells, Ferguson, & Lindsay, 1981). The purpose of our research program, therefore, was to identify and develop methods to enhance the completeness and accuracy of eyewitness reports and to test these methods empirically under controlled, yet realistic circumstances and ultimately in the field.

Previous research on eyewitness memory retrieval has produced few positive suggestions for law enforcement personnel. Two notable exceptions involve the ordering of the questions to be asked during the interview and the phrasing of the questions. First, the witness should be asked to report the incident in their own words before being asked any specific questions (Geiselman, Fisher, Firstenberg, Hutton, Sullivan, Avetissian, & Prosk, 1984; Hilgard & Loftus, 1979; Timm, 1983). This procedure reduces the possibility of the interviewer leading the witness, and the information given by a witness during a free report has been found to be more accurate, although more incomplete, than information given in response to specific questions. Second, to further avoid leading the witness, the specific questions should be phrased using indefinite articles rather than definite articles (Loftus & Zanni, 1975). A third, guided memory technique was shown to facilitate eyewitness recognition performance in line-up procedures (Malpass & Devine, 1981); but with the exception of Geiselman et al. (1984), little has been done to follow up on such memory-enhancement techniques.

Otherwise, as noted by Clifford and Lloyd-Bostock (1983),

"The work in the eyewitness field (has been) essentially negativistic. ... In short, the witness (has been) shown to be a somewhat pathetic figure in the face of extramemorial factors occurring at encoding, during storage or at retrieval" (p. 286). Yuille (1980) has proposed that considerable effort now be focused on how we can improve eyewitness performance. Wells (1978) made a similar argument with his distinction between variables that can be manipulated to reduce eyewitness fallibility (system variables) and those that cannot be controlled in actual crime cases (estimator variables). He concluded that system-variable research has greater potential for positive contributions to criminal justice.

One dramatic technique for eyewitness memory enhancement is the hypnosis interview. Hypnosis has been reported to be useful in criminal cases (Reiser, 1974, 1976; Reiser & Nielsen, 1980; Schafer & Rubio, 1978; Stratton, 1977), especially when trauma to the witness is involved. Enhanced memory under hypnosis also obtains in some controlled laboratory experiments (DePiano & Salzberg, 1981; Griffin, 1980; Stager & Lundy, 1984). On the whole, though, the evidence about memory under hypnosis is mixed. Many studies find no memory enhancement with hypnosis (see M. Smith, 1983, for a review). Of greater practical consequence, hypnosis may distort the memory process. It has been suggested that hypnotized subjects (1) introduce fabrications into their reports and exhibit increased error rates (Diamond, 1980; Dywan & Bowers, 1984; Orne, 1979), (2) are more susceptible to leading questions (Sanders & Simmons, 1983), and (3) are more likely to view distorted memories as being accurate (Orne, 1961; Sheehan & Tilden, 1983). In addition, the accuracy

of information generated under hypnosis appears to be unrelated to the witnesses' confidence in the information (Zelig & Beidleman, 1981). The case against hypnosis also is equivocal, as some researchers have found hypnosis to improve memory without showing increased confabulation or greater susceptibility to misleading questions (Griffin, 1980; Stager & Lundy, 1985). Furthermore, even nonhypnotized witnesses are highly subject to memory alterations (Loftus, 1979; Timm, 1983; Wells et al., 1981) and non-hypnotized witnesses are often inaccurate about the quality of their reports (Deffenbacher, 1980; Wells & Lindsay, 1983). Nevertheless, as a general safeguard against the potential problems encountered with memory under hypnosis, several U.S. states have placed some restrictions on the admissibility of hypnosis recall in a court of law.

Over the course of the last two thousand years, persons interested in memory enhancement have developed a variety of techniques other than hypnosis to enhance memory. However, whereas these methods have proven effective in many learning tasks, they are inappropriate for police investigation. This is because most techniques are designed to be employed at the time when the to-be-remembered event is being observed. In the typical crime scenario, however, the events unfold rapidly under emotionally charged conditions. As a consequence, consciously controlled learning strategies are unlikely to be used. Practically, eyewitness memory can be enhanced only by developing techniques that improve the memory retrieval or search phase of memory. Our focus, then, has been to develop methods that can be used to facilitate recollection of events after the fact, at the time of the police interview.

## THE COGNITIVE INTERVIEW

The theoretical underpinnings that have guided our thinking are based on two generally accepted principles of memory. First, a memory consists of a collection of several elements (Bower, 1967; Underwood, 1969; Wickens, 1970) and the effectiveness of a retrieval aid is related to the number of elements that the aid has in common with the memory for the event (Flexser & Tulving, 1978). Second, there may be several access routes to a memory, so that information not accessible with one retrieval cue may be accessible with a different cue (Tulving, 1974). Based on this theoretical framework, Geiselman et al. (1984) developed a memory retrieval procedure for eyewitnesses called the Cognitive Interview that consists of four general memory jogging methods. Of these, two attempt to increase the overlap of elements between stored memory and retrieval cues: (a) mentally putting yourself back at the scene of the crime, both in terms of environmental factors and emotional reactions (Malpass & Devine, 1981; S. Smith, 1979), and (b) reporting everything, even partial information, regardless of the perceived importance of the information. The latter technique might be effective either because some witnesses do not know what information has investigative value or because the act of being complete can lead to recollection through feature overlap of information that is important. The other two methods encourage using many access routes to memories: (c) recounting the events in a variety of orders, such as in reverse order (Burns, 1981; Whitten & Leonard, 1981), and (d) reporting the events from a variety of perspectives (Anderson & Pichert, 1978; Firstenberg, 1983). These techniques are described in detail below.

In the experiments presented in this report, interviewers using the Cognitive Interview technique read the following descriptions of the general methods verbatim to the "eyewitnesses" at the beginning of the interview:

(a) Reconstruct the Circumstances: Try to reconstruct in your mind the context surrounding the incident. Think about what the surrounding environment looked like at the scene, such as rooms, location of furniture, vehicles, the weather, the lighting, any smells, any nearby people or objects. Also think about how you were feeling at the time and think about your reactions to the incident.

(b) Report Everything: Some people hold back information because they are not quite sure that the information is important. Please do not edit anything out of your report, even things you think may not be important.

(c) Recall the Events in Different Orders: It is natural to go through the incident from beginning to end. However, you also should try to go through the events in reverse order. Or, try starting with the thing that impressed you the most in the incident and then go from there, going both forward in time and backward.

(d) Change Perspectives: Try to recall the incident from different perspectives that you may have had, or adopt the perspectives of others who were present during the incident. For example, try to place yourself in the role of a prominent character in the incident and think about what he or she must have seen.

In addition to the four general methods, a series of specific techniques was developed that could be used by an

investigator to elicit specific types of information following the narrative phase of an interview. These specific methods include the following:

(a) Physical Appearance: Think about whether or not the suspect reminded you of anyone you know. If you were reminded of someone, try to think of why. Was anything unusual about the physical appearance or clothing?

(b) Names: If you think that a name was spoken but you cannot remember what it was, try to think of the first letter of the name by going through the alphabet. Then, try to think of the number of syllables.

(c) Numbers: Was the number high or low? How many digits were in the number? Were there any letters in the sequence?

(d) Speech Characteristics: Think of whether the voice reminded you of someone else's voice. If you were reminded of someone, try to think of why. Was anything unusual about the voice?

(e) Conversation: Think about your reactions to what was said and the reactions of others. Were there any unusual words or phrases used?

At first glance, it may seem to some investigators that they have been using some of these techniques for years. Perhaps they have. However, as described below, the Cognitive Interview has been found in five studies to be effective for enhancing eyewitness memory. The amount of correct information generated was significantly increased in comparison to the amount of information obtained from witnesses who were interviewed in the manner that investigators normally employ. This result, which was evident even for the most critical items from the crime

scenarios, was not accompanied by an increase in the amount of incorrect information generated.

#### REVIEW OF THE EXPERIMENTS

The completed work has shown the Cognitive Interview to be effective for enhancing the recall of subjects who witnessed simulations of crimes. To promote the generalizability of the results, the interviews in the first two studies presented here were carried out by experienced police personnel. The Cognitive Interview was found to be as effective with non-student, lesser educated witnesses, as with student witnesses. Thus, we are encouraged that the findings in our laboratory studies will transfer to the real world.

The Cognitive Interview was first evaluated positively in a preliminary experiment conducted by Geiselman et al. (1984). In that research, actors disrupted a classroom situation and the students were interviewed subsequently as eyewitnesses via a questionnaire. Students who were instructed in the four memory retrieval methods at the time of test recalled more correct information about the incident than did subjects who were told simply to keep trying to remember more information. Further, the Cognitive Interview showed none of the drawbacks sometimes reported with other innovative interview techniques, such as hypnosis (M. Smith, 1983): It did not lead to more incorrect information being generated, nor did it lead to greater eyewitness confidence in the incorrect information. While the results of that study were encouraging, one major limitation was that the conditions of the experiment were somewhat dissimilar to those found in a real crime and police interview. The realism of the tests was increased in Experiments 1 and 2 described below.

The first experiment compared the Cognitive Interview to the hypnosis interview and to interviews conducted without either hypnosis or the cognitive retrieval methods. Experiment 2 evaluated the Cognitive Interview with non-student, lesser educated witnesses. Experiment 3 tested the effectiveness of each general technique in the Cognitive Interview individually to determine whether the procedure could be made even shorter. Experiment 4 assessed the effectiveness of the Cognitive Interview when misleading questions are asked to determine whether the Cognitive Interview causes the witness to become more suggestible.

#### Experiment 1

With the cooperation of various sections and divisions of the Los Angeles Police Department, a "real life" scenario was developed. In this study (Geiselman, Fisher, MacKinnon, & Holland, 1985a): The stimulus materials were emotionally arousing films of simulated crimes; the eyewitness recall protocols were collected using interactive interviews rather than fixed questionnaires, where the interviewers asked specific questions of the witness based on the witness's narrative report; and the interviews were conducted by experienced law enforcement personnel. The present study also extended the earlier work of Geiselman et al. (1984) by comparing the Cognitive Interview to the hypnosis interview and to the standard (control) police interview. The three types of interview were compared on (1) the number of correct items of information elicited, (2) the number of incorrect items of information elicited, and (3) the number of confabulated items of information generated.

## Method

### Subjects

The subjects were 89 undergraduate students, 55 males and 34 females recruited from three introductory psychology classes and one psychology of learning class at the University of California, Los Angeles.

### Interviewers

The interviewers were recruited principally through an announcement placed in the International Journal of Investigative and Forensic Hypnosis. Additional participants were obtained from various police departments in southern California. The final group of interviewers, 16 men and 1 woman, represented a variety of professions within the law enforcement domain: police detectives, CIA investigators, polygraph specialists, and private detectives. To ensure homogeneity among the interviewers, each interviewer had completed a 40-hr course on forensic hypnosis and had subsequent field experience on hundreds of cases. Each interviewer was offered a \$70.00 honorarium for their participation.

Each interviewer was randomly assigned to one of the three interview conditions (cognitive=6, hypnosis=7, and standard=4). The results of the interviews suggested that the interviewer population was homogeneous given that the effect of interviewer within interview conditions was not significant.

Three of the 17 interviewers had seen one or two of the films described below, but over two years had passed since that exposure. The five interviews that might have been affected by this prior exposure produced data consistent with the other interviews in those interview conditions.

### Materials and Apparatus

Films. The four films used in this experiment were borrowed from the training academy of the Los Angeles Police Department (LAPD). The academy utilizes these films as part of a computerized training process in which police officers are exposed to simulated, life-threatening situations (Decision Evaluation Firearms Trainer). Each film presents an audio-visual scenario of a violent crime or crime situation that lasts approximately four minutes. The scenarios of the four films include: a bank robbery, a liquor store holdup, a family dispute, and a search through a warehouse. In each film, at least one individual is shot and killed. The scenarios are realistic in that monitored physiological reactions of officers in training have been found to be comparable to reactions that would be expected in similar street situations (LAPD). The films are rich in quantifiable information including person descriptions, mannerisms, weapons, and sequences of events.

The films were projected onto a 9-by-9 ft screen using a 35 mm projector equipped with 4-track non-optical sound. All films were shown in the same large lecture hall.

Interview Environment. The interviews were conducted at the Center for Computer-Based Behavioral Studies (CCBS) in the Department of Psychology at the University of California, Los Angeles. Among the facilities at CCBS are separate cubicles (approximately 6-by-6 ft) such that several interviews can be carried out simultaneously in an undisturbed fashion.

All interviews were audio recorded on standard cassette player/recorders and the subjects wore lapel microphones. In addition to the audio recordings, subjects in the hypnosis condition were monitored using video cameras that were mounted in

every room, regardless of the interview condition. A graduate student trained in hypnosis from the Clinical Psychology program at UCLA observed the ongoing hypnosis sessions on monitors in a control room.

### Interview Conditions

Three weeks prior to the interviews, each interviewer received instructions for one, and only one, of the following three interview procedures. The method to be used was discussed for 15 min with each interviewer.

(1) Standard Interview. These interviewers were told to use the questioning procedures that they normally would use without an hypnotic induction procedure. The only restriction was that each "witness" was to be asked first to describe in their own words what they remembered (open-ended report). Then, and only then, were the interviewers to ask any specific questions about the film based on the witnesses' account. The practice of asking for an open-ended report first is commonly followed by most investigators that we have interviewed, and it is supported in basic research reported by Geiselman et al. (1984), Hilgard and Loftus (1979), and Timm (1983). That is, information given during the open-ended report typically is more accurate.

(2) Hypnosis Interview. In accordance with the guidelines of Orne, Soskis, Dinges, and Orne (1984) for conducting an hypnosis interview, the subjects in this condition first were to be asked to describe the film in their own words prior to any hypnosis induction. The interviewer then was to perform an hypnosis induction, and subsequently ask the witness to restate what he or she remembered from the film, followed in turn by any specific questions about the film based on the witnesses'

report. Only verbal responses were to be permitted; that is, no finger-movement responses were allowed.

To preserve realism, the interviewers were free to use whatever techniques they wanted to perform the hypnosis induction.

(3) Cognitive Interview. In this condition, the interviewers were to describe the four general memory retrieval techniques of the Cognitive Interview to the subjects before the questioning began. A four-item list of the techniques was placed in full view of the witness during the entire interview as a reference guide. Otherwise, the format of this interview was the same as that for the standard interview.

#### Procedure

Each subject participated in two sessions. During the first session, groups of 8-12 subjects each saw one of the four films. The subjects were asked to refrain from discussing the film among themselves. After the film, a graduate student trained in hypnosis from the Department of Psychology at UCLA informed all subjects about misconceptions concerning hypnosis and answered any questions. This presentation was based on our observations of presentations made by hypno-investigators in the field and on suggestions made by Reiser (1980) in his handbook on investigative hypnosis.

Approximately 48 hrs after viewing the film, the subjects were interviewed by the law enforcement personnel. Upon arrival at this second session, the subjects were assigned randomly to one of the three interview conditions (cognitive=33, hypnosis=30, and standard=26). Each interviewer questioned approximately five subjects during the course of the day, and each interviewer

interviewed at least one witness of each crime. Before each interview, the interviewer was told only the title of the crime scenario that had been witnessed by the subject (e.g., bank robbery).

#### Analysis of Protocols

Each tape recorded interview was transcribed by two of four different research assistants trained by the authors. The second listener filled in any information missed in the original transcription. The transcriptions of the tapes then were given to another member of the research team who categorized the information into three exhaustive lists for each film: persons, objects, and events. The persons category included physical appearance, clothing, mannerisms, and speech characteristics. The objects category included guns, knives, cars, and carried articles. The events category included movements, number of shots, interperson contacts, conversation, and general sequencing. These exhaustive lists were compiled and matched against the information contained in the four films for accuracy. Opinionated responses, such as "the suspect was nervous," were not scored and were deleted from the lists.

This catalogue of information then was used to score each subject's transcribed report for (1) the number of correct bits of information recalled, (2) the number of incorrect bits of information generated (e.g., the wrong hair color of a suspect), and (3) the number of confabulated bits of information generated (e.g., a description of a suspect's face when the face was not shown in the film).

#### Results and Discussion

The statistical analyses have been omitted from this report

for brevity; they appear in the journal articles as cited.

### Memory Performance Measures

Table 1 presents five performance measures as a function of the type of interview procedure. Both the Cognitive and hypnosis interviews elicited a greater number of correct items of information than the control interview, and the cognitive and hypnosis interviews did not differ. The number of incorrect items of information generated was not different across the three types of interview, with the average error rate being 16%. In sum then, the enhanced recall with the Cognitive and hypnosis interviews reflects more effective memory retrieval and cannot be interpreted as causing the witnesses to simply report more information, both correct and incorrect (Dywan & Bowers, 1983). The number of confabulated items also was not different across the types of interview. As can be seen in Table 1, given our definition of a confabulated item of information, few subjects confabulated in any of the interview conditions.

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Insert Table 1 about here  
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The results for the cognitive interview closely replicate those obtained by Geiselman et al. (1984), in which subjects were interviewed about a classroom intrusion using a structured questionnaire. In both experiments, a greater number of correct items of information were generated with the cognitive interview than with the control interview, and without an increase in the number of incorrect items.

While the present study showed enhanced memory with the hypnosis interview, the effects of hypnosis on memory recall are

debated. In studies where emphasis has been placed on experimental control, hypnosis procedures often have been shown either to not affect memory performance or they have been found to lead to more incorrect information (Orne et al., 1984). There are many differences between the present design and those of previous studies, and further research is required to specify the factors responsible for the differences in outcome. We believe the principal candidate factors to be: the nature of the materials (other studies most often have used wordlists), the interactive nature of the interviews (other studies most often have used questionnaires), and the population of interviewers (other studies have failed to specify the qualifications of the hypnotists). The present equality of performance observed with the cognitive and hypnosis procedures is consistent with Timm's (1953) speculation that the memory enhancement effects of the hypnosis interview lie in its memory guidance components.

Virtually no leading questions (questions containing "given" information that was not provided by the witness) were asked by the present interviewers in any of the conditions. Even though most interviewers questioned more than one witness from at least one of the crime scenarios, only one question in the 89 interviews was identified as clearly leading the witness. Given that, to our knowledge, the present study is the first to record and analyze the interviews of experienced law-enforcement investigators, this outcome itself is an important normative result. In contrast, Yuille (1984) reported the results of a survey in which a significant percentage of Canadian police personnel agreed that "direct (often leading) questions must be asked so that the witness is reminded of relevant facts" (p.

20). It is possible, therefore, that the present population of interviewers exhibited exceptional interviewing skills. Another possibility is that the interviewers were exceedingly careful in conducting the interviews because they were aware of being observed. Although this possibility would be difficult to test empirically, it does not appeal to the authors because such conservatism would have suppressed differences between the interview conditions and there were no obvious indications that the interviews were stilted.

#### Number of Questions Asked

Fewer questions were asked in both the cognitive (54.90) and hypnosis (34.82) conditions than in the standard condition (68.90). Thus, the memory enhancement achieved with the cognitive and hypnosis procedures cannot be explained in terms of the interviewers asking more questions. To the contrary, the cognitive and hypnosis techniques were more efficient (0.75 and 1.09 items correct per question, respectively, versus 0.42 items correct per question in the standard condition).

#### Gender of Eyewitness

The gender of the eyewitness was found to be unrelated to: (a) the number of correct items generated; (b) the number of confabulated items generated; and (c) questioning time. The only significant difference was found in the number of incorrect items generated: males generated a greater number of incorrect items than females (7.12 versus 4.92). Given that this result was not accompanied by an increase in correct information, the conclusion is that the females exhibited superior memory performance.

#### Recall of Critical Facts

The preceding analyses of the memory performance data were

carried out irrespective of the relative importance of the information that was generated across the interview conditions. Therefore, 20 facts from both the bank robbery and liquor-store holdup films, where differences in overall memory performance were observed, were chosen for selective scoring as the most important items of information from those crime scenarios. The lists of critical facts were generated independently by 5 members of the research staff and these lists were discussed and merged in a subsequent meeting of the entire group. Then, the protocols from the subjects were scored for the 20 critical facts.

As in the overall analysis, both the cognitive and hypnosis procedures led to the recall of more correct items than did the standard interview. Thus, the cognitive and hypnosis interviews were successful in the enhancement of eyewitness memory for the most critical facts, not merely for minor facts.

#### Conclusions

The major finding of this study is that both cognitive retrieval methods and techniques inherent in the forensic use of hypnosis are effective for the enhancement of eyewitness memory retrieval in the police interview. We believe these effects to lie in the guided memory search components of the Cognitive and hypnosis interviews. Both of these procedures encourage the eyewitness to mentally reinstate the contextual elements that were present at the time of the crime. In addition, the hypnosis procedure frequently draws upon a videotape replay analogy with "fixed-frame" and "zoom-in" capabilities (Reiser, 1980). It is plausible that this technique, in effect, simulates components of the no-edit and varied retrieval perspectives methods from the Cognitive Interview. In contrast, the standard interview as

observed here consists mainly of repeated attempts to recall the target information, each time in the same way without supplemental memory retrieval guidance.

The present results are not consistent with an interpretation that would attribute the enhancement of memory performance to heightened subject or interviewer motivation. First, it was our impression that the subjects in all conditions were well motivated in the experiment. The majority of the subjects in all conditions role played in answering the questions. Second, the interviewers were given a description only of the interview condition in which they were to participate. Furthermore, the the average number of questions asked was smaller in both the cognitive and hypnosis conditions than in the standard condition. These results would appear to contradict any interpretation where the quality of the interviews is hypothesized to have been inadvertently manipulated by the interviewers. Third, there is no evidence that memory retrieval performance is improved with greater motivation in any case (Weiner, 1966). Finally, and most important, the effects of the cognitive and hypnosis interviews were specific to the generation of correct items of information. If the subjects were simply giving the interviewers more information to be more helpful, then the number of incorrect items should have increased as well.

### Experiment 2

Experiment 2 (Geiselman, Fisher, MacKinnon, & Holland, 1985b) was conducted to expand the generalizability of the effectiveness of the Cognitive Interview in an important way, to a non-student population. An argument could be made that the Cognitive Interview would be less effective with non-students

because non-students are less practiced at using memory search strategies; all of the research on the retrieval methods used in the Cognitive Interview has been carried out with college students. A competing argument could be made that the Cognitive Interview would be more effective with non-students either because: (a) students are poorer observers due to their "preoccupation with competing thoughts" (McCarty, 1960), and thus much information is not stored for later retrieval in any case; or (b) students are more likely to know about and use retrieval techniques without being instructed to do so, and thus control subjects carry out their own version of the Cognitive Interview.

#### Method

##### Subjects

Fifty-one subjects were recruited from advertisements placed in a local paper and announcements posted at various locations at the University of California, Los Angeles. College students were excluded from the study. The participants were from a variety of occupations, such as custodian, secretary, laboratory assistant, and maintenance man.

Before agreeing to participate in the study, all subjects were informed that they would be viewing a film depicting a violent crime and that they would be interviewed about the contents of the film by an experienced law enforcement professional. Although these subjects knew in advance that they would be tested, the Cognitive Interview was effective in the Geiselman et al. (1984) study where no advance warning of a classroom intrusion was given. Furthermore, the present crime scenarios are sufficiently complex such that we have found an advance warning to be of little importance. Each subject was

offered \$20.00 for their participation.

#### Demographic Characteristics of the Sample

The demographic characteristics of the subjects varied as follows: The ages ranged from 20 to 52 with an average of 31.6 years; there were 32 males and 19 females; 66% were Caucasian; 25% had an annual income below \$10,000, 55% earned between \$10,000 and \$20,000, 20% earned above \$20,000; and 53% had received a college education. (The socioeconomic data were not provided by 3 subjects.) The composition of this sample accurately reflects the population of California, as per available census data, with the exception of education. Approximately 20% of the California population in the present age range have received a college education. However, the level of education in the present sample ranged between tenth grade and a college Masters degree. Thus, we were able to analyze the potential influence of level of education on the memory performance variables. We also examined the relations between each of the other demographic variables and memory performance.

#### Interviewers

The interviewers were recruited from various police departments in southern California. The final group of interviewers consisted of 9 male police detectives. Each interviewer had considerable field experience with hundreds of cases. Each interviewer was offered a \$50.00 honorarium for their participation.

Only one of the 9 interviewers had seen one of the stimulus films described below, and over three years had passed since that exposure. The performance measures for the 3 interviews that might have been affected were not noticeably different from those

found in the other interviews within the same condition.

### Materials and Apparatus

Films. The two films used in this experiment were the bank robbery and liquor-store holdup scenarios that were also used in Experiment 1. The films were projected onto a 9-by-9 ft screen using a 35 mm projector equipped with 4-track non-optical sound. Both films were shown in the same large lecture hall.

Interview Environment. The interviews were conducted at the Center for Computer-Based Behavioral Studies (CCBS) in the Department of Psychology at the University of California, Los Angeles. Among the facilities at CCBS are separate cubicles (approximately 6-by-6 ft) such that several interviews can be carried out simultaneously in an undisturbed fashion. All interviews were audio recorded on standard cassette player/recorders and the subjects wore lapel microphones.

### Interview Conditions

Three weeks prior to the interviews, each interviewer received instructions for one, and only one, of the following two interview procedures:

Standard Interview. These interviewers were told to use the questioning procedures that they normally would use. The only restriction was that each "witness" was to be asked first to describe in their own words what they remembered. Then, and only then, were the interviewers to ask any specific questions about the film based on the witnesses' report. Just prior to conducting the interviews, these interviewers participated in a 20-min training session where standard interview techniques were reviewed and discussed.

Cognitive Interview. In this condition, the interviewers

were given a description of the four general memory retrieval techniques used in the Cognitive Interview and were instructed to describe these four retrieval methods to the subjects (witnesses) prior to the narrative report. In addition, a four-item list of the techniques was placed in full view of the witness during the entire interview as a reference guide.

As was the case in the standard interview condition, these interviewers participated in a 20-min training session conducted by the researchers just prior to the interviews. During that session, the five specific memory-recovery techniques were presented that could be used by the interviewers, when appropriate, to elicit specific information after the narrative portion of the interview had been concluded.

#### Procedure

Each subject participated in two sessions. During the first session, groups of 8-12 subjects each saw one of the two films. The subjects were asked to refrain from discussing the film among themselves.

Approximately 48 hrs after viewing the film, the subjects were interviewed by the police detectives. Upon arrival at this second session, the subjects were assigned randomly to one of the two interview conditions (cognitive = 33, standard = 18). The subjects were interviewed individually in separate rooms. Each interviewer questioned approximately six subjects during the course of the day. Before each interview, the interviewer was told only the title of the crime scenario that had been witnessed by the subject (e.g., bank robbery).

#### Analysis of Protocols

The transcription and scoring of the interviews was the same

as that carried out in Experiment 1.

### Results and Discussion

#### Memory Performance Measures

Six summary performance measures are presented in Table 2 for each of the two types of interview.

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Insert Table 2 about here.  
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Eyewitnesses who received the Cognitive Interview recalled an average of 6.09 more correct items than the eyewitnesses who received the standard interview. This outcome represents an increase in recall of over 17% and provides a third replication of the success of the Cognitive Interview for enhancing eyewitness memory. The gain in correct information cannot be interpreted in terms of the witnesses' adopting a more lenient criterion for reporting information because, as in our previous studies, there were no differences in the number of incorrect items generated. The average error rate across subjects was 18%. The number of confabulations also did not differ between the two interview conditions.

The number correct measure also was examined as a function of the order in which the subjects were interviewed by each interviewer. The reports of the second or third witnesses to be interviewed about a given crime could have been influenced by the interviewer on the basis of information learned from the earlier interviews. If so, then it would be important to assess whether the magnitude of the order effect was more pronounced in the Cognitive Interview condition. The average number correct across interviewers and films for the first through the third subjects

interviewed was 32.75, 37.5, and 37.5 for the standard police interview and 39.2, 40.6, and 40.4 for the Cognitive Interview. (These data are based on 4 complete sets of 3 interviews in the standard interview condition and 5 complete sets of 3 interviews in the Cognitive Interview condition.) Thus, although the first subjects to be interviewed recalled somewhat less information than the subjects interviewed subsequently, this trend was less pronounced with the Cognitive Interview.

#### Nature of the Questioning

Table 2 also presents the average total time that the interviewers spent questioning the witnesses, excluding any intervals spent in casual conversation or in the cognitive methods training. Questioning time was not different for the two types of interview, and therefore the enhanced recall with the Cognitive Interview cannot be attributed to more time spent questioning the witness.

Also, more questions were asked in the standard police interview condition. Thus, the Cognitive Interview was more efficient. The standard interview, as observed here and by Geiselman et al. (1985), typically consists of repeated attempts to recall the target information, each time in the same way without retrieval guidance.

With the Cognitive Interview having generated more correct information on the basis of fewer questions, it was possible that "one can obtain more accurate and complete information in interviews through simply listening" (Miner, 1984). This interpretation was evaluated by computing the correlation (across subjects within each interview condition) between the number correct measure and the number of questions asked per unit time.

This correlation was computed to be  $-.05$  in the Cognitive Interview condition and  $+.10$  in the standard interview condition. Thus, there is no evidence in these data that recall performance is improved simply through listening.

Also shown in Table 2 is the average number of leading questions asked. A leading question was defined as containing "given" information about persons, objects, or events that was not provided previously in the interview by the witness. The number of leading questions asked was the same in the two interview conditions, and the absolute number of leading questions asked was low (20 in 51 interviews). However, virtually no leading questions were observed in Experiment 1 (only 1 in 89 interviews). The reason for this departure is not clear, but in any case, there is no indication that the Cognitive Interview procedures contributed differentially to the interviewers asking leading questions.

#### Level of Education

As noted in the Method section, the only measured demographic variable for the present sample that did not adequately reflect the California population was level of education. Fifty-one percent of the present subjects had received a college education. Thus, it was possible to block on the level of education factor (college education versus no college education) to determine whether the Cognitive Interview was as effective for individuals with lesser education as for college educated subjects. The means for this breakdown of the data are presented in Table 3. As can be seen,

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Insert Table 3 here.  
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### Age and Socioeconomic Factors

As noted by Yarmey (1979), the effects of age and socioeconomic factors on eyewitness performance have not been thoroughly researched. Given the variety of subjects studied here, the effectiveness of the Cognitive Interview was further evaluated as a function of age and three socioeconomic factors: Ethnic group (Caucasian versus minority group), annual income, and level of education. It was found that the recall of correct information was not related to any of these variables in either interview condition.

### Experiment 3

With the success of the Cognitive Interview established in Experiments 1 and 2, the purpose of Experiment 3 (Geiselman et al., 1985b) was to evaluate the success of two of the four general retrieval methods that comprise the technique. It was possible that one or more of the mnemonics used in the interview are not effective and could be eliminated to shorten the procedure. The two methods that were not examined here could be accepted as effective without further tests because numerous instances of their success were observed directly in the tape-recorded interviews from the previous experiments. These are the varied-orders and different-perspectives techniques. Furthermore, the varied-orders technique was shown to be effective on its own for generating different items in an eyewitness-memory experiment reported by Mingay, Dennett, and Bekerian (in press).

Direct evaluation of the reinstate-context and be-complete methods is more difficult because their use cannot be isolated in

tape-recorded interviews. That is, the moment-to-moment use of those methods by the eyewitnesses cannot be charted precisely. Thus, in Experiment 3 the success of the reinstate-context and be-complete techniques was compared independently to a control condition, where the subjects were told simply to recall as much as they could, and to the full Cognitive Interview.

#### Method

Subjects. Sixty undergraduates from the introductory psychology course at the University of California, Los Angeles, volunteered for the experiment in exchange for course credit.

Stimulus Materials. The subjects were shown a videotape version of the film of a staged bank robbery that was used in Experiment 1. The videotape was shown on a 25-inch monitor screen.

Procedure. The subjects participated in groups of 8 to 10. Approximately 5 min after the videotape was presented, each subject was given two pages containing 50 lines for purposes of recalling what they saw and heard, along with one of three sets of instructions. Fourteen subjects received the control instructions: "We would like you to write down as many of the facts as you can remember about the film you just saw. Please put each fact you can remember on a separate line. Do not worry about writing down some things out of order. Write down the facts as they come to you, but write legibly." Fifteen subjects received the reinstate-context instructions in addition to the control instructions: "Before you begin, reinstate in your mind the context surrounding the incident. Think about what the surrounding environment looked like at the scene, such as rooms, the weather, any nearby people or objects. Also, think about how

you were feeling at the time and think about your reactions to the incident." Sixteen subjects received the be-complete instructions in addition to the control instructions: "Some people hold back information because they are not quite sure that what they remember is important. Please do not edit anything out. Please write down everything, even things you think may not be important. It is necessary that you be complete." The remaining 15 subjects received instructions for all four of the methods that comprise the Cognitive Interview.

All subjects were given 20 min to write their account of the bank robbery. Each recall protocol was scored for accuracy against a catalog of correct information about the videotape compiled by Geiselman et al. (1985a). The scoring was carried out by a laboratory assistant who was blind as to the instruction condition for each protocol.

#### Results and Discussion

The performance means are presented in Table 4. Both the reinstate-context and be-complete methods led to significantly more correct items of information being recalled than the control instructions, and the full Cognitive Interview led to significantly more correct items being recalled than either of the two methods alone. The three conditions did not differ significantly on the number of incorrect items generated; but the absolute number of incorrect items was greater in the control condition where no memory retrieval techniques were used.

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Insert Table 4 here  
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On the basis of these results, we conclude that both the

reinstate-context and be-complete methods are useful and should be retained in the Cognitive Interview, together with the varied-orders and change-perspective methods that could be evaluated directly in the previous tape-recorded interviews. The complete Cognitive Interview is more effective than one method used alone.

#### Experiment 4

The results of Experiments 1, 2, and 3 showed the Cognitive Interview to be effective for enhancing the completeness of eyewitness reports. As a tool for investigation, it seems clear that the Cognitive Interview will be useful. From a legal perspective, it is also important that the Cognitive Interview be generally accepted as a reliable tool by the scientific community (Frye versus U.S., 1923). That is, it is important to demonstrate that not only is the Cognitive Interview an effective and reliable, memory-enhancement device, but that it is free of technical problems potentially associated with memory retrieval.

Two criticisms of forensic hypnosis that are relevant to this issue are (a) hypnosis induces the eyewitness to lower his/her criterion for reporting information, thus producing inaccuracies and confabulations, and (b) hypnosis heightens the negative effect of misleading questions on eyewitness memory (Sanders & Simmons, 1983; Zelig & Beidleman, 1981). We are confident that the first criticism does not apply to the Cognitive Interview, as it has been shown in each of our three previous studies to enhance the completeness of eyewitness reports without an accompanying increase in inaccurate information. The aim of Experiment 4 (Geiselman, Fisher, Cohen, Holland, & Surtes, 1985) was to assess the effect of the

Cognitive Interview on eyewitness responses to misleading questions.

Although the interviewers in our previous studies asked few questions on their own that were clearly misleading or leading, Yuille (1984) reported that a significant percentage of Canadian police detectives believe that leading questions must be asked to produce reasonably complete reports. Thus, the effect of the Cognitive Interview on eyewitness responses to misleading questions should be assessed to more fully establish the usefulness of the technique as an investigative tool.

There are two possible ways in which the Cognitive Interview might influence the recollection of details about which misleading information has been presented. On the one hand, the interview might produce a strong bond between the interviewer and the witness, as is suspected with the hypnosis interview, and therefore the witness is more easily misled by the cognitive interviewer. On the other hand, arguments can be made that the Cognitive Interview should reduce a subject's susceptibility to misleading questions. First, if a misleading question serves to create a second memory that co-exists with the original one (Berkerian & Bowers, 1983) rather than replaces the original one (Greene, Flynn, & Loftus, 1982; Loftus, 1979), then reinstatement of the original context with the Cognitive Interview should lead the subject to retrieve the original (correct) memory. Or, because of more complete memory retrieval with the Cognitive Interview, the Cognitive Interview might prevent the replacement of the original (correct) memory in the first place, at the time the misleading questions are asked.

Method. The subjects were 42 undergraduate students

recruited from introductory psychology classes at the University of California, Los Angeles.

A staged incident was carried out during the first meeting with the subjects by three research assistants from the Theater Arts Department at UCLA. A female played the role of an experimenter from the psychology department and two males played the roles of intruders. The experimenter greeted the students upon arrival and informed them that they would be expected to memorize a long list of words. The words were projected one at a time onto a screen at the front of the room. After approximately 20 slides had been presented, the two males entered the room and turned on the lights. One intruder pushed a cart that held a tape recorder and a typewriter. The other intruder carried a backpack with a yellow cord hanging out of it and stated that they were there to pick up the projector because it was scheduled to be used by a professor. A verbal exchange ensued between the intruders and the experimenter in which several bits of key information were presented. Despite objections by the experimenter, the intruders put the projector on their cart and left. The entire incident lasted between 45 sec and 1 min.

Each subject returned 48 hrs after observing the incident and was assigned randomly to one of two groups. The two groups of subjects were taken to different rooms. At that time, both groups were asked to recall as much information as they could about the incident. Each subject in each group was given a printed test booklet that was to be used to record the information they recalled. The group that received the Cognitive Interview was first instructed in the use of the four memory retrieval methods to aid their recall as described in Experiment

1.

At the beginning of the specific-questions phase of the interviews, which immediately followed the narrative phase, space was provided in the response booklets for the answers to 3 questions. For each subject, one of these questions contained misleading (incorrect) information, another contained leading (correct) information, and the remaining question served as the control, containing no supplemental information. (The present distinction between leading and misleading questions has been labeled by other researchers as consistent versus inconsistent information questions -- e.g., Loftus, 1979.) The target items were: A name (Dr. Henderson) that was mentioned by one of the intruders, the nature of the trousers (tan slacks) worn by one of the intruders, and the color of a backpack (blue) carried by the other intruder. As an example, the 3 versions of the question referring to the backpack were as follows: Leading version, "Describe whether anything was hanging out of the blue backpack carried by the guy who talked the most." Misleading version, "Describe whether anything was hanging out of the green backpack carried by the guy who talked the most." Control (no-information) version, "Describe whether anything was hanging out of the backpack carried by the guy who talked the most." Only one of the three versions of each question was asked of a given subject. The misleading information for the name and trousers questions was Dr. Davidson and brown corduroys, respectively.

Following those 3 questions, additional specific questions were presented in the test booklet as filler items. At the end of each of the interviews, space was provided for the answers of 3 questions designed to assess the impact of the

leading/misleading questions manipulation. Immediately prior to asking these questions, the experimenter in the Cognitive Interview condition briefly reviewed the 4 general techniques for the subjects. Subjects in the standard interview condition waited for a comparable period of time (1 min). Then, the questions were read as follows: "What was the color of the backpack carried by one of the intruders?" "What was the name of the doctor who was mentioned?" "Describe the trousers worn by the intruder who pushed the cart?"

Results and Discussion. The results are presented in Table 5. The proportion-correct data illustrate the considerable influence of misleading questions on the accuracy of eyewitness reports. The subjects gave the correct answer to the control question roughly half the time, but they gave the correct answer after being misled only about one-tenth of the time. However, the important aspect of the present data is that the Cognitive Interview not only did not increase the negative effect of misleading the witness, but it decreased both the effects leading and misleading questions by 10% each (see the top and bottom panels in the left-hand column of Table 5).

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Insert Table 5 here.  
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The number-correct data with leading questions represent the first instance in all of our research where the Cognitive Interview led to a lower probability of recall than the standard interview, but this is as should be the case. This result is understandable when the "dont know" data are considered. Some of the subjects who were given the Cognitive Interview searched

their memories and could not find the answers to the questions. Some of these subjects, then, answered that they did not know the answer. The subjects who were not given the Cognitive Interview answered with the information that had been inserted (see the bottom panel in the second column of Table 5), which happened in this case to be correct.

Thus, unlike what has been claimed by some researchers to be the case with forensic hypnosis, the Cognitive Interview did not heighten eyewitness responsiveness to misleading or leading information embedded in questions. To the contrary, the data suggest that the Cognitive Interview may insulate some subjects from the negative effects of misleading questions on accurate recall.

An important theoretical question is whether the Cognitive Interview sometimes prevents the replacement of the original (correct) memory in the first place (assuming that replacement would otherwise occur), or whether the Cognitive Interview sometimes guides the eyewitness to the original memory that naturally co-exists with the memory created from the leading/misleading questioning. First, 30% of the subjects who received the Cognitive Interview offered unsolicited comments that the experimenter had tried to mislead them. Only 5% of the other subjects offered such comments. This suggests that the subjects in the cognitive condition were not simply guided back to an intact original memory without retrieving memories created by the interviewer. However, the data from the leading-question manipulation would appear to support the co-existence theory. Given that the information inserted in the leading questions happened to be correct, there was no inconsistency that the

Cognitive Interview could have detected at the time the leading question was asked. The new information should have become part of any subject's memory that did not yet contain the target information. Instead, it would appear that two memories sometimes were created. When some subjects retrieved the original memory using the Cognitive Interview, the target information was not found; hence, they reported that they did not know the answer. Further research is required to test the replacement versus co-existence hypotheses.

#### GENERAL CONCLUSIONS

The purpose of this research was to identify and develop interview methods based on current memory theory to enhance the completeness and accuracy of eyewitness reports, and to test these methods empirically under controlled, yet realistic circumstances. Both general and specific memory jogging and memory guidance techniques were identified and were combined to form the Cognitive Interview. The Cognitive Interview was found to be effective with non-student, lesser educated witnesses as well as with college students; and each technique comprising the Cognitive Interview was found to be effective independently. Furthermore, the Cognitive Interview effectively reduced the negative consequences of asking misleading questions on subsequent witness recall.

It is instructive to note that the Cognitive Interview can be learned and applied with little training. The interviewers who carried out the Cognitive Interviews in Experiments 1 and 2, for example, studied a two-page description of the cognitive methods and participated in a 15-20 min discussion prior to conducting the interviews. In addition to the savings in

training time, Experiment 1 showed that less time is required on average to instruct a witness in the general cognitive methods (6.7 min) than to perform an hypnosis induction (27.1 min). Thus, eyewitnesses can learn the methods quickly so as to save valuable time for the investigators, who often have demanding case loads.

Experiments 1 and 2 evaluated the Cognitive Interview under more realistic circumstances than those employed in the preliminary test of the Cognitive Interview by Geiselman et al. (1984). The stimulus materials were selected and presented to enhance the arousal of the witness; an interactive questioning format was followed; and the interviews were carried out by experienced law enforcement personnel. The importance of validating laboratory data on eyewitness phenomena under more natural conditions has been stressed by other authors (Malpass & Devine, 1980; Monahan & Loftus, 1982; Reiser, 1980). The discrepancy between the memory enhancement qualities of forensic hypnosis observed here and results typically obtained under more artificial conditions underscores the importance of this validation. There still are major differences between the present laboratory setting and a real-world crime. For example, the element of personal involvement can never be achieved completely in studies of this type. However, it is interesting to note that the majority of the present subjects responded to the questions using personal pronouns, in a role-playing manner, as if they had actually experienced the crime. Nevertheless, the effectiveness of the Cognitive Interview relative to the hypnosis interview in cases of severe trauma to a victim remains to be evaluated in the field. Another potentially important factor is

the element of surprise (Murray & Wells, 1982). The present subjects knew that they eventually would be questioned about what they saw in the films. Nevertheless, the results that were obtained here with the cognitive interview are consistent with those reported by Geiselman et al. (1984) in which the subjects' memories were incidental.

Future effort will be to draw the program to its logical conclusion, namely to implement and evaluate the expanded and refined version of the Cognitive Interview in the field. Although the present results are encouraging, the skills of the interviewer may be a major variable in the success of the technique. Field research may provide important and necessary insights for effective training and use of the Cognitive Interview.

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Table 1  
Facts Recalled With the Three Types of Interview

	Type of Interview	
	Cognitive	Standard
Number Correct	41.15	29.40
Number Incorrect	7.30	6.10
Number Confabulated	0.70	0.40

Table 2  
Performance Measures for the Two Interview Procedures  
in Experiment 2

	Type of Interview	
	Cognitive	Standard
Number Correct	41.15	29.40
Number Incorrect	7.30	6.10
Number Confabulated	0.70	0.40
Question Time (min)	30.11	29.10
No. Questions Asked	76.73	93.06
No. Leading Questions	0.15	0.83

Table 3  
Recall Performance as a Function of Type of  
Interview and Level of Education

	College		No College	
	Cognitive	Standard	Cognitive	Standard
Number Correct	42.23	35.33	40.50	35.86
Number Incorrect	8.14	8.22	9.90	8.36
Number Confabulated	1.59	3.33	1.79	1.29

Table 4  
Recall Performance as a Function of Instructions

	Instructions			
	Cognitive Interview	Reinstate Context	Report Everything	Control
Number Correct	27.67	23.33	23.69	17.71
Number Incorrect	1.07	1.53	1.00	2.21

Table 5  
 Proportion of Subjects Giving Each Type of Answer  
 to the Target Questions

Type of Question	Type of Answer			
	Correct	Misleading Alternative	Other Alternative	"Don't Know"
Leading				
Cognitive	.55	.09	.05	.31
Standard	.65	.05	.10	.20
Control				
Cognitive	.55	.05	.13	.22
Standard	.50	.05	.25	.20
Misleading				
Cognitive	.15	.49	.05	.31
Standard	.05	.60	.10	.25