Enhancement of eyewitness memory with the cognitive interview

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This research evaluated an innovative interview procedure, the cognitive interview, that was designed to aid eyewitnesses recall the details of crimes. Experiment 1 was conducted to examine the success of the cognitive interview in a nonstudent population. Fifty-one nonstudent volunteers viewed police training films of simulated violent crimes and were questioned individually in interactive interviews 48 hr later by experienced law-enforcement personnel. The cognitive interview elicited significantly more correct information from the subjects than did the standard police interview, and without an accompanying increase in incorrect information or confabulation. Experiment 2 was designed to separate the cognitive interview into its constituent parts and to evaluate the success of each mnemonic. It was concluded that all four general mnemonics contained in the interview (two increasing feature overlap between encoding and retrieval contexts; two encouraging use of many retrieval paths) are useful and should be retained. The cognitive interview is a viable memory-enhancement technique that is effective, efficient, and legally acceptable.

A critical component of effective law enforcement is the ability of police investigators to obtain accurate and detailed information from eyewitnesses. One experienced judge has stated that incorrect eyewitness identifications have led to more miscarriages 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 a Rand Corporation survey (1975), more than half of the police departments that were polled reported that they had no formal training whatsoever for newly appointed investigators. Typically, investigators must rely on the limited interview techniques
acquired during their initial recruitment training, and through on-the-job experience and intuition.

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, 1983; Loftus, 1975, 1979; Loftus, Miller, & Burns, 1978; Wells, Ferguson, & Lindsay, 1981). The purpose of our research, therefore, is to identify and develop methods to enhance the completeness and accuracy of eyewitness reports and to test these methods empirically in controlled, yet ecologically valid, laboratory settings.

The theoretical underpinnings that have guided our thinking are based on two generally accepted principles of memory: (a) The memory trace is composed of several features (Bower, 1967; Wickens, 1970), and the effectiveness of a retrieval cue is related to the amount of feature overlap with the encoded event (Flexser & Tulving, 1978); and (b) there may be several retrieval paths to the encoded event, 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, the cognitive interview, that consists of four general retrieval mnemonics. Of these, two attempts to increase the feature overlap between encoding and retrieval contexts by (a) mentally reinstating the environmental and personal context that existed at the time of the crime (Bower, Gilligan, & Monteiro, 1981; 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 the retrieval through feature overlap of information that is important. The other two mnemonics encourage using many retrieval paths by (c) recounting the events in a variety of orders (Burns, 1981; Whitten & Leonard, 1981), and (d) reporting the events from a variety of perspectives (Anderson & Pichert, 1978; Firstenberg, 1983).

Mentally reinstating the context that surrounded a to-be-remembered event has been shown to be a powerful memory aid in numerous laboratory experiments. This technique is easier to carry out than to physically return to the scene of a crime, and it may be preferable given that the scene of a crime could change over time. Asking the
witness to provide complete memories has two positive effects. First, some people may not have a good idea of what has investigative value. Second, the act of being complete may lead to the elicitation of important facts that occurred simultaneously with the unimportant details. Although the events should be recalled initially in the order in which they occurred, recalling the events in reverse order serves to force the witness to examine the memory record, looking for benchmarks to facilitate the backward recall. When events are recalled in forward order, some people reconstruct what must have happened based on prior knowledge of similar crime scenarios. This could lead to incomplete or inaccurate reports. Mentally changing perspectives while recalling an event also enhances the completeness of reports. In some cases, witnesses have a variety of perspectives on an incident, but may report what they remember from a unitary, static perspective.

In addition to the four general mnemonics, five specific techniques were developed that could be used by an investigator to elicit specific items of information after the narrative phase of an interview has been conducted. These specific mnemonics are described below in the Method section.

The cognitive interview was evaluated positively in a preliminary experiment conducted by Geiselman et al. (1984). In that research, actors disrupted a classroom situation, and students were interviewed subsequently as eyewitnesses via a questionnaire. Students who were instructed in the four general retrieval mnemonics 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. Furthermore, the cognitive interview showed none of the drawbacks sometimes found 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. Although 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 interview.

To enhance the ecological validity of our tests of the cognitive interview, the present authors conducted a second study in 1985 in which (a) the stimulus materials were emotionally arousing Los Angeles Police Department (LAPD) training films of simulated crimes, and (b) the eyewitness recall protocols were collected using interactive interviews rather than fixed questionnaires, and the interviews were conducted by experienced law-enforcement personnel. This study also extended the earlier work by comparing the cognitive interview with the hypnosis interview and with the standard police interview. Eighty-
nine subjects were interviewed, generating over 120 hr of recorded interviews for analysis.

Both the cognitive interview and the hypnosis interview elicited significantly more correct information from the subjects than did the standard police interview. This result, which was found even when only the most critical facts from the films were scored, was most pronounced for crime scenarios in which the density of events was high. The amount of incorrect and confabulated information generated did not differ across the three interview conditions. Neither differential questioning time nor heightened subject or interviewer motivation could explain the results.

Although the cognitive and hypnosis procedures were equally effective, the cognitive interview can be learned and applied with relatively little training. In addition to the savings in training time, the results showed that much less time was required to instruct a witness in the general cognitive mnemonics than to perform a hypnosis induction. Perhaps most important, the cognitive interview circumvents the present legal problems that surround forensic hypnosis (People v. Shirley, 1982).

EXPERIMENT 1

Experiment 1 was conducted to expand the generalizability of the effectiveness of the cognitive interview to a nonstudent population. An argument could be made that the cognitive interview would be less effective with nonstudents because nonstudents are less practiced at using memory search strategies. Moreover, all of the previous research on the retrieval mnemonics used in the cognitive interview was carried out with college students. A competing argument could be made that the cognitive interview would be more effective with nonstudents either because (a) students are poorer observers because of their "preoccupation with competing thoughts" (McCarty, 1960), and thus they fail to store potential information for later retrieval, or (b) students are more likely to know about and use retrieval mnemonics 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 had proven effective in the Geiselman et al. (1984) study where no advance warning of a classroom intrusion had been given. Furthermore, the present crime scenarios were sufficiently complex to make advance warning of little importance. Each subject was offered $20.00 to participate.

Demographic characteristics of the sample

Subjects were 20 to 52 years of age ($M = 31.6$ 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% above $20,000; and 53% had received a college education. (Socioeconomic data were not provided by 3 subjects.) The composition of this sample accurately reflects available census data on the population of California, with the exception of education. Approximately 20% of the California population in the present age range has received a college education. However, the level of education in the present sample ranged between 10th grade and a Master’s degree. Thus, we were able to analyze the potential influence of level of education on the memory performance variables. We also examined the relation between each of the other demographic variables and memory performance.

Interviewers

Interviewers were recruited from various police departments in southern California, and the final group consisted of nine male police detectives. Each interviewer had considerable field experience with hundreds of cases. Each interviewer was offered a $50.00 honorarium to participate.

Only one of the nine interviewers had seen one of the stimulus films described below, and over 3 years had passed since that exposure. The performance measures for the three 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 borrowed from the LAPD training academy. 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 audiovisual scenario of a violent crime or crime situation that lasts approximately 4 min. The scenarios of the films are a bank robbery and a liquor store robbery. In each film at least two individuals are shot and
killed. The scenarios are realistic in that monitored physiological reactions of LAPD officers in training have been found to be comparable to reactions that would be expected in similar street situations. The films are rich in quantifiable information including person descriptions, mannerisms, weapons, and sequences of events.

The films were projected onto a 9' × 9' (2.74 M) screen using a 35-mm projector equipped with 4-track nonoptical 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' × 6' (1.82 M), 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 his or her own words the information remembered. Then, and only then, were the interviewers to ask any specific questions about the film based on the witnesses' report. This practice of asking the open-ended question 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).

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 mnemonics 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. The following descriptions of the techniques were read verbatim by the interviewer to the subject at the beginning of the interview.

1. **Reinstate the context:** Try to 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.

2. **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.
3. **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.

4. **Change perspectives:** Try to recall the incident from different perspectives that you may have had or adopt the perspectives of others that 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.

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, 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. These techniques were described as follows:

1. **Physical appearance:** Think about whether or not the suspect reminded you of anyone you know. If you were reminded of anyone, try to think of why. Was anything unusual about the physical appearance and/or clothing?

2. **Names spoken:** If you think 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. Try to think of the number of syllables. Please report partial information.

3. **Speech characteristics:** Think of whether the voice reminded you of someone else’s voice. Did the suspect sound educated?

4. **Conversation:** Think about your reactions to what was said and the reactions of others. Please report partial information. Were there any unusual words or phrases used?

5. **Numbers:** Was the number high or low? How many digits were in the number? Were there any letters in the sequence? Please report partial information.

**Procedure**

Each subject participated in two sessions. During the first session, groups of 8–12 subjects saw one of the two films. The subjects were asked not to discuss the film among themselves.

Approximately 48 hr 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 6 subjects during 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**

Each tape-recorded interview was transcribed by two of five different research assistants. The second listener filled in any information missed in
Table 1. Performance measures for the two interview procedures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cognitive</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. correct</td>
<td>41.67</td>
<td>35.58</td>
</tr>
<tr>
<td>No. incorrect</td>
<td>8.57</td>
<td>8.61</td>
</tr>
<tr>
<td>No. confabulated</td>
<td>1.88</td>
<td>2.17</td>
</tr>
<tr>
<td>Question time (min)</td>
<td>30.11</td>
<td>29.10</td>
</tr>
<tr>
<td>No. questions asked</td>
<td>76.73</td>
<td>93.06</td>
</tr>
<tr>
<td>No. leading questions asked</td>
<td>0.15</td>
<td>0.83</td>
</tr>
</tbody>
</table>

the original transcription. The information contained in each of the interviews was then compared with a template that categorized the information that actually appeared in each film into three lists: 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. Thus, each template contained separate and specific bits of information that would have some investigative value. Ancillary details were not scored. Opinionated responses, such as “the suspect was nervous,” also were not scored.

The templates were used to score each subject’s transcribed report for (a) the number of correct items of information recalled, (b) the number of incorrect items of information generated (e.g., the wrong hair color of a suspect), and (c) the number of confabulated items of information generated (e.g., a description of a suspect’s face when the face was not shown in the film). In the few cases where a subject changed a response during the interview, only the final response was scored. This scoring was carried out by five members of the research team, and each transcription was scored separately by two members. Disagreements were resolved at a meeting of the entire group.

Additional variables of interest were questioning time (total interview time excluding casual conversation and the retrieval methods training), total number of questions asked, and 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. Subject gender differences in performance also were examined.

RESULTS AND DISCUSSION

Memory performance measures

Six summary performance measures are presented in Table 1 for each of the two types of interview. Because interviewers were nested within conditions, a preliminary test was conducted to determine whether the scores differed reliably between interviewers within the
interview conditions. Three nested, random-effects analyses of variance (ANOVAs) were conducted on the number correct, number incorrect, and number confabulated dependent variables. The univariate $F$ with 7 and 42 degrees of freedom was computed to be less than 1.00 ($p > .55$) for both the number correct and number incorrect variables. Thus, the pooled error terms (the variance between subjects across interviewers within each interview condition) were used in those two between-interview comparisons to maximize the power of the tests (Winer, 1962, p. 207). The pooled error term could not be used for the number confabulated dependent variable, however, because there were reliable differences on that measure between interviewers, $F(7, 42) = 3.48, p < .005$.

The main effect for the number of correct items generated was significant, $F(1, 43) = 14.35, p < .001$. Eyewitnesses who received the cognitive interview recalled an average of 6.09 more correct items than 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, $F(1, 43) < 1$. This null result is unlikely to be a floor effect, because the average error rate across subjects was 18%. The number of confabulations also did not differ between the two interview conditions, regardless of whether the pooled or unpooled error terms were used (both $F$s < 1).

The three memory-performance measures also were analyzed as a function of the type of crime scenario (film) and gender. The crime scenario did not interact with the type of interview for any of the three measures (all $F$s < 1). There were no overall gender differences in recall performance, nor did gender interact with the type of interview, all $F$s(1, 43) < 2.38, $p > .13$. Thus, the memory enhancement qualities of the cognitive interview were robust across both sets of stimuli and across both genders of eyewitnesses.

An additional analysis of the number correct measure was conducted to determine whether the cognitive interview was more effective in the narrative or the specific-questions portion of the interviews. As is usually reported (e.g., Hilgard & Loftus, 1979), more correct items were obtained with the specific questions than from the narrative reports (22.5 vs. 17.3 items), $F(1, 45) = 6.11, p < .02$. This difference did not interact with the type of interview ($F < 1$). Thus, the effectiveness of the cognitive interview was not restricted to one
portion of the interview. This result replicates the finding of Geiselman et al. (1984) that the cognitive interview aids recall in both the narrative and specific-questions portions of an interview.

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 four complete sets of three interviews in the standard interview condition and five complete sets of three 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 1 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. The main effect for questioning time was not significant (F < 1), and therefore the enhanced recall with the cognitive interview cannot be attributed to more time spent questioning the witnesses.

The main effect for the number of questions asked was significant, F(1, 43) = 4.21, p < .05, but more questions were asked in the standard police interview condition (see Table 1). 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 1 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 main effect for this variable was not significant, $F(1, 49) = 2.97, p > .08$, and the absolute number of leading questions asked was low (20 in 51 interviews). However, virtually no leading questions were observed in our previous study (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. The number of leading questions asked did not increase as a function of the order in which the subjects were interviewed.

**Student vs. non-student eyewitnesses**

The procedures and films used in the cognitive and the standard interview conditions in the present study with nonstudents were the same as those used by Geiselman et al. (1985) with students. Thus, we were able to compare the present results with those from the bank robbery and liquor store hold-up scenarios of the previous experiment. First, the number correct measure was adjusted for each subject in each data set by subtracting that subject's number incorrect plus number confabulated. With this adjustment, the students recalled 4.2 more correct items on average than the nonstudents (33.39 vs. 29.18). However, the Interview Condition x Subject Population interaction effect was not significant, $F(1, 78) = 2.70, p > .10$. It therefore can be concluded that the cognitive interview was as effective for the nonstudents as for students.

**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. Of the present subjects, 53% had received a college education. Thus, it was possible to block on the level of education factor (college education vs. no college education) to determine whether the cognitive interview was as effective for individuals with lesser education as for college-educated subjects.

Three $2 \times 2$ ANOVAS were conducted on the number correct, number incorrect, and number confabulated dependent variables. The two factors were level of education (college education vs. no college education) and type of interview (cognitive or standard). The
cognitive interview was as effective for less-educated witnesses as for witnesses with a college education. The Type of Interview × Level of Education interaction was significant only for number confabulated, $F(1, 44) = 4.34, p < .05$. With college-educated witnesses, the number of confabulations was reduced when the cognitive interview was administered ($p < .05$), but with lesser educated witnesses, the number of confabulations was not affected significantly by the type of interview.

**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 vs. minority group), annual income, and level of education. For this evaluation, a multiple regression analysis was performed within each interview condition, with the number correct measure as the criterion variable and the age and socioeconomic factors as predictor variables. The recall of correct information was not related to any of the predictor variables in either interview condition (both $p$s > .60; all $r$s < .24).

**EXPERIMENT 2**

With the success of the cognitive interview established in Experiment 1, the purpose of Experiment 2 was to evaluate the success of two of the four general retrieval mnemonics that make up 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 mnemonics 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 (Geiselman et al., 1985; and the present Experiment 1). These are the varied-orders and different-perspectives mnemonics. Furthermore, the varied-orders technique was shown to be effective on its own for generating different items in a memory experiment reported by Loftus and Fathi (1985).

Direct evaluation of the reinstate-context and be-complete mnemonics 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 2 the success of the reinstate-context and be-complete techniques was compared independently with a control condition in
which the subjects were told simply to recall as much as they could and with the full cognitive interview.

METHOD

Subjects

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

Stimulus materials

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-in (9.8 cm) monitor screen.

Procedure

Subjects participated in groups of 8 to 10. Approximately 5 min after the videotape was presented, each subject was given two pages containing 50 ruled lines for purposes of recalling what they saw and heard, along with one of four 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 reinitstate-context instructions in addition to the control instructions: “Before you begin, reinitstate 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 mnemonics that constitute the cognitive interview as described in the Method section of Experiment 1.

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. (1985). The scoring was carried out by a laboratory assistant who was blind as to the instruction condition for each protocol.

Design and analysis

Two one-way ANOVAS were conducted, with the type of recall instructions (reinitstate-context, be-complete, full cognitive interview, control condition)
as the independent variable. The two dependent variables were the number of correct and number of incorrect items generated. Too few confabulated items were generated in this experiment for a meaningful analysis.

**RESULTS AND DISCUSSION**

The performance means are presented in Table 2. The main effect for type of interview was significant for the number of correct items recalled, \( F(3, 56) = 9.92, p < .001 \). Both the reinstate-context and be-complete mnemonics led to significantly more correct items of information being recalled than the control instructions \( (p < .01) \), and the full cognitive interview led to significantly more correct items being recalled than either of the two mnemonics alone \( (p < .05) \). The three conditions did not differ significantly on the number of incorrect items generated, \( F(3, 56) = 2.21 \), but the absolute number of incorrect items was greater in the control condition where no mnemonics were used.

On the basis of these results, we conclude that both the reinstate-context and be-complete mnemonics are useful and should be retained in the cognitive interview, together with the varied-orders and change-perspective mnemonics that could be evaluated directly in the previous tape-recorded interviews (Geiselman et al., 1985; and the present Experiment 1). The complete cognitive interview is more effective than one mnemonic used alone.

**CONCLUSIONS**

The purpose of this research was to develop and evaluate methods based on current memory theory to enhance the completeness and accuracy of eyewitness reports. To promote the ecological validity of our tests of the cognitive interview, we used stimulus materials of emotionally arousing films of violent crimes, tested eyewitnesses with interactive interviews, and had interviews conducted by experienced law-enforcement personnel. The present Experiment 1 extended the
generalizability of the memory-enhancement qualities of the cognitive interview in an important way, namely, to a nonstudent population. This validation is important because the retrieval mnemonics that constitute the cognitive interview were developed and previously evaluated only in student samples.

As in our previous work (Geiselman et al., 1985), the present results are not consistent with an interpretation that would attribute the enhancement of memory performance to heightened subject or interviewer motivation. First, the cognitive interview did not require more time nor were a greater number of questions asked. On the contrary, significantly more questions were asked in the standard condition. Thus, the cognitive interview was more efficient. Second, the interviewers were given a description only of the interview condition in which they were to participate. Third, based on unsolicited comments from the subjects, it was our impression that the majority of the subjects were highly motivated regardless of the interview condition. Fourth, there is no empirical evidence that heightened motivation affects retrieval processes in any case (Weiner, 1966). Fifth, and most important, the effect of the cognitive interview was specific to the generation of correct information. Given that no increase in the number of incorrect or confabulated items was elicited, the increase in correct information cannot be attributed to a simple shift in the witnesses’ criteria for responding to the questions.

The results of Experiment 2 indicate that both the reinstate-context and be-complete mnemonics should be retained in the cognitive interview together with the varied-orders and change-perspectives techniques. Thus, each general mnemonic in the procedure is useful. Although the interview should be as brief as possible, the technique as it presently exists is efficient. The cognitive interview techniques can be incorporated into the interviews of police investigators with little additional training, and eyewitnesses can learn the mnemonics quickly so as to save valuable time for those investigators with demanding case loads.

With these results, we consider the effectiveness of the cognitive interview in our laboratory setting to be robust. The logical and significant conclusion of this work will be the implementation and evaluation of the cognitive interview in the field. More important than our own reactions, some investigators who participated in Experiment 1 and others have informed us that they have begun to incorporate the retrieval mnemonics into their interview procedures. In sum, we consider the cognitive interview to be a practical, partial solution to the important problem of eyewitness memory enhancement.
Notes

This research was supported by a grant from the National Institute of Justice (USDJ-83-IJ-CX-0025). We thank the law-enforcement volunteers who served as the interviewers in Experiment 1. We also express our appreciation to the Los Angeles Police Department and the Inglewood Police Department for their cooperation in this project.

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