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# Effectiveness of the cognitive interview in a multiple-testing situation

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**FLORIDA INTERNATIONAL UNIVERSITY**

**Miami, Florida**

**EFFECTIVENESS OF THE COGNITIVE INTERVIEW**

**IN A MULTIPLE-TESTING SITUATION**

**A thesis submitted in partial satisfaction of the**

**requirements for the degree of**

**MASTER OF SCIENCE**

**IN**

**PSYCHOLOGY**

**by**

**Petra Brock**

**1993**

To: Dean Arthur W. Herriott:  
College of Arts and Sciences

This thesis, written by Petra Brock, and entitled  
EFFECTIVENESS OF THE COGNITIVE INTERVIEW IN A MULTIPLE-  
TESTING SITUATION, having been approved in respect to style  
and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

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Brian L. Cutler

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Arthur J. Flexser

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Ronald P. Fisher, Major Professor

Date of Defense: September 27th, 1993

The thesis of Petra Brock is approved.

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Dean Arthur W. Herriott  
College of Arts and Sciences

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Dean Richard Campbell  
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Florida International University, 1993

Zum Andenken an meine Grossmuetter:

Vera Schliebusch

und

Hanne Brock

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**ABSTRACT OF THE THESIS**  
**EFFECTIVENESS OF THE COGNITIVE INTERVIEW**  
**IN A MULTIPLE-TESTING SITUATION**

**by**

**Petra Brock**

**Florida International University, 1993**

**Miami, Florida**

**Professor Ronald P. Fisher, Major Professor**

The present study assessed the effectiveness of the Cognitive Interview (CI) in a multiple-testing situation. One-hundred and eighty-two undergraduate psychology students viewed a short film clip depicting an automobile accident. Subsequently, the subjects were interviewed twice using either the CI or standard interviewing technique. In both instances, subjects who received the CI recalled more accurate information ( $\bar{m}=32.30$  at Time 1 and  $\bar{m}=30.51$  at Time 2) than subjects who received the standard interview ( $\bar{m}=18.14$  at Time 1 and  $\bar{m}=18.38$  at Time 2). There was no effect of type of interview at Time 1 on amount recalled at Time 2. This research has implications not only for judicial fact-finders, but also for further researchers interested in the CI procedure.

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## Effectiveness of the Cognitive Interview in a Multiple-Testing Situation

It has long been believed that the most essential component of successful criminal investigations is the completeness and accuracy of information provided by eyewitnesses and victims (Rand Corporation, 1975). However, the effectiveness of the methods used to elicit this critical information has become suspect (Loftus, 1979, Yarmey, 1986). While there seems to be a lack of systematic training afforded police officers in this area, those that do receive training are often inadequately prepared to conduct effective interviews (Fisher, McCauley, & Geiselman, in press). In an attempt to counter these serious liabilities a new interviewing tool has been developed, namely the Cognitive Interview (CI).

### Components of the Cognitive Interview

The CI is an interviewing technique based on cognitive mnemonics by which memory retrieval can be enhanced. The concepts behind the CI are based on the principles of cognition and communication, as well as on the research findings of a number of well established studies.

One of the cognitive principles on which the CI is based is Tulving and Thomson's (1973) principle of encoding specificity. According to this principle the effectiveness of a retrieval probe is determined by its similarity to the encoding operations. As such, Geiselman and Fisher (Geiselman, Fisher, Firstenberg, Hutton, Sullivan,

Avetissian, & Prosk, 1984) argued that memory could be enhanced if the original environment is effectively reinstated by the retrieval environment. Smith (1979), in fact, has demonstrated that mental reinstatement can be as effective as physical reinstatement to assist recall.

The CI is also based on Bower's (1967) and Wickens's (1970) multicomponent view of a memory trace. According to this view, a memory trace is a network of many different features rather than a completely holistic representation of the original event. At any one time, only some of the features can be accessed while others cannot. On the basis of this concept, Geiselman and Fisher (Geiselman et al., 1984) believed that eyewitnesses should be encouraged to report everything they remember, including incomplete/partial information as well as seemingly unimportant information. The authors argued that the recall of this type of information could, with the aid of other memory search mnemonics, lead to a more complete recollection.

The multicomponent view also suggests that retrieval probes should be varied if one fails to access the desired memories. Geiselman et al. (1984) suggest that, based on the research of some well established laboratory studies (see Anderson & Pichert, 1978; Firstenberg, 1983, as cited in Geiselman et al., 1984; Whitten & Leonard, 1981), recalling the incident from different perspectives and in a variety of orders would constitute appropriate alternative retrieval probes.

Based on these cognitive principles and laboratory studies, Geiselman et al. (1984) developed the first four memory mnemonics of the CI as follows. The technique of Context Reinstatement asks eyewitnesses to recreate in their minds the physical and personal contexts surrounding the incident they witnessed. The witnesses are requested to create a mental image of the physical surroundings of the event (e.g., a witness to a fire might be asked to "Think about what the building looked like and where you were standing in relation to that building") as well as the physical conditions that may have been present (e.g., "Think about what you may have seen, smelled, or heard"). In addition, witnesses are also asked to think about the feelings they may have been experiencing at the time the incident was taking place and the reactions they may have had to the incident.

The second mnemonic asks the witnesses to report everything they remember, including incomplete/partial information as well as seemingly unimportant information. Witnesses are told that some people hold back information because they are not quite sure that the information is important, however what may seem unimportant to them could be of vital importance to the police or could even help them remember other more important information. As such, they are encouraged not to edit anything out of their report, even things which they think may not be important.

The third memory technique asks witnesses to recall the

events from a variety of perspectives. Eyewitnesses are requested to recall the events from a different perspective that they may have had or from the perspectives of others who may have been present. For example, a witness to an automobile accident might be asked to "Imagine that you were the driver of the reckless car. From the position behind the wheel of that car, what would you have seen?"

The fourth CI technique asks eyewitnesses to recall the information in a different order. Usually, witnesses remember events chronologically. In order to enhance overall recall, this technique encourages witnesses to remember the incident in reverse order, from the middle, or from the most memorable happening they may have.

Three more CI techniques were developed in response to the findings of a field study designed to investigate the type of techniques real police interviewers engage in (Fisher, Geiselman, & Raymond, 1987a). The results indicated that on the whole, police officers tend to utilize techniques which are detrimental to the interviewing process. The police interviewers that were studied had a tendency to interrupt eyewitnesses while they were trying to respond to open-ended questions, to ask more direct, short-answer questions, and to inappropriately sequence questions. Further, these interviewers also had a tendency to use poor wording and inappropriate presentation styles.

The last three CI techniques were developed to counter the detrimental tendencies described above. They instruct

interviewers how to appropriately conduct interviews and how to guide witnesses through a successful interview (Fisher, Geiselman, Raymond, Jurkevich, & Warhaftig, 1987b). The first, called Focused Retrieval, is based on the principle that memory retrieval, like other mental feats, requires a considerable amount of concentration and effort.

Interviewers are encouraged to assist eyewitnesses to focus their concentration and to encourage them to make the extra effort to concentrate. To make this process successful, interviewers must refrain from frequently interrupting the eyewitness's narration and from overusing direct, short-answer questions.

The second, called Extensive Retrieval, is based on the notion that the more retrieval attempts that are made, the more information will be recalled (Fisher et al., 1987b). Interviewers should encourage witnesses to make multiple attempts to retrieve a specific episode and encourage them to continue trying to recall information, even when they claim not to know.

The third, called Witness-Compatible Questioning, is based on the belief that the more compatible the questions are to the way in which the witness has coded the information, the more successful the retrieval will be. As such, the interviewer should be flexible and should tailor his/her interviewing style to reflect the way in which the witness is recalling the desired information.

In addition to these seven major components, the CI

also encourages interviewers to use a supplementary technique, asking pointed questions following the open-ended inquiry, to elicit more specific and/or omitted information. Geiselman et al. (1984) developed three sets of questions. The first set encourages interviewers to ask questions pertaining to the intruding person(s), such as their physical appearance, names, speech characteristics, and clothing. The second set encourages interviewers to ask about any objects that might have been carried, held, or touched by the intruder(s). The third set encourages interviewers to ask questions about any conversations that might have transpired.

In addition to the techniques described above, Fisher and Geiselman (1992) provided a general strategy about the sequential structure of the interview. Interviewers are encouraged to follow this strategy in order to optimize the effects of the CI techniques. According to this strategy, the interview should be conducted in five steps: introduction, open-ended narration, probing memory codes, reviewing the interview, and closing the interview.

The introduction gives the interviewer the opportunity to establish the appropriate psychological mood in the eyewitness, to promote a positive and effective rapport between the eyewitness and the interviewer, and to effectively relate the general guidelines of the CI so that memory recall and interviewer/witness communication will be maximized during the remainder of the interview. The Open-

Ended Narration segment allows the interviewer to determine the best mental representation the eyewitness has of the incident and to plan a probing strategy designed to elicit more detailed information. During the Probing Memory Codes segment, the probing strategy is implemented. The interviewer guides the witness through a narrative recollection of all possible memories, repeating the process until their contents are thoroughly exhausted. This is the primary information-gathering phase. During the fourth segment, Reviewing The Interview, the interviewer verifies the accuracy of the information by verbally reiterating what the witness stated during the interview. This procedure also provides the witness with an additional opportunity to furnish any additional information. The final step, Closing The Interview, provides the interviewer the opportunity to conclude any official business and to terminate the interview on a positive note.

#### Empirical Support of the CI

Geiselman et al. (1984) conducted the first study investigating the effectiveness of the CI, although only the first four principles (i.e., Context Reinstatement, Remembering everything, Recall from a variety of perspectives, and Different Order Recall) were examined. The CI was compared with a standard police interview in an experiment employing 16 undergraduate college students who witnessed a staged theft. The results demonstrated the superiority of the CI. Subjects in the CI interviewing

condition produced significantly more correct information than subjects who received the standard interview. Furthermore, the CI did not elicit more incorrect facts than did the standard interviewing technique.

Three similar studies (Ascherman, Mantwill, & Koehnken, 1991; Geiselman, Fisher, MacKinnon, & Holland, 1986b; Geiselman, Fisher, Mackinnon, & Holland, 1985) replicated the findings of Geiselman et al. (1984). While the Ascherman et al. study (1991) used a filmed scenario instead of the staged-theft paradigm and the Geiselman et al. study (1986b) utilized a non-student population, all three studies found that significantly more correct information was elicited with the CI than the standard interview and that there was no difference in the amount of incorrect information elicited by the two interviewing techniques. In addition, Geiselman et al. (1985) also found that even when only critical facts, and not just total facts, were investigated the CI still elicited significantly more correct facts than the standard interview, without eliciting significantly more incorrect facts.

The effectiveness of the full CI procedure was examined in a field setting (Fisher, Geiselman, & Amador, 1989). Using 16 detectives from a metropolitan police department, the authors examined the interviews conducted before and after CI training. The authors found that detectives who were trained in the CI elicited 63% more information after training than the detectives who were not trained.



Furthermore, the trained detectives elicited 47% more information after training than they did before training.

A second field study on the effectiveness of the full CI procedure was conducted in Britain (George & Clifford, 1992). Twenty-eight experienced British police officers served as subject-interviewers. They were randomly assigned to one of four interviewing conditions: no training (control), CI training, Conversations Management training (an interviewing technique developed in Britain that relies mainly on principles of communication), and a CI/Conversation Management training group.

The results indicated that the CI group was the only group to differ reliably from the control group. Interviewers in this group asked significantly fewer questions overall, significantly more open-ended questions, and significantly fewer closed questions than interviewers in any of the other groups. Furthermore, the CI was the only group to elicit significantly more information from witnesses between pre- and post-training.

The generalizability of the CI has been demonstrated in a number of studies. In a study designed to investigate eyewitnesses' ability to recall license plate numbers (MacKinnon, O'Reilly, & Geiselman, 1990), subjects who received the CI recalled 6% more additional correct license plate characters than subjects in the control condition. And in a study designed to investigate the utility of the CI for road accidents (Perry & Chapman, as cited in Memon &

Koehnken, 1992), subjects in the CI condition, once again, recalled significantly more correct information than subjects in the standard interviewing condition, with no statistical difference in the amount of incorrect information recalled.

The generalizability of the CI has also been extended to contexts other than eyewitness memory, namely into the public health arena. In a study designed to investigate the effects of the CI on food recall (Fisher & Quigley, 1991), subjects in the CI condition recalled significantly more foods than subject in the standard interviewing condition, yet there was no significant difference in the recall rate of inaccurate foods.

The CI has been shown to be an effective tool in memory retrieval. However, the research conducted on its effectiveness has had one major limitation, namely, the interviews were administered only one time. Eyewitnesses to actual crimes are typically interviewed several times: by a uniformed police officer shortly after the incident has taken place, by a more experienced detective, and, if the case is pursued, several times more after that. The extent to which previous interviews affect subsequent interviews has received only minimal attention in the CI literature.

Only two studies, utilizing an adult population, have employed a multiple-interviewing strategy. Both, however, have serious methodological limitations. Perry and Chapman's study (as cited by Memon & Koehnken, 1992) is

limited in that their second interview was designed to elicit information concerning an incident different from the one used for the first interview. Orne's study (1989) compared the effects of the second cognitive or standard interview to a first interview which consisted only of a general statement asking the subjects to recall everything they remembered.

McCauley's (1993) investigation into children's memory is the only one in the CI literature to successfully investigate the effects of a multiple-recall strategy. The results indicate that the type of interview received at Time 1 had no effect on the amount of recall at Time 2. The study's one limitation is that it did not utilize an adult population.

In the learning literature one finds some evidence of the effect an initial test has on the performance on subsequent tests. Foos and Fisher (1988) conducted an experiment designed to measure the effect of a multiple-testing situation. Subjects who received a first test answered more questions correctly on the second test than subjects who received one test. The authors contend that receiving a first test had a knowledge-enhancing effect on the performance score of a second test.

In a similar study, Fisher and Chandler (1991) investigated the amount of forgetting that occurred between the initial and final tests. Prior to each test subjects were given a cue to facilitate recall. The results

indicated that the initial test had no effect on performance of the final test if the cues were changed between the two tests. When the cues remained constant, the amount of forgetting decreased between the two tests.

The hypermnnesia/reminiscence literature also provides some insight on the effects of the multiple-testing situation (for a detailed review see Payne, 1987). Poole and White (1991) conducted a study designed to investigate the effect of multiple interviews on the content of eyewitness testimony. The results indicate that adults who were interviewed twice recalled more information during the second interview than those who did not have an initial interview.

Scriver and Safer (1988) investigated the effects of repeated interviewing on recall of a violent event. They found that, in general, repeated interviewing expedited the recall of information on subsequent interviews, including information that subjects had not mentioned during previous interviews.

The results of these studies seem to suggest that the recall of information is affected by repeated interviewing. What has largely been ignored by the literature is the extent to which multiple interviews may have an effect on memory recall generated by the CI. To address this issue the current research employed a repeated-interview design to investigate the effectiveness of the CI in a multiple-recall situation.

A second limitation of the CI research conducted to date is the manner in which the information was coded. Earlier studies, especially those conducted by the Fisher and Geiselman research teams, coded whole statements for accuracy. For example, when describing a perpetrator the witness may say "He was wearing a long sleeved, button-down shirt". In the current experiment, bits of information were coded for accuracy. For example, given the above illustration, one bit consists of "long sleeved" and a second bit of "button-down". Coding for bit-of-information yields a more precise measure of accuracy than coding whole responses because it affords a more objective measure of the information recalled. When evaluating a bit of information, that bit is either right or wrong. For example, if the witness recalls that the shirt had long sleeves, either it did or it did not. Evaluating whole responses requires a more subjective weighing of the information provided. Parts of the response may be correct, while other parts may not be. For example, if "long-sleeved" is correct and "button-down" is incorrect, a subjective partial accuracy rating will have to be assigned. As such, one must more subjectively assess the accuracy of that response.

In summary, this study was designed to investigate two research questions:

1. How effective is the CI in a dual-recall situation?
2. How effective is bit-of-information coding?

#### Method

## Subjects

One-hundred and eighty-two male and female undergraduate psychology students from Florida International University served as subjects. Prior to agreeing to participate, subjects were told that they would be participating in a two-part memory study. Extra-class credit was awarded for participation. Thirty subjects did not complete the experiment and were dropped from the study. The analyses were conducted on the data collected from the remaining 152 subjects.

## Interviewers

Two graduate and three undergraduate psychology students served as interviewers. Each interviewer was trained in both the cognitive and standard interviewing technique. Interviewers were trained in the use of the CI as per the recommendations made by Fisher and Geiselman (1992). The initial training phase consisted of one in-class session during which the trainees were instructed in the use of the CI. Additional phases consisted of practice sessions during which the trainees received feedback on practice tapes they had conducted. These practice sessions were continued for approximately 5-7 days until trainees had achieved minimal competence in conducting a CI. The instructions for the standard interview consisted of a written statement outlining the standard interview procedure (see Appendix I). Interviewers were instructed to read this outline prior to administering the standard interview.

## Interview Conditions

Standard Interview. Interviewers read questions from a prepared questionnaire (see Appendix II) which was modeled after interviews conducted by the National Transportation Safety Board. Interviewers asked for information concerning the car or cars involved in the accident, the car or cars that were at fault, the environmental conditions (e.g., lighting, road), and the people involved in the incident. Each interviewer wrote the answers on the questionnaire and recorded them on audio tape.

Cognitive Interview. Interviewers guided the subjects through the general memory-retrieval techniques of the CI outlined in the introduction and by Fisher and Geiselman (1992). Further, the sequential structure of the interview followed the recommendations made by Fisher and Geiselman (1992). The type of information that was specifically probed for was identical to that asked on the standard interview. Interviewers were given a summarized outline of the standard interview questionnaire (see Appendix III). Interviewers used this outline to check off recalled information and to make notes of information to probe at a later time. As with the standard interview, all interviews were tape recorded.

## Materials and Apparatus

Films. Excerpts from two Hollywood movies (It's a Mad, Mad, Mad, Mad World and Cannonball Run II) were used in the study. Each excerpt presented an audiovisual scenario of an

automobile crash. The excerpt from Mad World showed a driver recklessly passing cars on a winding mountain road. The excerpt from Cannonball showed a car causing multiple accidents in a city location. Each excerpt lasted approximately 15 seconds.

The films were taped using a Panasonic AG 1950 video cassette recorder and shown on an 45cm NEC stereo receiver monitor. Each unit was mounted on a video cart approximately 140 cm high. Subjects were seated approximately 183 cm away from the monitor, directly facing the screen.

Interview Environment. The experiment was carried out in the psychology laboratory of Florida International University where outside noise levels and distractions were kept at a minimum. The interviews were conducted in the same room in which the video was viewed.

### Procedure

Subjects were assigned randomly to one of the experimental conditions prior to beginning the experiment. Each subject participated individually in two sessions separated by two weeks. Upon arriving for the first session, the subject was seated in front of the video screen and told that he/she would be shown a short film. Once the subject had seen the excerpt, he/she waited 5 minutes before being interviewed about the accident in the excerpt. This 5 minute waiting period was incorporated to replicate the "real world", where it usually takes police several minutes



to arrive on the scene of an accident. At the conclusion of the interview, the subject was reminded that a follow-up interview would be conducted in exactly two weeks. Upon completion of the second interview, each subject was thanked for his/her participation.

### Design

A 2 (Lighting: good, poor) x 2 (Film: Cannonball, Mad World) x 2 (type of interview at Time 1: CI, standard interview) x 2 (type of interview at Time 2: CI, standard interview) between groups design was used. The dependent variables measured consisted of (a) the overall number of accurate bits of information recalled at Time 1, (b) the proportion of accurate bits of information recalled at Time 1, (c) the overall number of accurate bits of information recalled at Time 2, and (d) the proportion of accurate bits of information recalled at Time 2.

The variables were manipulated between groups. Lighting was manipulated by varying the back lighting of the video screen. Half of the subjects viewed the excerpt with the screen at normal lighting levels. The other half viewed the excerpt with the screen poorly lit. More specifically, the poorly lit screen allowed only minimal distinction of the objects and the colors that were being shown.

The quality of the interviewing style was manipulated in two ways. At Time 1, approximately half of the subjects received the CI (N = 68) and the other half received the standard interview (N = 77). At Time 2, approximately half

of the subjects were administered the CI ( $N = 69$ ) while the other half were administered the standard interview ( $N = 76$ ). Approximately, the same number of subjects appeared in the four combinations of Time 1 interview X Time 2 interview (i.e., CI-CI = 32, S-S = 40, CI-S = 36, and S-CI = 37).

### Analysis of Interview Protocols

Each tape recorded interview was transcribed by the interviewer who conducted the interview. The transcriptions of the tapes were then given to the senior member of the research team who compiled a list of all of the responses (across subjects) for each question. Each response was then divided into bits of information. For example, if the subject described a car as a four-door, 1960's Ford, the three bits of information were: "four-door", "1960", and "Ford." In instances in which a subject changed a response within an interview session, only the final response was evaluated. In addition, opinionated responses (e.g. "The car looked like a New York City cab"), responses such as "I don't know", "I don't remember", etc, and omissions were not scored.

Each bit of information was then given an accuracy rating. Accuracy was scored on a three-point scale ranging from 1 (inaccurate) to 3 (accurate). For example, if the color of the car at fault was black and the subject correctly said that the car was black, that bit of information was given a score of three. If the subject said that the car was dark, the response would be considered

accurate, yet less precise, and given a score of two. If the subject incorrectly stated that the car was white, that bit of information was given a score of one.

### Results

Two scoring criteria were used: (a) a stringent criterion, where statements were considered accurate only if they received an accuracy rating of 3, and (b) a lenient criterion, where statements were considered accurate if they had received a rating of either 2 or 3. The trends of these two scoring criteria were similar, and as such only the results of the lenient criterion are reported here (see Appendix IV and V for a summary of the stringent criterion results).

The results were analyzed separately for the Time 1 and Time 2 interviews. The memory-performance variables (overall number of accurate bits of information recalled and proportion of accurate bits of information recalled) were analyzed by means of analyses of variance (ANOVAs). An alpha level of .05 was used for all tests.

#### Time 1 Recall

The type of interview administered at Time 1 had a significant effect on the overall number of accurate bits of information recalled. As seen in Table 1, subjects who received the CI recalled significantly more accurate bits of information than subjects who received the standard police interview,  $F(1,143) = 88.64$ ,  $MSE = 80.09$ . There was no reliable difference in the proportion of accurate responses

recalled for the two interviewing conditions,  $F(1,143) = .08$ ,  $MSE = .008$ .

Effects of Lighting and Film: Lighting had a marginally significant effect on the number of accurate bits of information recalled,  $F(1,143) = 3.83$ ,  $MSE = 80.09$ . Subjects in the good lighting condition recalled more accurate bits of information ( $\bar{m} = 26.35$ ) than subjects in the poor condition ( $\bar{m} = 22.97$ ). Film, on the other hand, did not have a significant main effect on the number of accurate bits of information recalled,  $F(1,143) = 1.04$ ,  $MSE = 80.09$ . Further, there were no significant two- or three-way interactions, all  $F$ 's  $< 1.99$ ,  $MSE = 80.09$ .

In terms of proportion of accurate bits of information recalled, both Lighting and Film were found to have significant main effects,  $F(1,143) = 7.74$ ,  $MSE = .008$  and  $F(1,143) = 4.34$ ,  $MSE = .008$ , respectively. As predictable, subjects in the good lighting condition recalled a significantly higher proportion of accurate bits ( $\bar{m} = .76$ ) than subjects in the poor condition ( $\bar{m} = .72$ ). Subjects who witnessed the Mad World clip recalled a reliably higher proportion of accurate bits ( $\bar{m} = .76$ ) than subjects who witnessed the Cannonball clip ( $\bar{m} = .73$ ).

Type of interview interacted with Lighting to significantly affect the proportion of accurate bits of information recalled,  $F(1,143) = 5.78$ ,  $MSE = .008$ . A post-hoc Newman-Keuls indicated that 3 of the 4 means differed significantly. Subjects in the poor/standard condition

recalled a reliably lower proportion of accurate bits ( $\bar{m} = .70$ ) than subjects in either of the two good lighting conditions ( $\bar{m} = .75$  for good/cognitive and  $\bar{m} = .78$  for good/standard).

Proportion of accurate bits recalled was also significantly affected by the type of interview X Film interaction,  $F(1,143) = 4.13$ ,  $MSE = .008$ . A post-hoc Newman-Keuls indicated that only 2 out of the 4 means differed significant. Subject in the cognitive/Cannonball condition recalled a reliably lower proportion of accurate bits ( $\bar{m} = .71$ ) than subjects in the cognitive/Mad World condition ( $\bar{m} = .78$ ). Neither the Lighting X Film interaction nor the three-way interaction had a significant effect on this dependent variable,  $F(1,143) = 1.74$ ,  $MSE = .008$  and  $F(1,143) = .001$ ,  $MSE = .008$ , respectively.

### Time 2 Recall

The results of the Time 2 data replicated the Time 1 results. Type of interview received at Time 2 had a significant effect on the overall number of accurate bits of information recalled,  $F(1,143) = 64.37$ ,  $MSE = 78.15$ . As Table 2 indicates, subjects who received the CI recalled significantly more accurate bits of information than subjects who received the standard interview. No reliable difference in the proportion of accurate responses recalled was found between subjects in the two interviewing conditions,  $F(1,143) = .001$ ,  $MSE = .01$ .

The effect of type of interview administered at Time 1

on recall performance at Time 2 was also examined. The ANOVA results indicated that the type of interview received at Time 1 did not have a significant effect on either the number of accurate bits of information recalled,  $F(1,143) = 1.64$ ,  $MSE = 78.15$ , or the proportion of accurate bits of information recalled,  $F(1,143) = .06$ ,  $MSE = .01$ . In addition, as seen in Table 2, there was no significant interaction between type of interview Time 1 X type of interview Time 2 on either the number accurate,  $F(1,143) = 1.41$ ,  $MSE = 110.17$ , or proportion of accurate bits recalled,  $F(1,143) = .1.34$ ,  $MSE = .01$ .

Effects of Lighting and Film: The lighting manipulation had no significant main effect on either number of accurate bits recalled,  $F(1,143) = 2.35$ ,  $MSE = 183.79$  or the proportion of accurate bits recalled,  $F(1,143) = 1.97$ ,  $MSE = 0.21$ . The Film manipulation, however, had a marginally significant effect on number of accurate bits recalled,  $F(1,143) = 3.76$ ,  $MSE = 78.15$ , and a significant main effect on proportion of accurate bits recalled,  $F(1,143) = 10.14$ ,  $MSE = .11$ .

No significant two-way or three-way interactions between Lighting, Film, and the other independent measures (type of interview Time 1 and type of interview Time 2) were found for either number of accurate bits recalled, all  $F$ 's  $< 2.80$ ,  $MSE = 78.15$ , or proportion of accurate bits recalled, all  $F$ 's  $< 1.10$ ,  $MSE = .011$ . In addition, the four-way interaction did not significantly affect any of the memory

performance measures,  $F(1,143) = 1.53$ ,  $MSE = 78.15$  for amount accurate and  $F(1,143) = .08$ ,  $MSE = .011$  for proportion accurate.

#### Comparison between Time 1 and Time 2 Recall

A MANOVA was conducted to determine whether there was a difference in the amount of accurate information and the proportion of accurate information recalled at Time 1 and Time 2. The results indicated that no difference in either the amount of accurate information recalled,  $F(1,141) = 1.02$ ,  $MSE = 31.30$ , or the proportion of accurate information recalled,  $F(1,141) = .04$ ,  $MSE = .01$ , existed between the two time periods.

#### Discussion

The results of the present study replicate previous findings that the CI elicits more accurate information than the standard interviewing technique (e.g., Geiselman et al., 1984; Fisher et al., 1989). The current findings revealed that the CI elicited an average of 78% more accurate bits of information at Time 1 and an average of 66% more accurate bits of information at Time 2 than the standard interview. However, both the CI and the standard interview elicited the same proportion of accurate bits of information (.75 and .74 for CI and standard respectively at Time 1, and .73 for both CI and standard at Time 2).

The primary focus of the present study was to examine the effectiveness of the CI in a multiple-recall situation. Subject-eyewitnesses who received the CI recalled more

accurate bits of information at both interviewing times than subjects who received the standard interview. Why might this have occurred? Two plausible explanations to account for this phenomena have been suggested (McCauley, 1993). First, the CI's success could be due to improved memory retrieval. That is, cognitive mnemonics inherent to the CI may enhance the process of bringing information into conscious memory. Second, the CI's success could be due to the communication techniques that interviewers are encouraged to use (e.g., establishing positive and effective rapport, asking open-ended and witness-compatible question, encouraging extensive and focused retrieval, etc.). These techniques may simply expedite transferring information from conscious awareness into verbal description.

The memory retrieval explanation postulates that receiving a first interview, that is, conducting an initial memory retrieval routine, has a positive effect on subsequent memory recall (Fisher & Chandler, 1991; Foos & Fisher, 1988). In other words, the type of initial interview received should have an effect on the retrieval process at Interview two. Whitten (cited in Bjork, 1975) has postulated that deeper retrieval processes facilitate more memory retrieval than shallower ones. According to this view, the CI is assumed to promote the deeper retrieval process, while the standard interview promotes shallower processes. As such, subjects who receive the CI at Time 1 should recall more information at Time 2 than subjects who



initially receive the standard interviewing technique.

The communication explanation, on the other hand, postulates that, although there is no difference in the way the two interviewing techniques affect memory retrieval, there is a difference in the manner in which witnesses report the information. While subjects in the two interviewing conditions retrieve the same amount of information, subjects who receive the CI report more information. This difference in the amount of information reported, according to Orne (1989), occurs because the CI lowers subjects' report criterion, thereby allowing them to report information they were previously too uncertain to relate. Hypothetically then, there should be no carry-over effect, restricting the benefits of the CI to the current interview.

Since there was no effect of type of interview at Time 1 on amount of recall at Time 2, the findings of this study appear to lend support only to the communication explanation. Subjects who received a CI at Time 2 recalled the same amount of accurate information whether they received a CI or a standard interview at Time 1. Likewise, subjects who received a standard interview at Time 2 recalled the same amount of accurate information regardless of the type of interview they received at Time 1. These data suggest that the CI does not enhance retrieval, only communication. While subjects in both interviewing conditions may retrieve the same amount of information,

subjects who received the CI, and thereby better directions in communication, were able to recall more information.

For Orne's (1989) lowered recall criterion hypothesis to be valid, the following predicted results must occur. First, the proportion of accurate information recalled should be lower for the CI than the standard interviewing condition. Second, subjects in the CI condition should have less confidence in their statements than subjects in the standard interviewing condition. The current study found no difference in the proportion of accurate information recalled between subjects in the CI and standard interviewing conditions. While the current study could not evaluate Orne's (1989) second predicted result, an experiment conducted by Mantwill, Koehnken, and Ascherman (1993) indicates that there is no difference in the mean confidence ratings between interview conditions. Consequently, while the current data support the communication explanation of increased recall among CI subjects, Orne's (1989) hypothesis was not supported.

The findings of the current study also seem to suggest that the bit scoring technique is an effective measure of accuracy. It was argued that bits of information afford a more precise measure of accuracy than holistic information. In the present study, the CI elicited an average of 72% (across both time periods) more accurate information than the standard interview. This increase in accurate information falls well within the range of previous studies

which elicited as little as 12% to as much as 92% more accurate information (Bekerian & Dennett, 1993). The current study illustrates that the CI performs effectively not only under "holistic" scoring, which past studies have indicated, but also under "bit" scoring. This provides some convergence between the two scoring procedures. Ultimately, bit scoring is the favored approach because it provides a more detailed account of the eyewitness's testimony.

The current study has serious implications for the judicial fact-finding process. Primarily, the study's multiple-testing design has illustrated that even during subsequent interviews, the CI will continue to elicit more accurate information, regardless of the type and adequacy of previous interviews. This is especially important during court proceedings where it may be argued that a witness's present testimony has been contaminated by previous, ill-conducted interviews.

The present study also provides evidence for the generalizability of the CI findings to other criminal events. The to-be-remembered event utilized in this study was that of a traffic accident rather than the more commonly-used theft paradigm.

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Table 1

Performance Measures for Cognitive and StandardInterview at Time 1

Measure	Interview	
	Cognitive	Standard
Number accurate	32.30 <sup>a</sup>	18.14 <sup>a</sup>
Proportion accurate	.75	.74

Note: means that share superscripts differ significantly  
at  $p < .05$

Table 2

Performance Measures for Cognitive and Standard  
Interview at Time 2

Measure	Time 2 Interview	
	Cognitive	Standard
Number Accurate		
Time 1 Interview		
Cognitive	32.61	18.50
Standard	28.76	18.27
Means	30.51 <sup>a</sup>	18.38 <sup>a</sup>
Proportion Accurate		
Time 1 Interview		
Cognitive	.75	.72
Standard	.72	.74
Means	.74	.73

Note: means that share superscripts differ significantly  
at  $p < .05$

## Appendix I

### Procedure for the Standard Interview

The interviewers began the interview by instructing the Subject to state his/her name into the tape recorder. Then interviewers were instructed to read the questions to the subject and to record the verbal responses in the corresponding spaces on the questionnaire. Interviewers were told to hurry the subjects along so as not to allow them much time to think about the questions. Specifically, interviewers were instructed to wait only a few seconds for yes/no questions and about 8 seconds for responses that required a little more detail. Upon completion of the interview, the interviewers thanked the subject for their participation.

## Appendix II

### Sample Questionnaire

- 1) How many cars were involved in the incident you just witnessed?
- 2) Describe the area where the accident took place (e.g., what did it look like):
- 3) Describe the car(s) which was/were at fault for the accident?
- 4) Did you see who was in the car(s) that was/were at fault for the accident? (y/n)  
If so, describe him/her/them:
- 5) Aside from the car(s) that was at fault for the accident, did you see who was in the other cars? (y/n).  
If so, describe him/her/them:
- 6) What was/were the color(s) of the car(s) that was/were at fault for the accident?
- 7) What were the colors of the other cars involved in the accident?
- 8) What was/were the road condition(s) where the accident took place like? (ie: rough, dry, wet, paved, gravel)
- 9) Did the accident occur because of a traffic violation? (speeding, running of a stop sign/red light, etc):  
If so, describe:
- 10) Did any of the cars sound their horn? (y/n)  
If so, which car/cars:

- 11) Did you hear the sound of brakes or tires? (y/n)  
If so, describe:
- 12) Describe the type of cars that were involved in the accident? (ie: make model, etc)
- 13) How fast was the car(s) that was at fault going?
- 14) Other than the car(s) that was/were at fault, how fast were the other car(s) going?
- 15) What kind of lighting conditions were present during the accident? (sunlight, haze, dark, etc)
- 16) Is there anything else you can remember about the incident you witnessed, even things that may not have been involved with the accident? (Y/N)  
If so, describe:
- 17) Have you seen this film clip before? (y/n)

## Appendix III

### Cognitive Interview Question Outline

Car(s) at fault:

describe

type (make, model, year, etc)

color

who was driving it/them?

how fast was/were it/they going?

was accident due to a traffic violation?

Other car(s)

type (make, model, year, etc)

color

who was driving it/them?

how fast was/were it/they going?

Total number of cars involved

Description of accident site

Road condition

Lighting condition

Sounds

horn

brake/tires

Any other information not asked

## Appendix IV

### Performance Measures for Cognitive and Standard Interview at Time 1 (Stringent Scoring Criterion)

Measure	Interview	
	Cognitive (n)	Standard (n)
Number accurate	26.43 <sup>a</sup> (67)	19.91 <sup>a</sup> (77)
Proportion accurate	0.61 (67)	0.61 (77)

Note: means that share superscripts differ significantly  
at  $p < .05$

# Appendix V

## Performance Measures for Cognitive and Standard Interview at Time 2 (Stringent Scoring Criterion)

Measure	Time 2 Interview			
	Cognitive (n)		Standard (n)	
Number Accurate				
Time 1 Interview				
Cognitive	26.81	(31)	15.53	(36)
Standard	23.89	(37)	15.02	(40)
Means	25.22 <sup>a</sup>	(68)	15.26 <sup>a</sup>	(76)
Proportion Accurate				
Time 1 Interview				
Cognitive	0.63	(31)	0.60	(36)
Standard	0.60	(37)	0.61	(40)
Means	0.61	(68)	0.61	(76)

Note: means that share superscripts differ significantly  
at  $p < .05$