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The Effect of Exposure to Multiple Lineups on Face Identification Accuracy

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This study examines the conditions under which an intervening lineup affects identification accuracy on a subsequent lineup. One hundred and sixty adults observed a photograph of one target individual for 60 s. One week later, they viewed an intervening target-absent lineup and were asked to identify the target individual. Two days later, participants were shown one of three 6-person lineups that included a different photograph of the target face (present or absent), a foil face from the intervening lineup (present or absent), plus additional foil faces. The hit rate was higher when the foil face from the intervening lineup was absent from the test lineup and the false alarm rate was greater when the target face was absent from the test lineup. The results suggest that simply being exposed to an innocent suspect in an intervening lineup, whether that innocent suspect is identified by the witness or not, increases the probability of misidentifying the innocent suspect and decreases the probability of correctly identifying the true perpetrator in a subsequent test lineup. The implications of these findings both for police lineup procedures and for the interpretation of lineup results in the courtroom are discussed.

Consider the following hypothetical situation. A crime occurs and during the police investigation a suspect is apprehended. The witness is brought in to view a lineup and asked to make an identification. The suspect is truly innocent and the witness correctly rejects the target-absent lineup. As more evidence emerges, a new suspect is found. Now the witness is asked back to a second lineup that consists of the innocent suspect, the new suspect (the actual criminal), and four additional foils. On this second lineup, the witness now chooses the innocent suspect she saw in the first lineup but failed to identify. The police consider this a correct identification and proceed with the prosecution of the innocent suspect. This scenario depicts the potential danger of how intervening lineups may influence identification accuracy.

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The problem of decreased identification accuracy after viewing mugshot photographs was first noted by the U.S. Supreme Court in *Simmons v. United States* (1968). The court maintained that viewing mugshot photographs may have detrimental effects on identification accuracy because "the witness . . . is apt to retain in his memory the image of the photograph rather than of the person actually seen" (quoted in Brown, Deffenbacher, & Sturgill, 1977, p. 312). Since this ruling, numerous studies have examined the extent to which intervening mugshot photographs influence identification accuracy.

In one of the first studies examining the effects of intervening lineups on the accuracy of subsequent eyewitness identification, Brown et al. (1977) examined the relationship between viewing previously seen mugshot photographs with either the criminal present or absent and subsequent identification accuracy. In Experiment 3, two sets of "criminals" distributed materials to participants on the day of a scheduled exam. Half of the class encountered one set of criminals and the other half of the class encountered the other set of criminals. Three days after the exam, participants were asked to identify the "criminals" from a series of 12 pairs of mugshot photographs. For a given witness, one pair of photographs was composed of the criminal they encountered in class and a criminal that they did not encounter in class. Four to five days later, each participant was shown a lineup that consisted of a criminal with a mugshot, a criminal not seen in the mugshot phase, a foil seen in the mugshot phase, and an unfamiliar lineup foil. The hit rate for the criminal with a mugshot was .45, for the criminal without a mugshot it was .24, and for the foil in an earlier mugshot it was .29. Participants were most accurate recognizing the criminal whose mugshot was previously seen. However, participants chose the innocent person seen in the mugshot only condition just as often as they chose the criminal whose mugshot photograph they did not see.

Expanding on these findings, Brigham and Cairns (1988) examined how viewing intervening photographs influence eyewitness identification accuracy. First, participants watched a videotaped staged crime. Approximately 20 min. later, the experimental group was shown a series of mugshot photographs that did not contain the criminal; the control group was simply asked to return in two days. Two days later, all participants were asked to identify the criminal from a target-present lineup. The hit rate was .69 in the control condition and .36 in the experimental condition. Similarly, the false alarm rate was .08 in the control condition and .20 in the experimental condition. Gorenstein and Ellsworth (1980) reported similar results. Thirty-nine percent of the participants in the control condition who did not view the mugshot photographs correctly identified the target photograph; only 22% of the participants in the experimental condition did so. Furthermore, on the final test lineup 44% of participants in the experimental condition incorrectly identified the photograph they had chosen during the intervening phase.

The research on the effect of intervening lineups on subsequent identification accuracy conceptually dovetails with the research on the suggestibility of memory. In the classic paradigm for studying suggestibility (Loftus, 1975; Loftus, Miller, & Burns, 1978; Pezdek, 1977), participants first witness an event. Next, participants in the experimental condition receive misleading information about the original event; those in the control condition do not receive misleading information. Finally, participants

are asked to discriminate between the original event and the misleading information. The primary result is that the hit rate to the original target event is lower and the false alarm rate to the misleading information is higher in the experimental than the control condition. These results are exactly the same pattern of results found in the aforementioned studies examining intervening photographs. For example, Gorenstein and Ellsworth (1980) and Brigham and Cairns (1988) reported lower correct identification rates and higher false identification rates in the conditions in which participants viewed the intervening mugshot photographs than in the conditions in which participants did not view the intervening photographs.

As a result of the similar cognitive processes involved in these two areas of research, the theories that predict suggestibility effects should also predict how identification accuracy is affected by intervening lineups. The two primary interpretations of the suggestibility effect are trace alteration and source monitoring. According to the trace alteration interpretation, after viewing suggested information similar to the target information, the suggested information permanently alters the original information in memory (Loftus, 1979). Such memory impairments may be a product of memory blends where pieces of the original target event and pieces of the misleading event are blended together to make a new memory (Loftus, 1979; Loftus et al., 1978) or the impairment may be caused by the suggested information overwriting the original information in memory (Loftus & Loftus, 1980). According to the trace alteration interpretation, once witnesses are exposed to potentially misleading information, their memory for the target item will be permanently altered.

On the other hand, according to the source monitoring interpretation, both the suggested information and the target information remain in memory as distinct traces. The reason memory errors occur is because of source confusion errors in which witnesses confuse the suggested information with the original event (Johnson, Hashtroudi, & Lindsay, 1993; Lindsay & Johnson, 1989). The source monitoring interpretation rests upon the assumption that the suggested information does not render the original target event permanently altered. Rather, the suggested information and the original information are still in memory; the witness simply confuses the source of each piece of information.

Although these two interpretations are currently being debated in the field (Belli, Lindsay, Gales, & McCarthy, 1994), the source monitoring interpretation is generally better supported (Chandler, 1991; Chandler, Gargano, & Holt, 2001). The results of Chandler et al. (2001) suggest that a witness's report does not become permanently tainted if he or she views intervening postevent information. However, it is clear from the research on lineup construction that under some conditions a witness's report is likely to be affected by this intervening information. Therefore, although it is best practice to limit the amount of postevent information witnesses are exposed to, this is not realistic during police investigations. This experiment extends Chandler et al.'s conclusions to a real-world problem, namely, examining the effect of intervening lineups on face identification accuracy, to discover the extent to which identifying a target face is affected by an intervening lineup.

The model of recognition memory by Mandler (1980) provides an explanation for the role of source monitoring in accounting for the effect of postevent information on memory. Mandler differentiated between the process of *recognition* and the

process of *identification*. According to Mandler (1980), *recognizing* that a stimulus is familiar is a relatively fast process that involves determining whether there is a match between a stimulus and a representation that exists in memory. In recognition responses, stimuli that surpass a familiarity threshold are responded to as "old." This can explain how a familiar nontarget face may be misidentified as "old." However, *identifying* a specific stimulus is a relatively slower process that involves recalling contextual information regarding the circumstances surrounding the initial perception and encoding of the stimulus. Identification involves determining, for example, whether a specific face was seen at the scene of the crime or someplace else. The critical difference between recognition responses and identification responses is the recall of contextual information in identification responses.

Several issues are addressed in this study. The first concerns the extent to which the hit rate to the perpetrator's face and the false alarm rate to the innocent suspect's face are influenced by the presence of the innocent suspect in the intervening lineup and the presence of both the innocent suspect and the true perpetrator in the test lineup. The second issue concerns how falsely identifying an innocent foil in an intervening lineup affects subsequent identification accuracy. The third concern is whether misidentifications that results from intervening lineups occur because witnesses' response criteria have been set too high, or rather because memory for the observed face has been impaired.

Previous studies examining the effect of intervening photographs on eyewitness identification accuracy have not adequately addressed these concerns. This is because many of these previous studies (e.g., Brigham & Cairns, 1988; Brown et al., 1977; Gorenstein & Ellsworth, 1980) employed only target-present lineups. In addition, in some studies the effect of repeating foils was not controlled (e.g., Brigham & Cairns, 1988; Gorenstein & Ellsworth, 1980). Thus, it is not clear whether the accuracy rates on the subsequent identification test were because of the intervening photographs per se or a result of repeating specific foil photographs. In the present study, the effects of exposure to intervening photographs were controlled by having participants in both the control and the experimental conditions receive an intervening lineup. Also, the problem of repeating foils was controlled by having different foil faces in the intervening phase and the test phase of the experiment. The only foil face that was repeated from the intervening phase to the test phase of the experiment was called the repeated distractor face, RDF.

In this study, the effect of intervening lineups on eyewitness identification accuracy was examined. The procedure consisted of three phases; a presentation phase followed by an intervening lineup phase and a test lineup phase. The primary manipulation consisted of whether a specific foil individual in the intervening lineup (the RDF) was repeated in the final lineup phase. In the presentation phase, all participants were shown a single photograph of the target face. In the intervening phase, one of two intervening 6-person target-absent lineups was presented. Control subjects saw a lineup consisting of six foil faces. Experimental subjects saw a similar lineup; however, one foil face from the control lineup was replaced with the RDF that was to be repeated in the test phase. To isolate the effects of the RDF from just viewing an intervening postevent lineup, the control group received an intervening lineup in which none of the faces were later repeated. In the test phase, participants were

shown one of three lineups determined by a combination of the target face (present or absent) and the RDF (present or absent), without including the condition in which both target face and RDF were absent.

Several of the predictions for this study follow from the source monitoring interpretation. First, the hit rate is predicted to be greater in the experimental condition when the RDF is absent from the test lineup than when it is present. Similarly, the false alarm rate is predicted to be greater in the experimental condition when the target face is absent from the test lineup than when it is present because of the confusion between the target face and the intervening lineup faces. This confusion is predicted to result from not accurately remembering whether the source of the familiarity is the intervening lineup or the originally presented target face. Also, it is predicted that the hit and the false alarm rates in the control condition will not be affected by whether the target and RDF are present in the test lineup. That is, in the control conditions there should be no confusion between the target face and the RDF as the RDF was not viewed during the intervening phase in the control condition.

METHODS

Participants

One hundred and sixty adults (age: 18–55 years, $M = 27.82$, $SD = 8.97$) participated in this experiment. Participants were volunteers from psychology classes at community colleges in the metropolitan Los Angeles area. They were predominately Caucasian and came from middle-class socioeconomic backgrounds. There were 128 females and 32 males.

Design

The design was a 2×3 mixed factorial design. The two factors, summarized in Table 1, were the intervening lineup condition (experimental—RDF present; control—RDF absent) and test lineup condition (target face, RDF, and four foil faces; target face, and five foil faces; or RDF plus five foil faces). The primary dependent variables were the hit rate to the target face, p("old"/old), and the false alarm rate to the RDF, p("old"/new).

Table 1. Diagram Illustrating the Design of the Experiment

Presentation phase	Intervening phase	Test phase[a]
View photograph of target face	Target absent lineup plus RDF (experimental)	Target, RDF, 4 foils (Test Lineup 1)
		Target, 5 foils (Test Lineup 2)
	Target absent lineup (control)	RDF, 5 foils (Test Lineup 3)

[a] Different sets of foils were used in each phase of the experiment.

Procedure and Materials

The stimulus faces used in this study were photographs of 12 different Caucasian males between the ages of 20–30 years, downloaded from the University of Stirling face database (available at: http://pics.psych.stir.ac.uk). None of the individuals had any identifying features such as visible scars, tattoos, or piercings. All participants were run in small groups.

This study consisted of three phases; the presentation phase, followed by the intervening lineup phase, and then the test lineup phase (see Table 1). In the presentation phase, participants were asked to fill out a demographics questionnaire. Next, all participants were shown the target photograph of an individual named Steve Kent, projected on a screen in front of them for approximately 60 s. As they examined the photograph, they heard a story about Steve Kent (see Appendix). Participants were instructed to pay attention to the story and the photograph being presented because they would have to answer questions about the story and the photograph at a later date.

One week later participants were presented the intervening lineups. Participants were randomly assigned to control and experimental groups. Each person received a white piece of paper with six color photographs arranged in two rows of three photographs each. Each photograph was approximately 1.5×2.5 inches in size. The control group received a 6-person target-absent lineup. The experimental group received a similar 6-person target-absent lineup except that one photograph was replaced with the RDF in the fifth position. The RDF was new in this phase of the experiment and was the only foil subsequently repeated in the final lineup phase. Each group was asked to identify Steve Kent, the man viewed in the presentation phase. Participants were asked to circle the number on the answer sheet in front of them corresponding to the face they identified. All participants were told the following: (a) the target may or may not be present, (b) only one choice was allowed, and (c) they had the option of responding "not present." After handing in their responses to the experimenter, subjects were informed that the experimenter would be returning in two days to ask more questions about the photographs and the story.

The test lineup phase occurred two days later. In the test phase, participants in the control and experimental conditions were randomly assigned in equal numbers to one of three test lineup conditions. Test Lineup 1 consists of the target, RDF, and four foils; test Lineup 2 consists of the target and five foils; Test Lineup 3 consists of the RDF and five foils. The target was always in the second position, and the RDF was always in the fifth position. The photographs of the RDF and the target face were different photographs of each person than participants initially saw. In the two pictures, the target individual and the RDF were wearing different clothing and their hair was styled somewhat differently.

In the test lineup phase, each participant was handed a piece of paper containing a 6-person color photographic lineup. They were told that the lineup they were given in the intervening phase may or may not have included Steve Kent, the individual they viewed in the presentation phase. Participants were then instructed to identify Steve Kent. Responses were recorded in the same manner as in the intervening phase. We added a second test to the procedure after we started collecting data. This test

was added to control for response bias on the part of participants. Ninety-six of the 160 participants participated in this second test. After participants handed in their responses to the first test, this second test was distributed. Participants were asked to review the test lineup again, and this time they had to select one of the test faces as the target individual; there was no option of choosing "not present." After participants responded, their answer sheets were collected and then they were debriefed.

To control similarity effects, the RDF was selected so as not to look the most similar to the target face. Based on suggestions by Wells (1993), each lineup was pilot tested to determine if any bias existed in the lineup, that is, if the *a priori* rate for selecting the target face and the RDF differed significantly from chance. A different group of 30 college students pilot tested each of the five lineups. Participants were given the same general verbal description of the target individual that the test subjects received (see Appendix), but they did not ever see the photograph of the target individual. Then, they were asked to guess who the target individual was in the test lineup. Pooling the data from the three lineups in which the RDF was present, it was found that the RDF was selected 14.8% of the time. Pooling the data from the two lineups in which the target was present, it was found that the target face was selected 15.5% of the time. These rates did not statistically differ from the chance rate of $p = .167$ ($p > .05$).

RESULTS

A comparison of the hit and false alarm rate data as a function of the type of test lineup was conducted. These data are presented in Table 2. Throughout this study, results are considered significant at the $p < .05$ level of significance. As can be seen in the top panel of Table 2, in the experimental condition, the hit rate to the target face in the test phase was significantly greater when the RDF was absent from the lineup (Lineup 2: .76) than when it was present (Lineup 1: .42), $z = 2.50$. Similarly, the false alarm rate to the RDF in the test phase was significantly greater when the target was absent from the lineup (Lineup 3: .46) than when it was present (Lineup 1: .19), $z = 2.21$. Neither of these comparisons was significant in the control condition; there

Table 2. Hit and False Alarm Rates as a Function of Target and RDF Present or Absent in the Test Lineups

	Hit rate to the target		False alarm rate to the RDF	
Condition	Target, RDF, 4 foils (Test Lineup 1)	Target only (Test Lineup 2)	Target, RDF, 4 foils (Test Lineup 1)	RDF only (Test Lineup 3)
Experimental[a,b]	0.42[c] (11 out of 26)	0.76[c] (19 out of 25)	0.19 (5 out of 26)	0.46[c] (14 out of 30)
Control	0.35[c] (9 out of 26)	0.50[c] (14 out of 28)	0.07 (2 out of 26)	0.12 (3 out of 25)

[a] Test Lineup 2 is significantly greater than Test Lineup 1, $p < .05$.
[b] Test Lineup 3 is significantly greater than Test Lineup 1, $p < .05$.
[c] Cell is significantly greater than the chance rate of $p = .167$, $p < .05$.

were no differences in the hit or false alarm rates as a function of the type of test lineup presented.

These results suggest that in the test phase, participants were making source confusing errors, confusing which was the target face and which was the RDF. Consequently, when participants viewed the lineup that contained only the target face or only the RDF, they chose the most familiar face. This would explain the high hit rate and false alarm rate in the target only lineup (Lineup 2) and the RDF only lineup (Lineup 3). This would also explain why when participants viewed the lineup that contained both the target face and the RDF (Lineup 1), their hit rate was lower (relative to the hit rate to Test Lineup 2, the target only lineup) and their false alarm rate was lower (relative to the false alarm rate to Test Lineup 3, the RDF only lineup). They were making source confusion errors.

The next set of analyses tested whether the mean hit rate and mean false alarm rate in the test phase in each condition significantly differed from what would be expected by chance. As can be seen in Table 2, the mean hit rates for Lineups 1 and 2 were significantly greater than the $p = .167$ chance rate in both the control and experimental conditions. These results indicate that participants took the experiment seriously and were able to identify the target face at a rate better than chance when it was in the test lineup. However, only in Lineup 3 for the experimental group was the false alarm rate to the RDF significantly greater than chance. Participants only false alarmed to the RDF at a rate greater than chance when it had appeared previously in the intervening phase, and was not accompanied by the target face in the test lineup.

The data in this study also allowed an examination of identification rates in a subsequent lineup based on how participants responded on the intervening lineup. On the intervening lineup, experimental participants were asked to identify the target from a lineup in which the target was absent and the RDF was present. Three responses were possible: subjects could identify the RDF, identify one of the foil faces, or they could respond "not present." Only the responses from the experimental condition are included in this analysis because only in this condition were participants exposed to the RDF in the intervening phase. Because of the small sample size, these data are analyzed with Fisher's Exact Test instead of a z test for the difference between two proportions.

As can be seen in the top panel of Table 3, given that a participant picked the RDF in the intervening phase, the hit rate to the target face was significantly higher in the test phase when the lineup did not include the RDF (Lineup 2: .85) than when the test lineup did include the RDF (Lineup 1: .25), $p = .03$. Similarly, the false alarm rate to the RDF in the test phase was significantly higher when the lineup did not include the target face (Lineup 3: .77) than when the test lineup did include the target face (Lineup 1: .25), $p = .04$.

Although the effect was not as strong for participants who responded "not present" in the intervening phase, as can be seen in the middle panel of Table 2, a similar pattern of results emerged. For the participants who responded "not present" in the intervening phase, the hit rate was marginally greater in the test phase when the lineup did not include the RDF (Lineup 2: .88) than when the lineup did include the RDF (Lineup 1: .45), $p = .05$. However, the false alarm rates to the RDF in the

Table 3. Hit and False Alarm Rates in the Test Phase as a Function of Target and RDF Present or Absent in the Lineups for Participants Who Chose the RDF, "Not Present," or One of the Foil Faces in the Intervening Phase

		Hit rate to the target		False alarm rate to the RDF	
Choice in the intervening phase	Condition	Target, RDF, 4 foils (Test Lineup 1)	Target only (Test Lineup 2)	Target, RDF, 4 foils (Test Lineup 1)	RDF only (Test Lineup 3)
"RDF" chosen in intervening phase	Experimental[a,b]	0.25 (2 out of 8)	0.85 (6 out of 7)	0.25 (2 out of 8)	0.77 (7 out of 9)
"Not present" chosen in intervening phase	Experimental[c]	0.45 (5 out of 11)	0.88 (8 out of 9)	0.27 (3 out of 11)	0.40 (4 out of 10)
Foil face chosen in inteverning phase	Experimental	0.57 (4 out of 7)	0.55 (5 out of 9)	0.00 (0 out of 7)	0.27 (3 out of 11)

[a]Test Lineup 2 significantly greater than Test Lineup 1, $p < .05$.
[b]Test Lineup 3 significantly greater than Test Lineup 1, $p < .05$.
[c]Test Lineup 2 marginally greater than Test Lineup 1, $p < .06$.

test phase did not differ significantly as a function of whether the lineup contained the target (Lineup 1: .27) or not (Lineup 3: .40).

This pattern of results did not occur in the responses of participants who chose a foil face on the intervening test. As can be seen in the bottom panel of Table 3, in the test phase, the hit rates did not significantly differ between the conditions in which the test lineup included the RDF (Lineup 1: .55) or not (Lineup 2: .57). Similarly, the false alarm rates did not significantly differ between the conditions in which the test lineup included the target face (Lineup 1: .00) or not (Lineup 3: .27).

Together, these results suggest that the effect of the presence of the RDF in the intervening lineup on identification accuracy in the test lineup is greatest when participants falsely identified the RDF in the intervening lineup. Viewing an innocent suspect in an intervening lineup is less detrimental if the participant falsely identifies a face in the intervening lineup besides the RDF. However, even when participants viewed the RDF in the intervening lineup but responded that the target was "not present" in the subsequent test lineup, the hit rate to the target face was significantly less when the RDF was included in the test lineup than when it was not.

The final set of analyses examined the responses on the last test, the forced choice test lineup in which the "not present" response option was not included. Twenty-three of the participants in Lineups 1 and 2 who had responded "not present" on the previous test lineup were administered this forced choice test. The forced choice test was given to participants after they had handed in their responses to the first lineup test. The question of interest here is whether these participants would identify the target face at a rate greater than chance (.167) if forced to choose a test face, even if they had previously indicated an inability to do so.

In Lineups 1 and 2, there were 11 participants in the control intervening item condition and 12 participants in the experimental intervening item condition who had responded "not present" in the first test lineup and then participated in the forced choice test. Eight of the 11 participants in the control condition (73%) and 6 of the 12 participants in the experimental condition (50%) correctly identified the target face in the forced choice test. Although participants were more likely to correctly identify the target face on the forced choice test if they had been in the control condition than in the experimental condition, the high rate of correctly identifying the target face on the forced choice test suggests that the lower hit rate to the target face in the previous lineup test did not result primarily from impaired memory for the target face. Rather, on the first test lineup participants apparently had placed their response criterion too high.

DISCUSSION

This study addresses the conditions under which eyewitness identification accuracy is affected by the composition of an intervening photographic lineup as it relates to the composition of a subsequent photographic lineup. It is important to understand the potential effect of intervening lineups on the accuracy of identification in subsequent lineups to protect against misleading investigative practices.

First, it is clear that the hit rate to the target face and the false alarm rate to the RDF were influenced by both the presence of the RDF in the intervening lineup and

the presence of the RDF in the test lineup. As can be seen in Table 2, when participants had viewed the RDF in the intervening lineup (i.e., the experimental condition), in the subsequent test phase, the hit rate to the target face was greater when the test lineup included the target face but not the RDF (Lineup 2) than when the test lineup included both the target face and the RDF (Lineup 1). Similarly, when participants had viewed the RDF in the intervening lineup, in the subsequent test phase, the false alarm rate to the RDF was significantly higher when the test lineup did not include the target face (Lineup 3) than when it did (Lineup 1). None of these differences were significant in the control condition in which participants did not see the RDF in the intervening phase. These results suggest that in the test phase, participants were confusing which was the target face and which was the RDF. Consequently, when participants viewed the lineup that contained only the target face or only the RDF, they chose the most familiar face.

These results fit nicely with Mandler's model of recognition memory (Mandler, 1980). According to Mandler (1980), *recognizing* that a stimulus is familiar is a relatively fast process that involves determining whether there is a match between a stimulus and a representation that exists in memory. However, *identifying* a specific stimulus is a relatively slower process that involves recalling contextual information regarding where the stimulus was previously viewed. The results of the present study suggest that although this task was an identification task, participants frequently made recognition responses rather than identification responses. This would explain why compared to the lineup that included both the target face and the RDF (Lineup 1), the hit rate to the target face was higher in the target-only lineup (Lineup 2) and the false alarm rate to the RDF was higher in the RDF-only lineup (Lineup 3). Participants simply recognized the most familiar face in the lineup and responded accordingly.

Alternatively, participants may have conducted the slower identification process, but they did not make accurate identification responses because insufficient contextual information had been encoded in memory for the target face and the RDF. This would support the source monitoring interpretation for the effect of the intervening lineup on subsequent eyewitness identification accuracy, as accurate source monitoring involves accessing sufficient contextual information regarding the previously encoded stimuli (Johnson et al., 1993).

A second set of results assessed whether the effect of viewing the RDF in the intervening lineup on subsequent face identification accuracy is affected by whether participants actually identify the RDF in the intervening lineup. These results reveal how a prior identification response may influence subsequent face identification accuracy. In a previous study, Gorenstein and Ellsworth (1980) had participants view an intervening lineup followed by a test lineup. They reported that in the test lineup, 44% of the participants incorrectly identified the face they had selected in the intervening phase. But it is not clear from this previous study what the comparable figure was for participants who viewed the intervening lineup but did not make an identification. In the present study, as can be seen in Table 3, the false alarm rate to the RDF in the test lineup was greatest when participants falsely identified the RDF in the intervening lineup. However, even when participants viewed the RDF in the intervening lineup and responded that the target was "not present," in the

subsequent test lineup, the hit rate to the target face was significantly less when the RDF was included in the test lineup than when it was not.

The third set of findings assessed whether the intervening lineup altered the trace of the target face viewed in the presentation phase. Of the participants in Lineups 1 and 2 who received the forced choice test, 73% of control participants and 50% of experimental participants correctly recognized the target face on the forced choice test after having chosen the "not present" response on the previous test that included the target face. This suggests that even the participants who could not identify the target face in the first test lineup did nonetheless retain memory for a significant amount of the information in the target face. The inability of the participants to identify the target face in the first test lineup apparently resulted from having placed their response criterion too high, rather than from impaired memory for the target face.

There are important implications of these findings for both police lineup procedures and the interpretation of lineup results in the courtroom. First, the police should make every attempt to make each eyewitness's first lineup as accurate and valid as possible because viewing multiple lineups adversely interferes with witnesses' ability to correctly identify the perpetrator. In fact, in this study, an innocent suspect viewed in two different lineups was just as likely to be chosen as the actual perpetrator who was seen in only one lineup. To eliminate the potential bias of intervening lineups, police should avoid presenting multiple lineups to the same eyewitness.

In addition, these results suggest that if witnesses are shown a target-absent lineup with an innocent suspect in the lineup, even if they do not select the innocent suspect from this lineup, the probability that they will identify the guilty suspect in a subsequent target-present lineup is reduced, if they are forced to choose someone from this second lineup. A reasonable approximation to a forced choice identification lineup would occur if, for example, witnesses are told that the police have found the suspect and are asked if they can identify him in the lineup.

Although it is best practice to limit the amount of postevent information presented to eyewitnesses (Lindsay, Nosworthy, Martin, & Martynuck, 1994; Wells, 1993), the results of this study suggest that even though an intervening target-absent lineup does reduce recognition accuracy on a subsequent lineup, the intervening lineup does not alter or overwrite the trace of the target face. In this study it was found that the condition in which eyewitness identification accuracy is most harmed by an intervening lineup exists when participants view an intervening target-absent lineup containing an innocent suspect, they identify the innocent suspect, and subsequently they view a lineup containing the innocent suspect but not the guilty suspect. The false alarm rate to the innocent suspect is reduced if the subsequent test lineup includes both the innocent suspect and the guilty suspect. Also, viewing an innocent suspect in an intervening lineup is less detrimental if the participant falsely identifies a face in the intervening lineup other than that of the innocent suspect. The condition in which eyewitness identification is least harmed by the intervening lineup exists when the participants view an intervening target-absent lineup containing an innocent suspect, but then are subsequently shown a lineup that includes the guilty suspect but not the innocent suspect. A hit rate of .76 resulted in this condition in the present study. This finding concurs with the recommendations of Wells and

colleagues (Wells et al., 1998) that more than one suspect should not be presented in any single lineup.

In terms of the implications of these findings in the courtroom, the results suggest that it is particularly important to treat positive identifications with skepticism if the identifications occurred after viewing multiple intervening lineups. In such cases, one cannot dismiss the possibility that the identifications resulted from familiarity based on viewing the previous lineup rather than from the witness's memory for the actual perpetrator. That is, once eyewitnesses are exposed to intervening lineups, their subsequent identifications are specious at best.

APPENDIX: STORY READ TO PARTICIPANTS IN THE PRESENTATION PHASE

This is Steve Kent. He is currently living in Connecticut and attending Yale. He will be graduating with a major in English Literature next Spring. He dreams of becoming a writer. He lives in a small 2-bedroom apartment that is located 1 mile from campus. He shares the apartment with another student named Joshua Fisher, who is Steve's very best friend. Both Steve and Joshua are the copresidents of the chess club. Steve's mom, Mildred, is very happy that Steve has made a lot of friends at Yale. She was worried that Steve might be lonely in college because he was so shy and introverted while growing up. "He just preferred to read books by himself than to hang out with his classmates," said Mildred. However, by the end of high school, Mildred admits that all of Steve's reading and studying paid off. Steve Kent was elected the valedictorian of his class. Steve said that becoming the valedictorian gave him the confidence to apply for admission to Yale. After he was accepted to Yale, he vowed that he was going to overcome his shyness, make friends, and make the best of his college career. Steve Kent has kept his promise.

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