

Elimination Lineups: An Improved Identification Procedure for Child Eyewitnesses

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Elimination lineup procedures were proposed that required the witness to eliminate all but 1 lineup member before being asked if the remaining lineup member was the criminal. Elimination lineups were designed and tested with the aim of reducing false-positive choices by child eyewitnesses ($n = 587$ children, 10–14 years, $M = 12$ years; $n = 185$ adults). Elimination lineups decreased false-positive responding in children without significantly reducing correct identifications. Fast elimination lineups with modified instructions emphasizing the negative consequences of identifying an innocent person and explaining how to make an absolute judgment significantly decreased children's false-positive rate to a level comparable with adults shown a simultaneous lineup. The potential benefits of elimination lineup procedures for child witnesses are discussed.

In some cases—sexual assaults by pedophiles, for example—child eyewitnesses may be the only source of information available to law enforcement officials. The child may be asked to recount what occurred during the crime, and eventually the child witness may be asked to examine a lineup and provide an identification of the criminal. Shown a criminal-present lineup, children over the age of 5 typically produce rates of correct identification comparable to those of adults (Pozzulo & Lindsay, 1998). Shown a criminal-absent lineup, however, children consistently produce more false positives than adults do (Pozzulo & Lindsay, 1998). For example, Parker and Ryan (1993) found that 83% of children and 58% of adults incorrectly selected someone from target-absent lineups. Similarly, Lindsay, Pozzulo, Craig, Lee, and Corber (1997, Experiment 1), found that children made more false positives (70%) than adults did (34%). Thus, children are prone to making false-positive choices from lineups, which may discourage police officers and prosecutors from seeking and using the identification evidence of child witnesses.

An identification procedure for children is needed that

sustains identification accuracy when the criminal is present and decreases false-positive choices when the criminal is absent. Two types of false-positive lineup decisions are possible with varying consequences for the person identified and the witness (Wells & Turtle, 1986). A false positive may be an identification of either an innocent suspect (false identification) or a known-to-be innocent lineup member (foil identification). An innocent suspect who is identified may be prosecuted while the criminal remains at large, possibly committing further crimes. Although foils are not prosecuted because such identifications are “known errors,” foil identifications damage the credibility of the witness. Maintaining witness credibility may be important for two reasons. First, other testimony by the witness may be less credible after a known identification error because such errors suggest both that the witness's memory is faulty and that the witness is willing to report inaccurate memories. Given that at this point it is not clear, especially for children, whether identification errors correspond to inferior memory for other details of the crime, we may want to preserve a witness's credibility for other crime details. Second, if the suspect is actually innocent, preserving the credibility of the witness will allow him or her to examine a subsequent lineup if another suspect is arrested. It is unlikely that an identification of a subsequent suspect would carry much weight if the witness had made a known error in a previous identification situation, particularly when the prior error was a misidentification of the purported perpetrator of the same crime.

Identification Procedures

Typically, witnesses are presented with a simultaneous lineup from which to make an identification. In this type of lineup, all lineup members are presented to the witness at

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one time. Simultaneous lineups allow, perhaps even promote, the use of a relative judgment or best choice strategy; that is, the person who looks most like the criminal may be identified (Wells, 1984, 1993). In a lineup where the criminal is present, a relative judgment may be effective. However, in a lineup where the criminal is absent, and thus the suspect is innocent, the relative judgment strategy leads to high rates of false or foil identification (Lindsay, 1997).

Researchers have investigated presenting photographs sequentially in order to alter a witness's relative judgment strategy and replace it with an absolute judgment strategy (i.e., comparing a photograph with one's memory of the criminal rather than comparing it with other photographs used in the identification procedure; Lindsay & Wells, 1985). For adult witnesses, sequential lineups, compared with simultaneous lineups, do not have an impact on correct identification rates but reduce false-identification rates by increasing the probability that no one will be identified from a criminal-absent lineup (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, et al., 1991; Lindsay & Wells, 1985). Lindsay (1997) found not only that sequential lineups led to a lower rate of reported use of relative (versus absolute) judgments, but also that false-positive choices were substantially more likely to be made by witnesses who reported using relative judgments than those who reported using absolute judgments. The increase in false positives by those who reported using relative judgments occurred regardless of the method of lineup presentation. Unfortunately, children do not respond to sequential lineups in a manner similar to that of adults (Pozzulo & Lindsay, 1998). Children will frequently make false or foil identifications resulting in high false-positive identification rates, even with the use of sequential lineups (Lindsay et al., 1997; Parker & Ryan 1993).

Child witnesses can be forced to make absolute judgments by showing them only the suspect. The presentation of a single person, the suspect, is called a *showup*. The witness states whether the suspect is or is not the criminal without viewing any other individuals or making any other judgments. Clearly, such a procedure requires an absolute judgment and eliminates any potential for foil identifications. On the other hand, because there are no foils, every identification made in a showup when the suspect is innocent is a false identification. To clarify, the false-identification rate for an identification procedure can be estimated as the proportion of false-positive selections divided by the nominal size of the identification procedure (Lindsay et al., 1997). The nominal size of a showup is one; therefore, the false-positive selection rate and the false-identification rate are the same. Previous research using this notion of estimated false-identification rates indicates that, with child witnesses, showups produce much higher rates of false identification than simultaneous or sequential lineups (Lindsay et al., 1997). Foil choices cannot be made from

showups, so the child witness will not be discredited; however, showups lead to high rates of false identification and possible wrongful conviction.

Child witnesses could be given special training or instructions prior to attempting identifications to reduce their false-positive rates. To date, attempts to find training tasks or instructions that reduce children's false-positive lineup decisions have fared poorly (Davies, Stevenson-Robb, & Flin, 1988; Parker & Ryan, 1993; Pozzulo & Lindsay, 1998). Researchers have emphasized both the risk of false identification and the importance of choosing no one rather than making a false identification, but such instructions have led to small increases in correct identification rates rather than reductions in false-positive choices (Pozzulo & Lindsay, 1997). Thus, none of the techniques currently available (sequential lineup, showup, or special instruction) solve the problem of high false-positive selection rates by child witnesses.

Two-Judgment Theory of Lineup Identification

In an attempt to develop a superior identification procedure for children, we addressed a basic question: Why do children fail at a higher rate than adults to correctly reject target-absent lineups? One possibility is that children have more difficulty than adults with the decision process. A simultaneous identification task can be viewed as involving a two-judgment process. Judgment 1 is to determine which lineup member is most similar to the criminal, and Judgment 2 is to determine whether the most similar lineup member is the criminal. Judgment 1 is a relative judgment, whereas Judgment 2 is an absolute judgment. Shown a criminal-present lineup, a relative judgment leading the witness to select the most similar lineup member often produces a correct identification. An absolute judgment (Judgment 2) is not necessary for accuracy, provided the lineup foils are not overly similar to the criminal (see Luus & Wells, 1991; Wells, Rydell, & Seelau, 1993, regarding the issue of selecting lineup distractors). Shown a criminal-absent lineup, an absolute judgment is necessary for identification accuracy (correct rejection) because the most similar lineup member is not the criminal. In the absence of Judgment 2, a witness using a relative judgment will frequently identify an innocent lineup member (Wells, 1993).

One explanation for high rates of false-positive identifications is the failure of the witness to exercise Judgment 2 in this two-judgment process. There is some evidence consistent with this hypothesis in previous eyewitness studies. As mentioned above, sequential lineups reduce false-positive choices, perhaps by forcing witnesses to use Judgment 2 for each person in the lineup (Lindsay & Wells, 1985; Wells, 1993). Lindsay (1997) found that adults who use relative judgments are responsible for disproportionate numbers of false-positive choices, as are those who fail to

engage Judgment 2 of the identification process. Similarly, biased lineup instructions—instructions that do not inform the witness the criminal may not be present but instead suggest the criminal is present and the witness need only pick him or her out—may increase false-positive identifications by discouraging the use of Judgment 2 (Stebly, 1997).

There are a variety of potential reasons that children may not be conducting Judgment 2 in the identification process when presented with a simultaneous lineup. Children may succumb to the demands of the situation and assume that the experimenter or police officer expects an identification (Ceci, Toglia, & Ross, 1987). Once the most similar lineup member is selected, they have complied with the experimenter's (or police officer's) instructions and made an identification. There is no need for any further decision making on the part of the witness. Alternatively, children may be unaware they should make an absolute judgment and that they should only make an identification if the most similar lineup member is actually the criminal. Furthermore, children may not know how to make an absolute judgment when presented with a simultaneous lineup.

Given children's ability to identify the targets from target-present lineups, it would appear they can successfully complete Judgment 1. However, any positive evaluation of children's identification evidence resulting from their ability to correctly identify targets is countered by the high rate of false positives with target-absent lineups. A two-judgment identification procedure that requires responses be provided separately for each judgment, rather than given as one response to the entire process, may provide an opportunity for children's correct identification ability to be maintained while their false-positive rate is lowered.

Elimination Lineup Procedures

The standard or traditional simultaneous identification task can be partitioned into two steps corresponding to the two-judgment identification theory. First, witnesses can narrow the multiperson, simultaneous lineup to the single person most similar in appearance to their memory of the criminal (Judgment 1). Once a single lineup member remains, the witness can be asked to make an identification (Judgment 2). For Judgment 2, the witness decides if the "surviving" lineup member is or is not the criminal. The first step eliminates all but the lineup member most similar to the criminal (relative judgment), and the second step asks the witness to compare the surviving lineup member to his or her memory of the criminal (absolute judgment).

There are two procedures (fast and slow elimination lineups) that vary how Judgment 1 is achieved. With a fast elimination lineup, the witness is asked to select the lineup member who looks most like the target (Judgment 1). Because it was not clear that children would make a distinction

between selecting the most similar lineup member to the criminal and stating that the person so selected is not the criminal, a second elimination procedure was designed. In a slow elimination lineup, the witness is asked to eliminate lineup members one at a time by selecting the (remaining) lineup member who looks least like the criminal until only one remains (Judgment 1). Two additional lineup procedures (fast-modified and slow-modified elimination lineups) were generated by modifying the elimination procedures instructions to emphasize the undesirability of identifying an innocent person and to aid the witness in making an absolute judgment. The modified instructions had previously been demonstrated to slightly increase children's correct identification rates from simultaneous lineups (Pozzulo & Lindsay, 1997). All elimination procedures (i.e., fast, fast-modified, slow, and slow-modified) were tested to examine their impact on the rates of correct identification and false-positive selections. These elimination procedures were compared with a traditional simultaneous lineup and a simultaneous lineup with the same modified instructions used for the elimination procedures.

The elimination procedures, by design, can eliminate all foil identifications. That is, any witness who has eliminated the suspect during Judgment 1 need not be asked to make Judgment 2 because an identification of a survivor in this case would be a known error (i.e., foil identification) and would jeopardize the witness's credibility. Elimination of the suspect during Judgment 1 is a nonidentification of the suspect. Because Judgment 2 may only be requested if the suspect survives Judgment 1, foil identifications need not occur with an elimination procedure. Thus, the foil identification rate can always be 0% with the elimination procedures if police decide not to ask for an identification when the suspect is eliminated during the Judgment 1 process. The preservation of witness credibility is most valuable if witnesses who eliminate the suspect at Judgment 1 and are not asked to make an identification can be shown to provide useful evidence on a subsequent identification task. We examined the correct identification and false-positive selection rates of a subsequent lineup after stopping a prior elimination lineup after Judgment 1. Preserving the witness's credibility is less useful if having participated in an elimination lineup dramatically reduces the ability to identify the guilty party from a subsequent lineup.

Predictions

We expected that children's correct identification rates would be comparable to those obtained with adults, regardless of identification procedure used, and that children would produce comparable correct identification rates across all identification procedures examined. We did not expect adult correct or false-positive identification rates to be influenced by identification procedure. We expected that

children presented with a target-absent simultaneous (or modified simultaneous) lineup would have a higher false-positive rate than that of adults and that the elimination procedures would decrease children's false-positive rates to a level comparable with those of adults shown a simultaneous lineup.

Method

Participants

Children in Grades 5 through 8 ($n = 587$, $M = 12$ years, range = 10 to 14 years) were recruited from elementary schools in southern Ontario, Canada. Adults ($n = 185$) were recruited from the introductory psychology subject pool of Queen's University, Ontario, and received additional marks for their participation.

Procedure

Each testing session for the children was conducted in their classroom and commenced with a brief introduction to the study by the experimenter. The study was presented as a project on street proofing. Following the introduction, children were shown a videotape of a male confederate (Mike) discussing how to stay safe. This allowed children to be exposed to a stranger/target they would later have to identify. After they viewed the videotape, children were informed that we were concerned with their ability to describe and recall people and events they had seen. Children were asked to describe Mike and to respond to a set of questions probing what they had seen on the videotape. These were filler tasks to occupy children until they were shown a lineup. The children were then shown either a target-present lineup, a target-absent lineup, or both. The session lasted approximately 35 min.

Adults (in small groups of five) were shown the same videotape as the child participants. Once the video was viewed, we informed adults that we were interested in comparing children's and adults' eyewitness abilities. This information was necessary because the videotape was clearly for children. The procedure as described with children was then conducted.

Design

Children were shown either a target-present or -absent lineup using one of the procedures described below. Adults were shown either a target-present or -absent lineup using the standard simultaneous lineup (i.e., control condition), the fast elimination procedure, or the slow elimination procedure.¹ Participants were randomly assigned to conditions within each testing session.

Lineups

Three 6-person lineups were constructed: one target-present and two target-absent (one target-absent lineup was used as the initial lineup shown to witnesses in the two-lineup condition described later, the other target-absent lineup was used for all other procedures and as the second lineup shown to witnesses in the two-lineup condition). We used "head and shoulder" color photos of the target and 17 other White men who resembled the target. All photos were approximately 3 × 5 in. (7.5 × 13 cm). In front of the

participant, the experimenter appeared to select photos from a stack of 13 and laid 6 photos (either target-present or target-absent) in front of the participant in two rows of 3 photos.² The photos were placed on a board numbered from 1 to 6 (simultaneous conditions only). Participants were then given an identification form. The instructions and identification form varied with condition.

Control condition (standard simultaneous lineup). In the control conditions, participants received the following instructions:

Now I'm going to show you some pictures. I want you to think back to what Mike looks like. Mike's picture might be here or Mike's picture might not be here. Please look at the pictures and decide if you see Mike's picture. If you see Mike's picture, I would like you to place a check mark in the box that has the same number as Mike's picture. If Mike's picture is not here, I would like you to place a check mark in the box that says "Not here."

Fast elimination. In the fast elimination conditions, participants were given the following instructions:

Now I'm going to show you some pictures. Mike's picture might be here or Mike's picture might not be here. To start, I would like you to think back to what Mike looks like. Please look at the pictures and pick out the person who looks most like Mike.

This constituted Judgment 1 of the identification procedure. Once a picture was selected, the remaining pictures were re-

¹ We collected and examined the adult data from the simultaneous, fast elimination, and slow elimination procedures prior to collecting any further data with adults. We chose not to collect data from adults using the modified lineup procedures for a variety of reasons. The simultaneous, fast, and slow elimination procedures all produced extremely low false-positive rates (.13-.06). Given a possible floor effect, it was unlikely that we could demonstrate that the modified conditions would produce lower false-positive rates with adults. Also, published data suggest that instructions similar to those we were testing with the modified conditions do not influence adult correct identification or false-positive rates (Lindsay, 1997; Pozzulo & Lindsay, 1997). Furthermore, regardless of the effect on identification accuracy with the modified lineup procedures for adults, we are not arguing that any of these procedures be used with adults but rather that the elimination lineups decrease children's false-positive rates when compared with the standard simultaneous lineup and decrease children's false-positive rates to a level comparable with adults given a standard simultaneous lineup. Hence, we did not investigate the modified conditions with adults. For improvement in adults' false-positive rates, the sequential lineup has been demonstrated to be effective (e.g., Lindsay & Wells, 1985). Also, with the use of a sequential lineup, maintaining adult credibility is not a serious issue, thus the two-lineup condition was not tested with adults.

² To dissuade children from discussing which photos they saw or picked, the children were told they would see different photos from each other. To provide credence to this, the experimenter had more photos in her hand than would be shown to the participant.

moved. The experimenter then provided an identification form and stated the following:

This might be a picture of Mike or it might be a picture of somebody else. Think back to what Mike looks like. I want you to compare your memory of Mike to this picture. I would like you to tell me if this is a picture of Mike or a picture of somebody else. If you think this is a picture of Mike, place a check mark beside *Yes, this is a picture of Mike*. If you think this is not a picture of Mike, place a check mark beside *No, this is not a picture of Mike*.

This constituted Judgment 2 of the identification procedure.

Slow elimination. In the slow elimination conditions, participants were given the following instructions:

Now I'm going to show you some pictures. Mike's picture might be here or Mike's picture might not be here. To start, I would like you to think back to what Mike looks like. Please look at the pictures and pick out the person who looks the least like Mike.

Once a photo was chosen it was removed. The experimenter then stated, "From the photos remaining, pick out the person who looks the least like Mike." That photo was then removed. This procedure continued until there was one photo remaining, which marked the end of Judgment 1. The procedure for Judgment 2 was identical to that used with the fast elimination procedure.

Given our concern that children may have been making identifications because they believed that was what was expected and that we were unsure of whether children knew how to make an absolute judgment, we modified the instructions for all three lineup procedures (simultaneous, fast, and slow). Doing so would also allow for a replication of the results across the three lineup procedures. How the lineup procedures were conducted remained the same, regardless of how the instructions were changed.

Modified simultaneous condition (standard simultaneous lineup with modified instructions). Once the photos were laid out, the experimenter stated:

If Mike was a criminal, the police would want to know if one of these pictures is of Mike or if these pictures are of other people. Making the right decision is very important because if the wrong person is picked out, he will get into trouble for something he did not do. For example, he might be put in a detention home or even go to jail. Sometimes police arrest the wrong person. When the wrong person is arrested, the criminal's picture will not be in the set of pictures shown to you. I want you to pretend that you are the only witness to this case and you now have to decide if Mike's picture is here or if these are pictures of other people. Just like in real cases, Mike's picture might be here or it might not be here. To help with your decision, I would like you to think back to what Mike looks like. Try to remember what Mike looks like. Think about what his face looks like. I want you to compare your memory of Mike's face to these pictures [participants were given time to do this]. If you see Mike's picture I would like you to place a check mark in the box that has the same number as Mike's picture. If you don't see Mike's picture, I would like you to place a check mark in the box that says *Not here*.

Fast-modified and slow-modified elimination. For these two

procedures, the instructions for Judgment 1 remained the same as described above for the fast and slow elimination procedures, respectively. The instructions for Judgment 2 were modified and were the same for these two procedures. Once there was one photo remaining the experimenter stated the following.

If Mike was a criminal the police would want to know if this is a picture of Mike or a picture of somebody else. Making the right decision is very important because if the wrong person is picked out, he will get into trouble for something he did not do. For example, he might be put in a detention home or even go to jail. Sometimes police arrest the wrong person. When the wrong person is arrested the criminal's picture will not be in the set of pictures shown to you. I want you to pretend that you are the only witness to this case and you now have to decide if this is a picture of Mike or a picture of somebody else. Just like in real cases, this might be Mike's picture or it might be a picture of somebody else. To help with your decision, I would like you to think back to what Mike looks like. Try to remember what Mike looks like. Think about what his face looks like. I want you to compare your memory of Mike's face to this picture [participants were given time to do this]. If this is Mike's picture, I would like you to place a check mark beside the sentence *Yes, this is a picture of Mike*. If this is a picture of somebody else, I would like you to place a check mark beside the sentence *No, this is not a picture of Mike*.

Two-lineup condition. To examine any effects elimination procedures have on subsequent lineup identification, at the beginning of the testing session, some participants were presented with a different, six-person, target-absent lineup (different from what was used with the elimination procedures).³ The experimenter conducted the slow elimination procedure with this absent lineup; however, the lineup was stopped at the end of Judgment 1, that is, prior to asking the participant to make an identification decision. A second lineup was shown to these participants at the end of the testing session (approximately 20 min after seeing the first lineup). Using the slow elimination procedure, participants were shown either the target-present or -absent lineup shown to the other participants. With this lineup, participants completed the procedure by making an identification decision (Judgment 2). These were the only conditions in which participants were presented with both a target-present and a target-absent lineup.

Results

We used Z tests for differences between proportions. The Z tests are identical to chi-square tests on cell frequencies. The following analyses were conducted with one-tailed testing, given our a priori predictions.

³ Because of the limited number of participants we initially had access to, we examined some preliminary identification data using the Elimination lineup procedures. The slow elimination procedure appeared more promising than the fast procedure (i.e., greater correct identifications and similar correct rejections), thus we tested the two-lineup condition only with the slow elimination procedure.

Target-Present Lineups

Table 1 presents the rates at which each lineup member survived Judgment 1 and was subsequently identified during Judgment 2. Presented with a simultaneous lineup, children produced a lower, although not significantly different, rate of correct identification than adults did (.65 for children, .80 for adults), $Z = 1.39, p = .08$. Children did produce a significantly lower correct identification rate with the modified simultaneous lineup (.56) compared with adults presented with a simultaneous lineup, $Z = 2.10, p < .05$. Correct identification rates did not differ for children shown the simultaneous or modified simultaneous lineup. Collapsing across these two conditions, children produced a significantly lower correct identification rate (.61) than adults shown a simultaneous lineup, (.80), $Z = 1.90, p < .05$. In a meta-analysis examining children's identification accuracy, Pozzulo and Lindsay (1998) reported that some studies found a significant difference in correct identification rates between children and adults, although this is not the general finding. Note, however, that in the present study adults produced an anomalously high correct identification rate for simultaneous lineup presentation. This high correct identification rate may have been due to a particularly good exposure to the target not typically used in other eyewitness studies.

As expected, regardless of the lineup procedure used, none of the children's correct identification rates differed from each other. All of the experimental lineup procedures produced comparable correct identification rates to the children's simultaneous conditions. Compared with the adult correct identification rate with the standard simultaneous lineup (.80), children's correct identification rate was mar-

ginally lower with the standard simultaneous lineup (.65) and significantly lower for all other procedures: fast elimination procedure (.51), $Z = 2.58, p < .01$, slow elimination procedure (.62), $Z = 1.64, p < .05$, fast-modified Elimination procedure (.55), $Z = 2.18, p < .05$, slow-modified elimination procedure (.54), $Z = 2.30, p < .01$, two-lineup slow elimination procedure (.50), $Z = 2.47, p < .01$. The adult correct identification rate was also significantly lower with both the fast elimination procedure (.48), $Z = 2.57, p < .01$, and the slow elimination procedure (.58), $Z = 1.91, p < .05$, as compared with the adult correct identification rate with a standard simultaneous lineup.

The survival rate of the target was significantly higher than the correct identification rate in each elimination procedure for children and adults; that is, the target surviving elimination (Judgment 1) did not always go on to be identified at Judgment 2. For children's fast elimination, the survival rate was .80, and the correct identification rate was .51, $Z = 2.92, p < .01$. For children's slow elimination, the survival rate was .80, and the correct identification rate was .62, $Z = 1.86, p < .05$. For children's fast-modified elimination, the survival rate was .83, and the correct identification rate was .55, $Z = 2.65, p < .01$. For children's slow-modified elimination, the survival rate was .90, and the correct identification rate was .54, $Z = 3.69, p < .01$. For children's two-lineup slow elimination, the survival rate was .72, and the correct identification rate was .50, $Z = 1.79, p < .05$. For adult's fast elimination, the survival rate was .87, and the correct identification rate was .48, $Z = 3.26, p < .01$. For adult's slow elimination, the survival rate was .88, and the correct identification rate was .58,

Table 1
Survival Rates at Judgment 1 and Identification Rates at Judgment 2 for Target-Present Lineups

Procedure and group	n	Lineup member				Target	6	J1	J2
		1	2	3	4				
Simultaneous									
Children	46	.04	.02	.02	.02	.65	.00	.75	.75
Adults	30	.00	.00	.00	.00	.80	.00	.80	.80
Fast Elimination									
Children	49	.02 (.02)	.02 (.00)	.04 (.02)	.10 (.06)	.80 (.51)	.02 (.02)	1.0	.63
Adults	31	.06 (.03)	.03 (.00)	.00 (.00)	.03 (.00)	.87 (.48)	.00 (.00)	1.0	.51
Slow Elimination									
Children	45	.00 (.00)	.02 (.02)	.04 (.04)	.13 (.09)	.80 (.62)	.00 (.00)	1.0	.77
Adults	33	.09 (.00)	.03 (.00)	.00 (.00)	.00 (.00)	.88 (.58)	.00 (.00)	1.0	.58
Modified Simultaneous									
Children	41	.00	.02	.00	.10	.56	.02	.70	.70
Fast-modified elimination									
Children	40	.02 (.00)	.02 (.02)	.05 (.00)	.08 (.05)	.83 (.55)	.00 (.00)	1.0	.62
Slow-modified elimination									
Children	41	.00 (.00)	.00 (.00)	.05 (.00)	.05 (.00)	.90 (.54)	.00 (.00)	1.0	.54
Two-lineup slow									
Children	32	.00 (.00)	.06 (.03)	.00 (.00)	.19 (.09)	.72 (.50)	.03 (.00)	1.0	.62

Note. Identification rates at Judgment 2 are in parentheses. Survival rate and correct identification rate are identical rates with simultaneous lineups because only one identification decision is requested. J1 = overall choosing rate at Judgment 1. J2 = overall choosing rate at Judgment 2.

$Z = 2.76, p < .01$. Each elimination procedure, however, produced a survival rate of the target comparable with the adult's correct identification rate (.80) with the simultaneous lineup. This may provide an impetus for courts to consider survival status as evidence that the suspect is the criminal.

Target-Absent Lineups

In Table 2, we present the rates at which each lineup member survived Judgment 1 and was subsequently identified during Judgment 2. Given that all lineup members were selected because they resembled the target and that there is no reason an innocent suspect would look more like the criminal than any other lineup member, we treated each lineup member as an innocent suspect. To obtain the total false-positive rate for each lineup procedure, we summed the false-identification rates (Judgment 2) for all lineup members. Consistent with previous literature (e.g., Pozzulo & Lindsay, 1998), children presented with a simultaneous lineup produced a significantly higher false-positive rate (.46) than adults (.13), $Z = 2.93, p < .01$. Children also produced a significantly higher false-positive rate (.33) with the modified simultaneous lineup, compared with adults presented with a simultaneous lineup, $Z = 1.93, p < .05$. False-positive rates did not differ for children shown the simultaneous versus the modified simultaneous lineup, $Z = 1.18, ns$.

The false-positive rates for the fast elimination procedure (.27), $Z = 1.88, p < .05$, and both the fast-modified elimination procedure (.15), $Z = 2.99, p < .01$, and slow-modified elimination procedure (.27), $Z = 1.81, p < .05$, were signifi-

cantly lower for children compared with the simultaneous lineup procedure (.46). Also, with these elimination procedures, children produced false-positive rates comparable with adults (.13). The slow elimination lineup was the only elimination procedure that produced a nonsignificant decrease in false positives for children (.32) compared with their standard simultaneous lineup false-positive rate (.46), $Z = 1.36, ns$. The false-positive rate for the slow elimination procedure also was significantly higher than that obtained with adults shown a simultaneous lineup, $Z = 1.84, p < .05$. Overall, the slow elimination procedures were somewhat, although not significantly, less effective at reducing children's false-positive responding than the fast elimination procedures (.30 and .21, respectively), $Z = 1.22, ns$. This may have been due to the greater number of decisions required on the part of the witness with the slow elimination procedure. The witness may have become confused. Also, the witness's memory may have been slightly altered with the greater number of relative decision-required with slow elimination. Adults made false-positive choices at a comparable rate across the simultaneous lineup (.13), fast elimination lineup (.06), and slow elimination lineup (.13).

Maintaining Credibility—The Two-Lineup Slow Elimination

For children, stopping a slow elimination procedure after Judgment 1 did not significantly influence the correct identification rate from a later slow elimination lineup (.50) compared to a simultaneous lineup (.65), $Z = 1.34$. In addition, the false-positive rate on the second slow elimination lineup (.27) was significantly lower than that ob-

Table 2
Survival Rates at Judgment 1 and False-Identification Rates at Judgment 2 for Target-Absent Lineups

Procedure and group	n	Lineup member						J1	J2
		1	2	3	4	5	6		
Simultaneous									
Children	46	.02	.15	.02	.17	.07	.02	.46	.46
Adults	30	.03	.00	.00	.07	.00	.03	.13	.13
Fast elimination									
Children	45	.07 (.00)	.13 (.02)	.11 (.00)	.31 (.13)	.33 (.11)	.04 (.00)	1.0	.27
Adults	31	.13 (.00)	.19 (.00)	.06 (.00)	.26 (.06)	.29 (.00)	.06 (.00)	1.0	.06
Slow elimination									
Children	47	.11 (.04)	.15 (.06)	.15 (.04)	.32 (.13)	.28 (.04)	.00 (.00)	1.0	.32
Adults	30	.07 (.00)	.30 (.03)	.00 (.00)	.33 (.07)	.30 (.03)	.00 (.00)	1.0	.13
Modified simultaneous									
Children	42	.05	.02	.07	.12	.02	.05	.33	.33
Fast-modified elimination									
Children	39	.08 (.05)	.18 (.00)	.08 (.00)	.33 (.03)	.31 (.08)	.03 (.00)	1.0	.15
Slow-modified elimination									
Children	41	.07 (.02)	.22 (.05)	.07 (.02)	.37 (.12)	.20 (.05)	.07 (.00)	1.0	.27
Two-lineup slow									
Children	33	.18 (.00)	.09 (.00)	.12 (.06)	.39 (.15)	.15 (.06)	.06 (.00)	1.0	.27

Note. False identification rates at Judgment 2 are in parentheses. Survival rate and false-identification rate are identical rates with simultaneous lineups because only one identification decision is requested. J1 = overall choosing rate at Judgment 1. J2 = overall choosing rate at Judgment 2.

tained with a simultaneous lineup (.46), $Z = 1.66$, $p < .05$, and comparable to the false-positive rate of adults shown a simultaneous lineup (.13), $Z = 1.37$, *ns*. Hence, the elimination procedure may be used to preserve a witness's credibility by stopping the procedure after Judgment 1 if the suspect has not survived, without negatively impacting a witness's identification accuracy on a subsequent lineup.

Diagnosticity Ratios

We calculated an estimated diagnosticity ratio based on the overall estimated false-identification rate (i.e., no. of correct identifications divided by [false-positive rate divided by nominal size]) for each lineup procedure examined with children (Wells & Lindsay, 1980). The standard simultaneous lineup and the modified simultaneous lineup produced the lowest diagnosticity ratios (8.49 and 10.18, respectively) whereas the modified fast elimination procedure produced the highest ratio (22.00). The diagnosticity ratios were similar for the fast elimination (11.33), the slow elimination (11.69), the modified slow elimination (12.00), and the two-lineup slow elimination procedure (11.11). A child witness's decision using the modified fast elimination procedure produced the most informative identification decision from the procedures examined.

Discussion

Elimination lineups were designed on the basis of a two-judgment theory of lineup identification: In Judgment 1, witnesses are asked to select the lineup member who looks most like the criminal (Fast Elimination) or to eliminate lineup members that look least like the criminal (Slow Elimination) and in Judgment 2, the witness is asked whether or not the "survivor" is actually the criminal; that is, the witness is asked to make an identification decision. A relative judgment is requested for Judgment 1 and an absolute judgment is requested for Judgment 2. Given children's propensity to make false-positive selections with criminal-absent lineups (Pozzulo & Lindsay, 1998), our goal was to reduce their rate of false-positive identifications.

Using an elimination procedure resulted in children making fewer false-positives than when a simultaneous lineup was used. The modified elimination procedures produced an even greater reduction in false-positive responding in children than the basic elimination procedures. The modified fast elimination procedure, in particular, produced a false-positive rate for children comparable to the false-positive rate obtained with adults. This was true even though the adult false-positive rate was unusually low.

Furthermore, all of the elimination procedures produced comparable correct identification rates to that obtained with the simultaneous lineup shown to children. Overall, the fast-modified elimination procedure produced the highest

diagnosticity ratio for children, suggesting that with this procedure more informative decisions (about the suspect's guilt) are made by children than with any other procedure examined in this study. The fast-modified elimination procedure not only partitioned the identification task into two judgments (relative and absolute), but also in the case of the absolute judgment, emphasized the undesirability of identifying an innocent individual and explained how to make an absolute judgment. The combination of the two-judgment identification task and the greater amount of instruction produced the most dramatic reduction in false-positive responding for children, lowering it to a level comparable with adults without significantly reducing children's correct identification rate. Slow elimination procedures may have been less effective because of the greater number of judgments required from the witness, which may have led to confusion. Also, the greater number of relative judgments necessary with a slow elimination lineup than with a fast elimination lineup may have slightly distorted the witness's memory.

Although the elimination procedures were not designed nor expected to influence identification accuracy of adults, the data in the present study are ambiguous given the anomalously high correct identification and correct rejection rates obtained with the standard simultaneous lineup. With adults, the elimination procedures produced significantly lower correct identification rates than the traditional simultaneous lineup. The two-judgment process may have violated adults' expectations of how a lineup is conducted (e.g., that only one decision is made upon viewing the lineup). Adults may have interpreted the request for a second judgment as an indication that the wrong person was selected, resulting in high rejection rates. The anomalously high correct rejection rate with the standard simultaneous lineup also makes it difficult to determine whether the elimination procedures produced comparable or higher correct rejection rates for adults. Further research should examine the influence of elimination procedures on adults' identification accuracy. The sequential lineup, however, is currently available and has been found to decrease adults' false-positive responding without negatively influencing correct identification rates (Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, et al., 1991; Lindsay & Wells, 1985). The difficulty with having different procedures for adults and children is determining when children operate as adults. Further research is needed to determine the age parameters for successful use of the elimination procedures.

To Stop or Not to Stop Elimination Procedures After Judgment 1?

The design of the elimination procedures presents an option to reduce false-positive responding by completely eliminating all foil identifications. That is, the elimination

procedures can be stopped after Judgment 1 has been made if the suspect is not the survivor. Thus, foil identifications are not possible because children will not be requested to make an identification decision. Eliminating foil identifications helps preserve the child witness's credibility. There are two primary advantages of preserving witness credibility. First, a child's statements regarding other aspects of the crime may be seen as more credible when no identification decision was requested than when a known identification error was made. Second, in cases where the suspect is innocent, the preservation of witness credibility for an attempted identification of a subsequent suspect may be critical. Using the slow elimination procedure, children who were shown a subsequent lineup after having been stopped after Judgment 1 on an earlier lineup continued to produce a comparable correct identification rate and significantly lower false-positive rate to the standard simultaneous lineup procedure.

There are, however, some potential negative aspects of stopping the Elimination procedures after Judgment 1 if the suspect has been eliminated. First, widespread use of the procedure in this manner may lead to "common knowledge" that once a witness is requested to make Judgment 2, the suspect has survived. This knowledge may lead to a prejudicial effect, similar to a showup, resulting in a high rate of false identification (Wagenaar & Veefkind, 1992; Yarmey, Yarmey, & Yarmey, 1996). False identifications are legally more serious than foil identifications. Second, Wells (1988) recommends police officers who administer the lineup should not know who the suspect is. Although it is possible to keep the lineup agent blind as to who the suspect is until Judgment 1 is completed, once Judgment 1 is made the lineup agent will need to know whether or not the survivor is the suspect. This knowledge may lead to prompting of the witness to make an identification which again may lead to high rates of false identifications (Wells, 1988). Third, some may argue that preserving the credibility of a witness who would identify a foil is not a benefit. Perhaps witnesses who would identify foils should not be held to be credible. Identifying a foil at Judgment 2 may suggest that the witness has a poor memory or exercises poor judgment in identification situations. In contrast, a correct rejection of a foil at Judgment 2 may suggest the witness has a good memory of the criminal, exercises good judgment, or both. Rejecting the lineup survivor may increase the child's credibility by demonstrating to police that he or she is not willing to identify just anyone. Certainly the data presented suggest that identification of a survivor from an elimination lineup is diagnostic of guilt, whereas nonidentification of a survivor is diagnostic of innocence.

At this time, however, it is not clear why children make false positives and what to infer from these decisions. For example, the child witness may go on to make an identification at Judgment 2 not because he or she has a poor

memory of the criminal but rather in response to social pressure (Ceci, Toglia, & Ross, 1987). Furthermore, we should also consider the relationship between identification accuracy and the accuracy of other information recalled about the criminal or the crime. If identification accuracy is not related to other relevant crime issues (e.g., description of the criminal, Wells & Murray, 1983) then preserving a witness's credibility by not asking the witness to make a potential known error may be beneficial. Currently, it is unclear whether the potential negative aspects of stopping the elimination procedures after Judgment 1 are sufficiently negative not to warrant the use of the procedure in this manner. We are not endorsing that the elimination procedures be used such that a decision is not requested once a foil has survived judgment 1; rather we raise issues surrounding the use of the procedure in this manner. Further research is needed before a decision can be made regarding whether or not elimination procedures should be stopped once a foil survives Judgment 1.

Potential Benefits With the Use of Elimination Lineups

The elimination procedures pose a new piece of evidence, survival status, though admittedly weaker evidence for the criminal justice system than an identification. In the present study, the criminal survived Judgment 1 at a significantly higher rate than Judgment 2. The courts may want to consider using survival status as a probabilistic measure of suspect guilt. Such a consideration is consistent with other recent recommendations for radical changes in the collection, presentation, and interpretation of (partial) identification evidence (Leippe & Wells, 1995; Levi, & Jungman, 1995).

The fast-modified elimination lineup produced significantly lower false-positive rates and comparable correct identification rates with traditional simultaneous lineups for children ages 10 to 14. In addition, the false-positive rate obtained with the modified fast elimination lineup for children was comparable with that of adults shown a simultaneous lineup. Given the low false-positive rate for adults in this study, it is possible that the rate is comparable with adult false-positive rates from sequential lineups as well. Currently, there appears to be no cost or negative consequence of using a fast elimination identification procedure with children between the ages of 10 and 14. Research on the effectiveness of elimination lineups with younger children (and older adolescents) is needed to determine the age parameters for the elimination lineups. Elimination lineups provide an identification procedure that may eliminate concerns that children's identification decisions are less accurate than the identification decisions of adults.

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