

# **Can a Lineup Procedure Designed for Child Witnesses Work for Adults? Comparing Simultaneous, Sequential, and Elimination Lineup Procedures**

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A study ( $N = 165$ ) was conducted to examine whether the elimination lineup, an identification procedure developed for children to reduce their false-positive responding, was effective for adult witnesses. Although the sequential lineup is available to help reduce adults' false-positive identifications, having different procedures for child and adult witnesses poses difficulty for the police and justice system. One procedure for all witnesses would be ideal. Simultaneous, sequential, and elimination procedures were compared. The elimination procedure produced a comparable correct rejection rate to the sequential procedure. Both the elimination and sequential procedure produced a higher correct rejection rate than did the simultaneous procedure. Correct identification rates were comparable across the 3 lineup procedures.

In many criminal investigations, particularly where little physical evidence is available, the justice system will rely on eyewitnesses to identify the perpetrator. Positive identifications can lead to the suspect being charged, tried, and convicted (Wells et al., 1998). Different identification procedures can impact the accuracy of identifications provided by eyewitnesses. Simultaneous lineup and sequential lineup procedures are currently in use around the world (e.g., Kolata & Peterson, 2001). Unfortunately, these procedures are not optimal under all conditions. For example, neither the simultaneous nor the sequential procedure can reduce child witnesses' high false-positive rate (i.e., when the culprit is not present in the lineup; Pozzulo & Lindsay 1998). Alternative identification procedures are necessary for such special conditions (e.g., child witnesses, multiple culprits). The present research compares the identification accuracy of adults using an identification procedure initially developed for children (i.e., the elimination lineup) with the simultaneous and the sequential lineup procedures.

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### Identification and Lineup Procedures

Mistaken identifications account for more false convictions than all other causes combined (Wells et al., 1998). Mistaken identifications have also been well documented in laboratory studies and archival analyses of real-world cases (Behrman & Davey, 2001; Brandon & Davies, 1973; Buckhout, 1974; Malpass & Devine, 1981; Yarmey, 1979). For example, a National Institute of Justice study examined 40 cases in which innocent people were convicted of serious crimes. The study found that 36 of the cases (90%) involved eyewitness identification evidence in which at least one eyewitness falsely identified the person (Connors, Lundregan, Miller, & McEwan, 1996). Furthermore, false-positive rates in the laboratory have ranged from 12% (Lieppe, Wells, & Ostrom, 1978) to 78% (Malpass & Devine, 1981).

Research has demonstrated that certain methods of lineup presentation are more likely than others to promote false-positive identifications (Wells et al., 1998). With the simultaneous lineup, the police present the eyewitness with all of the lineup members at once. This procedure facilitates or even promotes the use of a relative judgment (i.e., selecting who looks most like the culprit; Wells, 1993). Thus, the simultaneous lineup may be quite effective when the culprit is present (i.e., the suspect is guilty), but the use of the relative-judgment process leads to high false-positive rates when the culprit is absent (i.e., the suspect is innocent; Wells et al., 1998).

Lindsay and Wells (1985) developed an alternative procedure, the sequential lineup, in order to reduce the eyewitness's reliance on the relative-judgment process in favor of absolute judgments. That is, the eyewitness compares his or her memory of the culprit with each lineup member. In a sequential lineup, the eyewitness is presented with each lineup member's photo serially. Several studies have found that the sequential lineup procedure reduces adults' false-positive rates while maintaining their correct identification rates, compared to simultaneous presentation (Clark & Davey, 2005; Cutler & Penrod, 1988; Gronlund, 2004; Lindsay, Lea, & Fulford, 1991; Lindsay & Wells, 1985; Maclin, Zimmerman, & Malpass, 2005; Steblay, Dysart, Fulero, & Lindsay, 2001).

Steblay et al. (2001) conducted a meta-analysis of sequential lineup studies and found that while the simultaneous procedure yielded a higher correct identification rate in target-present lineups when compared to sequential lineups, the difference largely disappeared when moderator variables approximating real-world conditions (e.g., live staged vs. videotaped methodology) were considered. Moreover, the difference in false-positive rates in target-absent lineups between these two procedures is preserved and possibly further decreased for the sequential lineup under more realistic crime conditions. In general, the meta-analysis indicated that except in cases

involving multiple culprits or child eyewitnesses, the sequential procedure was more effective at increasing identification accuracy than was the simultaneous procedure. Some recent work also has cast doubt regarding the superiority of the sequential lineup procedure for adults (as well as child witnesses and when there are multiple culprits; McQuiston-Surrett, Malpass, & Tredoux, 2006).

The elimination procedure (Pozzulo & Lindsay, 1999) was developed to reduce children's higher false-positive rate compared to adults (Pozzulo & Lindsay, 1998). It has been suggested that in the absence of a second (absolute) judgment, the eyewitness relying solely on the relative-judgment process will frequently identify an innocent person in a target-absent lineup (Wells, 1993). The elimination lineup makes use of both relative and absolute judgments in a dual-judgment procedure for children. In the first judgment, the witness is presented with all of the lineup members and is asked to pick out the one that looks most like the culprit, relative to all other members. For the second judgment, the remaining lineup members are removed and the eyewitness is asked whether the "most similar" lineup member is actually the culprit. Judgment 1 is a relative judgment, whereas Judgment 2 is absolute. Pozzulo and Lindsay (1999) found that the correct identification rate of children using the elimination procedure did not differ considerably from that observed with children presented with the simultaneous procedure. Successfully, the elimination procedure yielded a higher correct rejection rate and a lower false-positive rate with children, as compared to the simultaneous procedure.

Although Pozzulo and Lindsay (1999) also examined adults with the elimination procedure, the data were ambiguous, given anomalously high correct identification and correct rejection rates obtained with the simultaneous lineup. Also, the sequential lineup procedure was not compared to the elimination procedure. Thus, the elimination procedure requires testing in an adult sample, comparing to simultaneous and sequential procedures in both target-present and target-absent conditions.

A major difficulty with having alternate procedures for witnesses is knowing when to use which procedure. At what age should police switch from using an elimination procedure to a simultaneous or sequential procedure? If an adult witness is developmentally delayed, should an elimination procedure be used? Also, with alternate procedures, attorneys may challenge the procedure chosen by police. For example, defense attorneys may argue that if a sequential procedure were used, their clients would not have been identified. Ideally, if one procedure were effective for all witnesses, these difficulties could be avoided.

The goal of the present research is to compare the simultaneous, sequential, and elimination lineup procedures using target-present and target-absent

conditions with adult witnesses. Prior to embarking on the actual study, a pilot study comparing simultaneous and elimination procedures was conducted to determine the viability of conducting a larger scale study that includes the sequential lineup procedure.

## Pilot Study

### *Method*

#### *Participants*

Study participants were 100 students (28 male, 72 female;  $M = 23.7$  years,  $SD = 8.5$ ; range = 17–55 years) who were recruited from the first-year psychology participant pool at a university in eastern Ontario, Canada. Participants received course credit for their participation.

#### *Design*

A 2 (Presence of Target: present vs. absent)  $\times$  2 (Lineup Procedure: simultaneous vs. elimination) between-subjects factorial design was used.

#### *Materials*

*Video.* Participants were shown a videotaped, staged theft, which was filmed at a convenience store. The video began with the culprit entering the convenience store and browsing down an aisle. After a few moments, the culprit picked up pain medication and placed it in his jacket. Looking around, he quickly exited the store. The videotaped event lasted approximately 40 s. A close-up of the culprit lasted approximately 4 s.

*Description form.* Participants were provided with an open-ended description form. They were asked to describe the crime that had occurred and to describe the culprit. The completion of this form was a filler task to allow a brief lapse (approximately 20 min) between viewing the culprit and being shown the lineup.

#### *Lineups*

*Lineup construction.* Photos (4 in.  $\times$  6 in., or 10 cm  $\times$  15 cm) were taken of volunteers who resembled the culprit to construct a six-person lineup. The

photos were color, head-and-shoulder shots. The target-present lineup used the picture of the culprit. The target-absent lineup substituted the target's picture with a similar other. All other photos in the target-absent lineup were the same as in the target-present lineup. The target or target replacement always appeared in Position 4. All photos remained in the same positions across target-present and target-absent lineups.<sup>2</sup>

*Simultaneous lineup.* For the simultaneous lineup, the six lineup photos were arranged in two rows of three photos with a number above each photo (1 to 6). Each participant was provided with a one-page simultaneous lineup response form to record his or her decision prior to being presented with the lineup. The form includes the following instructions:

Please look at the lineup photos. The criminal's photo may or may not be present. If you see a picture of the criminal, place a checkmark in the box with the same number as the photo's number. If you do not see a photo of the criminal, place a checkmark in the "not here" box.

Underneath the instructions were several boxes that were numbered (1 to 6) to represent the lineup photos, and one box labeled "not here."

*Elimination lineup.* For the elimination lineup, the photos were displayed in the same manner as in the simultaneous lineup procedure. First, participants were asked to select the lineup member who most resembles the culprit with the following instructions: "Please look at the lineup photos. The criminal's photo may or may not be present. To start, think back to what the culprit looked like and then select the photo that most resembles him."

Once the participants had selected a lineup member, the other photos were removed and participants were given the elimination-lineup response form. The number of the lineup member selected as most similar was marked. Participants were then instructed as follows: "This may or may not be a picture of the culprit. Think back to what the culprit in the video looked like. Now, compare your memory to this photograph. Then make a decision and complete the lineup form."

The form includes a set of instructions at the top that states "Is this a photo of the criminal in the video? Place a checkmark in the appropriate box." Underneath these instructions are two boxes, one labeled "Yes, this is a photo of the criminal" and the other labeled "No, this is not a photo of the criminal." Participants were asked to record their decision by checking the appropriate box.

<sup>2</sup>As a result of a theft in the laboratory, an analysis for lineup fairness using mock jurors could not be conducted. While we acknowledge the limitation of not having this measure, a table with frequency of lineup choices as a function of lineup member is presented in Table 4.

### *Procedure*

Upon their arrival at the laboratory, participants were asked to view a video as the experimenter retrieved materials for the study. After participants viewed the video, the experimenter returned to the room and participants were informed of the true nature of the study; that is, to examine eyewitness memory and police procedure. Participants were taken to individual rooms and were given the description form. Once the descriptions were complete, participants were presented with the lineup using either the simultaneous or elimination procedure, with the target either present or absent. These conditions were randomly determined, with constraints in place to ensure an equal number of participants across conditions.

### *Results and Discussion*

The data were divided between target-present and target-absent lineups for two reasons. First, each lineup type results in a different accurate decision: correct identification versus correct rejection. Second, the identification accuracy across the two types of lineups may be driven by different processes (Pozzulo & Lindsay, 1998). Cognitive factors may govern correct identification, whereas cognitive as well as social factors may govern correct rejection.

#### *Target-Present Lineups*

Comparable correct identification rates were obtained across the simultaneous and elimination procedures (0.32 and 0.12, respectively),  $\chi^2(1, N = 50) = 2.91, p = .09$ . However, significance may not have been reached as a result of a lack of power ( $\phi = .24$ ). Table 1 presents the identification decision rates as a function of lineup procedure. Table 2 presents the rate of "survival" following Judgment 1, and the identification rate following Judgment 2 as a function of lineup member.

#### *Target-Absent Lineups*

A significantly higher correct rejection rate was achieved with the elimination lineup procedure (0.64), as compared to the simultaneous lineup procedure (0.36),  $\chi^2(1, N = 50) = 5.13, p = .02$  ( $\phi = .22$ ). Table 1 presents the identification decision rates as a function of lineup procedure.

Table 1

*Identification Decision Rates as a Function of Lineup Procedure: Pilot Study*

	Simultaneous lineup		Elimination lineup	
	Rate	<i>n</i>	Rate	<i>n</i>
Target present				
Correct identification	0.32	8	0.12	3
Foil identification	0.56	14	0.48	12
False rejection	0.12	3	0.40	10
Target absent				
Correct rejection	0.36	9	0.64	16
False positive <sup>a</sup>	0.64	16	0.36	9

*Note.* Foil identification rate = rate of identification for all lineup members known to be innocent.

<sup>a</sup>The false positive rate is the rate of identification for all lineup members collapsed.

Table 2

*Survival Rate (at Judgment 1) and Identification Rate (at Judgment 2) as a Function of Lineup Member: Pilot Study*

	Survival rate	Identification rate
Lineup Member 1	0.08	0.04
Lineup Member 2	0.16	0.00
Lineup Member 3	0.20	0.08
Lineup Member 4	0.16	0.12
Lineup Member 5	0.16	0.08
Lineup Member 6	0.24	0.16

*Note.* *n* = 25. Lineup member 4 was the target.

The elimination procedure produced a significantly higher correct rejection rate than did the simultaneous procedure. The elimination procedure appears to work for adults, as well as for children. The correct identification rate, although not significantly different across procedures, may be lower for the elimination procedure, as compared to the simultaneous procedure.

A study was conducted that included the sequential lineup, as well as different stimuli from the pilot study. Simultaneous, sequential, and elimination lineup procedures were examined across target-present and target-absent lineups. Also, we attempted to ensure that similar results could not be obtained with the simultaneous procedure by merely altering its instructions to make them more similar to the elimination procedure. The set of instructions across the three lineup procedures was made as comparable as possible to ensure that it was the procedure, rather than the instructions driving the identification rates.

## Main Study

### *Method*

#### *Participants*

Study participants were 165 students (56 male, 109 female) who were recruited from the first-year psychology participant pool at a university in eastern Ontario, Canada. The students received course credit for their participation. Participants' mean age was 22.4 years ( $SD = 5.4$ ; range = 17–47 years).

#### *Design*

The study was a 2 (Presence of Target: present vs. absent)  $\times$  3 (Lineup Procedure: simultaneous, sequential, or elimination) between-subjects factorial design.

#### *Materials*

*Video.* A staged purse theft was videotaped at a bus stop. The video begins with a young woman waiting at a bus stop. The woman is standing with her purse hanging off her shoulder, under her right arm. A male then approaches the bus stop from around the corner, but stays out of the female's line of sight. A close-up of the culprit's face is captured as he walks around the bus stop. The culprit watches the female as she attempts to get her phone from her purse. The awkward positioning of her purse on her arm makes this task difficult, so the female puts her purse down on the ledge behind her. Throughout this process, the culprit stays off to the left of the female,



observes her actions, and periodically scans his surroundings. When the female puts down her purse and steps away from it, the male walks between the female and her purse, grabs the purse, and stuffs it under his coat as he walks away. The female is still on the phone and does not realize that her purse has been stolen. The video lasts approximately 60 s.

*Description form.* The description form is the same open-ended form used in the pilot study. The form is described in the Method section for the pilot study.

### *Lineups*

*Lineup construction.* The construction of the lineup is the same as that for the pilot study.

*Sequential lineup.* For the sequential lineup, participants were provided with a four-page sequential lineup response form. This form allows judgments of up to 15 photographs, although only 6 photographs were ever shown to participants. The nondisclosure of the number of photographs is designed to negate the anticipatory effect of feeling pressure to make an identification decision (Lindsay & Wells, 1985).

The following instructions were included at the top of the form and were read aloud to the participants:

Now, I am going to show you some pictures. The criminal's picture may or may not be shown. You will see each picture once. You need to make an identification decision each time I show you a picture. Once you have made an identification decision, you will not be able to see that picture again. You will not be able to move ahead or back in the sequence. To start off, think back to what the criminal looks like, and compare your memory of the criminal's face to each picture. If the picture shown is the criminal, place a checkmark beside "Yes." If the picture shown is not the criminal, place a checkmark beside "No."

Underneath the instructions were the questions for each photo—"Is Photo #X a picture of the criminal?"—where "X" refers to the photograph number. Participants were asked to check either the box labeled "Yes" or the one labeled "No."

*Simultaneous lineup.* The procedure for the sequential lineup is the same as the one that was used in the pilot study. The following instructions were included on the response form and were read aloud to participants:

Please look at these pictures. To start off, think back to what the criminal looks like and compare your memory of the criminal's face to each picture. The criminal's picture may or may not be present. If you see the criminal, place a checkmark in the box corresponding to the criminal's picture. If you do not see the criminal, place a checkmark in the "not here" box.

Underneath the instructions were several boxes that were numbered (1 to 6) to represent the lineup photos, and one box labeled "not here."

*Elimination lineup.* The procedure for the elimination lineup is the same as the one that was used in the pilot study. Lineup photos were displayed in the same manner as in the simultaneous lineup procedure. Before they were given the elimination lineup response form, participants were asked to select the lineup photo that most resembles their memory of the culprit. The following instructions were read aloud to participants:

Please look at these pictures. The criminal's picture may or may not be present. To start off, think back to what the criminal looks like. Please look at the pictures and pick out the person that looks most like the criminal.

Once the participants had made a decision, all other pictures were removed from the display, except for the one they had chosen. Participants then received the elimination lineup response form, upon which the number of the lineup member chosen was marked. The participants were told "This may or may not be a picture of the culprit. Think back to what the culprit in the video looked like. Now, compare your memory to this photograph. Then make a decision and complete the form."

The top of the form contains similar instructions to those that were stated aloud. Participants were then instructed as follows:

If this is a picture of the criminal, place a checkmark beside "Yes, this is a picture of the criminal." If this is a picture of someone else, place a checkmark beside "No, this is not a picture of the criminal."

Beside each statement was a box that participants could check.

### *Procedure*

We used the same procedure as was used in the pilot study. Once the participants had completed the description form, they viewed a simultaneous, sequential, or elimination lineup that was either target-present or

Table 3

*Participants Selecting Each Lineup Member Collapsed Across Lineup Procedure: Main Study*

	Lineup Member 1	Lineup Member 2	Lineup Member 3	Lineup Member 4	Lineup Member 5	Lineup Member 6
Target present ( <i>n</i> = 75)	7	8	7	36	0	0
Target absent ( <i>n</i> = 90)	16	11	8	5	6	8

*Note.* For the target-present condition, Lineup member 4 was the target.

target-absent. Participants were randomly assigned to conditions (with some constraints to allow for an equal number of participants per condition).

### *Results*

Table 3 presents the number of participants who selected each lineup member. The results are collapsed across lineup procedure for target-present and target-absent lineups.

#### *Target-Present Lineups*

Comparable identification rates occurred across the three procedures (simultaneous = 0.48; sequential = 0.40; elimination = 0.32),  $\chi^2(2, N = 75) = 2.09, p = .35$  (Cramer's  $\phi = .12$ ). Table 4 presents the identification decision rates as a function of lineup procedure. Table 5 presents the rates of "survival" following Judgment 1, and the identification rates following Judgment 2 as a function of lineup member.

#### *Target-Absent Lineups*

A significant difference for correct rejection rate was found across the three lineup procedures,  $\chi^2(2, N = 90) = 8.12, p = .02$  (Cramer's  $\phi = .30$ ). The

Table 4

*Identification Decision Rates as a Function of Lineup Procedure: Main Study*

	Simultaneous lineup		Sequential lineup		Elimination lineup	
	Rate	<i>n</i>	Rate	<i>n</i>	Rate	<i>n</i>
Target present						
Correct identification	0.48	12	0.40	10	0.32	8
Foil identification	0.28	7	0.16	4	0.32	8
False rejection	0.24	6	0.44	11	0.36	9
Target absent						
Correct rejection	0.47	14	0.76	22	0.77	24
False positive <sup>a</sup>	0.53	16	0.23	7	0.23	7

*Note.* Foil identification rate = rate of identification for all lineup members known to be innocent.

<sup>a</sup>The false positive rate is the rate of identification for all lineup members collapsed.

Table 5

*Survival Rate (at Judgment 1) and Identification Rate (at Judgment 2) as a Function of Lineup Member: Main Study*

	Survival rate	Identification rate
Lineup Member 1	0.20	0.16
Lineup Member 2	0.12	0.04
Lineup Member 3	0.12	0.12
Lineup Member 4	0.56	0.32
Lineup Member 5	0.00	0.00
Lineup Member 6	0.00	0.00

*Note.* *n* = 25. Lineup member 4 was the target.

sequential lineup resulted in a significantly higher correct rejection rate than did the simultaneous lineup (*Ms* = 0.76 and 0.47, respectively),  $\chi^2(1, N = 59) = 5.28, p = .02$ . The elimination lineup also resulted in a significantly higher correct rejection rate than did the simultaneous lineup (*Ms* = 0.77

and 0.47, respectively),  $\chi^2(1, N = 61) = 6.14, p = .01$ . The sequential and elimination lineups produced a comparable correct rejection rate,  $\chi^2(1, N = 60) = 0.02, p = .89$ . Table 4 presents the identification decision rates as a function of lineup procedure.

### *Discussion*

In order to determine the feasibility of using the elimination lineup with adults, the procedure was compared with two other current procedures: simultaneous lineup and sequential lineup. Numerous studies have demonstrated that the sequential lineup is superior at reducing false-positive rates with target-absent lineups, as compared to simultaneous presentation for adult witnesses (e.g., Steblay et al., 2001). Unfortunately, the sequential lineup is not a procedure that reduces false positives with all types of witnesses or under all conditions. For example, children under 12 years produce more false positives with a sequential lineup, as compared to a simultaneous lineup (Pozzulo & Lindsay, 1998). Moreover, recent research has suggested that the sequential lineup may not be superior to the simultaneous lineup for adults (McQuiston-Surrett et al., 2006). It is clear that the sequential lineup may not be appropriate for all witnesses and that the simultaneous lineup produces a high false-positive rate for many types of witnesses.

The elimination lineup was developed to combat children's high false-positive rates and to make them comparable to adult false-positive rates with the sequential lineup. Data demonstrate that the elimination lineup is successful for children (Pozzulo & Balfour, 2006; Pozzulo & Lindsay, 1999). Having different procedures for children and adults is problematic for the justice system, in that it is difficult to determine when to switch from the use of one procedure to another. What if the adult witness is developmentally delayed? Moreover, alternate procedures provide an opportunity for challenges in court. An attorney might argue that if a different procedure were used, his client would not be "wrongfully identified."

In the present study, the sequential and elimination lineup procedures produced comparable correct rejection rates. Moreover, these rejection rates were significantly higher than the correct rejection rate with the simultaneous lineup. In terms of correct identification rates, all three lineup procedures produced comparable rates. As can be seen with child witnesses, the elimination lineup (as compared to simultaneous presentation) appears to reduce false-positive responding in adult witnesses.

In terms of correct identification rates, significant differences across the three procedures were not observed. However, there is a suggestion that correct identification rates for the elimination procedure may prove

to be lower than with the simultaneous lineup—much like the sequential lineup—although there were no significant differences observed in the present data.

It should be noted that it was not feasible to conduct a lineup fairness assessment for the lineups used in the study because of a theft in the laboratory. Future work must demonstrate that the lineups were unbiased. However, distribution of selections across lineup members appeared to be adequate in the present study. Future studies also should investigate whether, in fact, the elimination lineup decreases correct rejections at the expense of correct identifications. Also, it will be important to delineate the conditions on which the elimination lineup may not be effective.

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