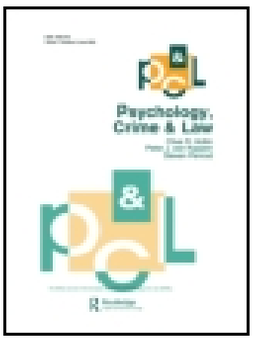

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Comparing identification procedures when the perpetrator has changed appearance

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Abstract
Adult's ($N = 240$) identification abilities were examined under conditions where the suspect's general appearance resembled that of the perpetrator at the time of the crime or was different from the appearance of the perpetrator as a result of a significant change in hairstyle. Simultaneous and sequential lineup procedures were examined across appearance manipulations. A videotaped, staged theft depicting a perpetrator with one of two hairstyles was viewed by participants. Witnesses attempted an identification from a target-present or -absent lineup. The correct identification rate (target-present lineups) was somewhat higher with a simultaneous versus sequential procedure when the perpetrator did not change his appearance. Correct identifications rates were significantly lower when the perpetrator changed his hairstyle across both lineup procedures. Thus, the guilty suspect was likely to elude identification when he changed his appearance following the crime. Correct rejection rates (target-absent lineups) did not differ significantly as a function of lineup procedure or appearance.

Keywords: *Eyewitness identification, lineups, memory*

Introduction

From the time an eyewitness views the perpetrator to the time he/she is requested to provide a lineup identification, opportunity exists for the perpetrator to undergo a change in appearance. Appearance changes may be deliberate, such as cutting long hair short, or natural, via the aging process. Although the criminal justice system cannot control changes in a perpetrator's appearance, the type of identification procedure used is under such control (i.e., system variable; Wells, 1978, 1993). The present study examined the impact of an appearance change on identification accuracy. In addition, simultaneous and sequential lineup procedures were compared to determine the more reliable procedure in an appearance change situation.

Lineup Identification

A witness is presented with one of two types of lineups: target-present or -absent (Wells, 1993). A target-present lineup occurs when police have arrested a guilty suspect, that is, the

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perpetrator is among the lineup members shown to the witness. A target-absent lineup occurs when the police have arrested an innocent suspect, that is, the perpetrator is not among the lineup members shown to the witness. The suspect, either guilty or innocent, is placed in a lineup with a set of foils (i.e. individuals known to be innocent for the crime in question).

Accurate identification decisions vary as a function of lineup type (Wells, 1993). Identifying the suspect in a target-present lineup produces a correct identification. Either identifying a foil (i.e. foil identification) or rejecting the lineup (i.e. false rejection) are errors that can occur with a target-present lineup. Rejecting a target-absent lineup produces a correct rejection. Either identifying a foil or identifying the (innocent) suspect (i.e. false identification) are errors that can occur with a target-absent lineup. In recent years, researchers have collapsed across errors with target-absent lineups and refer to these errors as the false positive rate (e.g. Lindsay, Pozzulo, Craig, Lee, & Corber, 1997).

The various errors have different implications for the justice system (Wells & Turtle, 1986). Falsely rejecting a guilty suspect allows the perpetrator to go free and possibly commit further crime. Identifying a foil is a known error and the foil will not be charged. However, making a foil choice calls into question a witness's credibility suggesting the witness may have a faulty memory and/or is likely to report inaccurate memories (Pozzulo & Lindsay, 1999). A false identification may lead to an individual being charged and convicted of a crime he/she did not commit. Moreover, the perpetrator remains at large to transgress further.

Lineup Procedure

Many police forces present suspects to witnesses for identification using a simultaneous procedure (Levi & Lindsay, 2001). That is, witnesses are presented with all lineup members at the same time and then offered an opportunity to make an identification. An alternative procedure that has received much attention and that has been adopted by some police forces is known as the sequential lineup (Lindsay & Bellinger, 1999; Lindsay & Wells, 1985; Wells, 2001). Lineup members are shown to the witness serially. Witnesses are asked to look at a single lineup member and decide if the individual is or is not the perpetrator. Once a decision is reached, the next member is shown to the witness. Witnesses are not allowed to review previous lineup members nor are they able to view the next lineup member until a decision is made. Furthermore, witnesses are not aware of the number of lineup members to be presented.

Simultaneous lineups allow, and possibly, encourage the use of a relative judgement; that is, witnesses select the lineup member that looks most like the perpetrator (Wells, 1993). In a target-present lineup, a relative judgement may be an effective strategy because it is likely that the perpetrator will look most like himself/herself. However, in a target-absent lineup, locating the individual who most closely resembles the perpetrator may incline witnesses to select that lineup member, thus leading to high rates of false positives (i.e., foil or false identifications). In contrast, the sequential lineup encourages witnesses to employ an absolute strategy, that is, witnesses compare their memory of the perpetrator to each lineup member. Such a procedure may protect against similar looking but innocent lineup members being identified.

Several studies have demonstrated that the sequential procedure reduces false positives with target-absent lineups with no significant loss in correct identifications for target-present lineups (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan, & Seabrook, 1991; Lindsay & Wells, 1985). Steblay,

Dysart, Fulero, & Lindsay (2001) conducted a meta-analysis comparing identification accuracy rates between sequential and simultaneous lineup procedures. They reported a moderate (15%) loss in correct identifications when a sequential lineup is used in comparison to a simultaneous lineup. In contrast, a larger (23%) increase in correct rejections was reported when a sequential lineup is used in comparison to a simultaneous lineup. In the present study, it was predicted that the correct identification rate would be lower with the sequential versus simultaneous procedure. In addition, it was predicted that the correct rejection rate would be higher with the sequential versus simultaneous lineup. There may be conditions, however, when the superiority of the sequential lineup is eliminated compared to simultaneous presentation. A perpetrator undergoing a change in appearance may be such a condition.

Appearance Change

Past research suggests that faces may be encoded as a whole, and a change (i.e. hairstyle) may make other features on a face appear different (Wells & Hryciw, 1984). Even changes in viewing conditions or pose position are sufficient to reduce identification accuracy (Laughery, Alexander, & Lane, 1971). Thus, changes in appearance may make it more difficult for a witness to produce an accurate identification decision.

A study conducted by Shepherd, Davies, and Ellis (1978) found that the upper portions of the face, especially hair and eyes are more essential than the inner features for accurate recognition. Therefore, if hair is a critical feature for identification, changing a hairstyle (i.e. cutting long hair short or growing short hair long) may hinder an eyewitness's ability to make a correct lineup identification decision.

Patterson and Baddeley (1977) found a decrease in hits (i.e. correct identification) following a change in hairstyle or the removal of glasses. Similarly, Patterson (1978) found that wig and beard changes reduced participants' ability to correctly identify the target. In a meta-analysis by Shapiro and Penrod (1986), transformation (e.g. disguise) hindered identification accuracy. They suggested a witness's performance declined because of a cue mismatch. A witness's memory trace does not match the lineup members presented. The implication to the criminal justice system is that a perpetrator who changes his/her appearance can seriously impede a witness's ability to correctly identify him/her.

Lineup Procedures and Appearance Change

Target-present lineups. Although the correct identification rate may not differ greatly between simultaneous and sequential lineup procedures when the perpetrator's appearance has not changed, employing an absolute judgement may be very difficult when there is a mismatch between the perpetrator's current appearance (or the photo of the perpetrator the police are using for the lineup) and his/her appearance at the time of the crime. In theory, the benefit of the sequential lineup is that witnesses keep rejecting lineup members until there is a match between their memory of the perpetrator and the lineup member presented. When the perpetrator has undergone a change in appearance, a witness may reject the perpetrator because of the mismatch between memory trace and lineup member, thus, significantly decreasing the correct identification rate. In contrast, a relative judgement strategy may be less vulnerable to changes in appearance given that a perpetrator who has undergone a change in appearance is still more likely to look most like himself/herself than other lineup members. Overall, it was predicted that the correct identification rate would significantly decrease following a change in the perpetrator's appearance versus no change. However, it

was predicted that the correct identification rate would be less affected with the simultaneous versus sequential lineup when the perpetrator changed appearance.

Target-absent lineups. The appearance manipulation was predicted to influence correct rejections differentially across lineup procedures. Although sequential lineups increase correct rejections compared to simultaneous presentation when the suspect matches the perpetrator's appearance at the time of the crime, the superiority of the sequential lineup may be reduced in some situations. Consider, that the task demands that may be associated with lineup presentation (e.g. I need to pick someone out because the police would not be showing me a lineup otherwise) may be greatly reduced if a witness feels the police have made a mistake. Showing a witness a simultaneous lineup with a set of lineup members that do not match the witness's memory of the perpetrator may be sufficiently powerful to overcome the demands of needing to pick someone. It was predicted that the correct rejection rate with the simultaneous lineup would increase when the suspect did not match versus match the perpetrator's appearance. Given witnesses tend to reject lineup members until a match is made between their memory of the perpetrator and the lineup member presented for sequential lineups, it was predicted that correct rejection rates would not differ across appearance manipulations for the sequential procedure. Thus, if there is a sufficient increase in correct rejections for the simultaneous lineup when there is an appearance change, the superiority of the sequential lineup may be eliminated. Moreover, if there is a higher correct identification rate with the simultaneous lineup over the sequential lineup, recommending the use of the sequential lineup may be unfounded in some situations.

Method

Participants

Undergraduate students ($N = 240$; 18–59 years of age, $M = 21.55$ years, $SD = 4.98$) were recruited from the introductory psychology participant pool at a university in Eastern Ontario. In addition, students from other departments were invited to participate to achieve the desired number of participants. The participants either received course credit for their participation or their names were entered into a draw to win $100.

Materials

Filmed crime. A staged theft of a woman's purse was filmed. The video commenced with a woman sitting on a bench, preparing to eat her lunch. As she was absorbed in her task, a male (i.e. perpetrator) walked by, stood behind the bench and observed her purse in clear view. A close-up of the perpetrator's face lasting approximately 4 seconds allowed a clear view of his features. Finally the perpetrator glanced around and grabbed the woman's purse. The perpetrator promptly left the scene, as the woman looked around in astonishment. The film lasted approximately 90 seconds. The crime was filmed twice; once when the perpetrator had short, salt and pepper hair and then again when he was wearing a dark, mid-length wig.

Lineups

Colour head and upper body photographs resembling the confederate with short, grey hair or dark, mid-length hair were taken. From the assortment of photographs, six photographs

of men (i.e. foils) that matched the perpetrator's appearance with short, grey hair and six photographs that matched the perpetrator's appearance with longer, darker hair were selected to construct the lineups.

a) Target-present lineups. Two target-present lineups were produced. One lineup consisted of six photographs, that is, five lineup members who had short, grey hair and the perpetrator's photograph with a similar appearance. The other target-present lineup also consisted of six photographs, that is, five lineup members who had longer, dark, brown hair and the perpetrator's photograph with a similar appearance.

b) Target-absent lineups. Two target-absent lineups were produced. One lineup consisted of the five foils with short, grey hair from the target-present lineup and the perpetrator's photograph replaced with a similar looking male. The other target-absent lineup consisted of the five foils with longer, darker brown hair from the target-present lineup and the perpetrator's photograph replaced with a similar looking male.

Simultaneous lineup procedure. Photos were placed on a legal sized folder numbered from 1 to 6 in a 3 column $\times 2$ row arrangement. The perpetrator's photograph was always in the fourth position. Witnesses were asked to look at the lineup and decide whether or not the perpetrator was present. An $8.5'' \times 11''$ response form was used for the witness to record his/her lineup decision. This form consisted of the lineup instructions and seven boxes, numbered 1–6 and "Not Here". The lineup instructions were typed at the top of the response form and stated:

> "Please look at the lineup photos and decide whether or not you see the perpetrator's picture. The perpetrator's picture may or may not be present. The perpetrator may or may not have changed his appearance. If you see the perpetrator that was in the video, please mark an X in the box with the same number. If you do not see the perpetrator's picture, please mark an X in the box that indicates 'Not Here'."

Sequential lineup procedure. Photos were shown serially to the witness. The experimenter kept the pictures in a legal size file folder to ensure the participants were unaware of the number of photos to be presented. The instructions were orally read to the participant to ensure their understanding. A set of $8.5'' \times 11''$ response forms were given to the witness to record his/her lineup decisions. The sequential lineup response form included the lineup instructions and yes/no response boxes for each photo. More response forms than needed were provided to ensure that participants were unaware of the number of photos to be shown. The lineup instructions were typed at the top of the response form and stated:

> "Photos will be shown to you one at a time. The perpetrator's photo may or may not be present. The perpetrator may or may not have changed his appearance. With each photo you are shown, you must decide whether it is or is not the perpetrator. If it is the perpetrator, place an X in the box marked "Yes". If it is not the perpetrator, place an X in the box marked "No". You will not be able to see a photo again so take your time before you decide on an answer."

Design

A 2 (video appearance; short hair vs long hair) × 2 (lineup appearance; short hair vs long hair) × 2 (lineup procedure; simultaneous vs sequential) × 2 (target-present vs -absent) between-subjects factorial design was employed. Participants were grouped across video appearance and lineup appearance to produce no change conditions (long hair video/long hair lineup and short hair video/short hair lineup) versus change conditions (long hair video/short hair lineup and short hair video/long hair lineup) to increase power. The dependent variable was identification accuracy; correct identification rate with target-present lineups and correct rejection rate with target-absent lineups.

Procedure

Participants were tested in groups up to three in the Laboratory. When the participants arrived, they were asked to be seated and to watch a brief videotape while the experimenter prepared for the study. After viewing the videotaped theft, participants were informed of our interest in their memory for the crime and perpetrator. Witnesses were provided with an open-ended description form that requested they describe what they recalled about the crime and then to describe the perpetrator. This form was a filler task until they were shown the lineup and will not be discussed further.

Once the description form was completed, each participant was shown a six-person, target-present or -absent lineup that was presented using a simultaneous or sequential procedure. Lastly, participants were debriefed.

Results

Data were divided into those who saw target-present versus target-absent lineups given that the accuracy decision differs for each (i.e. making a correct selection vs making no selection). In addition, it has been hypothesized that identification decisions across target-present and -absent lineups are driven by different processes (Pozzulo & Lindsay, 1999). Specifically, correct identification decisions (i.e. target-present lineups) may be driven by cognitive processes/factors, whereas, correct rejections (i.e. target-absent lineups) may be driven by social processes/factors as well as cognitive factors.

Target-present lineups

Table I presents the identification decision rates across target-present lineups. When the perpetrator matched his appearance at the time of the crime (no change), correct identification rates were higher, but not significantly different, with the simultaneous (0.67)

Table I. Identification rates (n) as a function of lineup procedure and appearance for target-present lineups.

	Simultaneous lineup		Sequential lineup	
Appearance:	No change	Change	No change	Change
Correct identification	0.67 (20)	0.23 (7)	0.47 (14)	0.23 (7)
Foil identification	0.13 (4)	0.37 (11)	0.47 (14)	0.67 (20)
False rejection	0.20 (6)	0.40 (12)	0.07 (2)	0.10 (3)

versus the sequential procedure (0.47), χ^2 (1, $n = 60$) = 2.44, ns. However, this lack of significance may be due to insufficient power (e.g. small sample).

Collapsing across identification procedures, witnesses were significantly less likely to correctly identify the perpetrator when he changed his appearance (0.23) versus did not change (0.57) his appearance, χ^2 (1, $n = 120$) = 13.89, $p < 0.01$. More specifically, using a simultaneous procedure, witnesses were significantly less likely to correctly identify the perpetrator when he changed (0.23) versus did not change (0.67) his appearance, χ^2 (1, $n = 60$) = 11.38, $p < .01$. Also using a sequential procedure, witnesses were less likely to correctly identify the perpetrator when he changed (0.23) versus did not change (0.47) his appearance, χ^2 (1, $n = 60$) = 3.59, $p < 0.06$. Correct identification rates were identical with the simultaneous (0.23) versus the sequential procedure (0.23) when the perpetrator changed his appearance, χ^2 (1, $n = 60$) = 0.00, ns.

Overall, correct identifications rates were not significantly different across procedures. However, the correct identification rate with the simultaneous lineup was somewhat higher than for the sequential lineup (0.45 vs 0.35), χ^2 (1, $n = 120$) = 1.25, ns.

Errors were not similar across lineup procedures. Witnesses were more likely to make a foil identification with a sequential (0.47) versus simultaneous (0.13) lineup when lineup members matched the perpetrator's appearance at the time of the crime, χ^2 (1, $n = 60$) = 7.94, $p < 0.01$. Also, witnesses were more likely to make a foil identification with a sequential (0.67) versus simultaneous (0.37) lineup when members did not match the perpetrator's appearance at the time of the crime, χ^2 (1, $n = 60$) = 5.41, $p < 0.05$. Witnesses seemed more likely to choose an incorrect lineup member with a sequential lineup compared to simultaneous presentation.

Target-absent lineups

Table II presents the identification decision rates across target-absent lineups. 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 perpetrator than any other lineup member, we treated each lineup member as an innocent suspect. To obtain the total false-positive rate with each lineup procedure, the false-identification rates for each lineup member was summed. The inverse of the false-positive rate is the correct rejection rate.

Correct rejection rates did not differ significantly as a function of lineup procedure. When lineup members matched the perpetrator's appearance (no change conditions), the correct rejection rate was moderately higher for the sequential procedure (0.63) than with the simultaneous procedure (0.50), χ^2 (1, $n = 60$) = 1.09, ns. When lineup members did not match the perpetrator's appearance, the simultaneous and sequential lineup procedures produced comparable correct rejection rates (0.57 vs 0.60), χ^2 (1, $n = 60$) = 0.07, ns.

In the predicted direction, when using a simultaneous procedure, correct rejection rates were higher when the lineup members did not versus did match the perpetrator's

Table II. Identification rates (n) as a function of lineup procedure and appearance for target-absent lineups.

	Simultaneous lineup		Sequential lineup	
Appearance:	No change	Change	No change	Change
Correct rejection	0.50 (15)	0.57 (17)	0.63 (19)	0.60 (18)
False-positive rate	0.50 (15)	0.43 (13)	0.57 (11)	0.40 (12)

appearance (0.57 vs 0.50), χ^2 (1, $n = 60$) = 0.27, ns. When using a sequential procedure, correct rejection rates were similar when the lineup members did not vs. did match the perpetrator's appearance (0.60 vs 0.63), χ^2 (1, $n = 60$) = 0.79, ns.

Collapsing across identification procedure, witnesses rejected the lineups at similar rates whether lineup members did (0.57) versus did not (0.59) match the perpetrator's appearance, χ^2 (1, $n = 120$) = 0.85, ns.

Discussion

Delays between witnessing a crime and examining a lineup provide perpetrators with an opportunity to change appearance. Perpetrators may cut their hair, grow facial hair, or age. Also, police may have an old photo of the perpetrator that no longer matches his/her current appearance that they use for the lineup identification. The present study was directed at clarifying the more reliable lineup procedure under these conditions (change vs no change in appearance). It was predicted that changes in appearance may be particularly challenging to overcome for witnesses who are shown a sequential lineup.

Past research has demonstrated the superiority of the sequential lineup to maintain correct identification rates while increasing correct rejection rates compared to simultaneous presentation (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay, Lea, Nosworthy, Fulford, Hector, LeVan & Seabrook, 1991; Lindsay & Wells, 1985). In a recent meta-analysis (Steblay, et al., 2001), sequential lineups were shown to reduce overall choosing and at times lowering correct identification compared to simultaneous lineups. In the present study, the correct identification rate with the sequential lineup was lower, although not significantly, compared to simultaneous presentation when the perpetrator did not change appearance. The correct rejection rate with the sequential lineup was moderately higher, although not significantly, compared to simultaneous presentation when the perpetrator did not change appearance.

Consistent with the facial recognition literature, when the perpetrator changed appearance, the correct identification rate decreased significantly compared to no change. It is possible that a hairstyle change may produce an overall change in appearance sufficiently detrimental for identification accuracy that the perpetrator will elude identification. Witnesses may not be able to manipulate their memory traces to consider appearance changes. Moreover, hair may be the primary feature focused on by witnesses as it is one of the most common features reported when describing a target (Pozzulo & Warren, 2003) posing great difficulty in identification if altered.

It was predicted that a relative judgement (i.e., compare across lineup members and select the member that looks most like the perpetrator), likely employed with simultaneous lineups, would be beneficial to maintain correct identification rates when the perpetrator changed appearance. Even with a change in appearance, it is probable that the perpetrator would look most like himself/herself. The simultaneous procedure was not helpful when the perpetrator changed his hairstyle. Simultaneous and sequential lineups produced identical correct identification rates when there was a change in appearance. The appearance change may have been so successful that the perpetrator no longer looked like himself at all!

There was an increase in foil identifications for the target-present, sequential lineup compared to simultaneous lineups regardless of the appearance of the lineup members. Witnesses had a tendency to make a selection with target-present, sequential lineups. This finding is inconsistent with past research with the sequential lineup (Steblay et al., 2001). The sequential procedure in this study differed from other studies in that we informed

witnesses that the perpetrator may have changed his appearance. Given that witnesses can only see each lineup member once with a sequential lineup, witnesses may have reduced their threshold for identification, opting for a more liberal decision criterion. Believing that the perpetrator would look different, witnesses may have decided to make a selection rather than miss the target.

It was predicted that correct rejections would increase with the simultaneous lineup when lineup members did not versus did match the perpetrator's appearance, given it would be easier for witnesses to reject a lineup when no one appeared similar to the perpetrator. That is, witnesses may believe police have made a mistake and the expectation to make a selection would decrease. The superiority of the sequential lineup to reduce false positives and increase correct rejections over the simultaneous lineup may be eliminated under change conditions, if correct rejections increase using the simultaneous procedure. Correct rejections increased for the simultaneous lineup when lineup members did not match the perpetrator's appearance versus no change. This increase in correct rejections with the simultaneous lineup was similar to the rate obtained with the sequential lineup when there was a change in appearance (and no change). These results question whether the sequential lineup is always better than the simultaneous lineup. It would be interesting to know how often changes in appearance occur in real life before making recommendations to police.

The very low correct identification rate with both the simultaneous and sequential lineup is disconcerting. This result is consistent with prior research indicating that perpetrators may elude identification following a change in appearance. Informing witnesses about the possibility the perpetrator may have undergone a change in appearance does not seem sufficient. Modifications to procedures may be necessary to increase correct identifications. A greater understanding of why witnesses have such difficulty with appearance changes may provide direction on the necessary modifications. Also, it is important to investigate whether various appearance changes produce similar difficulties. The present study used a hair change that may be particularly difficult for witnesses given it may be a primary feature focused on.

In conclusion, the present study explores the robustness of the sequential lineup procedure. The sequential lineup has been touted as a superior procedure over the simultaneous lineup because of its ability to increase correct rejections with only a modest decrease in correct identification (Steblay et al., 2001). There may be situations, however, when a sequential lineup may not be a better procedure to use. For example, when the suspect (and lineup members) does not match the perpetrator's appearance description, correct rejections are similar across procedures. The advantage of the sequential lineup is negligible when the suspect does not match the perpetrator's appearance description.

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