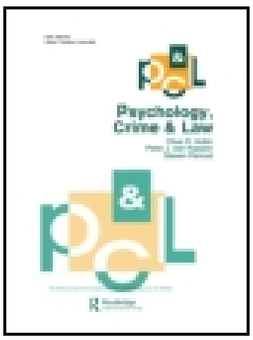

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ORIGINAL ARTICLE

An analysis of multiple choices in MSL lineups, and a comparison with simultaneous and sequential ones

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(accepted 28 June 2005)

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Abstract

Simultaneous lineups allow witnesses to compare lineup members, causing excessive mistaken identifications. Levi (1998b) has tested MSL lineups: they are sequential, larger, and allow multiple choices. [The MSL lineup was originally termed a Modified Sequential Lineup (Levi, 1998b). However, there are other modified sequential lineups.]

Each factor decreases mistaken identifications. However, witnesses make fewer single choices of culprits. Sometimes witnesses choose suspects more confidently than any foil. This analysis examines such multiple choices in four experiments. They account for half of multiple choices with culprits. Few foils are chosen, and such responses are rare in culprit-absent lineups, no more than single choices. They are therefore identifications too.

An experiment comparing simultaneous, sequential, and MSL lineups is also reported. The culprit was identified more in simultaneous lineups than in sequential ones. The simultaneous lineup had more mistaken choices than sequential and MSL lineups, whose results were identical. The simultaneous and sequential lineups were equally diagnostic, while the MSL lineup, four times larger, was more than four times more reliable.

Introduction

The simultaneous lineup has reigned supreme since its invention. People stand in a line, or photographs are laid on a table. Best practice has only one suspect, the rest being considered innocents (foils). If the witness chooses no one or selects a foil, the suspect will usually be released. If witnesses pick the suspect, he or she will probably be convicted in court. The selection of the suspect is considered the conclusive "identification" as the culprit.

However, an average of 60% experimental witnesses choose someone in a lineup in which the culprit is absent (Levi, 1998a). Whenever this happens, the innocent suspect will be chosen in a fair six-person lineup 1/6 of the time. This then occurs in $60 \times 1/6 = 10\%$ of the lineups and more often in unfair lineups. Wells (1984) has argued that the simultaneous lineup enables witnesses to compare members and choose the person most similar to the

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culprit relative to other lineup members. Other lineups that allow this also cause many choices when culprits are absent (Lindsay & Bellinger, 1999; Lindsay, Lea, & Fulford, 1991).

This "relative judgment" strategy undermines the very concept of "identification". "To identify" is to "establish absolute sameness". That is the basis of judges' and juries' willingness to convict when suspects are "identified" as culprits. If witnesses merely pick the individual most similar to the culprit among six persons, this falls far short of "establishing absolute sameness". Witnesses often choose a person most similar to the culprit who is not the culprit. The result is many false convictions.

The sequential lineup (Lindsay & Wells, 1985) minimizes comparisons of lineup members. Witnesses view the members one by one, and after each person they must decide whether he or she is the culprit. They do not know the lineup's size. They cannot compare the person they are viewing with those they have yet to see. They are forced to compare him or her with their memory of the culprit.

Steblay, Dysart, Fulero, and Lindsay (2001) found that while more culprits are chosen in simultaneous lineups (perhaps, they speculate, because simultaneous presentations induce eyewitnesses with a weak memory to guess and some of them guess correctly), but they cause far more mistaken identifications. Sequential lineups thus seem superior, and have begun to replace the simultaneous (Lindsay, 1999). However, they are far from perfect. Witnesses still make false identifications, many more than with fingerprints or DNA (Ashbaugh, 1999; Conners, Lundregan, Miller, & McEwen 1996; Levi, 1998a) while judges convict as easily.

However, the advantage of the sequential lineup in preventing false identifications may be exaggerated. The experiments analyzed by Steblay et al. (2001) tended to use the lineup member most similar to the culprit as the innocent suspect, but doing so may overestimate mistaken identification rates in the simultaneous lineup. We have noted that witnesses tend to choose the lineup member most similar to the culprit, and therefore in the experiments they made many mistake identifications. In the real world, on the other hand, if the lineup is fair the innocent suspect will be the most similar to the culprit only one out of six times in a six-person lineup[1].

Also, the fact that witnesses identify culprits less often in the sequential lineup is a problem. A method that protects the innocent at the expense of enabling guilty to go free is bound to be controversial. Indeed, police have been known to "modify" the sequential lineup to enable witnesses to compare members, thus destroying the extra protection to the innocent (Lindsay & Bellinger, 1999).

Many sequential witnesses fail to choose anyone when the culprit is present in the lineup. One reason they may do so is because they are less confident and expect that they have only one choice. They are thus afraid to choose lest they select a foil before viewing the culprit, and thus miss him. They thus pass over the culprit also. If this is so, allowing witnesses to choose more than once could help solve the problem of lost identifications. Witnesses would know that even if they choose a foil, they have an opportunity to select the culprit later. Indeed, when witnesses are allowed to choose more than one many do so (Levi, 1998b; Lindsay, Nosworthy, Martin, & Martynuck, 1994).

Witnesses sometimes choose more than one person in the sequential lineup, since the standard instructions do not prohibit it. Such multiple choices have posed a problem for the sequential lineup (Corey, Malpass, & McQuiston, 1999; Lindsay & Wells, 1985; Technical Working Group for Eyewitness Evidence, 1999). Counting all choices as identifications increases mistaken identifications. We can expect some witnesses with poor memory to take

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advantage of the opportunity to choose more than once, doing so even when the suspect is innocent. On the other hand, counting only the first choice or considering them all to be foil selections misses some identifications. We can also expect some witnesses with good memory to choose more than once, even when the suspect is guilty – they may choose foils too just to hedge their bets.

The challenge is to differentiate between choices of the suspect that constitute identifications of the perpetrator from those that do not. This article presents evidence supporting the proposition that the lineup choices made with highest confidence by witnesses are indeed accurate identifications.

We have noted that allowing multiple choices should result in more identifications. Equally important, more false identifications should not occur. Witnesses will rarely falsely identify the innocent suspect. When Y lineup members are chosen, these suspects are selected Y/N times in fair lineups, where N is lineup size. Of these Y, they will be picked most confidently $1/Y$ times. Thus, mistaken identifications will occur $(Y/N)(1/Y) = 1/N$ times, the same as with single choices.

On the other hand, allowing multiple choices may also increase single choices, resulting in more false identifications. This increase in false identifications is offset by other factors. "Identifications" are known to be false when witnesses choose too often. Witnesses with good memories should select few: With better memory, not many will seem possible culprits. Also, some lineup members may be picked with equal confidence. Suspects among them are not then "identified" in the sense of being uniquely selected by the witness. In the proposed methodology, "identifications" are only associated with the most confident selection.

There is a clear advantage to enlarging lineups (Levi & Lindsay, 2001). The chance (if witnesses choose) of picking innocent suspects in a 24-person lineup is 1/24, four times less than a six-person one. Lineups cannot be enlarged indefinitely. Witnesses may tire, and fail to identify culprits. However, they can identify them from lineups larger than 24 (Ellis, Shepherd, Flin, Shepherd, & Davies, 1989; Lindsay et al., 1994).

Lineups so large cannot be live. Finding five appropriate foils can be difficult, let alone 23. However, photo lineups are regularly conducted in North America (Wogalter, Malpass, & Burger, 1993), and England is moving towards video ones (Kemp, Pike, & Bruce, 2001; Valentine & Heaton, 1999). There is no experimental difference between live and video lineups[2] (Cutler & Fisher, 1990; Yuille & Cutshall, 1984).

There are other advantages to photo and video lineups over live ones. Police sometimes fail to find appropriate foils for live lineups. This reduces the fairness of the lineup. Photo and video foils, on the other hand, can be chosen from large libraries that have been prepared in advance. Valentine and Heaton (1999) found indeed that police video lineups were fairer than live ones.

In addition, the suspects in live lineups are obviously more tense than the foils, since they alone are in danger of being convicted if identified. When this tension can be discerned by witnesses it causes the suspect to stand out in the lineup (The State of Israel v. Kdoshim, 1999), thus increasing the chance of being identified. Photos and video-clips of suspects, on the other hand, can be obtained under conditions in which the foils are no less tense than them.

To summarize then, enlarging lineups, allowing multiple choices, and getting a confidence judgment right after each choice may result in a significant increase in identifications in the sequential lineup without increasing false identifications. This occurs if witnesses often choose the culprit more confidently than any foil. In this paper, the data

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from such MSL (multiple-choice, sequential, large) lineups from four experiments are combined to test these propositions and other supporting ones.

The analysis: When witnesses choose the suspect most confidently

The proposition that witnesses who choose the suspect most confidently is accurate. The confidence–accuracy relationship has been considered weak (Kassin, Ellsworth, & Smith, 1989; Wells, 1993). However, Lindsay, Read, and Sharma (1998) found a stronger relationship with a wider range of eyewitness conditions and Sporer, Penrod, Read, and Cutler (1995) reported moderately strong confidence–accuracy correlation among witnesses who made positive identifications. Juslin, Olsson, and Winman (1996) showed that the correlation may not be the most informative measure of the relationship as it can be low even when the relationship is usefully strong.

Moreover, the use of confidence presently suggested is different from most. Those test a between-witness relationship. If witnesses are "80% confident" are they more accurate than other witnesses who are "70% confident"? The present use is within witnesses. When witnesses are more confident for the suspect than any foil, are they accurate? We expect only rank-order consistency.

Nonetheless, we might also expect accurate witnesses to be highly confident in the absolute sense. This should be so if the confidence–accuracy relationship is strong. We might also expect accurate witnesses to stop choosing once they identify the culprit. They should then be confident enough.

The preceding analysis provides five questions to test: (a) Are culprits chosen most confidently often enough to provide useful data? (b) Do witnesses stop choosing after the culprit is chosen most confidently? (c) Does choosing suspects most confidently predict their guilt more than when suspects are not chosen most confidently? Does choosing suspects most confidently predict guilt as well as single choices do? (d) Are culprits picked most confidently with only few foils? (e) Are witnesses highly confident when choosing the culprit?

MSL lineups are sequential, large, and allow multiple choices. Four studies[3] have been conducted testing MSL lineups with confidence judgments. Study 1 (Levi, 2002) compared 40-person video lineups presented sequentially that allowed one choice, that allowed more than one (MSL), or that accepted only one but allowed witnesses to compare members before choosing ("comparison lineups"). Study 2 (Levi & Wimesberg, 2004) compared 14-person MSL video lineups with and without voice. Study 3 (Levi submitted), compared 20–25-person photo MSL and single-choice sequential lineups with adults and children. Study 4 (reported later in this article) compared photo lineups that were six-person simultaneous or single-choice sequential, or 24-person MSL lineups. This analysis makes use only of the data from MSL lineups.

The recruitment/eyewitness conditions were nearly identical across studies. The author visited offices (homes in study 3) with a confederate and recruited witnesses. He did most of the talking, the confederate playing a minor role. Later, the confederate was the "culprit" in either culprit-present or culprit-absent lineups.

The intent was to create an event approaching the difficulty of real crimes (Levi, 1998a). It produced few identifications, single or multiple. This study pooled the MSL lineup data from all four experiments. The variation in the designs of each one should help establish the credibility of the general validity of the findings.

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Method

Participants

In Study 1, 145 viewed MSL lineups. They were staff of the Cholon Institute of Technology, the Hebrew University, and government offices in Jerusalem. In Study 2, 170 were staff and lab students of the Hebrew and Tel Aviv Universities, in Study 3, 88 students from the fourth and fifth grades and their parents were the witnesses. In Study 4, 80 workers in offices in downtown Jerusalem participated.

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Procedure

In Study 3, witnesses were scheduled for at least a week after the eyewitness event. The last lineup was conducted after 21 days, the median 13. In the rest of the studies, 1 hour up to 2 days passed, unless witnesses missed their original time. Then a maximum of 2 weeks went by. In Study 1, witnesses came to a separate room for the lineup. In the other studies, it was conducted where they had been recruited.

In Studies 1 and 2 the instructions were: "We are going to conduct a lineup. The 'culprit' is the person who was with me when I visited your office, and asked you for your name and phone number. As in all lineups, the culprit may or may not be in the lineup. The lineup is a video lineup consisting of video-clips lasting (15 in Study 1, 8 in Study 2) seconds for each member. When you decide whether the person you are viewing is or is not the offender, tell me and I will show you the video-clip of the next person. You may have difficulty deciding and may need to view the same video-clip a second time before deciding. However, once you make a decision you will not see that person again."

Study 1 continued with: "This makes the task difficult. Therefore, you may choose more than one person. However, be careful. The more people you choose, the less trust can be put in you as a witness. Finally, I am going to show you the entire lineup irrespective of the choices you make."

Study 2 continued with: "You can choose more than one person. If you are not sure whether the person in the video-clip is the person that you saw, please choose him. If you are certain that you have identified the person, please choose only him."

The instructions in Studies 3 and 4 were: "I am now going to conduct a lineup. The person that I ask that you find in the lineup is my partner who was with me when you agreed to participate in the experiment. I will show you some photographs. My partner may or may not be among them. I will show you the photos one by one. After each one please tell me if the person in the photo is my partner or not. You may choose more than one photo. In any case, I will show you all the photos."

Study 1 showed 40 video-clips, Study 2 showed 14 clips in culprit-present lineups and 13 clips in culprit-absent ones. Study 3 showed 20 and 25 photos, Study 4 showed 24 photos. In Study 1 all video-clip members were police officers aged 30–40, of medium build, dark hair, and brown eyes. Each officer walked towards the camera and sat down in front of it, moved his head from side to side, and spoke a few words. Sound was not recorded. However, having them speak added realistic movement to their faces.

Study 2 used video-clips of students. They were 20–30 years of age, of medium build, dark hair and blue eyes. A close-up of the face was provided. The students were told what they might say, but they spoke freely. Voice was recorded, but half the witnesses saw the video voiceless. Studies 3 and 4 used close-up color photos of students differing from Study 2 only in having brown eyes.

Seven of the men in Study 1 served as the confederate/culprit, while two served in the other ones. In Study 1 the culprit was positioned equally in the 10th, 20th, and 40th position. In Studies 2 and 4 he was placed randomly. In Study 3 he was placed last, in the 20th or 25th, position.

Studies 2 and 4 had different witnesses for culprit-present and culprit-absent lineups. Study 1 combined such culprit-absent lineups with culprit-present ones in which the culprit was placed in the 40th (last) position. The last position was ignored to create 39-person culprit-absent lineups. Study 3 also ignored the culprit in the last place to create 19- and 24-person culprit-absent lineups.

In all studies, foil lineup order was randomly varied. Witnesses viewed each person as long as they wanted before deciding. Confidence was recorded for each choice, as a percentage.

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Results

For culprit-absent lineups, an innocent suspect was randomly designated for each multiple-choice.

(a) Are culprits chosen most confidently often? The culprit was chosen most confidently in 39 (52%) out of the 75 multiple choices that included him.

(b) Is the most confident choice of the culprit also the last choice? For this analysis those lineups where the culprit was last were removed. In them, if the culprit is picked most confidently he must be the last choice. Witnesses averaged three choices for the remaining cases. Out of 29 culprit selections, the culprit was the last choice in 20 (69%) instances. If position was random (that is, if witnesses' decision to terminate was unrelated to accuracy), culprits would be last 1/3 of the time, $29/3 = 9.67$ times. Comparing actual with expected yields χ^2 $(2, N = 29) = 16.563$, $p < 0.001$. The identified culprit is thus disproportionately the last choice.

(c) Are suspects chosen most confidently guilty? In culprit-present lineups, 39 out of 75 culprits (52%) are chosen most confidently, compared to 17 out of 106 innocent suspects (16%) in culprit-absent ones [$\chi^2(1, N = 186) = 24.929$, d.f. $= 1$, $p < 0.001$].

Does choosing suspects most confidently predict guilt as well as single choices do? The number of mistaken single choices was 62, while there were 17 mistaken multiple choices. The innocent suspect in a multiple choice will be chosen Y times more than a single choice, where Y is the number of lineup members chosen in each multiple choice. Y averages 3.63; $3.63 \times 17 = 62$: The chance of picking an innocent suspect is equal for single and multiple choices.

(d) Are fewer foils chosen when the culprit is chosen most confidently? For this test the data for the children were separated, since children tend to choose more (Pozzulo & Lindsay, 1998). Of all the 37 adult cases in which the culprit was chosen most confidently, three (8%) have more than four choices. Of the 31 times when he was not chosen most confidently 15 (48%) have that many [$\chi^2(1, N = 53) = 12.067$, $p < 0.001$]. Thus, selections of suspects with that many choices are non-identifications. For the children, on the other hand, 2/5 (40%) have

more than four choices when the culprit was chosen most confidently, compared to 3/4 (75%) when he was not.

(e) Are culprits chosen most confidently picked with greater absolute confidence? Of the 39 culprit-present cases, in 25 (64%) the culprit was chosen very confidently (90%+). One out of the 36 culprits not chosen most confidently (4%) were chosen at that level [$\chi^2(1, N=51) = 28.435$, $p < 0.001$]. Culprits tend to be identified very confidently compared to those not identified.

This study verified the hypothesis that witnesses who pick the suspect more confidently than any foil are usually correct: Mistaken identifications occurred only 0.16% of the time. The culprit is also chosen often, about half of the time. Culprits are thus chosen much more frequently than innocent suspects: The chance of mistaken identifications is identical to single choices. These witnesses choose no more than three foils. They tended to pick the culprit very confidently, and stopped choosing once they selected him. Such cases, then, are identifications.

While highly significant, two of the findings have a meaningful minority of witnesses who do not fit the predictions. First, almost a third of the witnesses continue choosing after identifying the culprit. Accurate witnesses can remain uncertain even after viewing the culprit. Second, more than a third of the accurate witnesses had less than high confidence (under 90%). This limits the value of absolute confidence as an indicator of guilt. Using it as an indication of guilt would allow the guilty chosen with less confidence to escape justice. The internal rank order of confidence for each witness, on the other hand, has proven very useful. These find witnesses who choose the suspect most confidently.

Study 4: Comparing simultaneous, sequential, and MSL lineups

Study 4, not previously published, is reported now. The data of this study were included in the previous analysis. However, that analysis limited itself to the data from MSL lineups. Study 4 had six-person simultaneous and sequential lineups in addition to 24-person MSL ones. The purpose of this analysis is to directly compare the three lineups.

Since past individual experiments Steblay et al. (2001) have found only a few more identifications in simultaneous than in sequential lineups, but many more mistaken choices, we predict the same. Since this is the first experiment in which MSL lineups differ from the other two both by being larger and by allowing multiple choices, no predictions will be made regarding the MSL lineup.

Method and results. Most of Study 4's method has been described. A culprit-present or -absent simultaneous, sequential, or MSL lineup was randomly presented. For simultaneous lineups witnesses were told: "I shall now conduct a lineup. The person that I want you to find is my partner who was with me when you agreed to participate in the experiment. I will show you a number of photos. My partner may or may not be among them. If you identify him, point to the photo." The author spread out six photos. When witness chose one, they were asked for their percent confidence.

For sequential lineups the last sentence was replaced with: "I will show you the photos one by one. After each photo please tell me whether the person in the photo is my partner or not. When you choose a photo the lineup will end and I will not show you any more photos". The photos were then shown one by one, with approximately 2 seconds between each failure to choose and the next photo. Once one was chosen, the percentage confidence was elicited and the lineup ended.

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Table I. Lineup choices for culprit-present lineups.

Lineup type			Simultaneous	Sequential	MSL
Identifications					
		Culprit only ID	25 (62.5%)	14 (35%)	9 (22.5%)
	Choice	Culprit+foils ID	NA*	NA	8 (20%)
		Total IDs	25 (62.5%)	14 (35%)	17 (42.5%)
Non-Identifications					
	of culprit	Culprit+foils (non-ID)	NA	NA	8 (20%)
	Choice of foils		9 (22.5%)	7 (17.5%)	12 (30%)
	No choice		6 (15%)	19 (47.5%)	3 (7.5%)
		Total non-IDs	15 (37.5%)	26 (65%)	23 (57.5%)
	Total		40	40	40

*Not applicable.

For each simultaneous and sequential lineup six photos were randomly chosen from the 25 MSL ones, with the culprit used in the culprit-present condition and not in the culprit-absent one. The presentation order was random for each witness, except that the "culprit" was never presented first in the sequential and MSL lineups.

Table I presents the results for culprit-present lineups. Simultaneous lineups had more identifications than sequential ones, 62.5% versus 35% ($z = 2.46$, $p < 0.02$, two-tailed, by the test for differences between proportions). The MSL lineup's 42.5% did not significantly differ from either of the others. They are almost equally divided between single- and multiple-choices.

In sequential lineups 47.5% of the witnesses chose no one, much higher than the 15% and 7.5% of the simultaneous and MSL ($z = 3.14$, $p < 0.002$ two-tailed, between simultaneous and sequential lineups).

Table II gives the results for culprit-absent lineups. The simultaneous lineup has more mistaken choices than the sequential, 48.7% versus 30% ($z = 1.70$, $p < 0.05$ one-tailed). We have noted that if a witness chooses more than one person most confidently, we can consider this a non-identification. A majority of MSL multiple-choices (12.5% of witnesses) had more than one person with the witness's highest confidence (10% of the witnesses did not). We therefore can add those 12.5% [More than 1 ("not ID")] in Table II] to correct non-choices. This reduced mistaken choices to the 30% of sequential lineups.

Table II. Lineup choices for culprit-absent lineups.

Lineup type		No. of foils	Simultaneous	Sequential	MSL
Mistaken choices					
	Choice of	One foil	19 (48.7%)	12 (30%)	8 (20%)
		More than one ("ID")	NA	NA	4 (10%)
		Total mistaken choices	19 (48.7%)	12 (30%)	12 (30%)
Correct non-choices					
	Foils	More than one ("not ID")	NA	NA	5 (12.5%)
	No choice		20 (51.3%)	28 (70%)	23 (57.5%)
		Total correct	20 (51.3%)	28 (70%)	28 (70%)
	Total		39	40	40

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Table III. The probability of the suspect being innocent if chosen in Study 4, for various levels of *a priori* probability of guilt.

	A priori guilt				
	0.5	0.6	0.7	0.8	0.9
Simultaneous	0.115	0.080	0.053	0.031	0.014
Sequential	0.125	0.087	0.058	0.034	0.016
MSL	0.029	0.019	0.012	0.007	0.003

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Baysian analysis combines identifications and false identifications to measure the diagnosticity of each lineup (Levi, 1998a). The lower the probability that a suspect is innocent despite having been chosen, the more reliable is the lineup. Bayes theorem is:

$$p(\mathrm{G}/\mathrm{C}) = \frac{p(\mathrm{C}/\mathrm{G})\ \mathrm{p}(\mathrm{G})}{p(\mathrm{C}/\mathrm{G})\ p(\mathrm{G}) + p(\mathrm{C}/\mathrm{not\ G})\ p(\mathrm{not\ G})}$$

where G stands for being guilty and C for being chosen in the lineup.

The likelihood that suspects are guilty is also based on other evidence. If all suspects were guilty, they would be guilty whatever the lineup outcome. $p(\mathrm{G})$ and $p(\mathrm{not\ G})$ represent the contrasting *a priori* probabilities of being guilty or innocent based on the other evidence. Table III gives the probabilities of innocence, for various levels of such *a priori* guilt. The different levels reflect differing policies of police departments regarding the strength of evidence they require before conducting a lineup.

In the special case in which $p(\mathrm{g}) = p(\mathrm{not\ G}) = 1/2$ the Baysian equation reduces to

$$p(\mathrm{G}/\mathrm{C}) = \frac{p(\mathrm{C}/\mathrm{G})}{p(\mathrm{C}/\mathrm{G}) + p(\mathrm{C}/\mathrm{not\ G})}$$

This equation is much clearer and shows us that without differing *a priori* probabilities, the probability of being guilty if chosen is simply the proportion of those chosen who are guilty of the total number of those chosen (the guilty plus the innocent).

The simultaneous and sequential lineups predict almost the same, whatever the *a priori* probability of guilt, while the MSL lineup predicts four times less chance of the suspect being innocent if picked (Table III).

Discussion. There is no significant difference between the sequential and MSL lineups either in the absolute number of identifications or mistaken choices. However, the MSL lineups were four times larger than the sequential ones. Since the probability of making a mistaken identification is mistaken choices divided by lineup size, the MSL lineups are four times more reliable. The probability of suspects being innocent despite being chosen in the MSL lineup is four times less than that probability for the sequential.

The MSL lineup differs in two respects from the sequential. It is larger and allows multiple choices. Lineup size is the basis for the large reductions in mistaken identifications: In Study 3, lineup size was held constant while a one-choice sequential lineup was compared with the MSL. The MSL lineup produced more identifications, 34% versus 10%. Thus, multiple choices seem to increase identifications relative to the sequential lineup.

In this study the difference between identifications, 42.5% in the MSL versus the 35% in the sequential, was smaller and not significant. However, in study 3 the MSL and sequential were equally large, while in the present one the MSL was four times larger.

Enlarging the lineup in these photo lineups to around 25 members seems then to reduce identifications. The price of somewhat reduced identifications was worth paying, however. The 24-person lineup reduced mistaken identifications far more. In Study 3, as in this one, sequential lineups produced more failures to choose anyone when the culprit was present, 51% versus the 26% of the MSL lineup. The cause of their reduced identifications seems then to be failure of witnesses lacking full confidence to choose the culprit. MSL witnesses without high confidence picked the culprit because they knew that they could choose again, 19% making a single choice (compared to the 10% single choices in the sequential lineup), and 15% choosing the culprit most confidently in a multiple choice. Sequential witnesses feared that they would miss the real one.

Simultaneous lineups had an unexpected advantage over sequential ones in identifications. Two factors may have contributed to this. Firstly, usually foils have been chosen using the similarity-to-suspect method, while this experiment was nearer to matching the witness description of the culprit. The latter method makes it easier, in the simultaneous lineup, to distinguish the culprit from the foils, thus increasing identifications (Luus & Wells, 1991; Memon & Bartlett, 2002; Memon & Gabbert, 2003; Wells, Rydell, & Seelau, 1993). The sequential lineup, where comparison of lineup members is not possible, should benefit less.

Secondly, eyewitness conditions of this experiment were difficult. With simultaneous lineups witnesses can fall back on choosing the person most similar to the culprit, who of course is the culprit if he or she is present. Together with the greater differentiation between lineup members afforded by the matching-to-description method, even witnesses with poorer memory will sometimes choose the culprit. The sequential lineup, however, does not have this advantage.

The matching-to-description method is good practice, and real world conditions are difficult (Levi, 1998a). Thus, in the real world simultaneous identifications may fare better, relative to the sequential ones, than other experimental studies suggest.

The advantage of the sequential lineup over the simultaneous manifests itself in fewer mistaken choices, and therefore fewer false identifications. While this was replicated in this study, the gap is smaller than usually reported. Other studies concentrate on reporting false identifications rather than mistaken choices. Mistaken choices in the Lindsay and Wells (1985) study are very similar to this one. Choosing the person most similar to the culprit as the innocent suspect, as they did, inflates simultaneous lineup mistaken identifications. In real cases innocent suspects are usually less similar. Even in unfair lineups, innocent suspects will less often, by chance, be most similar to the culprit. Since witnesses, when they choose in culprit-absent lineups, choose the person most similar to the culprit (Wells, 1984), innocent suspects are less likely to be chosen in real cases.

To sum up, experimental simultaneous lineups may have produced fewer identifications and more false identifications, compared to sequential lineups, than real world ones. In Study 4 the gains of the sequential in reducing mistaken identifications were canceled by losses in identifications. Thus, the improvement in reliability gained by switching to the sequential lineup has perhaps been overstated. If this is true, the MSL lineup insofar as it can increase reliability should look even more attractive.

General discussion

The general conclusion of this paper is that the MSL lineup is far superior to either the simultaneous or sequential lineup. The MSL lineup, as the sequential, decreases mistaken choices, in Study 4 30% versus 48.7%. On the other hand, The MSL has more

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identifications than the sequential: While the sequential lineup had 35% identifications compared to the 62.5% of the simultaneous, the MSL lineup fell in between with 42.5%. Increased identifications in the MSL relative to the sequential seem to result from allowing more than one choice. Finally, the enlarged size of the MSL, four times larger in Study 4 than the standard six-person lineup, results in four times less mistaken identifications.

The Bayes equation, which takes into consideration both identifications and false ones, summarizes these results by showing that while the chance of choosing an innocent suspect was about the same for the simultaneous and sequential lineups, the chance was four times less with the MSL lineup. A caveat is that while these results seem to hold for lineups as large as 40, an experiment not used in this paper (footnote 3) suggests that multiple choices do not work in 160-person ones.

Is the MSL lineup practical in the criminal justice system? By a cost–benefit analysis (Levi & Lindsay, 2001), the lineup is. The cost of conducting an MSL photospread is small, the time to find up to 40 photos instead of six and the increased time (in a few minutes) to conduct the lineup. Video lineups are also cost-effective. Regarding benefit, the MSL lineup is much more reliable.

Will the criminal justice system adopt MSL lineups? Levi and Lindsay's (2001) analysis suggests that this question is not useful. It would be extraordinary for the lineup to be used already. Researchers have to independently verify the findings. However, the literature is full of verified findings whose application is honored in the breach by the criminal justice system. If practical application was a criterion for psychologists' interest, eyewitness identification research would have closed shop years ago.

If the MSL lineup is superior, we should recommend it. If players in the criminal justice system do not understand this, we should find better ways of explaining it. If some refuse to accept more valid evidence because they want to convict rather than achieve justice, we should study this phenomenon to find solutions. Another innovation in lineup practice is Lindsay's (Pryke, Lindsay, Dysart, & Dupuis, 2004) strategy of showing each witness four independent lineups representing different aspects of the person (face and voice, for example). The results show increasing lineup reliability as witnesses correctly identify the suspect in more of the lineups. An exciting prospect is wedding the MSL with this approach, perhaps achieving even better lineups. Testing this is a study waiting to be done.

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Notes

1 Real lineups tend to be unfair because of inappropriate choice of foils (Levi, in press) that enables witnesses to ignore some of them. Thus, for example, if witnesses can ignore two foils in a six-person lineup, the actual lineup size if four, and the chance of choosing the innocent suspect is 1/4, not 1/6. This is still less than when the innocent suspect is chosen as the most similar to the culprit. There are of course lineups (The State of Israel v. Nachmias, 2000) so biased that witnesses can ignore all the foils, in which case we have the experimental situation we have discussed. This paper is based on what best practice can achieve, and lineups can be constructed that are fair.

2 The lack of an effect, the null hypothesis, can of course never be proven. If a difference exists, however, if lacks practical significance.

3 A fifth study was not used in the analysis, since the little relevant data did not seem to warrant the space required to describe it. The experiment compared 20- and 160-person MSL and comparison lineups that allowed multiple choices.

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