APPLIED COGNITIVE PSYCHOLOGY
Appl. Cognit. Psychol. **13**: S41–S58 (1999)

Parallelism in Eyewitness and Mock Witness Identifications

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SUMMARY

The fairness of eyewitness identification lineups is assessed through the use of a series of fairness measures. All the measures proposed to date are based on the lineup choices of 'mock witnesses'. Mock witnesses are persons who have not previously seen the offender but who have been given information about him, usually a verbal description. In a fair lineup mock witness choices should be distributed approximately equally across all lineup members. Simultaneous presentation of lineup members is the most common form of identification procedure, although recent evidence suggests that sequential presentation decreases the proportion of false identifications while maintaining the proportion of correct identifications. The present study used lineups from a recent court case to explore the limits of the mock witness paradigm using different photographs of the defendant, variations in the verbal description, and two presentation modes. Results indicated that suspect choices and the distribution of foil choices were sensitive to changes in the suspect photograph and alternate forms of the verbal description. The patterns of mock witness choices were similar across presentation modes. Our findings raise questions concerning the limits of the validity of the mock witness paradigm. Specifically, they illuminate the cognitive process differences between eyewitnesses and mock witnesses, and the information available for the identification decision.

Fairness in eyewitness identification can be achieved most directly by appropriate procedures in the identification process. One important element focuses on the relationship of the suspect to the other members of a lineup or photospread.[1] Wells *et al.* (1998) identify this problem in their third rule:

> The suspect should not stand out in the lineup or photospread as being different from the distracters based on the eyewitness' previous description of the culprit or based on other factors that would draw extra attention to the suspect.

The first steps toward fairness are in the hands of those administering the identification process. However, if appropriate procedures have not been used or applied adequately, psychological scientists may be called upon to act as expert witnesses to identify suggestive and biasing factors in specific cases. Important among the techniques used by scientific experts to identify lineup bias is the mock witness paradigm.

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Contract grant sponsor: National Science Foundation.

[1]We will use the term 'lineup' to refer to both corporeal lineups and photospreads.

CCC 0888–4080/99/SI0S41–18 $17.50

Malpass and Lindsay (this issue) summarize a number of measures of lineup fairness. These fairness indicators are based on the use of mock witnesses to estimate the effects of potentially biasing lineup characteristics on real witnesses. Mock witnesses are persons who have not previously seen the offender but who have been given information about him. They are shown the lineup and asked to indicate who is the offender. The most common information given to mock witnesses is the eyewitness's verbal description of the offender. The rationale is that all members of the lineup should embody the features of the verbal description approximately equally, and that if mock witnesses can identify the suspect, the lineup is biased towards him. The same set of mock witness choices can be used to evaluate other aspects of lineup fairness, such as its size (Malpass and Lindsay, this issue).

MEASURES OF LINEUP FAIRNESS

Fairness measures have been discussed more extensively by Malpass and Lindsay (this issue). Fairness measures are of two types: measures of bias towards or away from the suspect, and measures of the number of acceptable foils present as alternatives to the suspect.

Lineup bias

Bias measures include the proportion of mock witnesses choosing the suspect, Functional Size (FS), which is the reciprocal transformation of the proportion choosing the suspect (Wells *et al.*, 1979), and Defendant Bias (DB), based on an adjustment of chance expectation of mock witness choices based on the lineup's Effective Size (ES) (Malpass, 1981).

Lineup size

Size measures include Effective Size (ES), a measure based on assessment of the cumulative proportion with which the lineup members fulfil the choice rate expected by chance, Acceptable Foils (AF), which is the number of foils whose mock witness choice rates exceed some arbitrary proportion of the mock witness choice rate expected by chance, and Tredoux' E, a measure derived from Agresti's I (Tredoux 1998; Tredoux, this issue). We use Tredoux' E in preference to ES because its underlying variance can be calculated (Agresti's I), allowing statistical analysis. Across the 18 mock witness evaluations presented in this paper, E and ES are highly correlated ($r = 0.97$, $p < 0.01$), and the magnitudes of the two measures are very similar, converging on nominal size when the lineup choice distribution perfectly reflects chance expectation. The correlation between E (a size measure) and the proportion choosing the suspect (a bias measure) was -0.606 ($p < 0.01$), confirming the relationship between size and bias measures.

We report all these measures in the experiments to follow, although statistical analysis is restricted to the proportion of mock witnesses identifying the suspect, and Agresti's I (presented as Tredoux' E), for reasons treated in detail by Tredoux (1998, Tredoux, this issue).

Evaluations of eyewitness lineups based on mock witness choices have been used to estimate the fairness of lineups in both court and laboratory contexts. However, the validity of mock witness choices as estimates of lineup fairness for eyewitnesses has not been empirically established.

The case of the squinted eyes

The need for empirical examination was revealed during our evaluation of the lineup used in a case of robbery at an automatic teller machine. The case was particularly interesting because three photographs of the defendant were available: two were available for the police to use in the original lineup and a third became available following the arrest of the defendant. The photograph chosen by the police for the lineup was uniquely biased against the defendant.

The eyewitness described the robber as a black male, medium build, 6 feet to 6 feet 6 inches tall, weighing about 250 pounds, with short, dirty black hair, a round face, and small, squinted eyes. The police used a photograph of the suspect in which he blinked for the camera, resulting in squinted eyes. The eyewitness identified the suspect from a lineup containing this photograph. In the alternate photographs the suspect did not blink for the camera and did not have squinted eyes. The question is whether the identification came from witnessing the event or from the conjunction of this one attribute of the verbal description and the suspect's photo.

EXPERIMENT 1

A standard mock witness assessment was performed on the original lineup and two additional lineups containing the same foils but substituting the alternate photographs of the suspect. The purpose of Experiment 1, then, was to assess the fairness of the original, squinted eyes lineup as compared with the two alternative lineups.

Method

Participants

Three hundred and five University of Texas at El Paso (UTEP) students enrolled in criminal justice or psychology courses served as mock witnesses. All students participated on a volunteer basis. There was an approximately equal distribution of participants among the three conditions. The eyewitness was White, resulting in a cross-race identification. Based on Platz and Hosch (1988) both El Paso Anglo and Hispanic participants were used to preserve the cross-racial aspect of the original identification.

Materials and procedure

The original and alternate lineups each consisted of six individuals displayed in both frontal and profile views. Alternate lineup photographs were identical to the original lineup except the photographs of the suspect from the squinted eyes lineup were replaced with the two alternate pairs of suspect photos. All the photographs were excellent laser copies of the originals and were arranged on a manila folder, two pairs across by three pairs down. The photographs of the suspect were always in the bottom-left position, as they had been in the original police lineup.

The response sheet contained a brief description of the crime, the verbal description of the offender given by the eyewitness, and directions for the participants to indicate which lineup member was the offender (a forced-choice instruction). Each participant was given a response sheet and viewed only one photographic lineup. Participants were allowed as much time as they needed to respond.

Results

The three lineups were evaluated on three measures of lineup bias: proportion of suspect choices, Functional Size, and Defendant Bias; and two measures of lineup size: Tredoux' E and number of Acceptable Foils. Table 1 contains these results. The expected proportion of choices of any member of the six person lineup is 1/6, or 0.167. In the original lineup, the proportion of suspect choices was significantly different from that expected by chance, indicating bias toward the suspect ($z = 13.95$, $p < 0.01$). Replacing the squinted eye photograph with alternate suspect photographs resulted in significant decreases in the proportion of suspect choices ($z = 9.88$, $p < 0.01$, and 8.69, $p < 0.01$, respectively). The proportions of suspect choices for the two alternate lineups were not different from the chance expectation ($z = 0.59$, ns, and 1.74, ns, respectively). Analysis of Functional Size and Defendant Bias indicated bias toward the suspect in the original lineup, while the two alternate lineups did not show bias. There was a significant increase in lineup size (Tredoux' E) when either of the alternate suspect photographs were substituted for the original ($z = 5.21$, $p < 0.01$, and 5.44, $p < 0.01$).

Table 1. Mock witness choices in original and alternate lineups

	Original lineup ($n = 101$)	A1 lineup ($n = 101$)	A2 lineup ($n = 103$)
Lineup bias			
Identification proportion	0.76_a**	0.19_b	0.24_b
Functional size	1.31	4.29	5.05
Defendant bias	8.38**	−1.59	−0.88
Lineup size			
Tredoux' E	1.67_a	3.59_b	3.75_b
Acceptable foils	0	2	2

Note. Asterisks indicate that the proportion is significantly different from chance expectation at $p < 0.05$ (*) or $p < 0.01$ (**).
Values with different subscripts differ significantly from other values in the same row at $p < 0.05$.

Discussion

The outcome of the mock witness assessment indicates that a unique match between the suspect's photograph and the eyewitness description can result in an egregiously biased lineup. When the squinted eyes photograph was used, the suspect was extremely distinctive to mock witnesses relative to the other lineup members. When the two alternate photographs were used, the suspect was not distinctive. The distribution of foil choices also changed when the alternate photographs were substituted, significantly increasing the proportion of choices of some foils. Without the presence of the

squinted eye photograph of the suspect, these foils became the lineup members who best fulfilled the verbal description. Tredoux's E reflects these effects.

EXPERIMENT 2

The results of Experiment 1 exemplify the difficulty that occurs when foils are used which fail to fulfill a strongly visualizable verbal description. The verbal description is the only information mock witnesses were given about the offender (although they may infer more from inspecting the lineup) and is the probable basis for their choice decision. Therefore, it is of interest whether changes in a verbal description produce differences in the outcome of the mock witness evaluation.

Variation in verbal descriptions can significantly affect mock witness evaluations. Gonzalez *et al*. (1995) found that changes in the verbal description moderated the effect of placing the suspect between two very dissimilar foils. The arrangement of the suspect's photograph within the lineup increased mock witness choices of the suspect only when the verbal description was relevant to all lineup members and did not uniquely identify the suspect. Different verbal descriptions also influenced the mock witness assessment of a lineup from a court case with two eyewitnesses (Brigham *et al*., 1990). Using the verbal description of one witness, the lineup was found to be fair, but was unfair with the second witness's description.

To further examine the unique fit between a photograph and the verbal description, the effects of deleting 'squinted eyes' and 'round face' from the verbal description given by the eyewitness were explored. The rationale was that these descriptors were the salient characteristics embodied in the photographs of the suspect: 'squinted eyes' in the original suspect photo, and 'round face' in all suspect photographs. If this were true, then deletion of these descriptors would result in significant changes in the mock witness evaluation of the original lineup, but not the alternate lineups.

Method

Participants

Two hundred and fifty-one UTEP students enrolled in criminal justice or psychology courses served as mock witnesses. All students participated on a volunteer basis. Participants were approximately equally distributed across all conditions, and were of either Anglo or Hispanic ethnicity.

Materials and procedure

Participants viewed either the original lineup or one of the alternates, as in Experiment 1. The response sheets were identical to those used in Experiment 1 except for deletion of descriptors from the verbal description of the offender. Approximately half of the participants received response sheets with the 'squinted eyes' descriptor deleted from the verbal description, while the other half received response sheets with both 'squinted eyes' and 'round face' deleted.

Results

The three lineups were evaluated on three measures on lineup bias: proportion of suspect choices, Functional Size, and Defendant Bias; and two measures of

Table 2. Mock witness choices in original and alternate lineups with verbal descriptor deletions

	Complete verbal description	Without 'squinted eyes'	Without 'squinted eyes' and 'round face'
		Original lineup	
	($n = 101$)	($n = 42$)	($n = 40$)
Lineup bias			
Identification proportion	0.76_a**	0.45_b**	0.30_c
Functional size	1.31	2.21	3.33
Defendant bias	8.38**	0.38	0.98
Lineup size			
Tredoux' E	1.67_a	3.02_b	4.62_c
Acceptable foils	0	1	4
		Alternate (A1) lineup	
	($n = 101$)	($n = 40$)	($n = 48$)
Lineup bias			
Identification proportion	0.19_a	$0.15_{a,b}$	0.06_b**
Functional size	4.29	6.67	16.0
Defendant bias	−1.59	−2.82**	−5.38**
Lineup size			
Tredoux' E	3.59_a	2.78_a	3.99_a
Acceptable Foils	2	2	3
		Alternate (A2) lineup	
	($n = 103$)	($n = 42$)	($n = 39$)
Lineup bias			
Identification proportion	0.24_a	0.14_a	0.15_a
Functional size	5.05	7.0	6.5
Defendant bias	−0.881	−2.37*	−1.67
Lineup size			
Tredoux' E	3.75_a	3.93_a	3.59_a
Acceptable foils	2	2	2

Note. Asterisks indicate that the proportion is significantly different from chance expectation at $p < 0.05$ (*) or $p < 0.01$(**).
Values with different subscripts differ significantly from other values in the same row at $p < 0.05$.

lineup size: Tredoux' E and number of Acceptable Foils. Table 2 shows the results of removing two descriptors for each of the three lineups: the original lineup and the two with alternate photographs of the defendant. In the original lineup, there was a significant decrease in suspect choices when the references to 'squinted eyes' and to both 'squinted eyes' and 'round face' were eliminated from the verbal description in comparison to the complete verbal description ($z = 3.53$, $p < 0.01$, and 5.48, $p < 0.01$, respectively). When 'squinted eyes' (only) was removed the lineup remained biased toward the suspect ($z = 3.69$, $p < 0.01$), but when both descriptors were removed it was not ($z = 1.84$, ns). Functional Size and Defendant Bias indicated that suspect bias decreased as verbal descriptors were deleted. Lineup size significantly

increased when either one or both verbal descriptors were removed in comparison with the complete verbal description ($z = 3.67$, $p < 0.01$, and 6.29, $p < 0.01$).

In the lineup with alternate photograph 1 (A1 lineup), the proportion of suspect choices was not biased following the deletion of 'squinted eyes' ($z = 0.30$, ns), but became biased away from the suspect when 'round face' was subsequently removed ($z = 3.12$, $p < 0.01$). Removing 'squinted eyes' from the verbal description did not reduce the proportion of suspect choices in comparison with the complete verbal description ($z = 0.58$, ns), although further removing 'round face' did ($z = 2.50$, $p < 0.05$). Functional Size increased to levels above nominal size as descriptors were deleted, also an indication of bias away from the suspect. Defendant Bias indicated that the lineup became biased away from the suspect in both descriptor deletion conditions. Removing verbal descriptors did not significantly alter the lineup's size ($z = 1.16$, ns, $z = 0.71$, ns).

The proportion of suspect choices did not significantly decrease in the alternate photograph 2 (A2) lineup for either descriptor deletion conditions compared to the complete verbal description ($z = 1.47$, ns, and 0.27, ns, respectively), and neither differed significantly from chance ($z = 0.50$, ns, and 0.29, ns, respectively). While Functional Size remained reasonably steady across the conditions, Defendant Bias indicated that the lineup became biased away from the suspect when 'squinted eyes' was deleted. Again, the deletion of verbal descriptors did not significantly change the lineup's size ($z = 0.17$, ns, and $z = 0.22$, ns).

Discussion

Changes in the verbal description affected the distribution of mock witness choices in all three lineups. The results underscore the impact of the conjunction between the descriptor 'squinted eyes' and the suspect's appearance in the original lineup. Deleting the verbal reference to this feature decreased suspect choices, and deleting the 'round face' descriptor reduced them further. Those choices not attracted by the suspect were redistributed to other members of the lineup in ways that did not parallel pre-deletion distributions. The two lineup size indicators increased as expected, illustrating the relationship between lineup size and bias measures. When a lineup is strongly biased towards a suspect there are proportionately few choices available for foil choices, and all foils will have lower shares of mock witness choices compared with chance expectation.

Removing the reference to 'squinted eyes' in the alternate lineups did not significantly alter the proportion of suspect choices, since the suspect photographs no longer corresponded to the 'squinted eyes' descriptor. When both descriptors were deleted in the A1 lineup, a bias away from the suspect appeared.

Overall, these results illustrate that variations in the verbal description affect the distribution of mock witness' choices, and is strongest when there is a conjunction between the verbal description and the characteristics of lineup members. The two means of eliminating this conjunction were not equally effective. Substituting an alternate face for the squinted eye photograph was a more powerful manipulation than removing the 'squinted eye' descriptor. Presumably this is because the squinted eye face remains distinctive in the lineup even when the descriptor is not used. This underscores once more the importance of care in the lineup construction process, and the value of Wells *et al*'s (1998) third rule.

SEQUENTIAL PRESENTATION

Sequential presentation reduces the effects of some forms of lineup bias in eyewitness identifications, resulting in fewer false identifications with little decrease in correct identifications compared with simultaneous presentation (Cutler & Penrod, 1988; Lindsay *et al.*, 1997; Lindsay & Wells, 1985; Parker & Ryan, 1993; Sporer, 1993, 1994). Sequential lineups confer protection against clothing, instructional, and structural biases (Lindsay *et al.*, 1991b). The theory behind sequential presentation is twofold: first, that simultaneous presentation induces a relative judgement strategy, in which comparisons between lineup members are made and the best candidate is selected (Lindsay & Wells, 1985; Wells, 1984). Second, sequential presentation reduces the opportunity for relative judgements by requiring that no two lineup members are visible to the witness simultaneously. The choice process is more absolute, increasing the likelihood that the eyewitness will make a comparison between their memory image of the offender and each lineup member individually without reference to comparisons within the lineup. Sequential presentation works in part through increasing non-identifications.

Eyewitness identification research has been strongly influenced by these ideas, and some law-enforcement agencies report using this technique (Wogalter *et al.*, 1993). While sequential presentation has been shown to reduce false identifications it does not eliminate them, or the influence of biasing factors, particularly if there are multiple biasing factors present (Lindsay *et al.*, 1991b). For this reason there remains a role for evaluation of sequential lineups as a means of assuring fairness in police investigations and research laboratories, and for *post hoc* evaluation of fairness by the defense.

Mock witnesses have not been used in the evaluation of bias in a sequentially presented lineup, to our knowledge. It is important to understand how the mock witness method applies to sequential presentation, and in particular whether the protections against suspect identifications for eyewitnesses extend to mock witnesses. If sequential presentation of lineup members to mock witnesses does not show the same protections against lineup bias that occur with eyewitnesses, it may be that mock witness choices are of limited use in estimating the effects of bias in sequential presentations. Therefore the above two experiments were repeated using sequential presentation to evaluate this possibility.

EXPERIMENT 3

Administered sequentially, the flagrantly biased original lineup should result in mock witnesses making fewer suspect choices compared to the same lineup presented simultaneously, and should result in a more equal distribution of choices across the lineup members.

Method

Participants

Two hundred and eighty-eight UTEP undergraduate students enrolled in criminal justice or psychology courses served as mock witnesses. All students participated on a

volunteer basis. Participants were approximately equally distributed across all conditions, and were of either Anglo or Hispanic ethnicity.

Materials and procedure

The original lineup and the two alternate lineups were administered in sequential form. The original photographs were copied onto 35 mm colour transparencies and presented to groups of participants sequentially as individual slides on a projection screen. The photographs were presented in the order of their position in the simultaneous array, beginning from top row left to bottom row right. In this case only the frontal photographs from the original lineup were used. Each slide was shown for 20 seconds. Each participant viewed one sequentially presented lineup.

The response sheet contained a brief description of the crime, the verbal description of the offender, and numbered blanks corresponding to each photo. There were 14 blanks on the response sheet but only the six-member lineup was shown. This technique was used to avoid informing participants of the number of slides to be shown which might influence their identification decision (Lindsay & Wells, 1985; Lindsay *et al*., 1991a). Participants were instructed to indicate which lineup member was the offender (biased instructions) and to respond yes or no to each individual slide as it was presented.

A difficulty with sequential presentation is that witnesses often make more than one choice. The question then arises concerning which identification to use. Some investigators have instructed eyewitnesses to respond 'no' to all subsequent photos following a 'yes' response (Cutler & Penrod, 1988), so the problem is not visible. Others have analysed only the first identification (Sporer, 1993). We chose not to constrain the identification process beyond the instructions given, but to use data only from those participants who made single choices. We offer three reasons. First, there is no satisfactory method for analysing multiple lineup identifications. Second, any analysis would require counterbalanced presentation orders, a step we decided not to take in order to preserve the relationship of the sequential presentation to the top-left to bottom-right ordering of the simultaneous lineup. Third, it is informative to know the prevalence of all responses: single, multiple and no-choice.

RESULTS

Of the 288 participants, 142 (49 per cent) made a single choice, 71 (25 per cent) made multiple choices, and 75 (26 per cent) made no choice.

The three lineups were evaluated on three measures of lineup bias: proportion of suspect choices, Functional Size, and Defendant Bias; and two measures of lineup size: Tredoux' E and number of Acceptable Foils. The results of Experiment 3 (Table 3) were very similar to those found in the simultaneous presentations. Among those making a single choice when shown the original lineup, the proportion of suspect choices was 0.74 ($z = 8.86, p < 0.01$). There was a reduction in the proportion of suspect choices when the alternate suspect photos were used, in comparison with the original lineup ($z = 8.33$, $p < 0.05$, and 5.73, $p < 0.01$, respectively; between; between A1 and A2 lineups $z = 2.05, p < 0.05$). The alternate photos were not chosen at a rate greater than chance ($z = 1.76$, ns, and $z = 1.24$, ns). Functional Size increased dramatically for the A1 lineup, and decreased again for A2, a pattern

Table 3. Mock witness choices in original and alternate lineups, sequential presentation

	Original lineup ($N = 46$)	A1 lineup ($n = 43$)	A2 lineup ($n = 53$)
Lineup bias			
Identification proportion	0.74_a**	0.09_b	0.24_c
Functional size	1.35	10.75	4.08
Defendant bias	5.39**	−4.29**	−1.61
Lineup size			
Tredoux' E	1.77_a	2.99_b	3.99_b
Acceptable foils	0	2	2

Note. Asterisks indicate that the proportion is significantly different from chance expectation at $p < 0.05$ (*) or $p < 0.01$ (**).
Values with different subscripts differ significantly from other values in the same row at $p < 0.05$.

expected in view of the inverse relationship of choice proportions and Functional Size. Defendant Bias indicated that both alternative lineups were biased away from the suspect. Lineup size increased when either of the alternate suspect photos were substituted in the lineup ($z = 2.22$, $p < 0.05$, and 3.49, $p < 0.01$).

Discussion

The general pattern of Experiment 3 parallels that of Experiment 1: the original lineup is once more egregiously biased towards the suspect, and when the alternate photos are substituted the bias no longer exists (except for the A1 lineup, where the bias is significantly away from the suspect). Lineup size again increased with substitution of the alternate photographs. The important result is that for these mock witnesses, sequential presentation conferred no protection against the structural bias of the lineup, in contrast to what would be expected from the eyewitness literature.

EXPERIMENT 4

Experiment 4 was undertaken to examine whether the verbal description deletions of Experiment 2 would have parallel effects in simultaneous and sequential lineup presentations.

Method

Participants
Five hundred and twenty-four UTEP undergraduate students enrolled in criminal justice or psychology courses served as mock witnesses. All students participated on a volunteer basis. Participants were approximately equally distributed across all conditions and were of either Anglo or Hispanic ethnicity.

Materials and procedure
The original lineup and the two alternate lineups were administered as in Experiment 3. Each participant viewed only one lineup. The response sheets were identical to those used in Experiment 3 except for deletions of descriptors from the verbal

Table 4. Mock witness choices in original and alternate lineups with verbal descriptor deletions, sequential presentation

	Complete verbal description	Without 'squinted eyes'	Without 'squinted eyes' and 'round face'
		Original lineup	
	($n = 46$)	($n = 33$)	($n = 41$)
Lineup bias			
Identification proportion	0.74_a**	0.58_a**	0.24_b
Functional size	1.35	1.74	4.10
Defendant bias	5.39**	3.02**	0.91
Lineup size			
Tredoux' E	1.77_a	2.59_a	5.20_b
Acceptable foils	0	1	3
		Alternate (A1) lineup	
	($n = 43$)	($n = 45$)	($n = 45$)
Lineup bias			
Identification proportion	0.09_a	0.40_b**	0.31_b*
Functional size	10.75	2.50	3.21
Defendant bias	−4.29**	2.16*	1.46
Lineup size			
Tredoux' E	2.99_a	$3.87_{a,b}$	4.88_b
Acceptable foils	2	2	3
		Alternate (A2) lineup	
	($n = 53$)	($n = 46$)	($n = 47$)
Lineup bias			
Identification proportion	0.24_a	0.15_a	0.13_a
Functional size	4.08	6.57	7.83
Defendant bias	−1.61	−2.53*	−2.22*
Lineup size			
Tredoux' E	3.99_a	3.27_a	4.11_a
Acceptable foils	2	3	3

Note. Asterisks indicate that the proportion is significantly different from chance expectation at $p < 0.05$ (*) or $p < 0.01$ (**).
Values with different subscripts differ significantly from other values in the same row at $p < 0.05$

description of the offender. Approximately half of the participants received response sheets with 'squinted eyes' eliminated from the verbal description, while the other half received response sheets with both 'squinted eyes' and 'round face' eliminated.

Results

One hundred and fifty-one participants responded with multiple choices (29 per cent) and 116 made no choice (22 per cent). Our analysis consisted of 257 single-choice responses (49 per cent).

The three lineups were evaluated on three measures of lineup bias: proportion of suspect choices, Functional Size, and Defendant Bias; and two measures of lineup size: Tredoux' E and number of Acceptable Foils. Table 4 contains the results of mock witness evaluations of the three sequentially presented lineups when descriptors

were eliminated from the verbal description. With the original lineup, removing 'squinted eyes' from the verbal description did not significantly reduce the rate of suspect choices in comparison with administering the complete verbal description ($z = 1.49$, ns), while removing both 'squinted eyes' and 'round face' did significantly reduce choices ($z = 5.38$, $p < 0.01$). There was a significant difference in suspect choices between the two descriptor deletion conditions ($0.58 > 0.24$; $z = 3.13$, $p < 0.01$). The lineup remained biased toward the suspect when 'squinted eyes' was deleted from the verbal description ($z = 4.81$, $p < 0.01$), whereas when both descriptors were removed the suspect was chosen at a rate no greater than chance ($z = 1.09$, ns). Functional Size again showed the expected reciprocal relationship to choice proportions. Defendant Bias remained somewhat consistent across the complete verbal description and the 'squinted eyes' deletion, but showed a decrease in bias toward the suspect when 'round face' was also removed. Removing both the 'squinted eyes' and 'round face' descriptors resulted in a significantly larger lineup size than when administering the complete verbal description or when removing only the 'squinted eyes' descriptor ($z = 4.22$, $p < 0.01$, and 2.44, $p < 0.05$).

For the A1 lineup, suspect choices significantly increased when verbal descriptors were removed in comparison with the complete verbal description ($z = 3.64$, $p < 0.01$, and 2.69, $p < 0.01$, respectively). These proportions differed from chance, indicating that the lineup actually became more biased toward the suspect as verbal descriptors were removed from the description ($z = 3.19$, $p < 0.01$, and 2.07, $p < 0.05$, respectively). Functional Size dramatically decreased. Defendant Bias indicated the lineup became biased toward the suspect only when 'squinted eyes' was deleted. Lineup size significantly increased only when both descriptors were removed from the verbal description in comparison with the complete verbal description ($z = 2.03$, $p < 0.05$).

For the A2 lineup, deleting verbal descriptors resulted in no change in the proportion of suspect choices compared to the complete verbal description ($z = 1.16$, ns, and 1.44, ns, respectively). Suspect choices in these two conditions did not differ from chance ($z = 0.33$, ns, and 0.75, ns, respectively). Functional Size and Defendant Bias indicated that bias toward the suspect increased as verbal descriptors were removed from the description. Lineup size did not significantly change across conditions ($z = 1.22$, ns, and 0.18, ns).

Discussion

Overall the pattern of results in the sequential presentation were similar to those in the simultaneous presentation, with one notable exception. With the A1 lineup, deleting either or both descriptors resulted in a significant increase in suspect choices. A similar effect did not occur with the A2 lineup. We offer no interpretation of this result.

The effects of sequential presentation work in part through increasing the probability of non-identifications. Therefore, it would be important to examine the rate of non-identifications, and to modify the base against which suspect choices are compared: the sum of suspect choices, foil choices, and non-choices. This presents two problems.

First, there are important differences in the 'identification' task given to eyewitnesses and to mock witnesses, for both simultaneously and sequentially presented

lineups. The preferred form of instruction for eyewitnesses is an unbiased instruction, which emphasizes that the offender may or may not be present in the lineup (Wells *et al.*, 1998). This attempts to adjust the witness's response criterion to a more neutral level, reducing the probability that a lineup choice will be made in the absence of the offender. Under these conditions, non-identifications should be high in comparison with a biased instruction, which is known to promote incorrect choosing (Malpass & Devine, 1981).

The instruction given to mock witnesses is a biased instruction. This is based on the logic of the mock witness technique: to determine whether persons who have not seen the offender can nonetheless choose him from the lineup on the basis of the verbal description given, or on some other basis. In mock witness studies, non-identifications are considered to be spoiled protocols and are discounted. These points are also true for sequential presentations. The result is that increases in non-identifications is a realistic outcome only where unbiased instructions are used, and in fact a heightened rate of non-identifications is a criterion of the success of the attempt to provide an unbiased instruction. But such a result is contrary to the conventions about instructions in mock witness tasks, since the logic of mock witness choice tasks is different from that of eyewitness tasks. To attempt to interpret the non-identification rate data from the present studies, one has to ignore these difficulties.

The second problem concerns multiple identifications in sequential presentations.The task is structured so as to be a weakly biased task, with the instruction to choose the offender from the series presented. Mock witnesses are not strongly instructed to choose only one person from the series, and the task continues after the first identification has been made. Witnesses (and mock witnesses) are led to believe that there are more photographs to come beyond those that are of interest to the investigators, so as to not force an identification at the end of the meaningful set in the sequence. Multiple identifications have been prevented in the eyewitness literature by not allowing additional identifications after the first (Cutler & Penrod, 1988), so it is unknown how many of these who made a choice from the lineup would also have made other choices. So in mock witness tasks where multiple lineup choices have been allowed there is a problem of whether to ignore them. Alternatives are to count them as suspect choices so long as one of the multiple choices was the suspect, and as foil choices when the suspect was not among their choices, or to count only the first choice. Again, to interpret suspect choices as a proportion of all single choices plus non-choices one has to ignore the problem of multiple choices.

Ignoring both the task contrast differences and the question of multiple choices, we can frame the analysis using non-choices. The results are as shown in Table 5. While the absolute magnitude of the bias is decreased, the pattern of the relationships does not change, and the inferences drawn are not different.

GENERAL DISCUSSION

The results of these experiments underscore the differences between eyewitnesses and mock witnesses, the information they have, and the constraints upon their information processing. The importance of these and other findings can best be seen within questions about outcome and process parallelism.

Table 5. Mock witness proportion of suspect choices and no-choice responses in original and alternate lineups, sequential presentation

	Complete verbal description	Without 'squinted eyes'	Without 'squinted eyes' and 'round face'
		Original lineup	
Proportion of suspect choices (N = all single-choice responses)	0.74_a** ($N = 46$)	0.58_a** ($N = 33$)	0.24_b ($N = 41$)
No-choice responses (N = all no-choice responses)	0.19_a ($N = 16$)	0.13_a ($N = 6$)	0.25_a ($N = 16$)
Proportion of suspect choices including no-choice responses (N = all single-choice responses+ no-choice responses)	0.55_a** ($N = 62$)	0.49_a** ($N = 39$)	0.18_b ($N = 57$)
		Alternate (A1) lineup	
Proportion of suspect choices (N = all single-choice responses)	0.09_a ($N = 43$)	0.40_b** ($N = 45$)	0.31_b* ($N = 45$)
No-choice responses (N = all no-choice responses)	0.32_a ($N = 34$)	$0.29_{a,b}$ ($N = 29$)	0.20_b ($N = 22$)
Proportion of suspect choices including no-choice responses (N = all single-choice responses+ no-choice responses)	0.05_a** ($N = 77$)	0.24_b ($N = 74$)	0.21_b ($N = 67$)
		Alternate (A2) lineup	
Proportion of suspect choices (N = all single-choice responses)	0.24_a ($N = 53$)	0.15_a ($N = 46$)	0.13_a ($N = 47$)
No-choice responses (N = all no-choice responses)	0.26_a ($N = 25$)	0.18_a ($N = 16$)	0.24_a ($N = 27$)
Proportion of suspect choices including no-choice responses (N = all single-choice responses+ no-choice responses)	0.17_a ($N = 78$)	0.11_a ($N = 62$)	0.08_a** ($N = 74$)

Note. Asterisks indicate that the proportion is significantly different from chance expectation at $p < 0.05$ (*) or $p < 0.01$(**).
Values with different subscripts differ significantly from other values in the same row at $p < 0.05$.

Parallelism in eyewitnesses and mock witnesses

The present work began with the finding that a unique conjunction between a verbal descriptor and a facial attribute in the suspect's photograph was egregiously biasing. Though the eyewitness had seen the offender, the question was whether the witness identified the suspect because he was the offender or because of the unique fit between one very salient offender attribute ('small, squinted eyes') and a photograph in which the suspect had blinked for the camera. When the eight-item description was given to mock witnesses in a simultaneously presented lineup they chose the suspect at an extremely high rate. When alternate photos of the suspect were substituted, the choice rates were not different from chance expectation. No further improvement was gained by also removing the 'squinted eyes' descriptor. It appears that the visual information was more powerful than the verbal information for the mock witnesses.

It is tempting to see these results as support for the power of the mock witness paradigm as a means of estimating effects of biasing factors such as the conjunction of verbal descriptors and suspect characteristics for eyewitnesses. But data on this

comparison are actually not available. To conclude that mock witness choice distributions are a good basis for estimating the choice distributions of eyewitnesses, one would ideally also examine the choice behaviour of a large sample of eyewitnesses and observe high degrees of parallelism between them. This work is underway in our laboratory. In the meantime we can reason from other grounds. If experiments with mock witnesses do not produce outcomes that parallel stable research findings in the literature using eyewitnesses, this may indicate that estimation of eyewitness behaviour from mock witness behaviour contains elements of risk.

The results from our experiments using a sequential presentation mode suggest that mock witness data may not be a good basis for estimating eyewitness choices under sequential conditions. While for eyewitnesses sequential presentation provides some protection against lineup bias, no such protection was found for our mock witnesses. The findings of these experiments generally showed outcome parallelism where it would not be expected. Interpretation of this outcome requires examination of important contrasts between eyewitness and mock witness contexts.

Process differences

Relative versus absolute judgements

The process by which mock witnesses make a choice may be analogous to a checklist, induced by the limitations of the list of descriptors. The demands of the task may override the benefits of sequential presentation by inducing a relative judgement process. Because mock witnesses have no memory image of the offender, the verbal description may be the most salient information available. It is also possible that some mock witnesses delayed making a response to faces in the sequence until they viewed all (or a long sequence of) the faces. While the photos were shown singly, in a slide presentation with 20-second intervals, viewing of the next slide was not contingent upon a response to the current slide. This method could allow a relative judgement. Experimenters observing the process of data collection think this is possible, but not modal. Even if it were frequent, the task participants were engaged in is substantially different from a simultaneous presentation. Still, it is a potential problem – one shared by all studies in which moving to the next lineup member is not contingent on a response to the present one. Future studies should develop procedures to minimize its occurrence.

Information source variation

From the earliest studies mock witness evaluations have been based on verbal descriptions obtained from one or more eyewitnesses. However, research over the last two decades shows important differences between visual and verbal sources of information about a face. The eyewitness' memory image contains configural and featural information whereas verbal descriptions contain only information that the eyewitness can externalize into a verbal message. Theoretically, the eyewitness decides if a sufficient match exists between his or her memory image and the contemporaneous image of an individual in a lineup. In contrast, mock witnesses must base their decisions on the degree of presence of the specific characteristics detailed in the verbal description, and on whatever image is generated from the description.

The quality of the eyewitness's verbal description is minimally predictive of the eyewitness's subsequent identification accuracy (Laughery *et al.*, 1986; Pigott &

Brigham, 1985; Wells, 1985). Although people are adept at recognizing faces (Bahrick *et al*., 1975; Sporer, 1994), when asked to verbalize this ability, they are rarely able to articulate well the reasons for their decision (Dunning & Stern, 1994). Several lines of evidence indicate that externalizing a facial image into a verbal message that others can translate and interpret precisely and accurately is difficult. In part, this is because faces are composed of both configural and featural information. Research examining face processing and recognition indicates that while featural information is important, configural information is particularly instrumental (Diamond & Carey, 1986; Haig, 1984; Rhodes, 1988; Rhodes *et al*., 1989, 1993; Sergent, 1984; Tanaka & Farah, 1993; Tanaka & Sengco, 1997). Converging evidence from several lines of research examining face recognition expertise and face inversion (Diamond & Carey, 1986; Farah *et al*., 1995; Rhodes *et al*., 1989; Valentine, 1988; Valentine *et al*., 1995) and verbal overshadowing (Dodson *et al*., 1997; Fallshore & Schooler, 1995; Schooler & Engstler-Schooler, 1990) supports the differential contribution of configural and featural information in face processing and recognition. Malpass *et al*. (1973) showed that training effects for improved recognition of faces based on verbal descriptions had no carry-over to visual recognition.

Cumulatively, these lines of research suggest there is a differential impact of configural and featural information in the processing and recognition of faces and that verbal descriptions contain different information than a memory image. How this information difference maps onto the eyewitness and mock witness decision process is an interesting question. It may be that the verbal description is an insufficient basis for mock witness assessment.

The findings of the present study raise questions about the use of mock witness data for estimating eyewitness behaviour, but they do not provide the answers. Clearly, the use of mock witnesses to evaluate fairness in sequentially presented lineups requires clarification before such testimony can reasonably be offered. For evaluation of simultaneously presented lineups the situation is more clear. Within the limitations of the Case Of The Squinted Eyes the mock witness evaluation concluded substantially as expected. There is good evidence that mock witness-based procedures are useful for identifying departures from fairness in simultaneously presented lineups. The extension to sequential presentation requires further research.

ACKNOWLEDGEMENTS

This research was supported by a grant from the National Science Foundation.

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