Evidence for the superiority of the large line-up.

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Short Communication

The line-up is by far the most reliable means of using eyewitnesses to determine whether a suspect is a culprit. The photo of the suspect is placed among the photos of a number of known innocent people (the simultaneous line-up). If a witness identifies the suspect as the culprit, the courts take this as evidence of his guilt.

Line-ups are fair if each of the foils and the suspect have an equal chance of being "identified" by people who have never seen the culprit (mock witnesses [1]) who have been given a description of the culprit. The reason the line-up is the safest eyewitness identification procedure is because the innocent people (foils) provide some protection to an innocent suspect. However, there is ample evidence that witnesses often choose someone who is not the culprit (or experimental target [2-5]. Police know that they have the wrong man when witnesses choose a foil in the line-up. Unfortunately, in a fair simultaneous line-up by chance these witnesses who choose "identify" a suspect who is innocent 1/N times, where N is the line-up size, and the common American line-up size is six. Thus, in the US an innocent suspect will be identified 1/6=0.167 or almost 17% of the time. This is much too great an error.

The danger of mistaken identifications has been considered so great that in the wake of research showing that we can reduce them if we warn witnesses that the target may not be in the line-up [6], the warning has been included in one of four recommendations of a White Paper of the American Psychological Association [5] to improve line-up identification evidence.

Yet even with the warning, experimental witnesses choose someone 57% of the time when the "culprit" (target) is absent when shown a simultaneous line-up [7,8].

Dupuis and Lindsay [9] introduced sequential line-ups. Their data and a meta-analysis, indicate that its chief advantage is in reduced mistaken identifications. With only 36% choices when the target is absent the innocent suspect will be chosen 36/6=6% of the time in the six-person American line-up. This remains too large a danger for an innocent suspect [9-11].

Levi [12-15] and Lindsay [16,17] proposed exploring large line-ups, that could reduce false identifications if the rate by which witnesses chose someone in target-absent line-ups increased less than the increased line-up size.

The number of mistaken identifications is a function of line-up size and mistaken choices in target-absent line-ups. The witness has never seen the innocent suspect and has never seen any of the other line-up members. Thus, for example, a witness who makes a mistaken choice in a 40 person target-absent line-up will simply by chance pick the innocent suspect in the line-up no more than any other line-up member, which is of course simply 1/40.

On the other hand, the more mistaken choices he makes the greater chance that he will mistakenly choose the innocent suspect. Thus, if a 40 person line-up had the same rate of mistaken choices as the six-person line-up, the number of false identifications would be 57/40=1.04%. This is clearly a tremendous improvement.

Early research by Davies et al. [10] and Laughery et al. [11] discouraged exploring this approach. However, this research showed only one photo at a time. The little research on line-up size had been with the sequential line-up which could also be adapted to grouping photos. Witnesses would view each page of groped photos one after the other, announcing whether they had identified the target before moving on to the next page [12]. This would maintain the inability of witnesses to pick the person most similar to the target, since they would not know whether he or she might appear on the next page.

However, the "simultaneous" line-up was chosen. The sequential line-up's advantage is in decreasing mistaken identifications in target-absent line-ups [8]. However, enlarging line-ups may decrease false identifications much more. 24 person line-ups will have no more mistaken identifications than 6 person sequential ones if the number of mistaken choices in target-absent line-ups remains constant with increase in size for simultaneous line-ups. If these mistaken choices continue to remain constant as line-up size continues to double, the sequential advantage could become marginal.

In addition to the problem of mistaken identification there is a second error that witnesses often make which goes undetected by the police: witnesses fail to identify guilty suspects [13].

While a number of innovative line-up procedures have been developed to reduce mistaken identifications [14-17], there have been few procedures available to increase correct ones that do not simultaneously increase mistaken ones.

Therefore, it seemed best to maintain the larger number of culprit identifications of simultaneous line-ups relative to sequential ones [7], relying on increased line-up size to reduce mistaken identifications.

Using the term "simultaneous" with grouped photos can be misleading. All the photos are not shown simultaneously, but rather in groups in a number of screens. The term has nonetheless been maintained, to emphasize the distinction between the ability of witnesses to pick the person most similar to the culprit in the simultaneous format adopted and their inability to do so in the sequential line-up: witnesses were informed that they could leaf back and forth between the pages before making their decision. This seems to be the critical element of the simultaneous line-up that enables more identification, yet causes more mistaken ones [18].

The first purpose of this research program was to discover approximately the largest line-up that was feasible using the grouping strategy. In order to do so, it was necessary to reach a line-up size that was too large. Therefore, the line-up size was doubled each time, as a method to quickly reach a line-up too big. It seemed that the issue was how many photos witnesses could view before the sheer number would begin to confuse them and reduce identifications.

The rationale for grouping photos was that this format enables witnesses in each group to reject all but the member most similar to the culprit relatively quickly. They need to make the more difficult decision of rejecting or accepting that final line-up member only once for each set of photos. Of course, there is the final decision of having to compare line-up members from the different groups. The difference in effort may not be noticeable in 6 person line-ups, but as line-ups grow in size (to 40, for example) the strain might become substantial, decreasing the cognitive resources required for successful identification.

On the other hand, showing witnesses 40 or more photos simultaneously may create a different difficulty, comparing simultaneously so many photos. A balance of fewer photos per page over a number of pages may produce the best identification results.

Clearly the two critical questions was how many photos it was possible to show witnesses before the sheer number of photos would begin to overwhelm them, and whether increasing line-up size also increases substantially the number of mistaken choices. Surprisingly, we did not manage to reach that number with a line-up of 120 members [12,15,19]. There is however one important caveat. The number of photos on each page makes a tremendous difference: no more than twelve photos can be shown. Thus, the 120 photo line-up consists of 10 pages.

The other important finding was that line-up size did not affect the number of mistaken choices. Thus, taking the average of 57% mistaken choices in 6 person line-ups the rate of expected mistaken identifications in a 120 person line-up is only 57/120=0.475%.

There was one puzzling finding. In the final study of this series, a 1 page line-up of twelve photos was tested. Lab graduate students, a subset of the witnesses, performed much better than any other witnesses or similar witnesses who viewed a larger line-up, in both more successful identifications and less mistaken choices. The later finding is more understandable. The lab graduate students, being more sophisticated in experimental design, guessed less often when the target was absent. Later we found an explanation for the former result.

The experimental method was to confront the witness with an eyewitness event in which the target was seen, and then at least an hour later present a line-up to the witness. All line-up members were college-aged men, with short dark hair and dark eyes, average body build, and no facial hair. The target also fit this description.

In the aforementioned studies testing the effect of line-up size, the eyewitness event was very difficult. The experimenter visited the office of potential participants with a young "assistant" and requested that they participate in a short experiment. The college-aged "assistant" found a mutually acceptable for those who agreed, and asked them for their name and phone number.

When the experimenter returned to run the experiment, the participants were told that they would view a line-up, the target being the "assistant". The participants had no idea that they were to remember any detail when they recruited, must less the face of the "assistant".

In the rest of the experiments reported, the eyewitness event, while difficult, was much easier. They were shown a 2 min video that included, along with the target, three other adults and rooms with many objects. While the participants did not know what they were supposed to remember, at least they knew that they were supposed to remember something.

In the second major study by Levi [20], an eye tracker was used. This is a device that photographs the movement and location of the eyes' gaze at some stimulus [21]. It was used by Loftus et al. [22] in an eyewitness study and more recently by Brace [23], Pike [24], Hunter and Pike [25] and Mansour et al. [26].

The purpose of this experiment was to increase identifications of the target. Large line-ups have proved themselves much better than smaller ones in preventing mistaken identifications, but are not better in producing correct ones of the target. Hunter and Pike [25] had the same aim of increasing identifications. They hoped that the gaze of witnesses looking at the target in a line-up which resulted in an accurate identification would be different from the gaze of witnesses who chose someone else, potentially an innocent suspect. If this were true we might be able to dispense with the unreliable verbal response of the witness and base identification decisions

on their gaze pattern instead, increasing correct identifications and decreasing mistaken ones. The results were encouraging.

Hunter and Pike [25] used the relatively new unique British line-up. English law forbids conducting photo line-ups, where photos replace the actual members, yet conducting live line-ups is very difficult, entailing a great waste of resources. The British solution has been, instead of taking photographs of suspects' faces, to take short video clips of them, where they move their head slowly from side to side. An appropriate sample of nine of these video clips from past cases is chosen to be the foils in the line-up. Along with the suspect, they are shown sequentially to the witness, at least twice.

While no clear theory seemed to predict gaze behavior for the British line-up, there seemed to be interesting possibilities for the simultaneous line-up. According to a popular conceptualization espoused by Wells [18] (relative judgment), witnesses with poorer memory of the culprit compare between line-up members, and often simply choose the person who seems to look most like the culprit-often the innocent suspect. Translating this into gaze behavior, in comparing between line-up members the attention of these witnesses will be on some of them in addition to the time spent concentrating on the culprit. Perhaps more time will be spent gazing on the culprit, but not a tremendous more time. On the other hand, witnesses with relatively good memory of the target are expected to spend far less time gazing at the other line-up members. Indeed, witnesses using this "absolute" strategy tend to spend less time in making their identification [27,28].

This less time should be concentrated far more on the target. Translating this into gaze behavior, while they will at least glance at the other line-up members, they should spend much more time looking at the target than at any of the foils.

The critical difference occurs when the target is not in the line-up. Witnesses with good memory should be able, after glancing at the line-up members, to decide that the target is absent. Other witnesses will compare between line-up members and choose the person most resembling their memory of the culprit, who all too often will be the innocent suspect.

These conflicting predictions lead to a promising outcome: witnesses who dwell a relatively long time on the suspect have identified the target. However, if the suspect who is chosen does not stand out as having been looked at so much longer than any other line-up member, the target was most likely chosen using relative judgment, and therefore is likely innocent.

This analysis differs from that of Mansour et al. [26]. That paper states that if a witness looks at all the faces in a line-up, this is indicative of relative judgment. This position contrasts with this paper, which expects witnesses to at least glance at all the faces. Relative judgment is indicated only if the witness fails to focus much longer on the person chosen.

If this is true we will be able to dispense with the unreliable verbal response of the witness and base identification decisions on their gaze pattern instead, increasing correct identifications and decreasing mistaken ones.

This next experiment [20] used a 48 person line-up, rather than a 6 person simultaneous one, since the interest is increasing identifications in large line-ups.

The results strongly negated the relative judgment conceptualization: witnesses most often focused on some foil when they did not identify the target in target-present line-ups, or could not do so in target absent ones. Adding up the two cases, 52 of 62 cases failed to act according to the relative judgment. By the binomial, the probability that so many cases would be contrary to the theory is $p<0.0001$ (two-tailed). This experiment did not merely fail to reject the null hypothesis. If found results exactly the opposite of the research hypothesis, very significant statistically.

Lindsay and Wells [16] used the relative judgment conceptualization to explain the differing results between the simultaneous and sequential line-ups: witnesses can compare between line-up members in the former, which results both in more identifications and false ones.

We require a different explanation, which brings us to the third paper [28]. We have noted that there are very few methods for increasing identifications without simultaneously increasing false identifications. The eye tracker experiment failed.

It has also been mentioned that when witnesses are not warned that the target may not be in the line-up they choose more often. Some of these choices are false identifications. However, some of them are correct ones. Clark [29] posits two different types of witnesses, the "bad memory witness" and the "cautious witness". With the former, just as because of their bad memory they are likely guessing and therefore picking innocent suspects 1/N times, so are they picking purely by chance the guilty suspect 1/N times. Aside from the consideration that picking the guilty suspect purely by chance is hardly a valid identification, decreased "identifications" with the warning is perfectly balanced by decreased mistaken ones.

However, with the "cautious witness" this is not the case. The warning causes some of these witnesses, who are actually capable of identifying the culprit, to state nonetheless that the target is not in the line-up. Indeed, Clark's [29] analysis of studies comparing no warning with warning [8] finds that "witnesses make correct identifications at a rate considerably above chance" with no warning.

Clark [29] rejects the conclusion that therefore we should dispense with the warning, as he should we value preventing a mistaken identification more than identifying a culprit. On the other hand, if by some method correct identifications became far more than mistaken ones, it would become worthwhile to dispense with the warning to allow for these correct ones.

What might happen, then, if the warning was omitted before a 48 person line-up? We might expect an increase in mistaken choices, perhaps to about 75% [6] in target-absent line-ups and therefore mistaken identifications would be 75/48=1.56%, compared to about 55/48=1.15% with the warning. We would thus be paying the price of about 0.5% more mistaken identifications by omitting the warning. The empirical question

is what the gain in target identifications will be if the warning is omitted. Study 1 examined this question.

Witnesses were shown a 48 person line-up, with or without the warning and with the target present or absent. The results were surprising and clear-cut. When the target was absent, the expected results were gotten. With the warning 50% of the witnesses mistakenly chose someone. Without the warning, 85% did so. On the other hand, omitting the warning did not increase identifications.

On possible explanation is that the maximum degree of identifications for the experimental conditions was reached with the warning, and therefore omitting the warning was not able to increase them. The fact that Clark [29] found that "identifications" increased without the warning in 6 person line-ups suggests that the maximum degree of these "identifications" was not reached with the warning in the sample he analyzed. The chance of increasing "identifications" in a six-person line-up is much greater than in a 48 person one by merely guessing. However, Clark found an "identification" rate greater than would be predicted by pure guessing. The discrepancy between the data Clark analyzed and the present experiment may result from the different experimental conditions aside from the use of the larger line-up, in particular the difficult eyewitness event used in the present one.

There is another explanation. Some witnesses have a partial memory of the target [30], which enables them to eliminate from consideration at least one of the foils (i.e., "the target had more hair"). If in a 6 person line-up, witnesses are able to discount even only one foil, if they guess from the remaining five their chance of picking the target are increased substantially. Some of the witnesses in this experiment spontaneously pointed to some foils and said that they could discount them. Similar behavior was found by Behrman and Richards [31]. Penrod [32] also mentions partial memory, as does Steblay [8].

In 48 person line-ups partial memory helps very little. Too many foils remain. The additional "identifications" in 6 person line-ups are not real ones. They are only educated guesses based on partial memory. Clark's [29] "cautious witness" may not be able to really identify the target.

The lower rate of identifications in the 48 person line-ups compared to previous research with 6 person ones when the warning was omitted could then resulted either from a more difficult eyewitness condition or because of the use of partial memory.

The next experiment [28] aimed at examining these alternate hypotheses. Witnesses were shown either a 6 person or 48 person target-present line-up, with or without the warning. If they made a choice they were asked to count the number of line-up members that they could discount with certainty.

The results supported both hypotheses: with the more difficult experimental condition, witnesses in 6 person line-ups did not differ in identifications with or without the warning. The partial memory hypothesis is supported by the witnesses viewing 6 person line-ups making more identification. Also supporting partial memory is the fact that after discounting line-up members, the 48 person line-up was left with a lot more members to guess between.

An explanation now exists for the finding that graduate lab students identified the target more often when they viewed one sheet of twelve photos. Some of them hit upon the strategy of discounting line-up members.

Perhaps there was less identification in the 48 person line-up because finding the target among 48 photos is a more difficult task than finding him among six. The final study reported in this paper [33] tests this explanation.

We have already described the unique British line-up. This 10 person line-up is likely inferior to the 48 person line-up because it is a lot smaller. If witnesses choose and the suspect is innocent, they have a one out ten chance of mistakenly choosing him, compared to a one out of 48 chance of choosing him in the 48 person line-up. On the other hand, possibly witnesses will choose the target more often in the much smaller British line-up, just as they do in the six-person simultaneous one.

This study tested these predictions. High confidence might enable us to differentiate some of the British line-up "identifications" as true ones, and therefore witnesses were asked after every choice of a line-up member to state how confident they were in that choice. Finally, all witnesses were asked to count the number of line-up members that they could discount.

The results found no difference between the two line-ups in either identifications or false choices. The latter finding meant that, because of the difference in line-up size, the British line-up would have far more mistaken identifications.

The former finding is significant. Despite the British line-up's considerably smaller size, it did not produce more identification. This puts to rest the explanation of the larger number of identifications in 6 person line-ups as resulting from witnesses getting confused by the large number of photos in the 48 person line-up.

Despite the fact that the British line-up was left with far fewer members than the 48 person line-up after discounting, witnesses did not use this as a strategy to guess the identity of the target from those members left after discounting some.

Discounting some members and guessing from amongst the remaining ones is likely a conscious strategy. It seems that the strategy did not occur to the British line-up witnesses. This contrasts with 6 person line-up witnesses. The 6 person simultaneous line-up may encourage witnesses much more to compare between the line-up members and note that the discounting strategy is effective, than the sequential presentation of the British one.

Finally, confidence judgments did not help to distinguish between accurate and inaccurate witnesses.

The results of the studies suggest further research. First of all, we could use more experimentation to test the partial memory hypothesis. In all the studies which asked witnesses to count

the number of line-up members that they could discount, they were asked to do this after they viewed the line-up.

If the hypothesis is correct, we should expect that more witnesses who were asked to do this before they viewed the line-up would realize the effectiveness of the strategy of using discounting to increase their chances of picking the target. One experiment, then, could compare witnesses who asked before to those who were asked after.

We have noted that a concern regarding the 48 person line-up is that seeing so many photos confuses witnesses and causes them to identify the target less than in the six-person simultaneous line-up.

Another experiment might provide conclusive evidence by comparing the 48 person line-up to the 6 person sequential line-up. Partial memory is not used in sequential line-ups. Thus, as with the 48 person line-up, all identifications can be considered real ones.

We would expect, then, that there will be no more target identifications with the 6 person sequential line-up than in the 48 person line-up. Thus, lower identifications in the 48 person line-up than in the 6 person simultaneous one will be attributed, not to confusion caused by the 48 person line-up. Rather they are caused by partial memory resulting in some choices of the target in the 6 person line-up that are not real identifications, the result of using partial memory.

We may find even less identifications in the sequential line-up, since there are other explanations for lower identifications in the sequential line-up which are not relevant to the 48 person line-up [33]; witnesses fearing to miss the target [14].

Also, we have yet to find the upper limit of the line-up size possible using by showing 12 photos per screen. This is important, since if it is possible to show more than ten screens (a line-up of 120) with no loss in identifications, then the police will be able to further reduce the chance of mistaken identifications. The use of the 48 person line-up in the reported experiments was merely for experimental convenience.

Finally, we should replicate the finding of no loss in identifications with ever enlarged line-ups in a different experimental setting. This could include different line-up members, a different eyewitness event, and perhaps even a different lapse of time between the event and the line-up.

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