



Change blindness and eyewitness identification: Effects on accuracy and confidence

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Purpose. Large changes in the visual field often go undetected, an effect referred to as change blindness. We investigated change blindness for an eyewitness event to examine its potential influence on identification accuracy and confidence.

Methods. Participants viewed a video that started with an innocent person walking through a building and finished with another person committing a theft. Participants subsequently attempted the thief's identification from a line-up that contained either the thief or the innocent person from the video.

Results. Most viewers (64%) experienced change blindness and were unaware of the person change. Overall identification accuracy in the change blindness group was significantly lower than in the change detection group. The decrease in accuracy in the change blindness group was primarily driven by poor performance when the line-up did not contain the thief. However, rather than misidentifying the innocent from the video, most witnesses who experienced change blindness misidentified a filler. Although change detection did not lead to a significant increase in correct identifications, it did lead to a significant increase in post-identification confidence.

Conclusions. Our findings suggest that (1) although change blindness increases misidentifications, under these conditions witnesses primarily misidentify known innocents who are not at risk of wrongful conviction; and (2) confidence is inferred not only from recognition strength but also from how well observers believe the event was encoded.

Imagine the following event with alternative endings: An eyewitness observes a man walk behind a van, outside of view. Suddenly, a loud 'smash' is heard.

Ending #1: Through the van's window, the man is observed entering the van and rummaging for goods. Moments later the man exits the scene, briefcase in hand.

Ending #2: A second man enters the scene, walks behind the van, and confronts the window smasher. Moments later, both men are viewed exiting the scene empty handed.

On the surface, the complexity of these two events is comparable; however, remembering the first ending might be simpler than remembering the second ending. When a witnessed event involves only one actor, all the observed actions can be associated with the observed culprit. At a subsequent identification test, the witness need only consider whether any of the line-up members were present at the witnessed event. By contrast, when an event

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involves more than one actor, even if an eyewitness is certain that a line-up member was present, the eyewitness must also determine whether that line-up member committed the crime. Below, we describe a growing body of literature suggesting that innocent bystanders can be misidentified because witnesses confuse them with culprits. We subsequently report new data showing that successfully differentiating between a culprit and an innocent person can have consequences not only for identification accuracy but also for identification confidence.

Line-up identifications for events involving multiple actors

A previously encountered person is more likely to be selected from a line-up than a never-before-seen person, regardless of whether the previously encountered person committed the crime (Deffenbacher, Bornstein, & Penrod, 2006). In an early demonstration of this effect, students viewed five photographs (one culprit and four innocents) associated with characters from a story heard via audiotape (Loftus, 1976). Of those administered a line-up containing an innocent from the story and four fillers, 60% misidentified the innocent. Loftus referred to the confusion of one previously encountered person for another as unconscious transference.

Several explanations of unconscious transference have been proposed (Ross, Ceci, Dunning, & Tolia, 1994). First, a feeling of familiarity elicited by a previously encountered innocent person could be mistaken for an experience that would be expected to occur upon recognition of the culprit. According to this explanation, the witness does not consciously recall having encountered the innocent person. An alternative explanation is that the witness recalls the encounter with the innocent person, but makes a source-monitoring error (i.e., the encounters with the innocent and the culprit are confused). Finally, the innocent could be mistaken for the culprit because the innocent and the culprit were perceived to be the same person. Mistaking two persons for one is an example of change blindness, which occurs when changes in the visual field go undetected (Simons & Levin, 1997). The latter possibility is the focus of this work.

Levin, Simons, Angelone, and Chabris (2002) observed change blindness for the identity of two individuals in a series of experiments. In Experiment 1, 75% of the participants did not notice when one experimenter ducked under a counter and was replaced by another experimenter. In Experiment 2, 53% of pedestrians were unaware that a confederate who had initially asked to have his photograph taken (pre-change person) was not the same person who had his photograph taken (post-change person). Most pedestrians who detected the change were able to identify the pre-change person from a line-up. However, pedestrians who experienced change blindness identified the pre-change person only at a rate that would be expected by chance, suggesting change blindness involved poor encoding of the pre-change person. In Experiment 3, change blindness led to chance-level performance on line-up tasks for both the pre- and post-change persons, suggesting neither were encoded well.

More recently, researchers have examined the implications of change blindness for line-up identifications following criminal events. Davies and Hine (2007) showed participants a video that began with one person breaking into a home and ended with another person leaving with stolen goods. On a line-up task that included both criminals, change detection had a positive effect on accuracy. In a subsequent investigation (Davis, Loftus, Vanous, & Cucciare, 2008), participants viewed a video in which an innocent person walked behind a set of boxes and then a culprit emerged to commit a theft. The innocent person was more likely to be misidentified after change blindness than after

change detection. Using a similar paradigm, Nelson *et al.* (2011) observed a high rate of misidentifications (of both the innocent actor and the other line-up members) among participants who thought two video actors were the same person; however, the effect of change detection on identification accuracy was unclear because only a small proportion of the participants (5%) detected the change.

The existing literature suggests that change blindness can have an impact on correct identification of criminals and on false identification of innocents. However, the designs employed in previous experiments have generally not conformed to standard practices in eyewitness identification research. For instance, many of the experiments included more than one previously encountered person within the same line-up (Davies & Hine, 2007; Davis *et al.*, 2008; Nelson *et al.*, 2011). In actual criminal investigations, this should never happen because line-ups should only contain one person suspected of committing the crime and a set of additional line-up members (fillers) who are known to be innocent (Wells & Turtle, 1986). Davis *et al.* addressed this limitation in their third experiment by comparing two line-ups that each contained only one previously encountered innocent. Note, however, that they did not employ a line-up containing the culprit. Although employing both culprit-present and culprit-absent line-ups is generally considered 'critical' (Wells & Penrod, 2011, p. 242), none of the three previous investigations of change blindness and eyewitness identification included both line-up types. In a recent review, Clark (2012) found that several manipulations that increased accuracy on culprit-absent line-ups also decreased accuracy on culprit-present line-ups (e.g., line-up instructions, presentation format). Thus, to provide a more comprehensive understanding of change blindness and identification accuracy, we randomly assigned participants to receive a line-up containing either the culprit or a previously encountered innocent suspect.

Change detection and identification confidence

In addition to accuracy, the confidence in eyewitness identifications is also of central interest. Identification confidence affects the decisions of various members of the legal system: Prosecutors deciding whether to take a case to trial; judges deciding whether to permit an identification as evidence; and jurors deciding whether to convict a defendant. Accordingly, a post-identification confidence assessment is recorded in legal investigations as well as in standard eyewitness memory experiments (Brewer & Palmer, 2010). Although early meta-analyses revealed a relatively weak relation between identification confidence and accuracy (Bothwell, Deffenbacher, & Brigham, 1987; Sporer, Penrod, Read, & Cutler, 1995), higher confidence–accuracy relations are typically observed for witnesses who choose a line-up member (choosers) relative to those who reject the line-up (Sporer *et al.*, 1995), and substantial correlations have been observed on occasion (e.g., Lindsay, Read, & Sharma, 1998).

Although confidence estimates appear to at least partly reflect the experience of recognition strength that occurs when deciding whether a stimulus has been previously encountered, both social and cognitive factors have been shown to influence these ratings. One such factor is the timing of the confidence assessment (Brewer, 2006). A substantial body of research has shown that feedback from line-up administrators can increase eyewitness confidence (e.g., Douglass, Brewer, & Semmler, 2010; Douglass & Steblay, 2006; Wells & Bradfield, 1998, 1999), which in turn weakens the confidence–accuracy relation (Bradfield, Wells, & Olson, 2002). Thus, it is important to obtain the confidence assessment immediately after the identification, before any feedback occurs.

In the present research, we focus on another potential influence on identification confidence: encoding conditions. In particular, we explore the association between change detection and identification confidence. Deffenbacher's (1980) optimality hypothesis proposes that the strength of the confidence–accuracy relation is influenced by the quality of information processing conditions. In his review of the eyewitness literature, Deffenbacher found that good processing conditions tended to produce reliable correlations, whereas poor processing conditions tended to produce unreliable correlations. If participants who detect the change do so because they attend to the stimuli to a greater extent than participants who do not detect the change, then the processing conditions for the change detection group can be considered good and the processing conditions for the change blindness group can be considered poor. Thus, the optimality hypothesis would predict a stronger confidence–accuracy correlation after change detection than after change blindness.

Fitzgerald, Oriet, and Price (2011) found support for this prediction using a laboratory-style change detection task. In four studies, participants completed multiple trials in which six faces were viewed simultaneously in an array and one face would change. Participants were required first to indicate the location of the change and then to indicate which of the three faces presented in a line-up had been viewed during the change detection task. Consistent with the optimality hypothesis, change detection enhanced the confidence–accuracy correlation. However, Fitzgerald *et al.* also noted that performance on the change detection task seemed to influence recognition confidence independent of recognition accuracy. That is, for both correct and incorrect recognitions, confidence was consistently higher after change detection than after change blindness.

To examine the possible influence of change detection on identification confidence in a more ecologically valid experiment that more closely mirrors the conditions of standard eyewitness memory experiments, we created a video that began with an innocent person walking through a building and finished with another person committing a crime. All standard practices in eyewitness identification were followed: culprit-present and culprit-absent line-ups were employed; the line-up only contained one suspect (the innocent person from the video *or* the culprit from the video); and confidence was assessed immediately after the identification. Relative to change blindness, we hypothesized that detection of the change between actors would lead to elevated levels of identification confidence as well as to a stronger confidence–accuracy correlation.

Method

Participants

The sample for the main experiment consisted of 180 undergraduate students ($M = 19.92$ years, $SD = 2.63$; 129 women). Two additional groups of undergraduate students, who were independent from the main experiment, were recruited to obtain actor similarity ratings ($n = 8$; $M = 22.38$ years, $SD = 2.88$; six women) and line-up fairness estimates ($n = 29$; $M = 20.66$ years, $SD = 3.53$; 22 women). Participation in all tasks was voluntary.

Design

The design included two between-subjects variables: line-up type (target present and target absent) and awareness (change detection and change blindness).

Materials

Video actors

The video involved two actors: the video innocent and the video culprit. Both actors wore blue jeans and black sweaters for the video. In previous research (Nelson *et al.*, 2011), a video containing a change between similar looking actors led to very low change detection rates. Given our interest in contrasting participants who detect the change with those who do not detect the change, we selected actors who were not excessively similar to ensure a sufficient rate of change detection. Although the actors were comparable in age and height, the video innocent was about 50 lbs heavier than the video culprit. Eight judges watched the video and rated the similarity between the video innocent and video culprit on a scale that ranged from 1 (*highly dissimilar*) to 6 (*highly similar*). The average similarity rating for the actors was 3.63 ($SD = 0.74$), which is very close to the midpoint of the scale (3.50). These judges also described as many features about the two actors as they could remember. These descriptions were subsequently used to assess the fairness of the line-ups (see Line-ups section).

Video content

The video begins with a full body view of the video innocent, walking up to and entering a building. The video innocent walks through two hallways, shaking the handles of locked doors. In the next scene the video culprit is shown walking through a third hallway. The video culprit then approaches another locked door and forces it open. The video culprit then enters an office, searches the desk drawers, and finds an *iPad*. The video ends with the video culprit exiting the office, *iPad* in hand. The video's duration was 67 s. The video innocent and video culprit were in view for 33 and 31 s respectively.

Line-ups

Culprit-present and culprit-absent line-ups contained one actor from the video (who served as the suspect) and five additional line-up members who were not in the video (who served as fillers). Fillers were selected by matching to the appearance of the suspect because surveys consistently show that this is how the majority of police officers construct line-ups (Police Executive Research Forum, 2013; Wogalter, Malpass, & McQuiston, 2004).

The culprit-present line-up comprised the video culprit and five fillers. To match fillers to the suspect's appearance, the first author directly compared a photograph of the video culprit with photographs of 278 individuals of the same race and sex. The five photographs judged to be most similar to the video culprit were selected as fillers.

The culprit-absent line-up comprised the video innocent and five fillers. The procedure used to select fillers for the culprit-absent line-up was identical to the procedure employed to select fillers for the culprit-present line-up. Consequently, these fillers were not the same as those used in the culprit-present line-up. The use of different fillers across culprit-present and culprit-absent conditions corresponds to how matching to the suspect's appearance would occur in the field, where the appearance of the culprit would not be known (Clark & Tunnicliff, 2001).

Line-up fairness

Line-up fairness was evaluated via mock-witness tests, which involve showing a line-up to judges who did not witness the target event and asking them to identify the suspect (Doob & Kirshenbaum, 1973). Following the procedures described by Malpass (2004), we used the descriptions obtained from the similarity judges to create a modal description of each suspect. An experimenter showed the modal description to 29 mock witnesses and explained that it belonged to a person suspected of committing a crime. After mock witnesses confirmed that they had studied the description sufficiently, the experimenter removed the description, presented the line-up, and asked the mock witnesses to select the line-up member they believed was most likely to have committed the crime. Each mock witness made a selection from the culprit-present line-up and from the culprit-absent line-up (line-up order was counterbalanced). Selection rates for both the video culprit (24%) and the video innocent (17%) did not differ from chance expectancy (17%), suggesting that the line-ups were not biased towards (or away from) the suspects.

The mock-witness data were also used to calculate E' (Malpass, 1981; Tredoux, 1998), which provides an estimate of the number of line-up members who are plausible alternatives to the suspect. The line-up containing the video culprit yielded an E' value of 3.34 (95% CI = 2.84, 4.04). The line-up containing the video innocent yielded an E' value of 3.94 (95% CI = 3.34, 4.81). Given that a six-member line-up with three or more plausible line-up members is considered fair (Brigham, Ready, & Spier, 1990), the E' values suggest that both line-ups contained a reasonable number of plausible fillers.

Procedure

The experiment was conducted in two classrooms. The first classroom was a large lecture theatre (approximate capacity: 500). The second classroom was a smaller lecture theatre (approximate capacity: 200). Both classrooms were equipped with audio-visual equipment that projected displays onto large screens, ensuring similar viewing conditions across participants. To prevent discussion among the participants during the experimental procedures, the students were seated in the same manner as they would be for an examination. Before commencing the experimental procedure, the experimenter informed participants that they were about to take part in a scientific experiment and that it was critical for them to remain silent at all times. Several research assistants were located throughout the classroom to ensure participants adhered to the experimenter's instructions.

Prior to viewing the video, participants were instructed to take the role of an eyewitness and pay close attention to details of the event. Following the video's presentation, the experimenter talked about the experience of pursuing a graduate degree for approximately 10 min as a filler task. Participants were then administered a questionnaire that had a line-up containing either the video innocent or the video culprit. The position of the actors in the line-up was fully counterbalanced. Random assignment to the line-up conditions was achieved by shuffling the questionnaires before entering the classroom.

The questionnaire included recall and identification tasks. For the recall task, participants were asked to report as much detail as possible about the video and whether they noticed anything unusual. Responses to these questions were used to discern whether the change was detected. The questionnaire then proceeded to the line-up identification task. Black-and-white photographs of the line-up members were presented simultaneously in a 2×3 array on a single page of the questionnaire. Participants were

instructed to circle the face of the person who stole the *iPad*, if present. Participants were instructed that the person who stole the *iPad* may or may not be in the line-up, and that they should write 'not here' if the thief was not present. Thus, three line-up choices were possible: identification of the suspect (video culprit or video innocent), identification of a filler, or rejection of the line-up (reporting that the thief is 'not here'). The final item was a post-identification confidence scale, which ranged from 1 (*not at all confident*) to 6 (*very confident*).

Analyses

The influence of change detection on identification response patterns was assessed with a 2 (awareness: change detection vs. change blindness) \times 2 (line-up type: culprit present vs. culprit absent) \times 3 (line-up choice: suspect vs. filler vs. rejection) hierarchical log-linear (HILOG) analysis. Two-proportion *z*-tests were used to test for any differences between choice rates. Two effect size metrics are provided for analyses involving categorical variables: Cohen's *b* and odds ratio (OR). Cohen's *b* is the difference between two arcsin-transformed proportions (Cohen, 1988). The conventions used to interpret *b* are the same as for Cohen's *d* (small = .20; medium = .50; large = .80). An OR of 1.00 indicates perfect unity between two groups in the odds of an outcome. Interpretation of OR above or below unity depends on which odds serve as the numerator and which odds serve as the denominator. We calculated OR such that the odds for the change blindness group always served as the numerator and the odds for the change detection group always served as the denominator. As a consequence, all OR above unity (i.e., >1.00) indicate that the odds of a given outcome are greater for the change blindness group than for the change detection group, and all OR below unity (i.e., 0.00–0.99) indicate that the odds of a given outcome are greater for the change detection group than for the change blindness group.

The hypothesis that change detection would increase identification confidence was tested with a 2 (awareness: change detection vs. change blindness) \times 2 (line-up type: culprit present vs. culprit absent) \times 2 (accuracy: accurate choice vs. inaccurate choice) factorial analysis of variance (ANOVA) with confidence ratings as the dependent variable. Simple effects were tested with independent samples *t*-tests. Partial eta squared (η_p^2) was used as an effect size metric for the ANOVA and Cohen's *d* was used as an effect size metric for the simple effects.

Results

Slightly more than one third (36.1%) of the participants detected the change between the video innocent (pre-change) and the video culprit (post-change). Change detection rates were similar among men (34.0%) and women (36.4%). Overall line-up accuracy (correct identifications/rejections) was lower in the change blindness group (28.7%) than in the change detection group (53.1%; $z = 3.22$, $p = .001$, $b = .50$; OR = 0.36, 95% CI = 0.19, 0.67). The HILOG analysis (awareness, line-up type, and line-up choice) indicated that the cell frequencies in Table 1 were best predicted by a three-way interaction, $\chi^2(2) = 7.59$, $p = .02$. Thus, awareness of the change had different effects on line-up choices in culprit-present and culprit-absent line-ups.

When the culprit was absent, a decrease in accuracy was associated with change blindness. The line-up was correctly rejected at a significantly lower rate following

Table 1. Identification choice rates and mean confidence ratings

Line-up	Awareness	Choice	<i>n</i>	Choice rate (%)	Confidence
Culprit absent	Change blindness	Video Innocent	7	12	3.71 (1.49)
		Filler	33	57	3.45 (1.03)
		Line-up Rejection	18	31	4.03 (1.12) ^a
	Change detection ^b	Video Innocent	0	0	–
		Filler	11	31	3.36 (1.02)
Culprit present	Change blindness	Line-up Rejection	24	69	4.71 (1.12)
		Video Culprit	15	26	3.50 (1.12)
		Filler	25	44	3.16 (1.03)
	Change detection	Line-up Rejection	17	30	3.53 (1.55)
		Video Culprit	10	34	4.10 (1.20)
		Filler	6	21	3.33 (1.03)
		Line-up Rejection	13	45	4.00 (1.34) ^c

Note. Confidence ratings were made on a scale of 1 (*not at all confident*) to 6 (*very confident*). Standard deviations for mean confidence ratings are in parentheses.

^aOne participant in the culprit-absent condition who experienced change blindness and rejected the line-up did not provide a confidence rating. ^bOne participant in the culprit-absent condition who detected the change did not make an identification decision or provide a confidence rating. ^cOne participant in the culprit-present condition who detected the change and rejected the line-up did not provide a confidence rating.

change blindness (31%) than following change detection (69%; $z = 3.38$, $p < .001$, $b = .78$; OR = 0.20, 95% CI = 0.08, 0.51). Relative to change detection, change blindness led to higher misidentification rates of both the fillers and the video innocent. The 26% increase in filler misidentifications was significant ($z = 2.47$, $p = .01$, $b = .53$; OR = 2.88, 95% CI = 1.19, 6.96) and although a significance test of the difference in video innocent misidentifications was precluded by low frequency counts, the effect size for this difference was substantial ($b = .71^1$) and it is noteworthy that no participant who detected the change misidentified the video innocent.

The pattern of identification choices on culprit-present line-ups was also affected by awareness of the person change; however, change detection did not lead to a reliable increase in correct identifications. Although the culprit identification rate was lower in the change blindness group (26%) than in the change detection group (34%), the difference was non-significant ($z = 0.79$, $p = .43$, $b = .17$; OR = 0.68, 95% CI = 0.26, 1.78). Thus, change detection did not substantially increase accuracy on the culprit-present line-ups. The only reliable difference was in the case of filler choices, which were made more often in the change blindness group (44%) than in the change detection group (21%; $z = 2.26$, $p = .02$, $b = .50$; OR = 2.99, 95% CI = 1.06, 8.47). Compared to the change detection group, the change blindness group was less likely to reject the line-up; however, the 15% difference was not significant ($z = 1.34$, $p = .18$, $b = .31$; OR = 0.52, 95% CI = 0.21, 1.32).

¹ Cohen's *h* amplifies differences between proportions when they are at the low and high ends of the probability spectrum. For example, a difference between 1% and 10% would yield a larger effect than a difference between 41% and 50%.

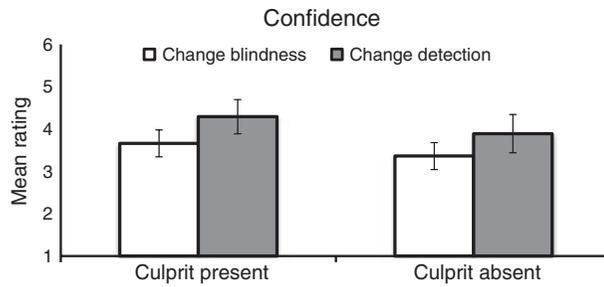


Figure 1. Post-identification confidence as a function of whether the culprit was present or absent and whether change blindness or change detection occurred. Error bars represent 95% confidence intervals.

Identification confidence

The ANOVA (awareness, line-up type, and accuracy) on confidence ratings revealed a main effect of accuracy, $F(1, 169) = 9.04, p = .003, \eta_p^2 = .05$, and a main effect of change detection, $F(1, 169) = 4.12, p = .04, \eta_p^2 = .02$. The main effect of line-up type and all interactions were non-significant. The main effect of accuracy was a consequence of higher confidence for accurate line-up choices ($M = 4.17, SD = 1.20$) than for inaccurate line-up choices ($M = 3.46, SD = 1.18$), $t(175) = 3.83, p < .001, d = .60$. Consistent with our prediction, post-identification confidence was higher in those who detected the change ($M = 4.11, SD = 1.25$) than in those who did not detect the change ($M = 3.51, SD = 1.18$), $t(175) = 3.19, p = .002, d = .49$. Figure 1 shows that the effect of change detection on confidence was similar for culprit-present and culprit-absent line-ups.

Confidence–accuracy correlation

The Pearson's correlation between confidence and accuracy provides a measure of the relation between witnesses' belief in the accuracy of their identification and their actual identification performance. Positive correlations (ranging from .07 to .51) were observed in all conditions, suggesting that higher accuracy was associated with higher confidence (Table 2). However, the confidence–accuracy correlation was significant only for those in the culprit-absent condition who detected the change ($r = .51; p = .002$). No significant associations were found for participants who experienced change blindness or for participants in the culprit-present condition who detected the change.

Table 2. Confidence–accuracy correlations^a

Line-up	Awareness	<i>r</i>	<i>p</i>	<i>n</i>
Culprit absent	Change blindness	.216	.106	57
	Change detection	.507	.002	35
Culprit present	Change blindness	.070	.607	57
	Change detection	.128	.516	28

Note. ^aThe sample sizes associated with some conditions in Table 2 are slightly different from the sample sizes associated with those same conditions in Table 1 because two participants responded to the identification task, but did not rate their post-identification confidence.

Discussion

Most participants (64%) did not detect the change between the video innocent and the video culprit. Change blindness was associated with reduced accuracy on target-absent line-ups, an effect also observed by Davis *et al.* (2008). Consistent with previous research conducted in laboratory settings (Fitzgerald *et al.*, 2011), detecting the change in the video led to increased confidence on the identification task. This heightened sense of confidence following change detection corresponded to a significant improvement in performance on the culprit-absent line-ups. The video innocent was correctly rejected by every participant who detected the change, suggesting that these participants recognized the video innocent, recollected that he was not involved in the theft, and dismissed him as a viable identification choice. A similar process could have been employed to reject the fillers in the culprit-absent line-up, given that they were matched to the video innocent's appearance rather than the video culprit's appearance.

Although change detection improved performance on the culprit-absent line-up, it led to only a small and non-significant increase in correct identifications on the culprit-present line-up. If change detection occurs as a consequence of better encoding of the target event, a higher correct identification rate should be expected. Although this did not occur, it is noteworthy that fillers from the culprit-present line-up were significantly less likely to be misidentified after change detection than after change blindness. Thus, identification errors in the change detection group primarily consisted of incorrect rejections.

Our investigation provided only partial support for Deffenbacher's (1980) optimality hypothesis. The better attentional conditions that are presumed to have led to change detection only led to a strong and reliable confidence–accuracy correlation when the culprit was absent. The low confidence–accuracy correlation observed in the change detection group for the culprit-present line-up is inconsistent with the optimality hypothesis. Rather, it appears that participants experienced a boost in confidence after successfully detecting the change, and that created a false sense of confidence for the identification task. This corresponds with the assertion by Lindsay *et al.* (1998) that witnesses base their identification confidence on meta-memorial judgements about the encoding conditions.

Change blindness errors in context

Suspects may be apprehended because (1) they were found in close proximity to the crime scene and (2) they matched a witness's description of the culprit. If a witness mistakenly perceived an innocent person and a culprit to be the same person, one likely explanation is that the two would have been viewed in some form of temporal continuity. As a consequence, the innocent person could be expected to be found near the location of the crime shortly after its occurrence. Although the innocent and the culprit need not be exceptionally similar in appearance for change blindness to occur, they would need to be similar on the details to which the witness was attending. Given that these attended details are likely to be reported in the description, the innocent person would also be expected to be consistent with the description of the culprit.

When the innocent and the culprit were perceived to be the same person in our sample, accuracy on culprit-absent line-ups decreased. Note, however, that when change blindness led to a mistaken identification from a culprit-absent line-up, these misidentifications were fairly evenly distributed among the innocent suspect (who was chosen 7 times) and three of the fillers (who were chosen 7–13 times each). Thus, only a small

fraction (17%) of these misidentifications could be classified as recognition-based identifications (i.e., unconscious transference errors), and the vast majority (83%) were filler misidentifications that occurred in the absence of recognition. In the only other experiment that used a comparable culprit-absent line-up (i.e., one innocent suspect and a set of fillers), a similarly high rate of filler selections (66%) was observed in the change blindness group (Davis *et al.*, 2008, Experiment 3). Given that change blindness is a consequence of poor encoding of both the pre-change person and the post-change person (Levin *et al.*, 2002), the distribution of culprit-absent line-up choices we observed is not all that surprising. Nevertheless, it is important to note because the consequences of some mistaken identifications are more serious than others.

When an innocent suspect is misidentified, the investigation of that person proceeds and sometimes leads to a wrongful conviction. By contrast, misidentified fillers are not investigated because fillers are (by definition) known to be innocent. Thus, if the line-up contains good fillers, the risk that change blindness will contribute to the type of misidentification that can lead to wrongful convictions is minimal. However, suspects are not always put in line-ups with suitable fillers. In spite of suggestions that fillers should match either a description of the culprit (Luus & Wells, 1991) or the appearance of the suspect (Fitzgerald, Price, Oriet, & Charman, 2013), archival research suggests that line-ups are often biased towards the suspect (e.g., Valentine & Heaton, 1999). Moreover, a suspect apprehended in the vicinity of the crime shortly after its occurrence may be presented for identification with no fillers (a showup identification). Under these circumstances, change blindness would likely lead to a higher innocent suspect misidentification rate than we observed.

Our findings underscore the importance of obtaining identifications from properly constructed line-ups. We showed that following a change blindness error, the likelihood of misidentification is heightened. If an innocent suspect was to be placed in a biased line-up or a showup identification, the misidentification could be expected to incriminate a person at risk of wrongful conviction. Conversely, if a fair line-up is used, witnesses who experience change blindness are most likely to misidentify a known innocent (i.e., no wrongful conviction risk). Thus, although change blindness poses a risk of misidentification, the problem can be addressed by constructing line-ups with suitable fillers.

Summary and conclusions

Our investigation highlights the importance of following established line-up identification research protocols. If only culprit-absent line-ups had been employed, the disproportionate benefits of change detection on culprit-absent line-ups relative to culprit-present line-ups would not have been revealed. Although we recognize that research designs should ultimately be governed by the hypotheses under investigation, including measures such as post-identification confidence ratings typically has only a small cost. Understanding influences on identification confidence is particularly important given its persuasive effect on jurors (Brewer & Burke, 2002). For example, jurors consider confidence to be the most influential factor when deciding whether an identification is valid (Wells, Ferguson, & Lindsay, 1981).

Our research was motivated by an interest in the possible effects of change detection on eyewitness identification confidence. Using a video paradigm, we showed that the increased identification confidence following change detection that had been previously demonstrated in laboratory research was also present in conditions more similar to an eyewitness experience. We also found that change blindness increases misidentifica-

tions. Nevertheless, only a small fraction of these misidentifications would lead to wrongful conviction if the line-up is properly constructed, suggesting that in practice change blindness may have few negative consequences for identifying a culprit from a line-up.

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