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The Effects of Explicit 'Not Present' and 'Don't Know' Response Options on Identification
Decisions in Computer Administered Lineups

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The data from all experiments are publicly available at the Open Science Framework:

<https://osf.io/u2chp/>

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Abstract

Eyewitness researchers recommend that “not present” and “don’t know” response options should be presented with police lineups. Although it is important that witnesses—most of whom are unlikely to be familiar with the identification task—are fully cognizant of all response options available to them, an understanding of how explicit non-identification options affect performance is lacking. Across 4 experiments, including 3,633 participants and 8 different stimulus sets, we tested the effects of including non-identification options in computer administered lineups. When explicit non-identification options were presented, target-present and -absent choosing decreased. This decrease in choosing was characterized by a shift from filler identifications to lineup rejections. ROC analyses revealed that there was no overall difference in discriminability between guilty and innocent suspects depending on response option condition. On balance, the findings suggest that, in addition to informing witnesses about acceptable responses, displaying non-identification response options does not undermine identification performance.

Keywords: eyewitness identification; explicit non-identification options, not present option, don’t know option, computerized lineups

The Effects of Explicit “Not Present” and “Don’t Know” Response Options on Identification Decisions in Computer Administered Lineups

Witnesses to crimes who are asked to make an identification may presume that the police have detained the perpetrator and be predisposed to pick from the lineup (Brewer & Palmer, 2010; Wells, 1993; Wells, Kovera, Douglass, Brewer, Meissner, & Wixted, 2020). Yet, the suspect could be innocent and their identification could lead to a wrongful conviction (Innocence Project, 2019). Hence, it is important that witnesses do not assume that the perpetrator must be present and that they should make a positive identification. To dissuade witnesses from assuming perpetrator-presence and to alleviate pressure from law enforcement to make a positive identification, a longstanding recommendation has been that lineup instructions should include a warning that the target may not be present (Wells, Small, Penrod, Malpass, Fulero, & Brimacombe, 1998; Wells et al., 2020). Recently, eyewitness identification experts have stipulated that the legitimacy of not choosing from a lineup should be emphasized by providing explicit “not present” and “don’t know” response options (Wells et al., 2020). Therefore, the practice of including explicit non-identification response options in lineups may become increasingly commonplace, especially in now commonly recommended computer administered lineups (e.g., Brewer, 2011; Kovera & Evelo, 2017; Wells, Steblay, & Dysart, 2015). When a lineup is administered on a computer, the witness may be asked to respond in a way that does not necessitate the visual display of non-identification responses (e.g., they give a verbal response, or record their response in a text-box); however, a simple and practical approach is to display all identification response options onscreen.

Clearly, from the witness’s perspective, the explicit highlighting of all possible response options is a positive step. Most witnesses do not choose to place themselves in a situation where they observe a crime and are then asked to view a lineup. Moreover, although

they may have some naïve understanding of what might transpire and some intuition of the possible consequences of their identification decision, for many the situation may be a little daunting and perhaps even intimidating. Thus, it seems both appropriate and, indeed, ethically responsible to ensure that not only are witnesses aware of the possibility that the culprit may not be in the lineup, but also of the different non-identification responses open to them. Yet, it is unclear from existing research how the inclusion of explicit not present and don't know response options affects identification decisions. For example, might we observe fewer (guilty or innocent) suspect identifications, filler identifications, a combination of both or perhaps no meaningful change in response patterns? In four experiments we examined how the inclusion of explicit non-identification options affects identification decisions when pre-lineup instructions have already warned that the perpetrator may or may not be present in the lineup.

Providing explicit not present and don't know response options to a witness is analogous to providing explicit cues to possible non-identification responses. There is widespread evidence that an explicit cue promoting a particular behavior—akin to a discriminative stimulus in operant conditioning theory—increases the likelihood of that behavior occurring. For example, the use of stairs rather than an escalator increased with the display of signs promoting the health benefits of stair climbing (Suri, Sheppes, Leslie, & Gross, 2014). Similarly, speeding in school zones decreased when flashing “check speed” signs were displayed (Gregory, Irwin, Faulks, & Chekaluk, 2014). In the identification context, providing people with lineup instructions warning the target may not be present in the lineup (i.e., unbiased lineup instructions) leads to fewer positive identifications (for meta-analyses see Clark, 2005; Steblay 1997, 2013), providing compelling evidence that, without this warning, people tend to assume the perpetrator is in the lineup and (or) feel pressured to make a positive identification (Wells et al., 2020).

In a similar vein to lineup instruction research, several studies found that including an explicit not present response option with a lineup—instead of cueing a rejection response via the lineup instructions—decreased choosing (for an overview, see Steblay, 2013). These studies provide tentative evidence that presenting an explicit option to reject the lineup affects identifications in a similar manner to unbiased lineup instructions. However, they do not speak to the effect of an explicit option to reject the lineup when presented in addition to unbiased instructions.

Under conditions where an explicit option to reject the lineup supplements unbiased lineup instructions, choosing could still decrease relative to a condition where the explicit lineup rejection option is missing. This result would suggest that failure to present a rejection option unfairly predisposes witnesses towards making positive identifications even when they have already been warned of possible target-absence. However, it is also possible that in the context of unbiased lineup instructions having been provided, choosing is not affected by an explicit lineup rejection option, which would suggest that one cue to reject the lineup is sufficient to prevent witnesses from being pressured to make a positive identification. If a lineup rejection option does affect lineup choosing in the context under consideration, it may do so in both target-present and -absent cases; however, another possibility is that only target-absent cases are affected (or the effect is stronger in target-absent than -present cases). In target-present lineups, a cue to respond not present is in competition with the match to memory presented by the perpetrator; therefore, the lineup rejection option may be less influential under these circumstances. Steblay (2013) posited a similar mechanism to explain meta-analytic evidence that lineup instruction effects may be more pronounced in target-absent cases. If lineup rejection options affect target-absent choosing more than target-present choosing, overall identification accuracy may be improved.

It is also important to consider how any decreases in choosing caused by a non-identification option are distributed across suspect and filler identifications. Through a combination of factors, it seems likely that the bulk of any decreases in choosing would involve filler identifications. Common sense dictates that alleviating pressure to make a positive identification will affect weaker matches to memory, causing what would have otherwise been low confidence identifications to instead be lineup rejections. In addition to generally presenting weak matches to memory, fillers comprise the bulk of a lineup (assuming it is a single-suspect lineup). Thus, it stands to reason that filler identifications are the prime candidates for being decreased by the inclusion of non-identification options. However, depending on how much a lineup rejection option decreases choosing in the present context, it is possible that suspect identifications are also affected. Thus, an important question is: what kind of trade-off occurs between guilty and innocent suspect identifications? One possibility, supported by the argument that lineup members presenting weaker matches to memory are more likely to be affected by a decrease in choosing, is that innocent suspect identifications are more likely to be affected than guilty suspect identifications. Yet, innocent suspect identifications tend to be lower than guilty suspect identifications, potentially constraining the effect that a lineup rejection option can have, and circumstances such as a change in appearance can lead guilty suspects to present poor matches to memory (Pozzulo & Marciniak, 2006). Therefore, the net result across different stimuli may be a similar effect of a lineup rejection option on guilty and innocent suspect identifications.

Research in which an explicit lineup rejection option has been tested in conjunction with unbiased lineup instructions has been conducted almost exclusively with child samples, with the option to reject taking the form of an image representing target absence, such as a silhouette surrounding a question mark (Havard & Memon, 2012) or a person hiding behind a

tree (Dunlevy & Cherryman, 2013). Such options have generally increased target-absent accuracy, without cost to target-present accuracy (e.g., Dunlevy & Cherryman, 2013; Zajac & Karageorge, 2009; cf. Beal, Schmitt, & Dekle, 1995), suggesting that the inclusion of an additional rejection cue has a positive impact on identification outcomes. However, these studies do not always report the filler identification rate in target-present lineups and tend not to provide a breakdown of suspect and filler identifications in target-absent lineups. Therefore, it is difficult to determine how the lineup rejection option affected choosing or the trade-off between innocent and guilty suspect identifications.

Whether the reported effects of an explicit lineup rejection option on children's identification decisions will generalize to adult samples is unknown, especially given children are more likely to choose from lineups than adults, thereby providing more scope for reduced choosing (Pozzulo & Lindsay, 1998). At first glance, two studies appear to have examined this question; however, there are interpretative issues associated with each. Bruer, Fitzgerald, Therrien and Price (2014) used an adult sample to examine the effect on identification outcomes of including an image representing target-absence in the lineup and observed decreased choosing in this condition relative to a condition where the image representing target-absence was not included. But they confounded the presence or absence of this lineup rejection option with the method by which participants could reject the lineup. In the condition where the lineup rejection option was not displayed, lineup instructions stated that the lineup could be rejected verbally. In the condition where the lineup rejection option was displayed, a lineup rejection could be made by selecting "0" on the computer keyboard. Using both adult and adolescent samples, Pica, Thompson, Pozzulo, Dempsey, & Pettalia, (2018) compared identification outcomes across the presentation of several types of lineup rejection options (e.g., a silhouette and/or a question mark representing target-absence, a "not here" box). They reported that the lineup rejection options did not affect identifications

relative to a control condition. However, although no explicit rejection option was displayed with the lineup in the control condition, participants were asked to indicate their identification decision on a response sheet where the option to respond not present was clearly indicated. Therefore, neither study isolated a manipulation of whether the option to respond not present was presented with the lineup or not.

In addition to including an explicit not present option, it has been argued that people should be given the option to respond don't know (Wells et al., 2020). When people are not expressly given the option to respond don't know they are unlikely to respond in this manner (e.g., Köhnken & Maass, 1988; Weber & Perfect, 2012). When a don't know option has been presented, it has been used at rates of anywhere between 10–50% (e.g., Brewer, Keast, & Sauer, 2010; Köhnken & Maass, 1988; Perfect & Weber, 2012), suggesting that its inclusion decreases choosing.

Although a don't know response may reflect dispositional uncertainty, it likely often indicates that the person recognizes they are at risk of making an incorrect decision (Koriat & Goldsmith, 1996). Therefore, apart from the explicit don't know option signalling that don't know is an acceptable response, identification accuracy may be improved by providing an option to opt out of making a definitive response. Two studies have shown an improvement in the quality of responses from target-present lineups when don't know was encouraged (Perfect & Weber, 2012; Warnicke & Sanders, 1980). In one study, target-absent cases were not included (Warnicke & Sanders, 1980), so the effect of the don't know option on overall identification accuracy was unknown. Perfect and Weber (2012) reported no change in the percentage of accurate decisions made from target-absent lineups. Taken together with the improvement in the percentage of accurate responses observed in target-present cases, these results provide tentative evidence that it is beneficial to include a don't know response with a lineup. Evidence of an explicit don't know response option improving accuracy in a show-up

procedure also exists (Weber & Perfect, 2012). Yet, other studies have reported no effect of don't know options on overall identification decision accuracy (Brewer, Keast, & Sauer, 2010; Steblay & Phillips, 2011). Thus, it is possible that a don't know option could increase accuracy; however, there may also be circumstances under which it has no, or even a detrimental, effect on identification performance.

In sum, despite the commendable ethical reasons for making all non-identification response options explicit for witnesses, it is unclear what the response patterns are likely to be compared with circumstances where the non-identification options are missing. Consequently, we examined the effect of explicit non-identification options on identification decisions in four experiments. In the following section we provide an overview of the general experimental approach and key differences between the individual experiments, before reporting them together in one method and results section.

All experiments were conducted online so our results are most applicable to situations where a lineup is presented to the witnesses using a completely computerized procedure (i.e., the lineup instructions and lineup are displayed onscreen and the identification decision is recorded electronically). Although lineups are still often conducted in person, known benefits of administering them on a computer are amassing. For example, computer presented lineups can minimize the potential for a lineup administrator to influence the identification decision, shorten retention intervals because of the greater ease in assembling lineup fillers, ensure recording of confidence immediately after the identification response, and permit recording of identification response latency (Brewer, 2011; Kovera & Evelo, 2017). Thus, it seems likely that, increasingly, lineups will be administered using some form of electronic procedure, necessitating an understanding of how explicit non-identification cues affect identification decisions in this paradigm. Twelve percent of respondents to a 2013 Police Executive Research Forum survey reported using computerized lineup procedures; we can

only assume that number has since increased. The generalizability of our results to a variety of applied contexts is considered in the General Discussion section.

Experiments 1 and 2 both tested the effect of supplementing a warning (in the lineup instructions) that the target may not be present in the lineup with visually displayed options to respond not present and don't know. The main difference between these two experiments was the stimulus sets used, to examine the stability of the Experiment 1 results for different stimuli. Additionally, a larger sample was collected in Experiment 2 and participants were required to remain on the lineup instructions page for a minimum of 20 s (to encourage careful reading of instruction). Both of these changes were retained in subsequent experiments. In Experiment 3, discrepant results between Experiments 1 and 2 were followed up with another examination of the effect of including (compared with not including) non-identification response options with the lineup, this time using a combination of stimulus materials drawn from Experiments 1 and 2. Experiment 3 also included a condition where, in addition to non-identification options being displayed with the lineup, the legitimacy of responding not present and don't know was emphasized in the lineup instructions. This condition was included to provide a sense of whether choosing would be further reduced with the inclusion of another set of non-identification cues. Experiment 4 then tested, using the same stimulus sets as Experiment 3, the effect of non-identification options under conditions where the lineup instructions were more comprehensive. In addition to displaying the explicit response options and warning participants that the target may not be present, all lineup instructions in Experiment 4 included an explicit statement that they could respond not present and don't know (i.e., the same instruction that was included in the additional condition in Experiment 3). The conditions in each experiment are summarized in Table 1.

In all experiments, our primary focus was on whether displaying non-identification options affected lineup choosing and, if so, the extent to which any decreases in choosing

were characterized by increases in not present compared with don't know responses and decreases in suspect compared with filler identifications. We also tested whether effects varied depending on target presence. Further, since existing research provides the tentative suggestion that both not present and don't know options could contribute to increases in the number of correct decisions, we examined how the inclusion of non-identification options affected overall identification accuracy. Finally, we probed the proposition that non-identification options are most likely to affect weak matches to memory, by examining the effect of non-identification options on filler identification confidence.

Method

Participants and Design

Participants were recruited from Amazon Mechanical Turk and paid 1.25 USD in exchange for their participation.

We commenced this series of experiments with no concrete sense of what effects would be observed, or how large they would be. In Experiment 1, we targeted a sample of ≈ 30 in each cell after (roughly estimated) likely exclusions. In subsequent experiments, we targeted a sample of 50–60 per cell. People who attempted to access the study on a mobile device (despite a warning that the study could not be completed using such a device), or failed an initial attention check question, were prevented from participating in the study (Ns = 161, 369, 491 & 462 in Experiments 1–4, respectively). Further exclusions included (a) incomplete data files indicating that the participant experienced technical difficulties or withdrew from the study (Ns = 44, 79, 85 & 64) (b) those who failed the stimulus video attention check (Ns = 52, 92, 109 & 68) and (c) those who typed a nonsensical response as their identification decision, or contradicted their identification decision in their response to a

follow-up question ($N_s = 71, 3, 10 \& 1$).¹ In sum, we implemented very thorough screening of online respondents, reflected in the large number of total exclusions: 473, 543, 695 and 595 in Experiments 1–4, respectively.

Experiment 1. The final sample in Experiment 1 included 504 individuals (211 female; aged 18–76 years, $M = 34.00$, $SD = 10.54$). A 2 (explicit non-identification response options: missing, displayed) \times 2 (target presence: present, absent) \times 4 (stimulus: 1–4) between-subjects experimental design was used, with participants randomly allocated to one of the cells.

Experiment 2. Participants were 896 individuals (427 female; aged 18–75, $M = 36.21$, $SD = 11.39$). The design was the same as Experiment 1, except that four different stimulus sets were used (5–8).

Experiment 3. The sample included 1,298 participants (622 female; aged 18–74, $M = 35.31$, $SD = 11.21$). A 3 (explicit non-identification response options: missing, displayed, displayed + emphasized in lineup instructions) \times 2 (target presence: present, absent) \times 4 (stimulus: 1, 4, 6, & 8) between-subjects experimental design was used. In addition to operationalizing whether non-identification response options were displayed, we included a condition in which non-identification options were outlined in the lineup instructions as well as being presented with the lineup. To represent a combination of the previous experiments, the stimuli were randomly selected subsets of those used in Experiments 1 and 2.

Experiment 4. There were 935 participants (472 female; aged 18–75, $M = 35.29$, $SD = 11.42$); the design was the same as Experiments 1 and 2. However, in this experiment the manipulation of non-identification response options occurred in a context where the non-identification options were also outlined as part of lineup instructions. Thus, the condition

¹ The number of nonsensical and contradictory responses may have been greater in Experiment 1 because this experiment had no exclusions.

where non-identification options were included in the lineup was equivalent to the extra condition in Experiment 3. The stimulus sets were the same as those used in Experiment 3.

Materials

Eight stimulus sets, each comprised of a video and associated target-present and -absent lineups, were used. The stimulus sets were chosen on the basis of archival data associating them with a range of choosing and accuracy rates.

All videos depicted a non-violent crime (e.g., a car theft), with durations of 14–28 s, and the targets' faces in view for between 4–25 s (see Supplemental Materials pp. 1–2, for a brief description of each video). The videos were set to auto-play and auto-advance after completion, so that participants could not pause them or watch them twice. The target of an attention check question, a photograph of an animal (e.g., a tiger), appeared for 2 s immediately following the mock-crime footage. After the attention check target disappeared, an onscreen message stated that the page would advance shortly. This message prolonged the video by one third of its length, to ensure that if the video took some time to load the end of the mock crime footage (and attention check target) would not be cut off. After viewing the video, participants were asked to select, from a list of five alternatives, what animal was displayed at the end of the video. As previously stated, data from those participants who failed the video attention check were not included in analyses.

The lineups corresponding to each stimulus video included the target, or a target-replacement (serving as the designated innocent suspect), and five fillers. The procedure for selecting the fillers and innocent suspects varied across stimulus sets, depending on the original projects the stimuli were used for. In each case, five descriptions of the target were used to compile a modal description and all fillers were selected to match this description. The procedure of selecting description matched lineup members was more rigorous for half of the stimulus sets (i.e., 1, 4, 5 & 8), involving pilot studies in which participants judged

whether each of the filler candidates matched description. For the other stimulus sets (i.e., 2, 3, 6 & 7) a match-to-description was agreed on by two people. In these cases, the similarity of the fillers to the target was piloted, leading to the selection of high and low similarity fillers. For stimulus set two we used a low similarity lineup, for stimulus set three we used a high similarity lineup and for stimulus sets six and seven we used a random selection of three high and two low similarity fillers. For all stimulus sets, the innocent suspects were randomly designated from the filler pools. Where lineups included a mix of high and low similarity fillers, the innocent suspect was drawn from the high similarity pool. For a detailed description of how each individual lineup was constructed see Supplemental Materials (pp. 1–2).

Instructions preceding the identification task stated: *We would now like you to try to identify (e.g., the girl who stole the wallet) from a lineup. S/he may or may not be present. Record your identification decision in the text box below the lineup. You are free to take as much time as you need.* In conditions where the non-identification options were outlined in the lineups instructions (i.e., the extra condition in Experiment 3 and both conditions in Experiment 4), instructions additionally read: *The perpetrator may or may not be present in the lineup, so you do not have to pick someone. If you think the perpetrator is not in the lineup you can respond “not present”. If you feel unable to make a decision, you have the option of responding “don’t know”.* To encourage careful reading of instructions, participants in Experiments 2–4 were prevented from advancing the screen to view the lineup until 20 s on the lineup instruction page had elapsed. Lineups were displayed simultaneously with the lineup members numbered 1–6. The fillers appeared in a fixed order and the target (or innocent suspect) appeared in one of two randomly selected positions for the first four stimulus sets (position 2 or 6 for stimulus 1; position 1 or 3 for stimulus 2; position 4 or 5 for stimulus 3; position 1 or 5 for stimulus 4) and position three or five for stimulus sets 5–8.

Where the non-identification options were displayed with the lineup, the words not present and don't know were printed underneath the lineup. All identification decisions were typed in a text box below the lineup, so that the mode of responding was not confounded across the manipulation of whether non-identification options were presented. The identification decision was submitted by advancing the screen. Following the identification decision, confidence was recorded on an 11-point decile scale (0–100%). The option to respond “not applicable” was presented to the right of the confidence scale for participants who provided a don't know or similar response. Participants who selected not applicable were asked to briefly state their reasons for their non-committal response to the identification task.

Procedure

Participants were first provided with study information and a consent statement. Consent was given by launching the experiment and participation could be withdrawn at any point by closing the browser. Participants were first asked to provide basic demographic information and answer two attention check questions (i.e., typing a word backwards and selecting a designated response option). Those who passed the attention check were prompted to watch one of the stimulus videos under instructions to pay close attention and completed the associated video attention check. Following a short retention interval (60 s), which was tracked with a countdown timer displayed onscreen, participants were instructed to try to identify the person they saw in the video from a lineup. After making their identification decision and rating confidence in their decision (or explaining why they were unable to decide), participants were provided with debriefing information and instructions on how to receive reimbursement for their participation. All experiments were approved by our institutional ethics committee.

Results and Discussion

Coding

Identification decisions were first coded as a suspect pick, a filler pick, a not present or a don't know response, with coders blind to all experimental conditions. Potentially ambiguous responses were coded independently by the first and third author with 100% agreement in Experiments 1 and 2. In Experiments 3 and 4, two discrepancies in coding were resolved through discussion. The frequencies of each response and 95% confidence intervals (CIs), at each level of the non-identification options condition and target presence, are reported in Table 2. The breakdown of responses by each stimulus can be found in Supplemental Materials (pp. 3–18).

Analytical Approach

The main analyses were conducted by fitting mixed-effects models to the data using the lme4 package (Bates, Mächler, Bolker, & Walker, 2015) in R (R Development Core Team, 2017). Following Barr, Levy, Sheeper, and Tily (2013), error was modeled by including a random by stimulus intercept, as well as random by stimulus slopes for each fixed effect (i.e., response option condition, target presence and their interaction). In order to fit the models using this random effects structure, which accounted for variation in results across stimuli, correlations between the predictors had to be removed. This can increase the chances of a Type-1 error, but is considered preferable to not accounting for variation in effects across stimuli (Brauer & Curtin, 2018) and is less likely to lose power if deviation coding (i.e., -.5, +.5) is employed (Barr et al., 2013). The random effects structure was included in each baseline model, which also included the relevant outcome variable. The fixed effects of explicit non-identification options condition (coded as: missing = -.5, displayed = .5), followed by target presence (coded as: absent = -.5, present = .5) and their interaction were then added to the model, similar to the steps of a hierarchical regression analysis. Chi-square

tests indicated whether model fit was significantly improved by the addition of each predictor. The regression coefficients—beta (b), associated standard error (SEb) and confidence intervals (b 95% CI)—indicated whether each predictor significantly estimated scores on the outcome variable when controlling for all other predictors in the model. A predictor was interpreted as having a significant effect on the outcome variable when the b 95% CI did not include zero. Because the inferential statistics for the models are extremely detailed, they are tabulated. The regression coefficients, key to establishing whether an effect was significant, are presented in the main article. The number of tables required to summarize the full set of inferential statistics for all experiments is large, so we have placed these tables in Supplemental Materials (pp. 19–27).

Given the importance of minimizing innocent identifications while maximizing guilty suspect identifications, receiver operating characteristics (ROCs) were also constructed to examine whether discriminability between guilty and innocent suspect identifications was affected by including non-identification options in the lineups (Mickes, Flow, & Wixted, 2012; Wixted & Mickes, 2018). Discriminability between guilty and innocent suspects is distinct from discriminability in the more traditional sense, which encompasses detection (i.e., ability to discriminate target-present from -absent cases) and identification (i.e., ability to discriminate the suspect from the fillers) (e.g., Palmer & Brewer, 2012). The rates of guilty and innocent suspect identifications were plotted across decreasing levels of confidence for the non-identification response option conditions in each experiment. Following others (e.g., Colloff, Wade, & Strange, 2016) discriminability was compared across non-identification option conditions with pairwise comparisons of partial area under the curve (pAUC) using the pROC package (Robin et al., 2011) in R (R Development Core Team, 2017). Note that for a small number of suspect identifications ($N_s = 1, 2, 2 \& 1$ in

Experiments 1–4, respectively) a confidence rating was not recorded and these cases could not be included in the ROCs.

Choosing

To examine the effect of the explicit non-identification response options on lineup choosing, suspect and filler picks were coded as choosers; not present and don't know responses were coded as non-choosers. The choosing inferential statistics are reported in Table 3.

Lower choosing rates were observed in the displayed than in the missing explicit non-identification response options condition in all experiments. In Experiment 1, choosing occurred at a rate of 86.35%, 95% CI [81.88, 90.41], in the missing condition and 64.71%, 95% CI [58.65, 70.38], in the displayed condition. In Experiment 2, with new stimulus sets, choosing decreased similarly from 81.68%, 95% CI [78.01, 85.13], in the missing condition to 63.43%, 95% CI [58.83, 67.80], in the displayed condition. In Experiment 3, comprising a combination of stimulus sets used in the first two experiments, choosing again decreased from 75.93%, 95% CI [71.76, 79.87], in the missing condition to 60.23%, 95% CI [55.47, 64.76], in the displayed condition. Choosing occurred at a rate of 56.78%, 95% CI [51.88, 61.44] in the additional condition included in Experiment 3 (i.e., where participants received more comprehensive lineup instructions in addition to the non-identification options being displayed with the lineup). This rate of choosing was significantly lower than choosing in the missing, but not the displayed non-identification options conditions. Therefore, we omit reporting any further analyses involving the extra condition in Experiment 3 (for these analyses, see Supplemental Materials, pp. 28–30). In Experiment 4, in which non-identification options were emphasized as part of the lineup instructions in all conditions, displaying the non-identification options with the lineup, 58.43%, 95% CI [53.74, 62.90], decreased choosing relative to when the non-identification options were not displayed

71.18%, 95% CI [66.96, 75.19]. In all experiments, choosing was lower for target-absent than for target-present cases (differences ranging from 14.08–21.78% across experiments). There was no interaction between the non-identification response options condition and target presence on choosing in any of the experiments.

Note on the effect of outlining non-identification options in the lineup

instructions. Outlining non-identification options in the lineup instructions as well as displaying them with the lineup did not affect choosing to a greater extent than simply displaying the options with the lineup (Experiment 3). Additionally, displaying non-identification options with the lineup affected choosing under conditions where non-identification options were detailed as part of the lineup instructions (Experiment 4). Taken together, these observations led us to speculate that perhaps outlining non-identification options in the lineup instructions presents a less salient cue to non-identification responses than when the options are displayed with the lineup. The present experiments do not allow for any definitive conclusions in this regard, because we did not manipulate non-identification instructions in conjunction with the manipulation of non-identification response options. However, the non-identification options conditions in Experiments 3 and 4 were identical apart from the fact that these options were outlined as part of lineup instructions in Experiment 4 but not Experiment 3. Therefore, we conducted a post-hoc analysis examining the relative effects of providing non-identification options as part of lineup instructions versus in the lineup by collapsing the data across Experiments 3 and 4.² The results of this analysis can be found in Supplemental Materials (p. 31). To summarize, choosing was 6.01% lower when non-identification options were outlined in lineup instructions (i.e., in Experiment 4), compared to when they were not (i.e., in Experiment 3). In contrast, across

² Note that results were the same when the extra condition included in Experiment 3 (i.e., non-identification options presented in lineup instructions and with the lineup) replaced the equivalent condition in Experiment 4.

Experiments 3 and 4, choosing was 14.58% lower when non-identification options were displayed with the lineup than when they were not displayed. There was no interaction between the two predictors on choosing.

Not Present and Don't Know Responses

Rates of don't know responding were low (0–5%) regardless of experimental condition, making it clear that the decrease in choosing associated with the inclusion of non-identification options was driven by an increase in not present responses. The choosing results did not differ when removing don't know responses from the analysis (see Supplemental Materials, pp. 32–33). However, it is worth noting that in conditions where non-identification options were not outlined as part of the lineup instructions or displayed with the lineup, only one participant (out of 916) responded don't know, suggesting that people are extremely unlikely to opt out of making a decision without being provided with that explicit option.

Suspect and Filler Identifications

Inferential statistics for the models examining suspect and filler identifications appear in Table 4. Here the effects of non-identification options varied somewhat across experiments. However, the effects of target presence on both suspect and filler identifications were consistent. Unsurprisingly, there was always a larger percentage (between 35.25% and 45.70%) of suspect identifications in target-present than -absent cases and filler identifications were more prevalent in target-absent than -present cases (differences ranging from 16.88%–31.65%).

The Experiment 1 results revealed no effect of non-identification options on suspect identifications, nor was there an Explicit Non-identification Options \times Target Presence interaction. However, non-identification options did affect filler identifications, with fewer of these occurring when the non-identification options were displayed, 36.47%, 95% CI [30.37,

42.18], than when they were missing, 54.62%, 95% CI [48.24, 60.60] and this pattern did not vary depending on target presence. In Experiment 2, there was again no overall effect of non-identification options on suspect identifications; however, there was an Explicit Non-identification Options \times Target Presence interaction. In target-absent cases suspect identifications were similar across non-identification response option conditions (19.63%, 95% CI [14.14, 24.66] in the missing and 21.33%, 95% CI [15.76, 26.46] in the displayed condition), whereas in target-present cases suspect identifications were more frequent in the missing condition, 61.11%, 95% CI [54.65, 67.14], than the displayed condition, 50.00%, 95% CI [43.13, 56.41]. As in Experiment 1, filler identifications were fewer in the displayed, 27.99%, 95% CI [23.69, 32.06], than the missing, 40.62%, 95% CI [35.99, 45.03], condition. However, this effect varied depending on target presence, with non-identification options having a more pronounced influence on filler identifications in target-absent (21.93%), than - present (4.48%) cases.

In Experiment 3, where subsets of the stimuli used in the previous experiments were used, results were consistent with the combined results of Experiments 1 and 2. Experiment 3 yielded fewer suspect and filler identifications when non-identification options were present and there were no interactions with target presence. Suspect identifications decreased from 35.28%, 95% CI [30.64, 39.69], when the non-identification options were missing to 30.80%, 95% CI [26.35, 35.03], when they were displayed; filler identifications decreased from 40.75%, 95% CI [35.97, 45.29], to 29.81%, [25.35, 34.04]. When collapsing across Experiments 1 and 2, suspect identifications decreased from 38.03%, 95% CI [34.37, 41.55] to 32.81%, 95% CI [29.26, 36.22] and filler identifications decreased from 45.58%, 95% CI [41.82, 49.19] to 31.09%, 95% CI [27.58, 34.45] in the missing compared with the displayed conditions (for inferential statistics, see Supplemental Materials, p. 34).

The results of Experiment 4, where the presence of non-identification options was manipulated in the context of these options being emphasized in the lineup instructions, non-identification options affected filler but not suspect identifications. Filler identifications decreased from 37.34%, 95% CI [32.88, 41.59], in the missing condition to 27.55%, 95% CI [23.36, 31.52] in the displayed condition. There was no interaction between the predictors on suspect or filler identifications.

Note on “at risk” innocent suspect identifications. We also examined the effect of non-identification options on innocent suspect identifications in cases where they were most at risk of being identified. Specifically, we re-examined the target-absent lineup data, designating as the innocent suspect the lineup member who was most frequently identified when non-identification options were missing. At risk innocent suspect identification rates in the missing non-identification options condition, broken down by stimuli, ranged from 14.29–51.61 ($M = 30.72$; $SD = 10.98$). We expected that perhaps non-identification options would have a greater effect on at risk suspect identifications, than what was observed for the suspects designated a priori. However, although at risk suspect identifications were generally lower when non-identification options were displayed than when they were missing, the differences were small (4–7% across experiments) and only significant in Experiment 3. For detailed descriptive statistics and all inferential statistics see Supplemental Materials (pp. 35–36).

Guilty and Innocent Suspect Discriminability

To acquire a more stable estimate of discriminability between guilty and innocent suspects—particularly in light of the variation in effects of non-identification options on suspect identifications across experiments—we present the ROCs collapsed across all experiments (see Figure 1). These curves reflect what was observed for three of the four individual experiments, which are shown in Supplemental Materials (pp. 37–38). In the

condition where non-identification options were missing, $pAUC = .051$, $CI [.045, .057]$. In the condition where non-identification options were displayed, $pAUC = .046$, $CI [.040, .052]$, and $pAUC$ did not differ between conditions, $p = .216$, $D = 1.24$. The absence of a difference in innocent-guilty suspect discriminability is also reflected in the small difference between measures of discriminability across the non-identification option conditions ($d' = 1.29$ in the missing condition and 1.20 in the displayed condition). Measures of the criterion level for suspect identifications indicate a slightly more liberal criterion in the missing ($c = 0.47$) than the displayed ($c = 0.60$) condition, consistent with the marginally lower suspect identification rates observed in the condition where non-identification options were presented (across Experiments 1 and 2 and in Experiment 3).

Overall Accuracy

Identification accuracy was examined in two ways: removing don't know responses from the analysis and, more conservatively, coding them as errors. Inferential statistics for the analyses where don't know responses were coded as errors showed no effect of non-identification options on overall accuracy and are reported in Supplemental Materials (pp. 39–40). Inferential statistics for the analyses where don't know response were removed are reported in Table 5.

With don't know responses removed from the analysis, there was some evidence of overall accuracy increasing with the inclusion of non-identification options. In Experiments 1 and 2, the non-identification response option condition was not a significant predictor of overall accuracy; however, when collapsing the data across these experiments accuracy was marginally but significantly higher in the displayed, 46.91% , $95\% CI [43.09, 50.59]$ than the missing, 41.74% , $95\% CI [38.02, 45.32]$ condition (for inferential statistics, see Supplemental Materials, p. 40). In Experiment 3, accuracy was also higher when non-identification options were displayed, 54.69% , $95\% CI [49.85, 59.30]$, rather than missing, 46.14% , $95\% CI [41.29,$

50.75]. There was no effect of non-identification options on overall accuracy in Experiment 4, where non-identifications were manipulated in the context of non-identification options having been emphasized in the lineup instructions. In Experiment 1, accuracy was higher in target-present, 53.39%, 95% CI [47.02, 59.36], than target-absent, 30.04%, 95% CI [24.10, 35.58], cases; elsewhere, accuracy did not vary with target presence. In all experiments, a significant Non-identification Response Options \times Target Presence interaction was observed—regardless of whether don't know responses were coded as errors or removed—reflecting substantial increases in target-absent (correct) rejections compared with largely negligible decreases in target-present (correct) suspect identifications when non-identification options were displayed (see Table 2 for percentages).

Confidence

A plausible explanation for non-identification options primarily affecting filler identifications is that low confidence positive identifications resulting from weak memory matches were reduced. If so, filler identification confidence should, on average, be higher when the explicit options were present. Confidence in filler identifications was modestly affected in Experiments 2 and 3 ($b = 9.82$, $SEb = 4.78$, b 95% CI [0.47, 19.18] and $b = 10.41$, $SEb = 3.08$ b 95% CI [4.37, 16.45], respectively), but not affected in Experiment 1, $b = 1.17$, $SEb = 3.19$ b 95% CI [-4.55, 7.97], $d = 0.07$, or Experiment 4, $b = 1.13$, $SEb = 2.52$, b 95% CI [-4.55, 7.97], $d = 0.04$). In Experiment 2, filler identification confidence was higher when non-identification options were displayed ($M = 65.16$, $SD = 19.61$) than when they were missing ($M = 57.36$, $SD = 5.26$), $d = 0.34$. Similarly, in Experiment 3 average confidence was lower when non-identification options were missing ($M = 62.82$, $SD = 23.18$) than when they were displayed ($M = 71.45$, $SD = 18.61$) $d = 0.40$.

To summarize, the key results of our analyses were that non-identification options consistently decreased lineup choosing and this effect was primarily driven by a shift from

filler identifications to not present responses. Across experiments there was some evidence of suspect identifications decreasing with the inclusion of non-identification options, but no overall difference in effects on guilty compared with innocent suspect identifications.

General Discussion

Witnesses to crimes who are asked to view a police lineup deserve to be clearly informed about the appropriate response options available to them. Making all response options (i.e., both the identification and non-identification options) explicit is a simple way to ensure witnesses are informed. Recently, it has been recommended that in addition to providing witnesses with unbiased lineup instructions—a warning that the target may not be present in the lineup—explicit non-identification response options should be displayed with the lineup (Wells et al., 2019). Yet, how identification decisions are affected by the inclusion of explicit options to respond not present and don't know with a lineup has not been resolved by previous research. Our experiments investigated the effects of including these non-identification cues in a computer administered lineup, in conjunction with unbiased lineup instructions.

Across all four experiments, choosing rates were lower when non-identification options were displayed with the lineup than when they were not, and this effect did not vary depending on target presence. In Experiments 1–3, the effect of non-identification options on choosing emerged despite the delivery of unbiased lineup instructions, which are themselves associated with decreased choosing (Stebly, 1997, 2013). In Experiment 4, lineup instructions additionally outlined that people were free to respond not present or don't know, providing evidence that non-identification options affect choosing even when lineup instructions are more detailed. These findings build on previous research showing that, in the absence of unbiased lineup instructions, displaying a lineup rejection option with the lineup decreases choosing (see Steblay, 2013 for an overview) and research which has shown that

supplementing unbiased lineup instructions with a lineup rejection option reins in the tendency for children to choose from lineups (e.g., Dunlevy & Cherryman, 2013; Zajac & Karageorge, 2009).

An obvious explanation for the effect of displaying non-identification options with lineups on choosing is that people experience pressure to make a positive identification when they are not presented—apparently even when these options are outlined as part of the lineup instructions. As a result, when non-identification options are provided, some cases on track to becoming low confidence identifications instead become lineup rejections. In Experiments 2 and 3, this account was supported by confidence in filler identifications being modestly higher when non-identification options were displayed than when they were missing (i.e., suggesting that fewer low confidence filler identifications had been made in the former condition). However, in Experiments 1 and 4 filler identification confidence did not differ depending on the non-identification response options condition. In interpreting these results it is important to bear in mind that a between-subjects comparison of confidence is problematic, since individuals' interpretations and use of the confidence scale are likely to vary widely and introduce noise. For example, one individual may use 90% and 70% to denote high and low confidence, respectively, whereas another may use values of 70% and 40% to denote the same. It is our view that the confidence results may well be attributable to participants' variable use of the confidence scale, as such variability would be expected to randomly obscure effects to varying degrees (such as showing a modest effect in some cases and no effect in others). However, it is of course also possible that some other mechanism caused the inconsistent confidence results.

Although consistent effects of non-identification options on choosing were observed, the effects on suspect and filler identifications varied across experiments. In Experiment 1, filler but not suspect identifications were decreased, in line with our expectation that any

effects of non-identification options would primarily affect filler identifications. In Experiment 2, target-present suspect identifications and target-absent filler identifications were affected. These results were unexpected as Experiment 2 was designed to replicate Experiment 1 using new stimulus materials (and with a couple of additional tweaks to the methodology). As the stimulus materials comprised the most significant difference between the two experiments, it seems likely that these were the source of variation in the effects on suspect and filler identifications. For example, the correct identification rate was very low for one of the stimulus sets in Experiment 2 (i.e., 21% when non-identification options were missing), signaling a very poor match to memory which may have driven the decrease in guilty suspect identifications that was observed. For two of the other stimulus sets in Experiment 2, correct identifications were high (i.e., 88.52% and 92.73% when non-identification options were missing), necessarily constraining filler picks and potentially contributing to the absence of an effect of non-identification options on target-present filler identifications. In Experiment 3, where randomly selected subsets of stimuli from the first two experiments were used, non-identification options led to a decrease in filler identifications and a smaller decrease in suspect identifications. These results are consistent with the identification patterns observed when collapsing across the first two experiments, highlighting that including multiple stimulus sets in an experiment does not ensure that findings are necessarily representative of the wider population. Thus, extensive and systematic testing of effects is needed before conclusions can be made with any degree of certainty. Collectively, the results from our first three experiments point to non-identification options primarily affecting filler identifications, with some evidence that suspect identifications can also be affected.

Experiment 4, which used the same stimuli as Experiment 3, tested the effect of non-identification options under conditions where lineup instructions were more detailed. Results

showed a decrease in filler but not suspect identifications. The lack of an effect for suspect identifications could have been a Type 2 error since this effect was small in the other experiments. However, it is also possible that the effect of non-identification options was a bit weaker in this experiment, precluding any meaningful effect on suspect identifications. The manipulation occurred across lineup instructions that were more detailed, which may have led baseline choosing to be a bit lower and the effect of non-identification options to be weaker (we discuss the potential effect of non-identification options presented as part of lineup instructions in further detail below).

It is difficult to compare the observed effects of non-identification options on suspect and filler identifications to the findings from previous research. In previous studies where unbiased lineup instructions were supplemented with an explicit option to reject the lineup, which were conducted with child samples, an innocent suspect was often not designated (e.g., Dunlevey & Cherryman, 2013; Havard & Memon, 2012). However, the results reported in these studies are generally consistent with what our analyses on identification accuracy showed: namely that non-identification options led to an increase in target-absent accuracy, while effects on target-present accuracy were negligible.

In the present experiments, the impact of the explicit non-identification options on identifications was clearly driven by the not present option. Although the prevalence of don't know responses increased with the presence of non-identification options, the increase was from virtually zero to a small percentage. The low frequency of don't know responses was surprising as other research has reported much higher frequencies when a don't know options was explicitly presented (e.g., Brewer et al., 2010; Perfect & Weber, 2012; Sanders & Warnicke, 1980). However, in those studies don't know responding was explicitly encouraged in the lineup instructions (e.g., people were told that it is better to respond don't know than to guess). Therefore, it seems likely that the low proportions of don't know

responses we observed can be attributed to the fact the option to respond in this way was presented but not encouraged.

Although our main focus was on the effect of including non-identification options with the lineup, the results of our experiments led us to speculate about the effect of lineup instructions which outline the legitimacy of providing a non-identification response. In Experiment 3, in addition to the missing and displayed non-identification options conditions, we included a condition in which non-identification options were outlined in the lineup instructions and displayed with the lineup. This condition did not affect identification decisions over and above the effect of the non-identification response options presented with the lineup. In Experiment 4, the inclusion of non-identification response options with the lineup affected identification decisions despite the non-identification options having already been highlighted in the lineup instructions. Taken together, these results suggest that perhaps non-identification cues in the form of explicit response options accompanying the lineup have a greater effect on identification outcomes than non-identification cues presented as part of lineup instructions. Rose, Bull, and Vrij (2005) reported that, when asked to describe what they were told prior to making their identification decision, a substantial proportion of both older and younger adult participants (32% and 54%, respectively) failed to mention that they were warned of potential perpetrator absence. This research suggests that non-identification cues are not always remembered when presented as part of lineup instructions, providing an explanation for why non-identification cues presented with the lineup may be more salient than when they are presented as part of lineup instructions.

In order to properly contrast the effects of non-identification options outlined as part of lineup instructions and presented with a lineup, it would be necessary to manipulate the presence of both within one experiment. However, combining the displayed and missing non-identification option conditions from Experiments 3 and 4 allowed us to make a very

tentative comparison of the effects of non-identification options presented as part of lineup instructions and in the lineup. In line with our speculations, overall choosing was lower in Experiment 4 (where non-identification options were presented with the lineup instructions in all conditions) than Experiment 3 (where non-identification options were not outlined in the lineup instructions). This effect was notably smaller than the effect of non-identification options (combined across Experiments 3 and 4).

Leaving aside the issue of properly informing witnesses as to their possible response options, what do our findings suggest regarding the identification performance implications of including explicit non-identification response options? It has been argued that because suspect identifications have the greatest potential to shape the outcomes of investigations, the most important consideration is the trade-off in effects on guilty and innocent suspect identifications (Wixted & Mickes, 2015). In this respect, the most consistent finding was that although non-identification options sometimes had a small effect on suspect identifications (i.e., non-identification options decreased suspect identifications), the inclusion of non-identification options did not differently affect the identifications of guilty and innocent suspects or underlying discriminability between guilty and innocent suspects.

Effects on other identification decisions are also important to consider, particularly when these effects are nontrivial in magnitude. In the present research, non-identification options primarily caused a shift from filler identifications to lineup rejections (in both target-absent and -present cases). Although there is evidence that filler identifications are as indicative of suspect innocence as lineup rejections, filler identifications are unlikely to be interpreted as equally strong exonerating evidence in an applied setting (Wells, Yang, & Smalarz, 2015). Instead, a filler identification is most likely to undermine the perceived credibility of the witness (Wells, Steblay, & Dysart, 2012). Therefore, it is possible that

including non-identification options in lineups could cause both guilty and innocent suspects to be more likely to be viewed as innocent.

People's opinions will obviously differ on what kind of trade-off in identification decisions is desirable; however, we reiterate two points. First, it is ethically appropriate to make it clear to the witness—who generally becomes involved through no fault of their own—exactly what response options are acceptable. Second, when making an identification decision, a witness should fully appreciate that the target may not be in the lineup (Wells et al., 1998; Wells et al., 2020). The decrease in choosing observed as a result of displaying non-identification options suggests that, regardless of what the witness's lineup instructions say, presenting a lineup without non-identification options misrepresents the identification task as one where the person should try to identify someone. In this context, our results support the recommendation that non-identification options should be presented with lineups (Wells et al., 2020).

An additional consideration is that the effects of including explicit non-identification response options were driven by the not present option, with the inclusion of a don't know option having a negligible effect on identification outcomes. We still think that it is important to include this option. Without its inclusion (either in the lineup instructions or with the lineup), only one participant in four experiments opted out of making a definitive identification decision. Infrequent instances of don't know responding have also been reported in other studies where an explicit don't know option was not presented (e.g., Sanders and Warnicke, 1980, Köhnken & Mass, 1988). Hence, it seems likely that unless provided with that option, people do not perceive it to be legitimate response. Moreover, since some studies have shown that larger proportions of don't know responding have been associated with improvements in identification performance (Perfect & Weber, 2012; Sanders &

Warnicke, 1980; Weber & Perfect, 2012), the effects of encouraging more liberal don't know responding should be further explored.

Finally, we consider the generalizability of our results to different types of identification procedures. As previously stated, the research paradigm used in our experiments renders our findings most applicable to situations where the entire identification procedure occurs on a computer. To operationalize the presence of non-identification options in online experiments, we had participants record their identification decisions in a textbox. We judged this approach to be the most effective way to manipulate whether non-identification options were explicitly provided, while ensuring that participants in both conditions (a) responded in the same manner and (b) could respond however they wanted. Although a real witness shown a lineup on a computer may be required to provide their identification decision by typing a textbox, it seems more likely that they would be asked to make their selection by clicking an option displayed on the screen or selecting a number on the keyboard. Although we have no reason to think that our findings do not apply to these other contexts, a future study could be conducted to test the effect of displaying versus not displaying non-identification options when keyboard selections are required to provide an identification response. The written lineup instructions would need to specify what these are (e.g., to make an identification select the numbers "1-6", to indicate the target is not present select "0", and to respond don't know select "?"). We cannot think of a way to operationalize the presence or absence of explicit non-identification options when witnesses are required to respond by making an onscreen selection, without introducing a confound to the manipulation.

A completely computerized procedure has the advantages of ensuring that lineup instructions are standardized and any potential for administrator influence is removed, as well as allowing for the immediate recording of confidence and the precise recording of

identification latency. Still, there are likely to be cases where the lineup is shown to the witness on a computer, but the lineup instructions are delivered verbally and (or) the identification decision is verbally communicated to the lineup administrator (e.g., Wells, Steblay & Dysart, 2015). Also, witnesses are still routinely shown photo or live lineups and there may always be situations where a computerized procedure cannot be implemented. Therefore, it is of interest to examine the effects of displaying non-identification options in conditions where varying degrees of interaction between the lineup administrator and the witness occur during the identification procedure. Under some circumstances, the effect of displaying non-identification options may differ from that observed when the lineup procedure was completely computerized. For example, we have discussed the possibility that when the lineup is administered on a computer explicit non-identification cues provided with the lineup are more salient than those provided as part of lineup instructions. However, information presented in the lineup instructions may be more salient if communicated in person. Further, factors which moderate the salience of verbally delivered lineup instructions may include their complexity and delivery (e.g., Baguley, McKimmie, Masser, 2017).

Bearing in mind that future research will likely refine our understanding of the circumstances under which explicit non-identification options affect identification decisions, the present studies provide compelling evidence that there are likely to be a variety of circumstances under which failing to display explicit non-identification options puts a witness under unwarranted pressure to make a positive identification.

References

- Baguley, C. M., McKimmie, B. M., & Masser, B. M. (2017). Deconstructing the simplification of jury instructions: How simplifying the features of complexity affects jurors' application of instructions. *Law and Human Behavior, 41*, 284 – 304. <https://doi.org/10.1037/lhb0000234>
- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*, 255–278. <https://doi.org/10.1016/j.jml.2012.11.001>
- Bates D., Mächler M., Bolker B., & Walker S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*, 1–48. <http://dx.doi.org/10.18637/jss.v067.i01>
- Beal, C. R., Schmitt, K. L., Dekle, D. J. (1995). Eyewitness identification of children: Effects of absolute judgments, nonverbal response options, and event encoding. *Law and Human Behaviour, 19*, 197-261. <https://doi.org/10.1007/BF01499325>
- Brauer, M., & Curtin, J. J. (2018). Linear mixed-effects models and the analysis of nonindependent data: A unified framework to analyze categorical and continuous independent variables that vary within-subjects and/or within-items. *Psychological Methods, 23*, 389–411. <http://dx.doi.org/10.1037/met0000159>
- Brewer, N. (2011). Practical advantages in computerized photo line-ups. *The Police Journal (Opinion section), 92*, 26 & 42.
- Brewer, N., Keast, A., & Sauer, J. D. (2010). Children's eyewitness identification performance: Effects of a Not Sure response option and accuracy motivation. *Legal and Criminological Psychology, 15*, 261-277. <https://doi.org/10.1348/135532509X474822>
- Brewer, N., & Palmer, M. A. (2010). Eyewitness identification tests. *Legal and Criminological Psychology, 15*, 77-96. <https://doi.org/10.1348/135532509X414765>

- Bruer, K. C., Fitzgerald, R. J., Therrien, N. M., & Price, H. L. (2015). Line-up member similarity influences the effectiveness of a salient rejection option for eyewitnesses. *Psychiatry, Psychology and Law*, 22, 124-133.
<https://doi.org/10.1080/13218719.2014.919688>
- Clark, S. E. (2005). A re-examination of the effects of biased lineup instructions in eyewitness identification. *Law and Human Behavior*, 29, 575-604.
<https://doi.org/10.1007/s10979-005-7121-1>
- Colloff, M. F., Wade, K. A., & Strange, D. (2016). Unfair lineups make eyewitnesses more likely to confuse innocent and guilty suspects. *Psychological Science*, 27, 1227–1239.
<http://dx.doi.org/10.1177/0956797616655789>
- Dunlevy, J. R., & Cherryman, J. (2013). Target-absent eyewitness identification line-ups: Why do children like to choose? *Psychiatry, Psychology and Law*, 20, 284-293.
<https://doi.org/10.1080/13218719.2012.671584>
- Gregory, B., Irwin, J. D., Faulks, I. J., & Chekaluk, E. (2014). Speeding in school zones: Violation or lapse in prospective memory? *Journal of Experimental Psychology: Applied*, 20, 191-198. <https://doi.org/10.1037/xap0000019>
- Havard, C., & Memon, A. (2012). The mystery man can help reduce false identification for child witnesses: Evidence from video line-ups. *Applied Cognitive Psychology*, 27, 50-59. <https://doi.org/10.1002/acp.2870>
- Innocence Project (2019). *Innocence Project*. Retrieved July 2019, from <http://www.innocenceproject.org>
- Köhnken, G., & Maass, A. (1988). Eyewitness testimony: False alarms on biased instructions? *Journal of Applied Psychology*, 73(3), 363-370.
<https://doi.org/10.1037/0021-9010.73.3.363>

- Koriat, A., & Goldsmith, M. (1996). Monitoring and control processes in the strategic regulation of memory accuracy. *Psychological Review*, *103*, 490-517.
<https://doi.org/10.1037/0033-295X.103.3.490>
- Kovera, M. B., & Evelo, A. J. (2017). The case for double-blind lineup administration. *Psychology, Public Policy, and Law*, *23*, 421-437.
<https://doi.org/10.1037/law0000139>
- Mickes, L., Flowe, H. D., & Wixted, J. T. (2012). Receiver operating characteristic analysis of eyewitness memory: Comparing the diagnostic accuracy of simultaneous versus sequential lineups. *Journal of Experimental Psychology: Applied*, *18*, 361–376.
<https://doi.org/10.1037/a0030609>
- Palmer, M. A., & Brewer, N. (2012). Sequential lineup presentation promotes less-biased criterion setting but does not improve discriminability. *Law and Human Behavior*, *36*(3), 247–255. <https://doi.org/10.1037/h0093923>
- Perfect, T. J., & Weber, N. (2012). How should witnesses regulate the accuracy of their identification decisions: One step forward, two steps back? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *38*, 1810-1818.
<https://doi.org/10.1037/a0028461>
- Pica, E., Thompson, L. E., Pozzulo, J., Dempsey, J., & Pettalia, J. (2018). Variations of salient rejection options: Does one work best for adolescents and adults? *Journal of Police and Criminal Psychology*, 1-11. <https://doi.org/10.1007/s11896-018-9307-8>
- Police Executive Research Forum. (2013). *A national survey of eyewitness identification procedures in law enforcement agencies*. Retrieved from https://www.policeforum.org/assets/docs/Free_Online_Documents/Eyewitness_Identification/a_national_survey_of_eyewitness_identification_procedures_in_law_enforcement_agencies_2013.pdf

Pozzulo, J.D., & Lindsay, R.C.L. (1998). Identification accuracy of children versus adults: A meta-analysis. *Law and Human Behavior*, *22*, 549-570.

<https://doi.org/10.1023/A:1025739514042>

Pozzulo, J. D., & Marciniak, S. (2006). Comparing identification procedures when the perpetrator has changed appearance. *Psychology, Crime & Law*, *12*, 429–438.

<https://doi.org/10.1080/10683160500050690>

R Development Core Team. (2017). *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing.

Robin, X., Turck, N., Hainard, A., Tiberti, N., Lisacek, F., Sanchez, J. C., & Müller, M.

(2011). pROC: An open-source package for R and S+ to analyze and compare ROC curves. *BMC Bioinformatics*, *12*, 77–84. <https://doi.org/10.1186/1471-2105-12-77>

Rose, R. A., Bull, R., & Vrij, A. (2005). Non-biased lineup instructions do matter—A problem for older witnesses. *Psychology, Crime & Law*, *11*, 147–159.

<https://doi.org/10.1080/10683160512331316307>

Stebly, N. M. (1997). Social influence in eyewitness recall: A meta-analytic review of lineup instruction effects. *Law and Human Behavior*, *21*, 283-297.

<https://doi.org/10.1023/A:1024890732059>

Stebly, N. M. (2013). Lineup instructions. In B. L. Cutler (Ed.), *Reform of eyewitness identification procedures* (pp. 65–86). <https://doi.org/10.1037/14094-004>

Stebly, N. K., & Phillips, J. D. (2011). The not-sure response option in sequential lineup practice. *Applied Cognitive Psychology*, *25*, 768-774. <https://doi.org/10.1002/acp.1755>

Suri, G., Sheppes, G., Leslie, S., & Gross, J. J. (2014). Stairs or escalator? Using theories of persuasion and motivation to facilitate healthy decision making. *Journal of Experimental Psychology: Applied*, *20*, 295-302. <https://doi.org/10.1037/xap0000026>

- Warnick, D. H., & Sanders, G. S. (1980). Why do eyewitnesses make so many mistakes? *Journal of Applied Social Psychology, 10*, 362-366.
<https://doi.org/10.1111/j.1559-1816.1980.tb00716.x>
- Weber, N., & Perfect, T. J. (2012). Improving eyewitness identification accuracy by screening out those who say they don't know. *Law and Human Behavior, 36*, 28-36.
<https://doi.org/10.1037/h0093976>
- Wells, G. L. (1993). What do we know about eyewitness identification? *American Psychologist, 48*, 553-571. <https://doi.org/10.1037/0003-066X.48.5.553>
- Wells, G. L., Kovera, M. B., Douglass, A. B., Brewer, N., Meissner, C. A., & Wixted, J. T. (2019). Policy and procedure recommendations for the collection and preservation of eyewitness identification evidence. Submitted for publication.
- Wells, G. L., Small, M., Penrod, S., Malpass, R. S., Fulero, S. M., & Brimacombe, C. E. (1998). Eyewitness identification procedures: Recommendations for lineups and photospreads. *Law and Human Behavior, 22*, 603-647.
<https://doi.org/10.1023/A:1025750605807>
- Wells, G. L., Steblay, N. K., & Dysart, J. E. (2012). Eyewitness identification reforms: Are suggestiveness-induced hits and guesses true hits? *Perspectives on Psychological Science, 7*, 264-271. <https://doi.org/10.1177/1745691612443368>
- Wells, G. L., Steblay, N. K., & Dysart, J. E. (2015). Double-blind photo lineups using actual eyewitnesses: An experimental test of a sequential versus simultaneous lineup procedure. *Law and Human Behavior, 39*, 1-14. <https://doi.org/10.1037/lhb0000096>
- Wells, G. L., Yang, Y., & Smalarz, L. (2015). Eyewitness identification: Bayesian information gain, base-rate effect equivalency curves, and reasonable suspicion. *Law and Human Behavior, 39*, 99-122. <https://doi.org/10.1037/lhb0000125>

- Wixted, J. T., & Mickes, L. (2015). ROC analysis measures objective discriminability for any eyewitness identification procedure. *Journal of Applied Research in Memory and Cognition*, 4, 329-334. <https://doi.org/10.1016/j.jarmac.2015.08.007>
- Wixted, J. T., & Mickes, L. (2018). Theoretical vs. empirical discriminability: the application of ROC methods to eyewitness identification. *Cognitive research: principles and implications*, 3:9. <https://doi.org/10.1186/s41235-018-0093-8>
- Zajac, R., & Karageorge, A. (2009). The wildcard: A simple technique for improving children's target-absent line-up performance. *Applied Cognitive Psychology*, 23, 358_368. <https://doi.org/10.1002/acp.1511>

Data Availability Statement

The data from all experiments are publicly available at the Open Science Framework:

<https://osf.io/u2chp/>

Table 1

Description of Experiment Conditions. Whether Non-identification Options Were Displayed and (or) Emphasized in Lineup Instructions and the Stimulus Sets Used

Experiment	Conditions and Stimuli
1	Two experimental conditions: non-identification options were either missing or displayed with the lineup (and lineup instructions in both conditions did not emphasize non-identification options); stimulus sets 1–4 were used
2	Two experimental conditions: non-identification options were either missing or displayed with the lineup (and lineup instructions in both conditions did not emphasize non-identification options); stimulus sets 5–8 were used
3	Three experimental conditions: in the main two conditions, non-identification options were either missing or displayed with the lineup (and in these conditions lineup instructions did not emphasize non-identification options); a third condition was included, in which non-identification options were included with the lineup and lineup instructions <i>emphasized</i> the non-identification options; stimulus sets 1, 4, 6 and 8 were used
4	Non-identification options were either missing or displayed with the lineup (and in both conditions lineup instructions <i>emphasized</i> the non-identification options); stimulus sets 1, 4, 6 and 8 were used

Note: In all experiments lineup instructions warned that the target may or may not be in the lineup

Table 2

*Experiments 1–4. Identification Decision Percentages [and 95% CIs] by Non-identification**Response Option Condition and Target Presence*

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Experiment 1					
Target-present					
Missing	124	55.65 [46.50, 63.99]	38.71 [29.73, 46.88]	5.65 [1.18, 9.31]	0 -
Displayed	131	49.62 [40.68, 57.80]	21.37 [13.97, 28.01]	25.95 [18.06, 33.08]	3.05 [0.00, 5.61]
Target-absent					
Missing	125	9.60 [4.04, 14.36]	70.40 [62.00, 78.00]	20.00 [12.59, 26.61]	0 -
Displayed	124	5.65 [1.18, 9.31]	52.41 [43.22, 60.80]	38.71 [29.73, 46.88]	3.23 [0.00, 5.94]
Experiment 2					
Target-present					
Missing	234	61.11 [54.65, 67.14]	26.50 [20.63, 31.94]	12.39 [7.95, 16.40]	0 -
Displayed	218	50.00 [43.13, 56.41]	22.02 [16.29, 27.29]	25.23 [19.24, 30.77]	2.75 [0.35, 4.69]
Target-absent					
Missing	219	19.63 [14.14, 24.66]	55.71 [48.90, 62.06]	24.66 [18.72, 30.14]	0 -
Displayed	225	21.33 [15.76, 26.46]	33.78 [27.38, 39.74]	43.11 [36.42, 49.36]	1.78 [0.00, 3.29]
Experiment 3					

Target-present					
Missing	214	57.67 [50.82, 64.06]	28.37 [22.10, 34.18]	13.49 [8.68, 17.83]	0.47 [0.00, 1.15]
Displayed	221	53.10 [46.29, 59.45]	22.12 [16.42, 27.37]	22.57 [16.83, 27.86]	2.21 [0.05, 3.92]
Displayed +	203	52.56 [45.44, 59.18]	21.86 [15.93, 27.30]	20.00 [14.25, 25.26]	5.58 [2.18, 8.49]
Target-absent					
Missing	213	12.68 [7.98, 16.91]	53.05 [46.11, 59.52]	34.27 [27.66, 40.41]	0 -
Displayed	205	6.70 [3.03, 9.88]	37.32 [30.46, 43.70]	54.07 [47.0, 60.65]	1.91 [0.00, 3.54]
Displayed +	209	6.82 [3.16, 10.0]	32.73 [26.13, 38.85]	55.45 [48.47, 61.95]	5.00 [1.81, 7.72]

Experiment 4					
Target-present					
Missing	239	53.56 [47.03, 59.67]	24.69 [19.01, 29.95]	20.50 [15.17, 25.41]	1.26 [0.00, 2.46]
Displayed	231	48.05 [41.39, 54.28]	21.65 [16.12, 26.74]	25.97 [20.10, 31.41]	4.33 [1.49, 6.74]
Target-absent					
Missing	235	10.64 [6.48, 14.37]	50.21 [43.60, 56.39]	36.17 [29.18, 42.10]	2.97 [0.59, 4.93]
Displayed	230	9.57 [5.70, 13.37]	33.48 [27.16, 39.36]	54.35 [47.70, 60.57]	2.61 [0.33, 4.45]

Table 3

Experiments 1–4. Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Choosing

Predictors	Experiment 1			Experiment 2			Experiment 4		
	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Intercept	1.38	0.24	[0.92, 1.84]	1.23	0.38	[0.49, 1.96]	0.61	0.17	[0.28, 0.94]
Non-identification Response Options	-1.48	0.32	[-2.10, -0.87]	-1.05	0.18	[-1.39, -0.71]	-0.60	0.19	[-0.97, -0.23]
Target Presence	1.08	0.31	[0.47, 1.70]	1.05	0.46	[0.14, 1.96]	1.02	0.35	[0.33, 1.71]
Non-identification Response Options × Target Presence	-0.94	0.56	[-2.04, 0.16]	-0.09	0.44	[-0.95, 0.77]	0.30	0.29	[-0.27, 0.87]

Predictors	Experiment 3								
	Missing vs. Displayed			Missing vs. Displayed +			Displayed vs. Displayed +		
	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Intercept	0.96	0.20	[0.57, 1.36]	0.88	0.18	[0.52, 1.24]	0.49	0.23	[0.03, 0.94]
Non-identification Response Options	-0.88	0.17	[-1.20, -0.55]	-0.95	0.17	[-1.28, -0.62]	-0.10	0.16	[-0.40, 0.21]
Target Presence	1.46	0.66	[0.17, 2.75]	1.52	0.51	[0.51, 2.53]	1.64	0.61	[0.45, 2.83]
Non-identification Response Options × Target Presence	0.11	0.34	[-0.55, 0.77]	0.33	0.33	[-0.32, 0.98]	0.23	0.31	[-0.38, 0.84]

Table 4

Experiments 1–4. Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Suspect and Filler Identifications

Predictors	Experiment 1			Experiment 2			Experiment 3			Experiment 4		
	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Suspect Identifications												
Intercept	-1.23	0.14	[-1.50, -0.95]	-0.65	0.64	[-1.91, 0.61]	-1.15	0.30	[-1.73, -0.56]	-1.19	0.35	[-1.88, -0.51]
Non-identification Response Options	-0.43	0.28	[-0.98, 0.12]	-0.35	0.20	[-0.73, 0.03]	-0.21	0.25	[-0.69, 0.27]	-0.48	0.21	[-0.89, -0.07]
Target Presence	2.72	0.46	[1.81, 3.63]	2.04	0.55	[0.96, 3.12]	2.38	0.80	[0.82, 3.94]	2.92	1.10	[0.77, 5.08]
Non-identification Response Options × Target Presence	0.35	0.56	[-0.75, 1.44]	-0.72	0.36	[-1.43, -0.01]	-0.12	0.38	[-0.87, 0.63]	0.45	0.42	[-0.38, 1.27]
Filler Identifications												
Intercept	-0.21	0.20	[-0.61, 0.18]	-0.87	0.50	[-1.86, 0.11]	-0.93	0.37	[-1.65, -0.21]	-0.79	0.44	[-1.66, 0.08]
Non-identification Response Options	-0.86	0.31	[-1.47, -0.25]	-0.64	0.17	[-0.96, -0.31]	-0.47	0.20	[-2.21, -0.31]	-0.58	0.16	[-0.90, -0.25]

Target Presence	-1.45	0.24	[-1.92, -0.97]	-1.25	0.38	[-1.99, -0.50]	-1.17	0.53	[-2.21, -0.13]	-1.20	0.44	[-2.06, -0.34]
Non-identification Response Options \times Target Presence	-0.06	0.59	[-1.21, 1.09]	0.66	0.33	[0.01, 1.30]	0.56	0.32	[-0.07, 1.19]	0.21	0.33	[-0.44, 0.85]

Table 5

Experiments 1–4. Regression Coefficients for the Mixed-Effects Models Testing the Effects of Explicit Non-identification Response Options, Target Presence and Their Interaction on Accuracy (with Don't Know Responses Removed)

Predictors	Experiment 1			Experiment 2			Experiment 3			Experiment 4		
	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Intercept	-0.36	0.15	[-0.66, -0.06]	-0.18	0.46	[-1.08, 0.73]	-0.04	0.37	[-0.76, 0.68]	0.02	0.50	[-0.97, 1.00]
Non-identification Response Options	0.37	0.19	[-0.01, 0.75]	0.14	.200	[-0.25, 0.53]	0.29	0.15	[-0.01, 0.59]	0.35	0.16	[0.04, 0.66]
Target Presence	1.02	0.29	[0.47, 1.58]	1.11	0.91	[-0.66, 2.89]	0.25	0.50	[-0.74, 1.24]	0.55	0.44	[-0.32, 1.41]
Explicit Non-identification Response Options × Target Presence	-1.12	0.39	[-1.88, -0.35]	-1.64	0.34	[-2.31, -0.98]	-0.97	0.38	[-1.72, -0.22]	-1.12	0.32	[-1.74, -0.50]

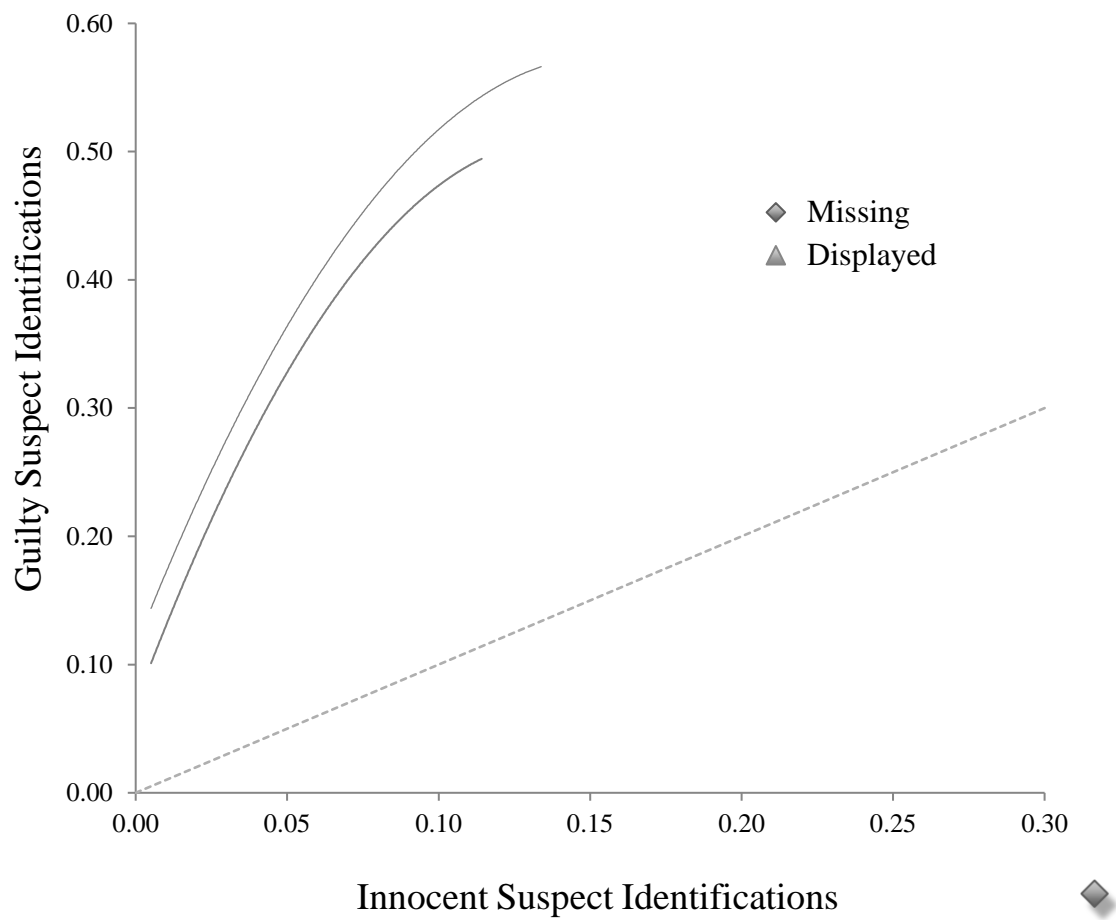


Figure 1. ROCs measuring discriminability between guilty and innocent suspects in the missing and displayed non-identification response options conditions, with data collapsed across all experiments.

Table S1

Stimulus Sets 1–8. Video Description and Lineup Construction Summary

Stimulus	Video Description	Video Length	Target Description	Filler and Innocent Suspect Selection
1	Female target stealing a wallet from a table outside a café	25 s; target's face in view for entire video (close-up for approx. 7 s)	Unavailable	N = 22 assessed 12 candidates for match-to-description; participants endorsed an average of 10.72 (SD = 1.72) faces; faces were selected as matching description by 68% – 100% of people; a random selection of six faces was used for this experiment; the innocent suspect was randomly selected from this filler pool
2	Female target stealing unknown object (not in view) from an open window	14 s; target's face in view for 4 s (2 side-on and 2 front-on – all close-up)	Caucasian female; shoulder length dark brown hair with a fringe; slim; 20s	Twenty-seven candidates selected from a database search, with 2 people agreeing on match-to-description; N = 60 rated similarity of each face to the target; for this experiment, ranked the candidates by mean similarity and randomly selected one filler from the top half and five from the bottom half of the list; the innocent suspect was randomly designated.
3	Female target stealing a mobile phone from a café table	23 s; target's face in view for 10 s (close-up for approx. 4 s)	Caucasian female; long blonde hair; 20s	Twenty-nine filler candidates pilot tested, in the same procedure as stimulus 2. All fillers selected as high similarity (compared to a lower similarity group used in another study). Innocent suspect randomly selected.
4	Male target stealing item from a clothing store	24 s; target in view for 14s (4 s close-up)	Caucasian male; aged in early 20s; short, dark	N = 15 assessed nine filler candidates on matching description and similarity to the culprit; the five photos that best matched

			hair; medium to heavy build; roundish face	description and were highest in similarity to the target were chosen as fillers; the innocent suspect was randomly chosen from the filler pool.
5	Female target stealing a wallet from a table inside a café	24 s; target's face in view for 10 s (close-up approx. 3.5 s)	Caucasian female; aged late teens to early 20s; medium height and build; wavy, shoulder length, light brown to blonde hair	Same procedure as stimulus 4
6	Male target breaking into and stealing a car	24 s; target's face in view for 13 s (close-up for approx. 5 s)	Caucasian male; balding; grey hair; 60s; moustache	Thirty candidates piloted in the same procedure as stimulus 2; three high and two low similarity fillers randomly selected (from pools used in previous research); innocent suspect randomly designated from the high similarity filler pool
7	Male target breaking into an apartment and stealing a laptop	28 s; target's face in clear view for 8 s (mostly close-up)	Caucasian male; brown hair; average build, middle age, moustache	Same procedure as stimulus 6
8	Female target shoplifting nail polish	19 s; target's face in view for 5 s (all close-up)	Caucasian female, late teens to early 20s, long straight blonde/light-brown hair, pale complexion	A small sample of judges (N unknown) assessed whether a filler pool matched description and the five best matches were used; the innocent suspect was randomly selected from the filler pool.

Table S2

Experiment 1, Stimulus Set 1. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	34	44.12 [25.96, 59.34]	47.06 [28.81, 62.37]	8.82 [-2.18, 16.88]	0 -
Displayed	37	40.54 [23.37, 55.01]	13.51 [1.14, 23.17]	45.95 [28.54, 60.66]	0 -
Target-absent					
Missing	30	26.67 [9.18, 40.83]	43.33 [23.93, 59.40]	30.00 [11.93, 44.73]	0 -
Displayed	32	12.50 [-0.52, 22.40]	46.88 [28.03, 62.61]	40.63 [22.05, 56.08]	0 -

Table S3

Experiment 1, Stimulus Set 2. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	33	60.61 [42.42, 75.77]	36.36 [18.43, 51.26]	3.03 [-4.33, 7.36]	0 -
Displayed	34	47.06 [28.81, 62.37]	38.24 [20.43, 53.10]	5.88 [-3.50, 12.32]	8.82 [-2.18, 16.88]
Target-absent					
Missing	31	6.45 [-3.81, 13.48]	80.65 [65.13, 92.94]	12.90 [-0.51, 23.09]	0 -
Displayed	32	3.13 [-4.47, 7.60]	78.13 [62.25, 90.89]	15.63 [1.49, 26.65]	3.13 [-4.47, 7.60]

Table S4

Experiment 1, Stimulus Set 3. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	32	56.25 [37.50, 71.88]	40.63 [22.05, 56.08]	3.13 [-4.47, 7.60]	0 -
Displayed	34	50.00 [31.72, 65.34]	14.29 [1.06, 24.58]	32.14 [14.97, 46.37]	3.57 [-4.14, 8.34]
Target-absent					
Missing	30	0 -	90.00 [77.60, 99.07]	10.00 [-2.40, 19.07]	0 -
Displayed	32	6.25 [-3.70, 13.07]	43.75 [25.00, 59.38]	43.75 [25.00, 59.38]	6.25 [-3.70, 13.07]

Table S5

Experiment 1, Stimulus Set 4. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	25	64.00 [43.18, 80.82]	28.00 [8.40, 43.60]	8.00 [-4.64, 16.63]	0 -
Displayed	32	62.50 [44.16, 77.71]	18.75 [3.67, 30.71]	18.75 [3.67, 30.71]	0 -
Target-absent					
Missing	34	5.88 [-3.50, 12.32]	67.65 [50.45, 81.90]	26.47 [10.17, 39.83]	0 -
Displayed	28	0 -	39.29 [19.41, 55.59]	57.14 [37.02, 73.68]	3.57 [-5.09, 8.66]

Table S6

Experiment 2, Stimulus Set 5. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	58	43.10 [29.49, 54.98]	24.14 [12.27, 34.29]	32.76 [19.82, 43.98]	0 -
Displayed	61	34.43 [21.69, 45.53]	18.03 [7.56, 26.86]	44.26 [30.98, 55.91]	3.28 [-2.01, 6.93]
Target-absent					
Missing	52	7.69 [-0.51, 13.97]	50.00 [35.45, 62.63]	42.31 [27.92, 54.78]	0 -
Displayed	53	9.43 [0.62, 16.36]	18.87 [7.39, 28.46]	71.70 [58.63, 82.88]	0 -

Table S7

Experiment 2, Stimulus Set 6. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	60	21.67 [10.41, 31.26]	68.33 [55.73, 79.27]	10.00 [1.58, 16.76]	0 -
Displayed	53	3.77 [-2.30, 7.96]	54.72 [40.38, 67.18]	35.85 [22.00, 47.82]	5.67 [-1.50, 10.95]
Target-absent					
Missing	61	8.20 [0.50, 14.27]	75.41 [63.78, 85.40]	16.39 [6.28, 24.86]	0 -
Displayed	54	9.26 [0.60, 16.07]	66.67 [53.17, 78.32]	22.22 [10.21, 32.38]	1.85 [-2.67, 4.52]

Table S8

Experiment 2, Stimulus Set 7. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	61	88.52 [79.70, 95.70]	4.92 [-1.33, 9.53]	6.56 [-0.47, 11.95]	0 -
Displayed	53	92.45 [84.39, 98.62]	3.77 [-2.30, 7.96]	3.77 [-2.30, 7.96]	0 -
Target-absent					
Missing	52	50.00 [35.45, 62.63]	34.62 [20.73, 46.59]	15.38 [4.61, 24.22]	0 -
Displayed	61	50.82 [37.45, 62.55]	18.03 [7.56, 26.86]	29.51 [17.25, 40.14]	1.64 [-2.37, 4.01]

Table S9

Experiment 2, Stimulus Set 8. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	55	92.73 [84.96, 98.68]	7.27 [-0.50, 13.22]	0 -	0 -
Displayed	51	72.55 [59.32, 83.82]	11.76 [1.94, 19.62]	13.73 [3.30, 22.20]	1.96 [-2.83, 4.78]
Target-absent					
Missing	54	14.81 [4.41, 23.36]	48.15 [33.90, 60.55]	25.93 [13.32, 36.69]	0 -
Displayed	57	12.28 [2.88, 19.92]	33.33 [20.22, 44.69]	50.86 [37.00, 62.96]	3.51 [-2.15, 7.41]

Table S10

Experiment 3, Stimulus Set 1. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	54	46.30 [32.08, 58.67]	29.63 [16.53, 40.88]	24.07 [11.74, 34.55]	0 -
Displayed	57	31.58 [18.64, 42.77]	15.79 [5.45, 24.38]	49.12 [35.26, 61.22]	3.51 [-2.15, 7.41]
Displayed +	55	30.91 [17.79, 42.21]	21.82 [10.00, 31.83]	38.18 [24.43, 50.11]	9.09 [0.58, 15.78]
Target-absent					
Missing	58	24.14 [9.77, 30.79]	44.83 [31.17, 56.77]	31.03 [18.26, 42.07]	0 -
Displayed	53	13.21 [3.15, 21.38]	30.19 [16.89, 41.61]	56.60 [42.31, 69.00]	0 -
Displayed +	58	12.07 [2.82, 19.59]	20.69 [9.40, 30.25]	67.24 [54.30, 78.46]	0 -

Table S11

Experiment 3, Stimulus Set 4. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	58	84.48 [74.30, 92.94]	6.90 [-0.49, 12.56]	8.62 [0.54, 14.98]	0 -
Displayed	57	77.19 [65.42, 87.21]	5.26 [-1.41, 10.18]	15.79 [5.45, 24.38]	1.75 [-2.53, 4.28]
Displayed +	53	75.47 [62.94, 86.11]	5.66 [-1.51, 10.94]	16.98 [5.93, 26.15]	1.89 [-2.72, 4.61]
Target-absent					
Missing	50	0 -	54.00 [39.19, 66.82]	46.00 [31.19, 58.82]	0 -
Displayed	52	1.92 [-2.77, 4.69]	34.62 [20.73, 46.59]	57.69 [43.30, 70.16]	5.77 [-1.53, 11.15]
Displayed +	53	0 -	37.74 [23.75, 49.85]	54.72 [40.38, 67.18]	7.55 [-0.51, 13.72]

Table S12

Experiment 3, Stimulus Set 6. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	52	11.54 [1.89, 19.26]	69.23 [55.72, 80.81]	17.31 [6.07, 26.63]	1.92 [-2.77, 4.69]
Displayed	56	17.86 [6.94, 27.00]	58.93 [45.15, 70.92]	19.64 [8.34, 29.15]	3.57 [-2.18, 7.54]
Displayed +	54	18.52 [7.23, 27.96]	55.56 [41.38, 67.89]	16.67 [5.80, 25.69]	9.26 [0.60, 16.07]
Target-absent					
Missing	53	11.32 [1.85, 18.91]	69.81 [56.51, 81.23]	18.87 [7.39, 28.46]	0 -
Displayed	49	6.12 [-1.61, 11.81]	65.31 [50.96, 77.62]	28.57 [14.90, 40.20]	0 -
Displayed +	54	11.11 [1.80, 18.57]	44.44 [30.26, 56.77]	38.89 [24.96, 50.97]	5.56 [-1.48, 10.75]

Table S13

Experiment 3, Stimulus Set 8. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	51	86.27 [75.84, 94.74]	9.80 [0.66, 16.98]	3.92 [-2.39, 8.27]	0 -
Displayed	56	85.71 [75.65, 93.98]	8.93 [0.57, 15.51]	5.36 [-1.43, 10.37]	0 -
Displayed +	53	86.79 [76.73, 94.96]	3.77 [-2.30, 7.96]	7.55 [-0.51, 13.72]	1.89 [-2.72, 4.61]
Target-absent					
Missing	52	13.46 [3.22, 21.78]	44.23 [29.77, 56.77]	42.31 [27.92, 54.78]	0 -
Displayed	55	5.45 [-1.46, 10.54]	21.82 [10.00, 31.83]	70.91 [58.00, 82.00]	1.82 [-2.62, 4.44]
Displayed +	55	3.64 [-2.22, 7.68]	29.09 [16.18, 40.18]	60.00 [46.14, 72.04]	7.27 [-0.50, 13.22]

Table S14

Experiment 4, Stimulus Set 1. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	58	34.48 [21.39, 45.85]	29.31 [16.73, 40.16]	32.76 [19.82, 43.98]	3.45 [-2.11, 7.29]
Displayed	57	33.33 [20.22, 44.69]	19.30 [8.18, 28.67]	40.35 [26.74, 52.21]	7.02 [-0.49, 12.78]
Target-absent					
Missing	58	20.69 [9.40, 30.25]	44.83 [31.17, 56.77]	32.76 [19.82, 43.98]	1.72 [-2.49, 4.20]
Displayed	56	16.07 [5.56, 24.80]	16.07 [5.56, 24.80]	64.29 [50.85, 75.95]	3.57 [-2.18, 7.54]

Table S15

Experiment 4, Stimulus Set 4. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	61	73.77 [61.91, 83.99]	9.84 [1.55, 16.50]	16.39 [6.28, 24.86]	0 -
Displayed	59	55.93 [42.41, 67.75]	10.17 [1.61, 17.04]	28.81 [16.41, 39.52]	5.08 [-1.37, 9.84]
Target-absent					
Missing	63	4.76 [-1.29, 9.22]	50.79 [37.65, 62.34]	42.86 [29.85, 54.29]	1.59 [-2.29, 3.89]
Displayed	58	3.45 [-2.11, 7.29]	29.31 [16.73, 40.16]	65.52 [52.43, 76.89]	1.72 [-2.49, 4.20]

Table S16

Experiment 4, Stimulus Set 6. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	59	13.56 [3.98, 21.45]	59.32 [45.94, 71.01]	25.42 [13.46, 35.68]	1.69 [-2.45, 4.13]
Displayed	57	22.81 [11.04, 32.83]	50.88 [37.02, 62.98]	21.05 [9.59, 30.76]	5.26 [-1.41, 10.18]
Target-absent					
Missing	58	6.90 [-0.49, 12.56]	62.07 [48.72, 73.70]	29.31 [16.73, 40.16]	1.72 [-2.49, 4.20]
Displayed	54	11.11 [1.80, 18.57]	51.85 [37.60, 64.25]	33.33 [19.83, 44.98]	3.70 [-2.26, 7.81]

Table S17

Experiment 4, Stimulus Set 8. Identification Decision Percentages [and 95% CIs] by Non-identification Response Option Condition and Target Presence

Non-identification Options	N	Identification Decision			
		Suspect Pick	Filler Pick	Not Present	Don't Know
Target-present					
Missing	61	90.16 [81.87, 96.82]	1.64 [-2.37, 4.01]	8.20 [0.50, 14.27]	0 -
Displayed	58	79.31 [68.02, 88.87]	6.90 [-0.49, 12.56]	13.79 [4.05, 21.80]	0 -
Target-absent					
Missing	56	10.71 [1.72, 17.92]	42.86 [29.01, 54.93]	39.29 [25.61, 51.19]	7.14 [-0.50, 12.99]
Displayed	62	8.06 [0.48, 14.03]	37.10 [24.27, 48.32]	53.23 [40.00, 64.84]	1.61 [-2.33, 3.94]

Table S18

Experiments 1, 2 and 4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Choosing

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	1.38	0.24	[0.92, 1.84]
Non-identification Response Options	7.24	1	.007	-1.48	0.32	[-2.10, -0.87]
Target Presence	5.79	1	.016	1.08	0.31	[0.47, 1.70]
Non-identification Response Options × Target Presence	2.24	1	.134	-0.94	0.56	[-2.04, 0.16]
Experiment 2						
Intercept	-	-	-	1.23	0.38	[0.49, 1.96]
Non-identification Response Options	9.01	1	.003	-1.05	0.18	[-1.39, -0.71]
Target Presence	3.39	1	.066	1.05	0.46	[0.14, 1.96]
Non-identification Response Options × Target Presence	0.04	1	.833	-0.09	0.44	[-0.95, 0.77]
Experiment 4						
Intercept	-	-	-	0.61	0.17	[0.28, 0.94]
Non-identification Response Options	5.34	1	.021	-0.60	0.19	[-0.97, -0.23]
Target Presence	4.55	1	.033	1.02	0.35	[0.33, 1.71]
Non-identification Response Options × Target Presence	1.08	1	.300	0.30	0.29	[-0.27, 0.87]

Table S19

Experiment 3. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing Pairwise Comparisons of the Missing, Displayed and Displayed + Conditions, Target Presence and Their Interactions on Choosing

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Missing vs. Displayed						
Intercept	-	-	-	0.96	0.20	[0.57, 1.36]
Non-identification Response Options	9.00	1	.003	-0.88	0.17	[-1.20, -0.55]
Target Presence	3.28	1	.070	1.46	0.66	[0.17, 2.75]
Non-identification Response Options × Target Presence	0.11	1	.740	0.11	0.34	[-0.55, 0.77]
Missing vs. Displayed +						
Intercept	-	-	-	0.88	0.18	[0.52, 1.24]
Non-identification Response Options	10.77	1	.001	-0.95	0.17	[-1.28, -0.62]
Target Presence	4.79	1	.029	1.52	0.51	[0.51, 2.53]
Non-identification Response Options × Target Presence	0.98	1	.321	0.33	0.33	[-0.32, 0.98]
Displayed vs. Displayed +						
Intercept	-	-	-	0.49	0.23	[0.03, 0.94]
Non-identification Response Options	0.58	1	.447	-0.10	0.16	[-0.40, 0.21]
Target Presence	4.20	1	.041	1.64	0.61	[0.45, 2.83]
Non-identification Response Options × Target Presence	0.55	1	.460	0.23	0.31	[-0.38, 0.84]

Table S20

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Suspect Identifications

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	-1.23	0.14	[-1.50, -0.95]
Non-identification Response Options	2.20	1	.138	-0.43	0.28	[-0.98, 0.12]
Target Presence	9.44	1	.002	2.72	0.46	[1.81, 3.63]
Non-identification Response Options × Target Presence	0.39	1	.533	0.35	0.56	[-0.75, 1.44]
Experiment 2						
Intercept	-	-	-	-0.65	0.64	[-1.91, 0.61]
Non-identification Response Options	2.23	1	.136	-0.35	0.20	[-0.73, 0.03]
Target Presence	5.89	1	.015	2.04	0.55	[0.96, 3.12]
Non-identification Response Options × Target Presence	3.39	1	.066	-0.72	0.36	[-1.43, -0.01]
Experiment 3						
Intercept	-	-	-	-1.19	0.35	[-1.88, -0.51]
Non-identification Response Options	3.26	1	.071	-0.48	0.21	[-0.89, -0.07]
Target Presence	4.05	1	.044	2.92	1.10	[0.77, 5.08]
Non-identification Response Options × Target Presence	1.13	1	.288	0.45	0.42	[-0.38, 1.27]
Experiment 4						
Intercept	-	-	-	-1.15	0.30	[-1.73, -0.56]

Non-identification Response Options	0.85	1	.356	-0.21	0.25	[-0.69, 0.27]
Target Presence	4.73	1	.030	2.38	0.80	[0.82, 3.94]
Non-identification Response Options \times Target Presence	0.10	1	.757	-0.12	0.38	[-0.87, 0.63]

Table S21

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Filler Identifications

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	-0.21	0.20	[-0.61, 0.18]
Non-identification Response Options	4.14	1	.042	-0.86	0.31	[-1.47, -0.25]
Target Presence	9.41	1	.002	-1.45	0.24	[-1.92, -0.97]
Non-identification Response Options × Target Presence	0.01	1	.919	-0.06	0.59	[-1.21, 1.09]
Experiment 2						
Intercept	-	-	-	-0.87	0.50	[-1.86, 0.11]
Non-identification Response Options	8.27	1	.004	-0.64	0.17	[-0.96, -0.31]
Target Presence	5.36	1	.021	-1.25	0.38	[-1.99, -0.50]
Non-identification Response Options × Target Presence	3.22	1	.073	0.66	0.33	[0.01, 1.30]
Experiment 3						
Intercept	-	-	-	-0.79	0.44	[-1.66, 0.08]
Non-identification Response Options	8.24	1	.004	-0.58	0.16	[-0.90, -0.25]
Target Presence	4.28	1	.039	-1.20	0.44	[-2.06, -0.34]
Number of Non-identification Cues × Target Presence	0.39	1	.534	0.21	0.33	[-0.44, 0.85]
Experiment 4						
Intercept	-	-	-	-0.93	0.37	[-1.65, -0.21]

Non-identification Response Options	4.33	1	.037	-0.47	0.20	[-2.21, -0.31]
Target Presence	3.33	1	.068	-1.17	0.53	[-2.21, -0.13]
Non-identification Response Options × Target Presence	2.99	1	.084	0.56	0.32	[-0.07, 1.19]

Table S22

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Accuracy (Don't Know Responses Removed)

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	-0.36	0.15	[-0.66, -0.06]
Non-identification Response Options	2.40	1	.121	0.37	0.19	[-0.01, 0.75]
Target Presence	5.82	1	.016	1.02	0.29	[0.47, 1.58]
Non-identification Response Options × Target Presence	5.97	1	.015	-1.12	0.39	[-1.88, -0.35]
Experiment 2						
Intercept	-	-	-	-0.18	0.46	[-1.08, 0.73]
Non-identification Response Options	0.36	1	.547	0.14	.200	[-0.25, 0.53]
Target Presence	1.29	1	.256	1.11	0.91	[-0.66, 2.89]
Non-identification Response Options × Target Presence	8.16	1	.004	-1.64	0.34	[-2.31, -0.98]
Experiment 3						
Intercept	-	-	-	0.02	0.50	[-0.97, 1.00]
Non-identification Response Options	4.85	1	.028	0.35	0.16	[0.04, 0.66]
Target Presence	1.22	1	.269	0.55	0.44	[-0.32, 1.41]
Non-identification Response Options × Target Presence	5.95	1	.015	-1.12	0.32	[-1.74, -0.50]
Experiment 4						
Intercept	-	-	-	-0.04	0.37	[-0.76, 0.68]

Non-identification Response Options	2.74	1	.098	0.29	0.15	[-0.01, 0.59]
Target Presence	0.23	1	.632	0.25	0.50	[-0.74, 1.24]
Non-identification Response Options \times Target Presence	3.68	1	.055	-0.97	0.38	[-1.72, -0.22]

Table S23

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effect of Non-identification Response Options on Filler Identification Confidence

Predictor	Chi-Square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	66.32	2.06	[62.27, 70.36]
Non-identification Response Options	0.27	1	.604	1.71	3.19	[-4.55, 7.97]
Experiment 2						
Intercept	-	-	-	60.03	2.77	[54.60, 65.46]
Non-identification Response Options	3.02	1	.082	9.82	4.78	[0.47, 19.18]
Experiment 3						
Intercept	-	-	-	66.54	1.51	[63.59, 69.50]
Non-identification Response Options	7.24	1	.007	10.41	3.08	[4.36, 16.45]
Experiment 4						
Intercept	-	-	-	65.19	1.37	[62.51, 67.87]
Non-identification Response Options	0.21	1	.647	1.13	2.52	[-3.82, 6.07]

Table S24

Experiment 3. Improvement of Model Fit Statistics and Regression Coefficients for the

Mixed-Effects Models Testing Pairwise Comparisons of the Missing vs. Displayed + and Displayed vs. Displayed + Conditions, Target Presence and Their Interactions on Suspect Identifications

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Missing vs. Displayed +						
Intercept	-	-	-	-1.26	0.35	[-1.95, -0.57]
Non-identification Response Options	2.45	1	.117	-0.48	0.23	[-0.93, -0.03]
Target Presence	3.67	1	.056	3.06	1.25	[0.60, 5.52]
Non-identification Response Options × Target Presence	1.13	1	.288	0.45	0.42	[-0.38, 1.28]
Displayed vs. Displayed +						
Intercept	-	-	-	-1.40	0.25	[-1.89, -0.91]
Non-identification Response Options	0.00	1	.956	-0.01	0.22	[-0.45, 0.43]
Target Presence	4.47	1	.034	3.15	1.11	[0.97, 5.33]
Non-identification Response Options × Target Presence	0.00	1	.995	0.00	0.45	[-0.88, 0.88]

Table S25

Experiment 3. Improvement of Model Fit Statistics and Regression Coefficients for the

Mixed-Effects Models Testing Pairwise Comparisons of the Missing vs. Displayed + and Displayed vs. Displayed + Conditions, Target Presence and Their Interactions on Filler Identifications

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Missing vs. Displayed +						
Intercept	-	-	-	-0.87	0.40	[-1.65, -0.11]
Non-identification Response Options	10.20	1	.001	-0.70	0.17	[-1.02, -0.37]
Target Presence	2.82	1	.093	-1.15	0.58	[-2.28, -0.01]
Non-identification Response Options × Target Presence	1.29	1	.255	0.38	0.33	[-0.27, 1.02]
Displayed vs. Displayed +						
Intercept	-	-	-	-1.14	0.42	[-1.96, -0.31]
Non-identification Response Options	0.98	1	.323	-0.15	0.18	[-0.50, 0.19]
Target Presence	3.06	1	.080	-0.99	0.47	[-1.92, -0.06]
Non-identification Response Options × Target Presence	0.13	1	.719	0.15	0.44	[-0.63, 0.93]

Table S26

Experiment 3. Improvement of Model Fit Statistics and Regression Coefficients for the

Mixed-Effects Models Testing Pairwise Comparisons of the Missing vs. Displayed + and Displayed vs. Displayed + Conditions, Target Presence and Their Interactions on Accuracy (Don't Know Responses Removed)

Comparisons	Chi-Square tests			Regression coefficients			
	Predictors	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Missing vs. Displayed							
Intercept	-	-	-	0.08	0.46	[-0.81, 0.97]	
Non-identification Response Options	5.51	1	.019	0.45	0.16	[0.14, 0.76]	
Target Presence	0.76	1	.384	0.50	0.54	[-0.55, 1.55]	
Non-identification Cues × Target Presence	5.96	1	.015	-1.18	0.32	[-1.80, -0.56]	
Displayed vs. Displayed +							
Intercept	-	-	-	0.26	0.45	[-0.62, 1.15]	
Non-identification Response Options	0.55	1	.459	0.11	0.16	[-0.20, 0.41]	
Target Presence	0.00	1	.974	-0.02	0.50	[-1.00, 0.96]	
Non-identification Cues × Target Presence	0.09	1	.765	-0.09	0.31	[-0.70, 0.52]	

Table S27

Experiments 3 and 4 Combined. Choosing Percentages [and 95% CIs] when Non-identification Response Options were Displayed and Missing from the Lineup Instructions and the Lineup

Non-identification Response Options with Lineup	Non-identification Response Options in Lineup Instructions		
	Missing	Displayed	Overall
Missing	76.17 [72.02, 80.09]	60.23 [55.52, 64.71]	72.84 [69.88, 75.69]
Displayed	69.83 [65.61, 78.88]	56.40 [51.76, 60.82]	58.26 [54.98, 61.43]
Overall	68.13 [64.96, 71.18]	62.12 [60.07, 66.25]	

Table S28

Experiments 3 and 4 Combined. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Lineup Instructions Emphasizing Non-identification Options and Their Interaction on Choosing

Predictors	Chi-square Tests			Regression Coefficients		
	X^2	df	p	b	SEb	b 95% CI
Intercept	-	-	-	0.68	0.15	[0.39, 0.97]
Non-identification Response Options	7.36	1	.007	-0.67	0.14	[-0.94, -0.39]
Lineup Instructions	4.34	1	.037	-0.25	0.10	[-0.45, -0.05]
Non-identification Response Options × Lineup Instructions	0.65	1	.420	0.17	0.21	[-0.24, 0.57]

Table S29

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Choosing (Don't Know Responses Removed)

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	1.47	0.28	[0.91, 2.20]
Non-identification Response Options	5.74	1	.017	-1.38	0.35	[-2.05, -0.70]
Target Presence	6.18	1	.013	1.13	0.32	[0.50, 1.76]
Non-identification Response Options × Target Presence	2.04	1	.153	-0.88	0.55	[-1.97, 0.20]
Experiment 2						
Intercept	-	-	-	1.27	0.38	[0.52, 2.01]
Non-identification Response Options	9.03	1	.003	-0.97	0.18	[-1.32, -0.63]
Target Presence	3.55	1	.059	1.08	0.46	[0.18, 1.98]
Non-identification Response Options × Target Presence	0.01	1	.931	-0.04	0.43	[-0.89, 0.81]
Experiment 3						
Intercept	-	-	-	0.99	0.20	[0.59, 1.39]
Non-identification Response Options	7.95	1	.005	-0.81	0.17	[-1.14, -0.48]
Target Presence	3.47	1	.062	1.48	0.64	[0.22, 2.74]
Non-identification Response Options × Target Presence	0.28	1	.594	0.18	0.34	[-0.48, 0.85]
Experiment 4						
Intercept	-	-	-	0.68	0.17	[0.36, 1.01]
Non-identification Response Options	5.12	1	.024	-0.56	0.19	[-0.93, -0.20]

Target Presence	5.16	1	.023	1.05	0.33	[0.41, 1.69]
Non-identification Response Options \times Target Presence	1.94	1	.163	0.42	0.30	[-0.17, 1.00]

Table S30

Experiments 1 and 2 Combined. Improvement of Model Fit Statistics and Regression

Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Suspect and Filler Identifications

Predictors	Chi-square Tests			Regression Coefficients		
	X^2	df	p	b	SEb	b 95% CI
Suspect Identifications						
Intercept	-	-	-	-0.96	0.35	[-1.65, -0.27]
Non-identification Response Options	5.13	1	.024	-0.31	0.14	[-0.59, -0.02]
Target Presence	13.58	1	< .001	2.42	0.41	[1.61, 3.23]
Non-identification Response Options \times Target Presence	1.61	1	.204	-0.37	0.29	[-0.94, 0.20]
Filler Identifications						
Intercept	-	-	-	-0.53	0.29	[-1.11, 0.04]
Non-identification Response Options	10.67	1	.001	-0.72	0.15	[-1.01, -0.43]
Target Presence	13.63	1	< .001	-1.32	0.23	[-1.78, -0.87]
Non-identification Response Options \times Target Presence	1.13	1	.289	0.37	0.33	[-0.28, 1.02]

Table S31

Experiments 1–4. At Risk Innocent Suspect Identifications Across Non-identification

Response Option Conditions, Shown Overall and Separately for Each Stimulus

Non-identification Response Options	Experiment			
	1	2	3	4
Stimulus 1				
Missing	26.67 [9.18, 40.83]	21.15 [9.01, 31.29]	29.31 [16.73, 40.16]	25.86 [13.73, 36.27]
Displayed	12.50 [0.00, 22.40]	13.21 [3.15, 21.38]	15.09 [4.51, 23.78]	16.07 [5.56, 24.80]
Stimulus 2				
Missing	51.61 [32.40, 67.59]	45.90 [32.58, 57.59]	30.00 [16.30, 41.70]	26.98 [15.23, 37.15]
Displayed	56.25 [34.50, 71.88]	48.15 [33.90, 60.55]	28.84 [15.57, 40.20]	20.69 [9.40, 30.25]
Stimulus 3				
Missing	30.00 [11.93, 44.73]	50.00 [35.45, 62.63]	43.40 [29.11, 55.80]	29.31 [16.73, 40.16]
Displayed	21.88 [5.99, 34.64]	50.82 [37.45, 62.55]	51.02 [36.00, 64.00]	27.78 [14.91, 38.80]
Stimulus 4				
Missing	29.41 [12.62, 43.26]	22.22 [10.21, 32.38]	15.38 [4.61, 24.22]	14.29 [4.23, 22.56]
Displayed	17.86 [1.89, 30.26]	10.53 [1.68, 17.62]	1.82 [0.00, 4.44]	9.68 [1.51, 16.23]
Overall				
Missing	34.40 [25.67, 42.33]	35.16 [28.61, 41.26]	29.58 [23.23, 35.50]	24.26 [18.57, 29.53]
Displayed	27.42 [19.16, 34.87]	31.11 [24.84, 36.94]	23.44 [17.46, 28.94]	18.26 [13.05, 23.04]

Note: Stimulus numbers 1–4 correspond to the following stimulus sets: 1–4, respectively, in

Experiment 1; 5–8, respectively, in Experiment 2; 1, 4, 6, and 8, respectively, in Experiments 3 and 4

Table S32

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effect of Non-identification Response Options on At Risk Innocent Suspect Identifications

Predictors	Chi-Square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	-0.89	0.33	[-1.53, -0.24]
Non-identification Response Options	1.55	1	.214	-0.44	0.35	[-1.14, 0.25]
Experiment 2						
Intercept	-	-	-	-0.84	0.40	[-1.63, -0.05]
Non-identification Response Options	1.18	1	.278	-0.32	0.30	[-0.91, 0.27]
Experiment 3						
Intercept	-	-	-	-1.12	0.12	[-1.35, -0.89]
Non-identification Response Options	9.40	1	.002	1.08	0.24	[0.62, 1.54]
Experiment 4						
Intercept	-	-	-	-1.34	0.19	[-1.72, -0.96]
Non-identification Response Options	2.42	1	.120	-0.37	0.24	[-0.84, 0.10]

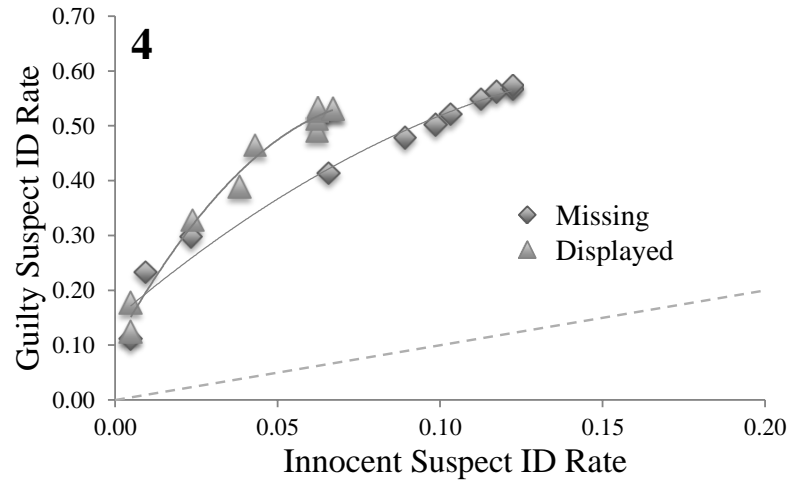
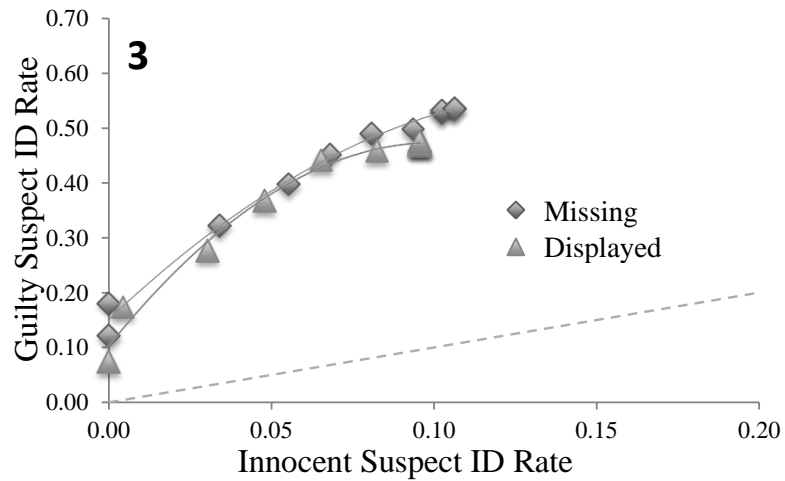
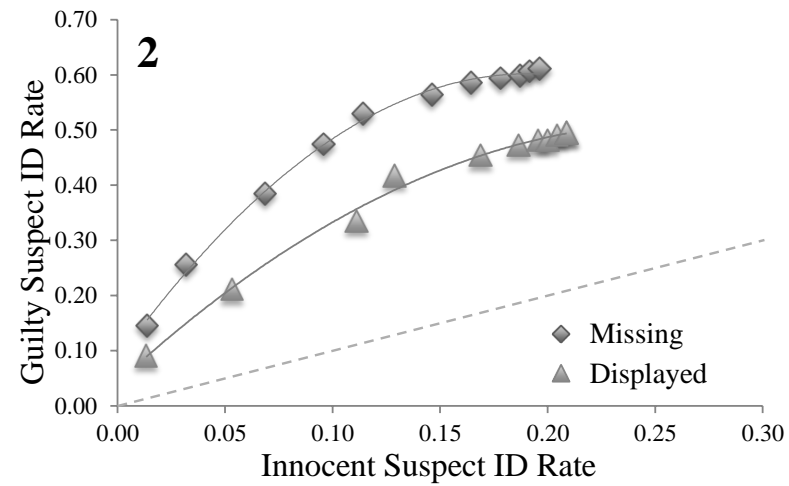
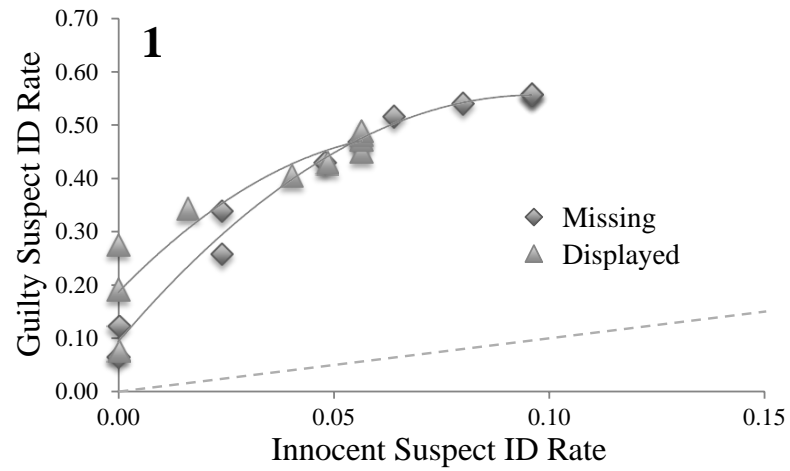


Figure S1. Experiments 1–4. ROCs comparing suspect identifications across the non-identification response option conditions

Table S33

Experiments 1–4. Partial Area Under the Curve (pAUC) values [and pAUC 95% CIs] for the Non-identification Option Conditions and Inferential Statistics for the Differences in pAUC Across Conditions

Non-identification Response Options	Experiment			
	1	2	3	4
Missing	.043 [.034, .052]	.093 [.075, .110]	.046 [.036, .058]	.043 [.033, .052]
Displayed	.041 [.028, .053]	.067 [.051, .085]	.053 [.042, .063]	.040 [.031, .049]
Difference (pAUC)	$p = .800$ D = -0.25	$p = .026$ D = 2.22	$p = .409$ D = 0.83	$p = .678$ D = 0.42

Table S34

Experiments 1–4. Improvement of Model Fit Statistics and Regression Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response Options, Target Presence and Their Interaction on Accuracy (Don't Know Responses Coded as Errors)

Predictors	Chi-square Tests			Regression Coefficients		
	χ^2	<i>df</i>	<i>p</i>	<i>b</i>	<i>SEb</i>	<i>b</i> 95% CI
Experiment 1						
Intercept	-	-	-	-0.38	0.16	[-0.69, -0.07]
Non-identification Response Options	1.72	1	.190	0.32	0.19	[-0.05, 0.70]
Target Presence	6.11	1	.013	1.00	0.27	[0.48, 1.52]
Non-identification Response Options × Target Presence	6.29	1	.012	-1.16	0.39	[-1.92, -0.41]
Experiment 2						
Intercept	-	-	-	-0.20	0.46	[-1.10, 0.71]
Non-identification Response Options	0.17	1	.679	0.09	0.21	[-0.31, 0.50]
Target Presence	1.25	1	.264	1.10	0.92	[-0.69, 2.90]
Non-identification Response Options × Target Presence	8.20	1	.004	-1.67	0.34	[-2.33, -1.01]
Experiment 3						
Intercept	-	-	-	-0.01	0.50	[-0.99, 0.97]
Non-identification Response Options	3.84	1	.050	0.30	0.16	[-0.01, 0.61]
Target Presence	1.16	1	.282	0.55	0.46	[-0.35, 1.45]
Non-identification Response Options × Target Presence	5.79	1	.016	-1.11	0.31	[-1.72, -0.49]
Experiment 4						
Intercept	-	-	-	-0.09	0.37	[-0.81, 0.64]

Non-identification Response Options	2.53	1	.111	0.25	0.14	[-0.04, 0.53]
Target Presence	0.22	1	.641	0.25	0.52	[-0.77, 1.27]
Non-identification Response Options × Target Presence	3.85	1	.050	-1.02	0.39	[-1.77, -0.26]

Table S35

Experiments 1 and 2 Combined. Improvement of Model Fit Statistics and Regression

Coefficients for the Mixed-Effects Models Testing the Effects of Non-identification Response

Options, Target Presence and Their Interaction on Accuracy (Don't Know Responses

Removed)

Predictors	Chi-square Tests			Regression Coefficients		
	X^2	df	p	b	SEb	b 95% CI
Intercept	-	-	-	-0.27	0.24	[-0.75, 0.21]
Non-identification Response Options	2.42	1	.120	0.27	0.13	[0.02, 0.52]
Target Presence	4.08	1	.043	1.09	0.47	[0.17, 2.01]
Non-identification Response Options × Target Presence	13.72	1	< .001	-1.39	0.25	[-1.89, -0.90]