

## Order and Strength Matter for Evaluation of Alibi and Eyewitness Evidence

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*Summary:* We explored the effects of presentation order and evidence strength on participants acting as investigators in a criminal context. Participants evaluated evidence and suspect guilt in a study in which alibi witness and eyewitness evidence of varying strength, presented in different orders, were compared. In contrast to research on the confirmation bias, which suggests that evidence presented early distorts subsequent evaluations of evidence, the present findings suggest that under certain circumstances, evidence received most recently can have a greater impact on decision-making. Recency effects were observed most frequently when recent evidence was particularly strong and often when it contradicted previously encountered strong evidence. The impact of recency extended beyond the impact of evidence and to evaluations of the credibility of individual pieces of evidence. Copyright © 2013 John Wiley & Sons, Ltd.

‘My dad was at home with me.’ When an investigator or trier of fact hears this alibi witness, what is he or she likely to think? Many cases of wrongful conviction involve the presence of alibis that were simply unconvincing to investigators. It is clear that this crucial evidence was either disregarded or undervalued, and this evaluation had grave consequences for the accused. Because of increasing public and empirical interest in factors contributing to wrongful conviction, alibi witnesses (i.e., a witness who confirms a suspect’s alibi) have recently come under scrutiny of researchers as a way to better understand why such evidence is often ignored by investigators and triers of fact and how investigations can consequently go awry.

When alibis are evaluated in a controlled experiment, they are often studied without integration of evidence that would normally accompany the alibi. This is, of course, deliberate with the goal of determining the impact of an alibi without the mess of a ‘real’ case. Nonetheless, because multiple forms of evidence are presented in a single case, it is also important to consider the context provided by an investigation. Thus, exploring additional factors that may influence the evaluation of the alibi and/or alibi witness him or herself is crucial to more fully understand how alibi witnesses are evaluated and how other similar evidence may be evaluated. In the present study, we explored the relative influence of two types of person evidence: alibi witnesses and eyewitnesses. We were particularly interested in examining how each piece of evidence might influence the interpretation of the other evidence.

### Alibi witnesses

In the relatively limited extant research exploring how alibi witnesses are evaluated, there is at least one consistent finding regarding the credibility of alibi witnesses. When an alibi rests on person evidence (as opposed to physical evidence such as surveillance video), who provides the alibi evidence can be critical. For example, those with familial relations to the defendant are perceived as less credible alibi witnesses

than those unrelated to the defendant (e.g., Culhane & Hosch, 2004; Culhane, Hosch, & Kehn, 2008; Hosch, Culhane, Jolly, Chavez, & Hawley, 2011; Olson & Wells, 2004). However, Dahl and Price (2012) recently reported that this repeatedly supported, intuitive observation may not apply to child alibi witnesses. Their findings raised questions about how children may differ from adults and what other currently unknown factors may impact the credibility of alibi witnesses.

Dahl and Price (2012) argued that children may not be subject to the same evaluative processes as adult alibi witnesses because of differences in perceived motivations and ability of children as witnesses. The evaluation of children’s credibility as witnesses has been conceptualized as falling along two dimensions: perceived honesty and perceived cognitive competence (i.e., accuracy). According to this two-factor model of credibility, compared with adults, children are generally perceived as more honest but less cognitively competent witnesses (Bottoms, 1993; Bottoms & Goodman, 1994; Connolly, Price, & Gordon, 2010; Ross, Jurden, Lindsay, & Keeney, 2003). Thus, when honesty is relatively more salient, as may be the case when a perceived motive to lie is present (i.e., a close relationship between alibi witness and suspect), children may surpass adult alibi witnesses in credibility. This did, indeed, appear to be the case in Dahl and Price (2012): Participants were more apt to believe a child alibi witness, regardless of his relationship to the suspect (son or neighbor), than to believe an adult alibi witness. In the Dahl and Price study, both alibi witness relationships may have been perceived as motivated to lie given their potential close relationships to the suspect, thus invoking thoughts about children’s relative honesty.

One question raised by these findings is how special children are in their value as alibi witnesses? Even when honesty is a prominent consideration, are they persuasive enough to outweigh other forms of probative evidence? The two-factor model of credibility described earlier provides a starting point for understanding how children may evoke different cognitions in investigators, but in the context of alibi witnesses, it may be overly simplistic. Because an alibi is likely to accompany other types of evidence in a criminal investigation, it is crucial to begin to explore how alibi evidence relates to these other forms of evidence.

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### Alibis and evidence integration

It is likely that each piece of evidence encountered during an investigation is not evaluated solely on its own and that the presence and timing of other evidence has reciprocal influences. Indeed, it appears that individual pieces of evidence may even corrupt other evidence. Hasel and Kassin (2009) found that following discovery of a false confession, eyewitnesses evidenced diminished confidence in their prior identification of the confessor. The authors point out that this finding could extend to other contexts as well, including alibi witnesses who themselves may become less confident in their memories for the suspect's whereabouts following discovery of apparently incriminating evidence—even if they had previously provided a confident alibi for the suspect. Perhaps even more concerning is the finding that false confessions also influenced experts' interpretation of other types of evidence. Elaad, Ginton, and Ben-Shakhar (1994) found that confessions influenced polygraph examiners' opinions of suspect deception, and Dror, Charlton, and Peron (2006) found that confessions impacted interpretation of latent fingerprints, often considered relatively 'solid' evidence.

Kassin, Bogart, and Kerner (2012) extended this work outside of the lab and explored this possibility in legal cases. In 241 DNA exonerations from the Innocence Project with 59 cases involving false confessions, the presence of a false confession corrupted both lay and expert (e.g., forensic science) witness evidence. That is, the authors observed that a particular type of evidence, a confession, provided contextual information that biased the interpretation of other important evidence. Although for Kassin et al. (2012), the causal relation was obviously not determinable, confessions were more likely to come before than after the faulty forensic science. Interestingly, Kassin et al. also observed that different types of witnesses corrupted one another. In particular, eyewitness errors often came before false confessions when both were present in a case. Kassin et al. speculated that strong evidence of any kind, not just confession evidence, may corrupt other evidence.

Although it is clear that strong evidence can corrupt the *content* of other evidence, there is also support for the contention that strong evidence may influence the *perception* of other evidence, even if that evidence itself is unchanging. Dahl, Brimacombe, and Lindsay (2009) found that when strong evidence was contradictory (i.e., a strong alibi versus an eyewitness identification), the evidence presented closest temporally to the decision had the largest impact on participants playing the role of a police investigator, thus demonstrating a recency effect. Dahl et al. proposed that the most recent information simply overruled the previously presented contradictory information (Hogarth & Einhorn, 1992). That an investigator is influenced by the order in which he or she receives the evidence is clearly problematic because it implies that the same case may not be pursued had a certain piece of evidence been encountered at a different time in the investigation. This pattern would also be of concern for the presentation of evidence during a criminal trial (Carlson & Russo, 2001), and indeed, order effects have not only been observed in investigators but also in mock juror decision-making (e.g., Constabile & Klein, 2005).

Order effects have also been documented in the well-known concept of investigator tunnel vision and in the processing of forensic science evidence (see Kassin, Dror, & Kukucka, 2013 for a thorough review and discussion, with commentaries following). For example, Ask and colleagues have recently conducted several studies in which they have found support for the confirmation bias in investigative decision-making, via 'asymmetrical skepticism' of disconfirming evidence (Ask & Granhag, 2007a, b; Ask, Rebelius, & Granhag, 2008). These authors, and others (e.g., O'Brien, 2009), find that beliefs developed early in an investigation can cloud, or interfere with, the ability to appropriately evaluate new evidence. Although apparently at odds with findings of recency effects in evidence presentation, these may be complementary effects, with variable contexts promoting the likelihood of either recency effects or initial tunnel vision. For example, recency effects have been reported when there is a direct contradiction in the nature of multiple pieces of evidence (i.e., one is strongly supportive of guilt, whereas the other strongly supports innocence) (Dahl et al., 2009). In the present work, we explored evidence presentation order effects and evidence strength in participants acting as investigators in a criminal context.

### Evidence credibility

To further explore the nature of order effects, we also introduced an evaluation of the credibility of each piece of evidence after participants made judgments about the guilt of their suspect. Ask and colleagues (Ask et al., 2008) examined investigators' estimates of the reliability of individual pieces of evidence after they had made investigative decisions about the totality of a case. The authors found that evidence reliability estimates were consistent with the overall decisions related to the case. That is, if the investigators thought the suspect was guilty, each piece of evidence was evaluated as more consistent with guilt. The same evidence was evaluated as more consistent with innocence if the investigator thought the suspect was innocent. Further, evidence reliability judgments extended to the class of evidence as a whole, not just the particular evidence in the case. Ask and colleagues' study explored DNA, photo, and witness evidence. The authors reported that witness evidence, as a particularly 'elastic' form of evidence, was especially sensitive to context. In the current work, we sought to extend exploration of this pattern to within-category comparisons of witness evidence. That is, even within the class of witness evidence, it is clear that particular evidence may be considered more elastic and thus provide more room for variable influences when evaluating credibility.

### THE PRESENT STUDY

In this study, we were interested in examining children as alibi witnesses and in exploring the child alibi witness as a proxy for evidence strength. To better understand the power of child alibi witnesses and the malleability of perceptions of alibi witnesses more generally, we sought to pit the child alibi against one of most compelling forms of evidence in a criminal context: the eyewitness. As has become clear from

decades of research (e.g., Cutler, Penrod, & Dexter, 1990; Semmler, Brewer, & Douglass, 2012; Wells, Memon, & Penrod, 2006), eyewitnesses are an especially, and often inappropriately, persuasive form of evidence. We compared a relatively weak alibi witness (adult son) with a relatively strong alibi witness (child son) and paired each of these alibis with an eyewitness who either made an identification (strong evidence) or opted to reject the lineup (weak evidence). Participants played the role of an investigator in a criminal investigation and were presented with these two forms of evidence, counterbalanced for order of presentation. A primary interest was in examining the relative strength of these forms of evidence and the potential influence of the order of presentation, as previously observed by Dahl et al. (2009).

## METHOD

### Participants

One hundred and seventy-nine undergraduate students ( $N=40$  male) between the ages of 17 and 59 years ( $M$  age = 22.22 years) participated individually for credit in their psychology class. Participants were randomly assigned to experimental condition. This study used a 2 (alibi witness age: 6 years, 25 years)  $\times$  2 (order of evidence: alibi first, eyewitness first)  $\times$  2 (Identification (ID) decision: ID suspect, not present) design.

### Materials and procedure

Participants arrived at the laboratory and were informed that they would assume the role of a police officer and would conduct a mock investigation of a crime. Participants first read a mock police file that described a robbery and a summary of an eyewitness description of a male culprit described as approximately 50 years old. The description of the crime and culprit were based on descriptions obtained in a prior study in which participants viewed a 3-minute simulated crime video and provided verbal descriptions of the culprit and crime (Dahl, Lindsay, & Brimacombe, 2006).

Participants were then given instructions for using a computer database to search through several potential suspects who had prior arrests on file. They were informed that the culprit might not be in the database. The database provided information about each suspect's physical description, prior criminal record, current employment, and registered vehicles. Participants were required to examine all suspects in the database before they could make a decision to either further investigate their chosen suspect or to reject all suspects as the possible culprit. The database was rigged to make one of the suspects the best fit based on physical description and prior criminal record (17 participants were removed from the full sample of 196 because they did not select the target suspect). Once participants selected a suspect, they rated the probability that their suspect had committed the crime (from 1–100%) and indicated whether or not they would be willing to arrest the suspect with the current information, and if not, what evidence they would require to make an arrest. These two dependent variables were selected, rather than a measure of conviction, for example,

because we were most interested in the types of decisions investigators, rather than triers of fact, would make.

Participants then viewed two evidence videos, which varied in order of presentation: an eyewitness and an alibi witness. The eyewitness video showed the eyewitness being interviewed by an off-camera investigator about his recall of witnessing the crime. The interviewer questioned the witness about the crime and physical description of culprit. The witness was then presented with a lineup (which was not visible to the participant), and the witness either identified the suspect by pointing to the picture and saying the lineup member's number aloud or rejected the lineup by reporting that the culprit was not present. On the basis of prior instructions to the investigator, when the eyewitness made an identification, it was clear that the lineup member selected was the investigator's suspect.

The alibi witness video depicted either a child (6 years old) or adult (25 years old) alibi witness (who identified himself as the son of the participant-investigators' suspect) sitting at a table answering questions posed by an off-screen interviewer. The alibi witness provided an alibi for the suspect for the entire day in question—watching football games at home. Both videos were filmed in the same room with the actors sitting in the same position.<sup>1</sup>

After participants saw the videos, they again rated the probability that their suspect had committed the crime and whether or not they would arrest him. Finally, participants were asked a series of questions about the credibility of both the alibi witness and the eyewitness. On a scale from 1 to 6, participants rated the truthfulness, accuracy, understanding of the event, likelihood of fabrication, intelligence, honesty, and overall credibility of each of these witnesses (from Connolly, Price, Lavoie, & Gordon, 2008). Two versions of these questionnaires were created with the questions presented in random orders on each and the order in which the questionnaires were presented was counterbalanced across conditions.

## RESULTS

### Pre-alibi probability suspect committed the crime

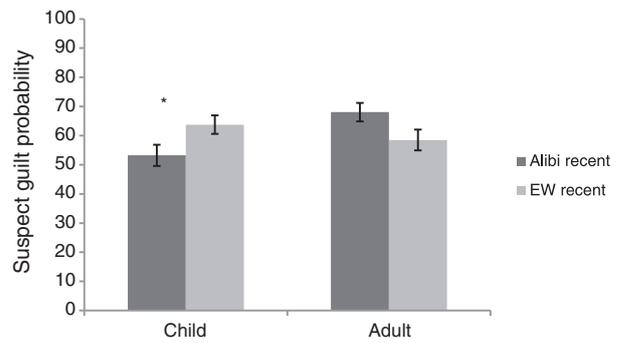
Participants were asked to rate the probability (from 1% to 100%) that their suspect was the culprit. The overall mean was 64.99% ( $SD=23.46$ ). A quarter (25%) of participants reported that they would arrest the suspect given the information they had received so far ( $N=45$ ). We conducted an exploratory analysis to ensure that our groups did not differ in guilt ratings prior to the introduction of any manipulation. Surprisingly, those randomly assigned to the ID suspect condition reported higher guilt ratings than those randomly assigned to the not present condition,  $F(1, 178)=3.88$ ,  $p=.05$ ,  $\eta^2=.02$ . This was unexpected given that this difference existed with random assignment and prior to viewing any video evidence, but the succeeding analyses of the

<sup>1</sup> For both alibi and eyewitness videos, one video was shown for each condition, but each had previously been pilot tested and used as stimuli in a prior study with two different actors for each condition, and no differences for each type of video were observed.

difference from pre-video to post-video, viewing guilt ratings allows us to examine changes in rating as a result of the evidence presentation, which controls for this unexpected pre-evidence presentation difference. No other main effects were significant.

**Probability suspect committed the crime**

A 2 (alibi age: child, adult) × 2 (order of evidence: alibi first, eyewitness first) × 2 (ID decision: ID suspect, not present) × 2 (pre-alibi, post-alibi) repeated measures analysis of variance (ANOVA) was conducted to determine whether there were significant differences between participants' pre-videos and post-videos (eyewitness and alibi) ratings of the probability that the suspect committed the crime (see Table 1 for complete descriptives). There was a significant change between pre-videos and post-videos probability ratings overall,  $F(1, 171) = 27.18, p < .01, \eta^2 = .14$ . There was also a significant two-way interaction between pre-post videos ratings and alibi age,  $F(1, 171) = 4.93, p = .03, \eta^2 = .03$ . Consistent with the Dahl and Price (2012) findings, participants who viewed the child alibi witness thought it was less likely that their suspect had committed the crime after they viewed the alibi witness and eyewitness evidence ( $M = 52.70, SD = 30.92, 95\% \text{ confidence interval (CI) [47.70, 57.37]}$ ) than before ( $M = 64.52, SD = 23.96, 95\% \text{ CI [59.69, 69.22]}$ ) viewing the videos,  $t(89) = 3.76, p < .01$ . There was no significant difference in pre-videos ( $M = 65.47, SD = 23.06, 95\% \text{ CI [60.73, 70.31]}$ ) and post-videos ( $M = 60.96, SD = 30.19, 95\% \text{ CI [55.85, 65.59]}$ ) scores in the adult alibi condition,  $t(88) = 1.53, p = .13$ . There was also an interaction between order of evidence and alibi age,  $F(1, 171) = 11.14, p < .001, \eta^2 = .06$ , depicted in Figure 1. When a child provided the alibi, guilt ratings were lower if the alibi was presented last ( $M = 53.23, SD = 24.01, 95\% \text{ CI [47.15, 59.31]}$ ) compared with when the eyewitness was presented last ( $M = 63.76, SD = 21.63, 95\% \text{ CI [57.82, 69.71]}$ ),  $F(1, 89) = 4.79, p = .03, \eta^2 = .05$ . That is, the recency of the powerful child alibi witness decreased guilt ratings. However, when an adult provided the alibi, guilt ratings were higher if the alibi was presented last ( $M = 68.05, SD = 21.14, 95\% \text{ CI [61.97,$



NB: \* indicates significance,  $p < .05$

Figure 1. Order × alibi witness age interaction

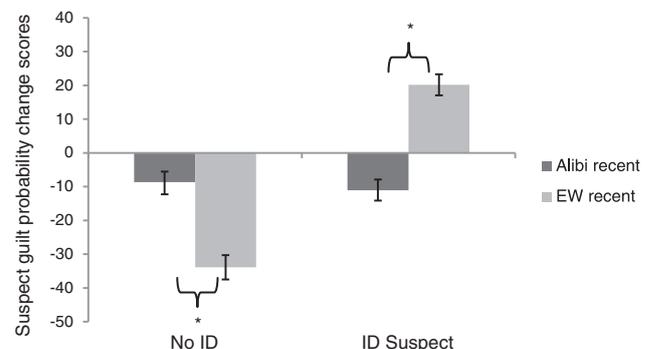
74.12]) than if the eyewitness was presented last ( $M = 58.49, SD = 23.91, 95\% \text{ CI [52.18, 64.21]}$ ),  $F(1, 88) = 3.99, p = .05, \eta^2 = .04$ . Thus, recent adult alibi evidence did not reduce guilt ratings. This latter finding is consistent with prior work that has found alibis provided by adults with a close relationship to the suspect can actually hurt the suspect's case (Dahl & Price, 2012).

Finally, there was also a two-way interaction between pre-post ratings and ID decision,  $F(1, 171) = 64.97, p < .001, \eta^2 = .28$ , that was qualified by a significant three-way interaction between pre-post video ratings, order of evidence, and ID decision,  $F(1, 171) = 27.18, p < .001, \eta^2 = .14$ . To explore this interaction, we calculated the change in guilt ratings from pre-video to post-video viewing, as can be seen in Figure 2. When the eyewitness was the most recently presented evidence, there was a significant difference in guilt ratings between the eyewitnesses who made an ID and those who did not,  $F(1, 89) = 150.34, p < .001, \eta^2 = .63$ . When participants saw an eyewitness make an identification as the last piece of evidence, guilt ratings increased ( $M = 20.17, SD = 21.11, 95\% \text{ CI [13.93, 26.42]}$ ), whereas when the eyewitness did not make an identification, guilt ratings decreased ( $M = -33.91, SD = 20.97, 95\% \text{ CI [-40.20, -27.57]}$ ). Conversely, when participants saw an eyewitness' evidence before an alibi witness' evidence (i.e., the alibi witness was the most recent), the eyewitness' decision had no impact on guilt ratings,  $F(1, 87) = 0.24, p = .62, \eta^2 = .003$ . That is, even an eyewitness who made a positive identification did not impact guilt ratings if an alibi witness followed the eyewitness.

Table 1. Pre-post guilt rating means (standard deviations)

			Pre-video	Post-video
Child witness	EW recent	ID	65.52 (27.16)	85.48 (14.87)
		No ID	69.57 (14.69)	34.48 (23.70)
		Total	67.54 (21.69)	59.98 (32.36)
	Alibi recent	ID	71.36 (21.21)	51.45 (29.68)
		No ID	51.36 (26.93)	38.73 (24.60)
		Total	61.36 (26.00)	45.09 (27.70)
Total			64.52 (23.96)	52.70 (30.92)
Adult witness	EW recent	ID	75.27 (16.29)	73.09 (16.57)
		No ID	64.27 (24.09)	59.55 (30.12)
		Total	61.27 (24.36)	55.71 (34.01)
	Alibi recent	ID	61.26 (27.72)	81.65 (19.61)
		No ID	61.27 (20.94)	28.59 (22.65)
		Total	69.77 (21.07)	66.32 (24.98)
Total			65.47 (23.06)	60.96 (30.19)

EW, eyewitness.



NB: \* indicates significance,  $p < .05$

Figure 2. Order × ID condition interaction (rating change from pre-video to post-video depicted)

### Final arrest decision

There were no significant main effects or interactions using a log linear analysis to examine participants' willingness to arrest their suspect (all  $p$ 's > .08).

#### *Credibility evaluations of alibi witnesses and eyewitnesses*

We examined the evaluation of the credibility of individual pieces of evidence because it is possible that guilt ratings are not necessarily tied to interpretation of the individual pieces of evidence but rather are influenced by other factors.<sup>2</sup> Thus, participants' responses to the 'overall credibility' of each of the alibi witness and the eyewitness were examined in two 2 (order of evidence)  $\times$  2 (ID decision)  $\times$  2 (alibi witness age) ANOVAs. For both alibi witness evaluation and eyewitness evaluation, there was a significant main effect of order of evidence: whichever evidence was presented most recently was evaluated as more credible. That is, when the alibi witness was presented last, he was evaluated as more credible ( $M=3.00$ ,  $SD=1.18$ , 95% CI [2.76, 3.24]) than when the alibi was presented first ( $M=2.56$ ,  $SD=1.23$ , 95% CI [2.35, 2.83]),  $F(1, 178)=5.72$ ,  $p=.02$ ,  $\eta^2=.03$ . Similarly, when the eyewitness was presented last, he or she was evaluated as more credible ( $M=4.77$ ,  $SD=0.77$ , 95% CI [4.61, 4.93]) than when he or she was presented first ( $M=4.48$ ,  $SD=0.83$ , 95% CI [4.31, 4.64]),  $F(1, 178)=6.17$ ,  $p=.01$ ,  $\eta^2=.04$ . There were also main effects of ID decision on credibility. Alibi witnesses were considered more credible if no identification was made ( $M=3.08$ ,  $SD=1.10$ , 95% CI [2.84, 3.32]), compared with when an identification was made ( $M=2.50$ ,  $SD=1.27$ , 95% CI [2.27, 2.75]),  $F(1, 178)=10.86$ ,  $p=.001$ ,  $\eta^2=.06$ . Conversely, eyewitnesses were rated as more credible if they did ( $M=4.79$ ,  $SD=0.77$ , 95% CI [4.62, 4.95]), rather than did not ( $M=4.46$ ,  $SD=0.83$ , 95% CI [4.30, 4.62]), make an identification,  $F(1, 178)=7.67$ ,  $p=.01$ ,  $\eta^2=.04$ . Finally, there was also a main effect of alibi age on alibi witness credibility: Children were rated as more credible ( $M=3.01$ ,  $SD=1.30$ , 95% CI [2.78, 3.26]) than adults ( $M=2.56$ ,  $SD=1.10$ , 95% CI [2.33, 2.81]),  $F(1, 178)=6.71$ ,  $p=.01$ ,  $\eta^2=.04$ .

Because of the findings reported by Dahl et al. (2009) and Kassin et al. (2012) related to the influence of evidence strength and order of evidence, we were also interested in exploring the impact of order of evidence on the evaluation of each individual piece of evidence when the first evidence presented was strong (i.e., a child alibi or an eyewitness who made a positive identification). Thus, we conducted two sets of two one-way ANOVAs for each of the strong evidence presented first on the credibility of the opposite evidence as a function of order. With two strong, contradictory, pieces of evidence, we replicated the order effect observed in guilt ratings on evaluations of evidence credibility. The eyewitness who made an ID was rated as more

credible following a child (strong) alibi witness ( $M=5.22$ ,  $SD=0.90$ , 95% CI [4.87, 5.56]) than if presented before a child alibi witness ( $M=4.64$ ,  $SD=0.73$ , 95% CI [4.28, 4.99]),  $F(1, 44)=5.63$ ,  $p=.02$ ,  $\eta^2=.12$ . If the eyewitness made no ID, there was no effect of order (alibi recent:  $M=4.45$ ,  $SD=1.01$ , 95% CI [4.10, 4.81]; eyewitness recent:  $M=4.48$ ,  $SD=0.60$ , 95% CI [4.13, 4.83]),  $F(1, 44)=0.01$ ,  $p=.92$ ,  $\eta^2=.00$ . The child alibi witness was rated as marginally more credible following an eyewitness who made an identification ( $M=3.23$ ,  $SD=1.41$ , 95% CI [2.60, 3.85]) than if presented before an eyewitness who made an identification ( $M=2.39$ ,  $SD=1.50$ , 95% CI [1.78, 3.00]),  $F(1, 44)=3.70$ ,  $p=.06$ ,  $\eta^2=.08$ . If the adult provided the alibi, there was no effect of order (alibi recent:  $M=2.36$ ,  $SD=0.95$ , 95% CI [1.97, 2.76], eyewitness recent:  $M=2.04$ ,  $SD=0.88$ , 95% CI [1.66, 2.43]),  $F(1, 44)=1.38$ ,  $p=.25$ ,  $\eta^2=.03$ . Thus, these findings indicate that the recency effect applies not only to overall guilt ratings change but also to the evaluation of strong individual pieces of evidence: Two strong, contradictory pieces of evidence paired together made the more recent evidence appear that much more credible.

### DISCUSSION

Order of evidence presentation and strength of evidence mattered for judgments of suspect guilt. When evidence was strongly probative (child alibi witness, eyewitness identification), there was a recency effect on guilt judgments and credibility ratings. Although recency influences were observed in some cases across all alibi witnesses (i.e., when an eyewitness did not make an identification), this was likely driven by the power of the child alibi witness overall; weak alibis had less of an influence on perceptions of suspect guilt than did strong alibis, which had differential influences depending on the order in which that evidence was encountered (Dahl et al., 2009). We further extended this research to alibis confirmed by children and credibility evaluations of the individual pieces of evidence. The findings indicate that the simple order of evidence presentation could have a disproportionate influence on case process decisions in both the evaluation of suspect guilt and the evaluation of each piece of evidence. More promising, the present findings also indicate that the concern regarding 'tunnel vision' and the confirmation bias (i.e., that evidence encountered early on presents a filter through which any forthcoming evidence is perceived) may be overridden if additional strong evidence is encountered. We discuss these findings in turn.

Although inconsistent with the well-known notion of early evidence being the most influential (Carlson & Russo, 2001; Findley, 2012), the present data are consistent with bodies of literature on jury decision-making (Constabile & Klein, 2005) and medical diagnostic processes (Bergus, Chapman, Gjerde, & Elstein, 1995; Elstein & Schwarz, 2002), as well as prior work on investigator decision-making (Dahl et al., 2009). Regardless of the direction of the effect, it is clear that evaluation of evidence value is not conducted independently for each piece of evidence. This is a problem because the simple order in which we encounter evidence may impact how influential that evidence becomes to an investigator.

<sup>2</sup> We conducted these analyses for both the single question 'overall credibility' score as well as the composite of the other six credibility questions. In only one case was there a difference between the two analyses (for the alibi composite score, order of evidence did not have a significant effect,  $p=.06$ , whereas it did for the overall alibi credibility score), thus for ease of interpretation the overall credibility responses are reported.

Indeed, the presentation of a recent alibi witness decreased investigator guilt ratings relative to a recent eyewitness, regardless of the strength of the alibi witness. Theoretically, each piece of evidence should be evaluated on its own merit and its contribution to the case should be considered independent of other evidence. Of course, we are not so naïve to believe that this compartmentalization is possible or even advisable. Nonetheless, this observation makes it clear that there are predictable patterns to what types of evidence (strong) and when the evidence is encountered (recently) is most likely to have a powerful effect on decision-making. Further delineating the circumstances under which investigators are likely to be more or less influenced by evidence could lead to the development of protections against inappropriate influence of certain types of evidence.

We believe there are at least two explanations for the recency effects observed in the present study. According to the contrast effect (Scherer & Lambert, 2009), the evaluation of a stimulus is influenced by the context in which it is presented. In our experiment, evidence presented first could produce a contrast effect if the initial piece of evidence that is strongly indicative of guilt creates a context in which subsequent exculpatory evidence appears even more implicative of innocence, relative to the initial evidence. This contrast between the two contradictory pieces of evidence could result in a greater weighting of the most recently presented evidence and thus our observed recency effect. That is, the contrast effect may evoke cognitions such as, 'that may have been strong, but this is stronger'.

A second explanation for the observed recency effects comes from the discussion of accessibility of information in memory by Ask et al. (2008). As Ask et al. (2008) described, evidence that comes to mind easily has a larger effect on judgments (Tversky & Kahneman, 1973), and information that is encountered recently is more accessible or temporally salient in memory (Higgins, 1996). Thus, it is perhaps intuitive that recent information can have the most substantial impact on evaluations if the recent information is more salient.

Given the clear observation that order of evidence presentation matters, what can be done? We concur with a suggestion made by Marksteiner, Ask, Reinhard, and Granhag (2011) for the introduction, as a matter of practice, of an independent evaluator of particular types of evidence that may be especially elastic. Just as is done when a forensic evidence specialist evaluates a piece of physical evidence, an independent investigator may provide his or her opinion on the reliability of a witness' testimony. Of course, the resource implications of this suggestion are likely to be prohibitive in making this a routine practice, but in certain cases, this strategy may be particularly useful.

Beyond investigative decision-making and guilt probability ratings, in the present study, we also explored evaluations of each piece of evidence. That is, after decisions about guilt probability were made, participants evaluated the credibility of each piece of evidence. Although children were rated as more credible than adults, the more interesting findings were related to the order of evidence. Evidence that was presented last (either alibi or eyewitness) was considered to be the most credible. That is, an eyewitness or alibi witness that was presented last was considered more credible than an

eyewitness or alibi witness that was presented first, *even though the content of their testimony was the same*. This was especially the case if the two pieces of evidence were particularly contradictory. Thus, the effect of recency extended beyond guilt probability estimates to judgments of evidence credibility. This pattern of influences on evidence is related to those reported by Ask et al. (2008; see also McQuiston-Surrett, Douglass, & Burkhardt, 2008), who found that investigators evaluated evidence in a way that was consistent with their existing beliefs and also then later evaluated that same class of evidence with the same lens. We do not know how long this effect will endure, but it appears that evidence exposure that takes place within a particular context can influence perceptions of that evidence when it should be evaluated independently. This finding is certainly worth further investigation.

It is important to note that children as alibi witnesses remained a potent source of evidence, even when in a close relational role as a son of the suspect (Dahl & Price, 2012). Child alibi witnesses contributed to decreased guilt ratings from pre-videos to post-videos viewing, decreased guilt ratings when presented as the last form of evidence and were rated as significantly more credible than adult alibi witnesses. In addition to providing crucial breadth to our understanding of alibi witness strengths and limitations, the finding that child alibi witnesses are consistently judged as more credible than adult alibi witnesses extends the domains in which children are found to be credible as witnesses to cases other than sexual assault (e.g., Ross et al., 2003) and to other circumstances in which honesty is a salient factor.

Given the relative honesty and cognitive competency ratings of child and adult alibi witnesses, it may appear that, in the business of alibis, honesty is the most important factor. However, our particular alibi may have allowed for greater reliance on honesty relative to cognitive competence. In our scenario, the alibi witness spent all day with the suspect and therefore was not required to produce precise time estimates. Future research should explore additional alibi witnesses in circumstances for which cognitive competence is more salient.

In our direct comparison of the relative influence of eyewitness and alibi witness evidence, we were also interested in whether or not there were circumstances under which an alibi witness could 'trump' a powerful eyewitness. Despite the frequent observation that eyewitnesses have a disproportionate impact on triers of fact (Semmler et al., 2012) and the complementary natural conclusion that alibi witnesses with a close relationship to the suspect have questionable motives, we did not find evidence that eyewitnesses were consistently more convincing than alibi witnesses (see also Dahl et al., 2009). Rather, an eyewitness who made a clear identification of the suspect only increased guilt ratings if it was the last piece of evidence received. Thus, concerns related to the believability of eyewitnesses may extend to other person evidence.

Finally, we found no significant differences as a result of any of the manipulations in decisions of whether or not to arrest the suspect (see also Dahl & Price, 2012). It has been previously noted in the literature (Olson & Wells, 2004; Sommers & Douglass, 2007) that various guilt measures are sometimes insensitive to perceptions of alibis, and perhaps, this was the case with the present data. Thus, it is important to consider in future research that guilt ratings of

the suspect may not necessarily translate into differences in decisions about arresting the suspect. Importantly, in our study, it appears as though many of the students acting as investigators may have been unwilling to arrest because of a lack of 'hard' forensic evidence in the presented case (see discussion of the 'CSI effect'; Casey & Mohr, 2005). When asked for reasons for their decision to not arrest their suspect, of those who provided a written response, over half (54%) of respondents cited a lack of forensic and/or physical evidence as a reason for not arresting.

### Limitations

Undergraduate participants acted as investigators in the present study, and this brings about questions of generalizability. However, there is a good deal of research that indicates that expertise does not protect against cognitive errors, including the confirmation bias (LeBlanc, Brooks, & Norman, 2002; Schultz-Hardt, Frey, Luthgens, & Moscovici, 2000), and it is clear that it is also a problem in real forensic investigations (e.g., Dror et al., 2006; Kassin, Goldstein, & Savitsky, 2003), so that there are good reasons to believe the same judgment errors would be at work in an experienced investigator sample. Further, the details of the witness testimony should be varied to extend exploration of the content of the testimony, which is likely to have a large impact on decisions. Also, despite the presentation of different types of evidence in the current study, 'real' forensic investigations are much more complex and likely involve much more evidence and different motivations than that presented here. The present work highlights the need to systematically explore combinations of different types of evidence and the influence on investigative and trier of fact decision-making. Finally, it is important to make clear that this is a basic laboratory study, which will differ in many ways from a complex criminal investigation. This basic laboratory work is important to assist in the establishment of decision-making patterns but is not sufficient to directly apply to a forensic setting.

### CONCLUSION

Mock investigators in the present study were heavily influenced by recently presented evidence, particularly when the new evidence was strong. These recency influences extended beyond impacts on guilt judgments to assessments of the credibility of individual pieces of evidence. It is clear that there are myriad influences on investigator decision-making, and this study contributes to the small body of work gradually beginning to explore conditions under which such errors are more or less likely. The findings of the current experiment indicate a pressing need to further explore the impact of order of evidence presentation in an investigative context.

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