

The phenomenology of carryover effects between show-up and line-up identification

Ryann M. Haw

Big Bend Community College, Moses Lake, WA, USA

Jason J. Dickinson

Montclair State University, Montclair, NJ, USA

Christian A. Meissner

University of Texas at El Paso, TX, USA

This study explored carryover effects from show-ups to subsequent line-up identifications using a novel paradigm in which participants rendered multiple identification judgements. A total of 160 participants studied a series of faces and subsequently viewed a series of target-absent and target-present show-ups. Following a retention interval, participants then made identification judgements from a series of target-absent and target-present line-ups. Remember-Know-Guess judgements were collected to assess the phenomenological basis of carryover effects in face identification. Our results indicated clear carryover effects from show-ups to line-ups, such that repeated exposure to a face increased the likelihood that it would later be identified, regardless of whether or not it had been presented at the time of study. The phenomenological basis for these carryover effects is discussed, as are the implications of these findings for police conduct of multiple eyewitness identification procedures.

In 2002, Troy Rufra was wrongfully charged with the robbery of four banks, based largely on mistaken eyewitness identifications (Wolfson, 2002). In particular, the detective working on the case presented four witnesses with a “show-up”—a single, grainy photograph of Rufra. Several days later the same witnesses were shown a line-up that contained a different photograph of Rufra. All of the witnesses identified Rufra as the bank robber from the line-up presented. However, two additional witnesses, who had not participated in the show-up identification, stated that the perpetrator was “not present” and that the robber was “greyer and older” than the men in the line-up. Although Rufra was charged with the robberies based on the four eyewitness identifications, the real perpetrator was

eventually apprehended and prosecutors quickly dropped the charges, citing mistaken eyewitness identification. (The actual perpetrator was 16 years older and 4 inches shorter than Rufra.)

Eyewitness research has traditionally treated participation in show-up and line-up identifications as mutually exclusive events, defining a show-up as a one-person identification task (the suspect) and a line-up as a separate and distinct multi-person identification task (one of whom is the suspect) (see Steblay, Dystart, Fulero, & Lindsay, 2003). In “real-world” investigations, however, police often combine these procedures, such that a witness may be exposed to a show-up involving a particular suspect and then view a line-up containing the same suspect at a later time (Behrman & Davey, 2001). The above case

Address correspondence to: Christian A. Meissner, Department of Psychology, University of Texas at El Paso, El Paso, Texas, 79968, USA. E-mail: cmeissner@utep.edu

example of Troy Ruffa suggests that, despite an absence of direct evidence, participation in an initial show-up identification may influence witness identification decisions in subsequent line-up tests.

THE EYEWITNESS CARRYOVER EFFECT

Previous research has demonstrated that witness participation in multiple identification procedures can have detrimental effects on eyewitness performance (Brigham & Cairns 1988; Brown, Deffenbacher, & Sturgill, 1977; Davies, Shepherd, & Ellis, 1979; Dysart, Lindsay, Hammond, & Dupuis, 2001; Gorenstein & Ellsworth, 1980; Hinz & Pezdek, 2001; Memon, Hope, Bartlett, & Bull, 2002; Pezdek & Blandon-Gitlin, 2005). In the present article, we use the term *eyewitness carryover effect* to describe this phenomenon. That is, eyewitness carryover effects occur when participation in an initial identification test carries over to affect performance on a subsequent identification test. Studies investigating this effect have used a variety of identification procedures including interpolated mugshot-sorting tasks and intervening line-ups. Deffenbacher, Bornstein, and Penrod (2006) have recently conducted a meta-analysis of the mugshot exposure literature in particular. Their results demonstrated that carryover effects caused a significant impairment in subsequent line-up identification performance, such that intervening mugshot tasks *reduced* the likelihood of correct identification of the target face and significantly *increased* the likelihood of false identification—particularly in so-called “commitment” designs (cf. Dysart et al., 2001; Memon et al., 2002) in which a non-target face is presented in both the mugshot and line-up identification tasks.

One notable study that has examined eyewitness carryover effects was conducted by Hinz and Pezdek (2001). In their experiment participants studied a target face for 60 seconds, and a week later viewed one of two “intervening” target-absent line-ups containing six novel faces. For the experimental group, one of these six faces would later serve as the “repeated distractor foil” (RDF). Participants returned to the laboratory 2 days later and viewed one of three “test” line-ups: (a) a line-up consisting of the target (involving a different photograph of the previously studied target individual), the RDF, and four novel foils;

(b) a line-up consisting of the target and five novel foils; or (c) a line-up consisting of the RDF and five novel foils. Although participants in both the control and experimental groups viewed the same line-ups, the RDF served as a novel foil to participants in the control condition (i.e., it had not been presented in the previous “intervening” line-up array). Hinz and Pezdek’s major finding was that merely viewing an innocent suspect in an initial line-up, irrespective of whether or not that person was identified, both *increased* the likelihood of misidentifying the innocent suspect (average increase = 23%) and *decreased* the likelihood of identifying the correct target (average decrease = 16%)—a finding consistent with the Deffenbacher et al. (2006) meta-analysis discussed above. The authors also found that the experimental group, who had viewed the RDF in the intervening line-up, was more likely to correctly identify the target in the subsequent test line-up when the RDF was not present ($M = 0.76$) compared to when both the target and the RDF were present ($M = 0.42$). Furthermore, there were more false identifications of the RDF when the target was absent from the test line-up ($M = 0.46$) than when he was present ($M = 0.19$).

In a recent study, Pezdek and Blandon-Gitlin (2005) used a similar design to examine whether variables that influence the quality of encoding, the retention interval between the two line-up tests, or the length of time the witness was exposed to the target face, might moderate the likelihood of subsequent carryover effects. Across three experiments, the authors demonstrated that factors associated with inferior memory for the target exacerbated the influence of eyewitness carryover effects between line-up tests, evidenced by lower hit rates for the target and higher false alarm rates of the RDF.

While eyewitness carryover effects are well established (Deffenbacher et al., 2006), their phenomenological basis remains a point of debate within the literature. A number of plausible explanations have been discussed. The most consistent interpretation of the effect has involved the apparent “commitment” of a witness to remain consistent with his/her initial identification (Brigham & Cairns, 1988; Dysart et al., 2001). For example, Dysart et al. found that witnesses who made identifications from “mugbooks” (choosers) were more likely to identify the same person in a subsequent line-up compared to witnesses who were exposed to a mugbook

suspect but had not selected him previously (see also Memon et al., 2002).

An alternative, yet often cited, interpretation of carryover effects involves that of source confusion (Johnson, Hashtroudi, & Lindsay, 1993). For example, Hinz and Pezdek (2001) suggested that the intervening line-up task in their study caused participants to have difficulty remembering which face was viewed at study and which had been seen during the intervening line-up. Memon et al. (2002) also favoured the source confusion hypothesis when interpreting their results that familiarised foils represented the locus of the carryover effect. Unfortunately, the source confusion framework generally fails to account for the impact of “choosing” on subsequent false identifications (i.e., the commitment effect; see Memon et al., 2002).

A final theory that may be used to understand carryover effects has been suggested by several authors, namely the role of two-process theories of recognition memory. For example, Hinz and Pezdek (2001) suggested that Mandler’s (1980) dual-process model of recognition memory may provide a theoretical explanation for eyewitness carryover effects, while Memon et al. (2002) discussed the influence of gist vs verbatim trace memory processes (Brainerd & Reyna, 1990). Generally speaking, dual-process models of recognition memory postulate that recognition may be based on a process of *familiarity*, which is associated with fluent conceptual and perceptual processing, and/or a process of *recollection*, which is associated with the conscious retrieval of contextual and episodic information (for a review see Yonelinas, 2002). With regard to the carryover effect, participants who falsely identify the RDF in the second identification task may respond based on their sense that the face was *familiar*, although they are unable to recollect the source of that familiarity. However, false choosing of a repeated distractor on the initial task (i.e., the commitment effect) may moderate this effect, such that the participant selects the foil again based on his/her retrieval of a *false recollective context* stemming from the first identification task (what Memon et al., 2002, p. 1225, refer to as a “verbatim context error”). Unfortunately, to date these theories have been assessed via exploration of performance data—the current study attempts to more directly investigate the role of a dual-process interpretation by asking participants to provide phenomenological judgements of memory across conditions that are believed to vary the

likelihood of carryover effects from a prior identification task.

THE PRESENT INVESTIGATION

Past research has clearly demonstrated that participating in multiple identification procedures can exert negative carryover effects on eyewitness accuracy. Specifically, while research has documented carryover effects between two line-ups and between mugshot identifications and line-ups, carryover effects between show-ups and line-ups have yet to be examined. While the cognitive processes operating in carryover effects are likely consistent across tasks, this issue merits further investigation based on field research indicating that it is common for suspects to appear consecutively in show-ups and line-ups (Behrman & Davey, 2001). Given the recent findings of Pezdek and Blandon-Gitlin (2005) regarding the influence of encoding quality on subsequent carryover effects, we also manipulated the time permitted for participants to encode each target face. However, a more significant limitation to prior research on the carryover effect reflects our lack of understanding of the mechanisms responsible for this phenomenon—as such, the current study attempts to explore the cognitive processes underlying carryover effects by utilising a dual-process memory approach. Finally, studies in the carryover effect literature have rarely examined the potential benefit of presenting the actual target face in the intervening identification task (see Memon et al., 2002, for a discussion of this issue). The current study will include this important condition and examine the role of a dual-process model in predicting the benefits of representing the target face.

In the present study we address these issues using a novel line-up recognition paradigm in which participants render multiple identification judgements (Meissner, Tredoux, Parker, & MacLin, 2005). Given our desire to explore the phenomenological basis for the carryover effect, we felt it was important to collect multiple judgements from participants in order to stabilise indices of recollection and familiarity. Furthermore, we manipulated the carryover effect within participants using this paradigm to maximise our power for detecting and understanding the effect. While this paradigm is somewhat removed from the more “ecological” eyewitness research paradigms used in prior studies, we believed that using

such a basic research paradigm would allow us a better opportunity to assess the theoretical basis of carryover effects and permit us to model the processes leading to this phenomenon in a controlled manner.

Our line-up recognition paradigm introduced participants to a sequence of faces during the encoding phase. Participants were asked to study these faces and were informed that later they would be asked questions about them. Following a distractor task, participants were exposed to a series of target-absent and target-present show-ups containing some of the original target faces and several foils that would later be re-presented in the line-up task. Following another distractor task, participants were finally presented with a series of target-absent and target-present line-ups. After rendering identification judgements and confidence ratings, participants provided phenomenological judgements using Remember-Know-Guess alternatives (Gardiner & Richardson-Klavehn, 2000). The Remember-Know procedure has been used previously to gain access to participants' mental experience or phenomenological state during recognition judgements, including eyewitness line-up judgements (see Meissner et al., 2005), and appear to coincide with estimates of recollection and familiarity obtained using other methodologies (see Yonelinas, 2002). "Remember" responses are believed to reflect a recognition judgement based on recollection, where some episodic information regarding the encoding experience has been retrieved. In contrast, "know" responses are said to reflect a recognition judgement based on familiarity, where a sense of fluency or familiarity is experienced in the absence of episodic details present at encoding. As noted below, care was taken to instruct participants regarding the basis for each judgement prior to and during the identification task.

Consistent with prior studies (see Deffenbacher et al., 2006), we predicted that participating in a show-up would exert strong carryover effects on subsequent line-up identification choices. Specifically, we predicted that presenting a repeated distractor foil (RDF) in a target-absent show-up would increase the likelihood of the RDF being chosen in a subsequent line-up, particularly when the RDF was presented in the absence of the actual target. Furthermore, though not readily investigated in prior studies, we predicted a *benefit* of presenting the actual target in a show-up, such that correct identifications would increase in a

subsequent line-up task. With regard to a dual-process model of carryover effects, we predicted that participants who falsely identified the RDF on both the show-up and line-up tasks would be more likely to render false judgements of "recollection". In contrast, those who initially rejected the RDF but later identified him in the line-up were predicted to base their identification on a generalised feeling of familiarity (or "know" judgements). In addition to the above hypotheses, we also included an encoding quality manipulation, namely "viewing time", to determine whether variations in strength of encoding might influence the likelihood of subsequent carryover effects. Consistent with prior research (Pezdek & Blandon-Gitlin, 2005), we predicted that limiting encoding strength would exacerbate the likelihood of carryover effects in subsequent identifications.

METHOD

Participants

A total of 160 undergraduate students from Florida International University participated for course credit (113 females, 47 males). The majority of our sample were completing their first year of college (72.5%) with a mean age of 19.03. The racial composition of our sample included Hispanic (70.6%), Black (6.9%), White (17.5%), and other (3.2%) participants.

Materials

Photographs and line-ups. The facial stimuli used in the current study were chosen from a database of photographs maintained by the third author. For each person in the database there were two head-and-shoulder photographs that differed in facial expression and clothing. Photographs presented at test involved targets wearing their street clothes, standing in front of a grey background, in a full frontal, smiling pose. Photographs presented at test were targets wearing a burgundy-coloured sweatshirt, standing in front of a grey background, in a full-frontal, non-smiling pose. Eight males were selected from the database for use as target faces. The selection of these individuals was based largely on ensuring variability in the facial features of target faces (hair colour, eye colour, shape of face, distinctive features, etc.). A total of 16 six-person line-ups were then created, including a target-present (TP)

and target-absent (TA) line-up for each of the eight target faces. A total of 20 participants were recruited to provide descriptions of each target face, and these descriptions were subsequently combined to yield a modal description for each face. This modal description was used as a basis for selecting fillers to compose six-person line-ups. Then 80 participants were recruited to assess line-up fairness via a “mock witness” paradigm (see Malpass & Lindsay, 1999), and the resulting estimates of size and bias demonstrated adequate fairness.¹ The average proportion of mock witnesses selecting the target face was 0.18 (95% CI = 0.15, 0.20) and the average *E* (a measure of line-up size proposed by Tredoux, 1998) was 4.99 (95% CI = 4.80, 5.19), meaning that the line-ups used in this study contained an average of five viable line-up members. For the target-absent line-ups and show-ups, a random individual from the associated line-up was chosen as the Repeated Distractor Foil (or RDF).

Computer program. PC_Eyewitness, a computer program specifically designed to present identification tasks, was used in the current study (MacLin, Meissner, & Zimmerman, 2005). This program has been shown to produce performance that is consistent with pencil-and-paper identification tasks (MacLin, Zimmerman, & Malpass, 2005).

Design

A 2 (Study Time: 1s vs 3s) × 4 (Show-up Conditions: No Show-up Control, TP Show-up Control, RDF Show-up + TP Line-up, RDF Show-up + TA Line-up) mixed design was used with Study Time manipulated between participants and Show-up conditions manipulated within participants. Each Show-up condition was presented twice per participant, randomly applied to two of the eight target faces, and involved the presentation of both a TP and TA line-up for each target face. In the

No Show-up Control condition, no show-up was presented for the target face prior to the TP and TA line-up identifications. For the *TP Show-up Control* condition, a TP show-up was presented prior to the TP and TA line-up presentations. For the *RDF Show-up + TP Line-up* condition, a TA show-up (involving a randomly designated RDF) was presented prior to a TP line-up, in which *both* the original target face and the RDF were included, and a corresponding TA line-up that included six novel foils. In the *RDF Show-up + TA Line-up* condition, a TA show-up (involving a randomly designated RDF) was presented prior to a TA line-up, in which the RDF was included, and a corresponding TP line-up that included the original target face (see Table 1 for the details of each Show-up condition).

Procedure

A *line-up recognition paradigm* was used consistent with Meissner et al. (2005). Participants were asked to study a series of faces, and were instructed that their memory for the faces would later be tested. All participants viewed eight faces for either 1 second or 3 seconds each, with a 2-second interval between photographs. The presentation of faces was randomised across participants by the computer program. Following a 3-minute distractor task, in which participants completed arithmetic problems, a series of six show-up identification tasks were presented. Participants were simply asked to respond “yes” or “no” regarding whether each face was one of the faces they had viewed in the study phase. The assignment of faces to each condition and inclusion of foils as RDF substitutes in the show-up task were randomised by the computer program across participants. After completing the show-up tasks, participants continued the distractor task for another 3 minutes, and were then presented with a series of 16 line-up identification tasks (8 target-present and 8 target-absent arrays). For each line-up identification task, participants were asked to identify faces that they believed had been presented as one of the original targets in the study phase (and were cautioned against identifying faces that may have been presented only in the previous show-up identification phase), or to designate that none of the faces had previously been shown in the study phase. Once again, both the order of presentation of line-up tasks and placement of faces within each

¹ Mock witness evaluations are widely used in eyewitness research to test the fairness of line-ups (see Brigham, Meissner, & Wasserman, 1999; Malpass & Lindsay, 1999). A group of “mock witnesses”, who are blind to the identity of the perpetrator, are typically provided with a brief description of the perpetrator and asked to select the suspect from the line-up on the basis of this description. If the line-up is fair, the mock witnesses should not be able to identify the suspect at a rate greater than chance (referred to as line-up bias), and the distribution of their choices should be equally spread over the line-up members (referred to as line-up size).

TABLE 1
Design for show-up conditions

<i>Condition</i>	<i>Show-up photo presented</i>	<i>Line-ups presented</i>
No Show-up Control	No Show-up	Target-Present & Target-Absent
TP Show-up Control	Target	Target-Present & Target-Absent
RDF Show-up+TP Line-up	RDF	Target-Present (w/ RDF) & Target-Absent
RDF Show-up+TA Line-up	RDF	Target-Present & Target-Absent (w/ RDF)

This manipulation was conducted within participants, such that two target faces (and corresponding line-ups) were presented for each condition.

line-up was randomised by the computer program across participants. Following each line-up identification task participants were asked to provide estimates of their confidence ranging from 1 (“not confident at all”) to 7 (“very confident”).

Participants were also asked to provide phenomenological judgements regarding their memory using Remember-Know-Guess alternatives (Gardiner & Richardson-Klavehn, 2000). Detailed instructions regarding the Remember-Know-Guess alternatives were provided to participants prior to their initiating the identification tasks, consistent with prior studies using this procedure. Participants were instructed to report a Remember judgement only if they could recall a specific detail or encoding context that they had thought about during the encoding phase (e.g., a specific facial attribute that caught their attention, or a resemblance of the face to someone they knew in everyday life, or an attribution they may have made about the person depicted), while Know judgements were to be made when a face appeared familiar to them but they lacked a particular episodic recollection of having studied the face during the encoding phase. Participants were reminded of these instructions following each identification decision. If participants did not select a face from the line-up, they were instructed to select “Not Present”, reflecting that they did not believe a target face was presented. After completing the 16 line-ups, participants provided basic demographic information and were then debriefed and thanked for their time.

RESULTS

Given the within-participants nature of the design and that multiple identification estimates were collected for each condition within participants, mixed factorial analysis of variance (ANOVAs) was conducted on both the identification and phenomenological data. Mean accuracy estimates

were calculated across responses within each condition for each participant, and these estimates were used in the analyses presented below. With regard to the phenomenological data, a nested mixed factorial ANOVA was used, such that we could assess the influence of choosing on the show-up task on subsequent reports of the phenomenological basis for choosing on the identification task. This nested design permitted us to control for the variance associated with trials conducted within participant. A p value of .05 was used across all analyses.

Show-up identifications

Show-up identifications were examined using a 2 (Study Time: 1s vs 3s) \times 2 (Target Presence: TP vs TA) mixed ANOVA. A main effect of Show-up Type indicated that participants were more likely to correctly identify a target face ($M = 0.83$, $SD = 0.28$) from a show-up than they were to falsely identify an RDF ($M = 0.30$, $SD = 0.47$), $F(1, 158) = 151.09$, $p < .001$, $\eta^2 = .49$. Neither the main effect of Study Time, $F(1, 158) = 2.98$, ns , $\eta^2 = .02$, nor the Study Time \times Target Presence interaction, $F(1, 158) = 0.53$, ns , $\eta^2 < .01$, was significant.

Line-up identification performance

Several 2 (Study Time: 1s vs 3s) \times 4 (Show-up Conditions: No Show-up Control, TP Show-up Control, RDF Show-up+TP Line-up, and RDF Show-up+TA Line-up) mixed ANOVAs were conducted to examine carryover effects for correct identification of the target face from TP line-ups, false identification of a foil or RDF from TA line-ups, and identifications of previous show-up members (i.e., targets and RDFs) from either TP or TA line-ups. Table 2 provides the means and standard deviations across the Show-up Condi-

TABLE 2
Mean identification decisions for each show-up condition

Identification decisions	Show-up conditions			
	No Show-up Control	TP Show-up Control	RDF Show-up + TP Line-up	RDF Show-up + TA Line-up
Correct identifications	.37 (.34)	.70 (.33)	.29 (.32)	.31 (.36)
False identifications	.42 (.38)	.42 (.35)	.40 (.38)	.62 (.35)
Previous show-up member	.17*	.70 (.33)	.34 (.35)	.46 (.33)

Standard deviations are denoted in parentheses. *Denotes chance identification from a six-person line-up array. Correct identifications stem from choosing the target face in a target-present line-up. False identifications stem from choosing a foil (non-target face) in a target-absent line-up.

tions for each of the line-up identification measures.

Correct identifications. Significant main effects of both Study Time, $F(1, 158) = 24.62, p < .001, \eta^2 = .14$, and Show-up Condition, $F(3, 474) = 61.92, p < .001, \eta^2 = .28$, were observed across correct identification responses; however, no interaction was observed, $F(3, 474) = 1.34, ns, \eta^2 = .01$. The main effect of Study Time indicated that, as expected, correct identification of the target was more likely in the 3-second ($M = 0.49, SD = 0.35$) compared to the 1-second ($M = 0.34, SD = 0.31$) encoding condition. For the main effect of Show-up Condition, follow-up tests confirmed predictions that correct identifications were more likely when the target face had been presented in the show-up phase and was repeated in a TP line-up (TP Show-up Control condition) compared with all other conditions ($0.33 < MD < 0.41, ps < .001$). In addition, correct identifications of the target face were significantly greater in the No Show-up Control condition when compared with the RDF Show-up+TP Line-up condition in which the RDF accompanied the target in the line-up, ($MD = 0.08, p = .03$), and marginally greater than performance in the RDF Show-up+TA Line-up conditions ($MD = 0.06, p = .08$). Thus, consistent with prior research on the carryover effect (Deffenbacher et al., 2006), viewing the RDF during the show-up identification phase interfered with participants' ability to identify the target face on the line-up task, particularly when the RDF was shown in the presence of the target face.

False identifications. A significant main effect of Show-up Condition was observed on false identifications, $F(3, 474) = 15.20, p < .001, \eta^2 = .09$. As predicted, significantly more false identifications were observed for the RDF Show-up+

TA Line-up condition compared to all other conditions ($0.20 < MD < 0.23, ps < .001$). This suggested that participants who saw a target-absent show-up were more likely to incorrectly select from a target-absent line-up, regardless of whether they had selected an innocent foil or the RDF. No main effect of viewing time was observed, $F(1, 158) = 0.38, ns, \eta^2 < .01$, nor any interaction, $F(3, 474) = 2.30, ns, \eta^2 = .01$.

Identification of previous show-up members ("carryover effects"). For this analysis we compared the frequency of line-up identification for faces (correct or incorrect) that had been displayed in the previous show-up identification phase (i.e., TP Show-up Control, RDF Show-up+TP Line-up, and RDF Show-up+TA Line-up conditions). Significant differences in identifications of previously seen show-up members were found between all conditions ($0.16 < MD < 0.36, ps < .01, F(2, 316) = 47.36, p < .001, \eta^2 = .23$). As displayed in Table 2, our results suggested that participants correctly identified the target most often from the target-present line-up in the TP Show-up Control condition, followed by false identification of the RDF when the target face was absent from the line-up array (RDF Show-up+TA Line-up condition), and that both of these conditions produced greater identification rates than participants who falsely identified the RDF when the target was present in the line-up array (RDF Show-up+TP Line-up condition). No main effect of viewing time was observed, $F(1, 158) = 0.29, ns, \eta^2 < .01$, nor any interaction, $F(2, 316) = 1.11, ns, \eta^2 = .01$.

Importantly, identification of the RDF in both the TP and TA line-up conditions reflected significant carryover effects when compared with chance identification of those faces from a six-person line-up array ($0.17 < MD < 0.29; ps <$

TABLE 3
Mean remember and know judgements as a function of show-up choice and show-up condition

Phenomenological judgement	Show-up identification	Line-up identification decision		
		Target identification TP show-up control	RDF identification TP line-up	RDF identification TA line-up
Remember	Choose	.66 (.47) ^A	.25 (.44)	.51 (.50) ^B
	Reject	.16 (.37) ^A	.38 (.48)	.29 (.46) ^B
Know	Choose	.24 (.43) ^C	.56 (.50)	.32 (.47) ^D
	Reject	.63 (.49) ^C	.42 (.49)	.50 (.50) ^D

Standard deviations are provided in parentheses. Values that share superscripts significantly differed at $p < .05$.

.001). Choosing the target face or RDF from the show-up identification task also contributed significantly to the likelihood of choosing the same face again during the line-up identification task. This was especially notable for participants who correctly identified the target face during the show-up task, with 78% of participants selecting the target from the line-up identification task as well, compared with only 35% of those who failed to identify him at the show-up phase but subsequently identified him from the line-up. For those choosing the RDF from the show-up and later being presented him in a TA line-up array, 74% falsely identified him again, compared with only 36% who rejected the show-up but later falsely identified him from the line-up. Finally, only 50% of participants who falsely identified the RDF on the show-up task identified him again when he was presented in a TP line-up array, compared with 35% who rejected the show-up but later falsely identified him from the line-up. The effects of choosing and “commitment” on a secondary identification task are clear in the present data and replicate previous findings in the carryover effect literature (cf. Dysart et al., 2001; Memon et al., 2002). As will be explored below, the phenomenology underlying these decisions may help to explain the identification patterns.

Phenomenological judgements

Finally, to better understand the basis of carry-over effects, we examined phenomenological judgements for decisions in which participants identified a previous show-up member (i.e., target or RDF faces). We were particularly interested in differences between those that chose vs rejected the initial show-up presentation. A 2 (Show-up Choice: choose vs reject) \times 3 (Show-up Condition: correct identification of the target in the TP Show-

up Control condition vs false identification of the RDF in the RDF Show-up + TP Line-up or RDF Show-up + TA Line-up conditions) mixed ANOVA was conducted separately for participants' judgements of recollection and familiarity for identifications of previously-viewed show-up members (i.e., target or RDF). Table 3 provides the means and standard deviations for Remember and Know judgements as a function of show-up choosing and show-up condition.

Given the conditional nature of the analysis and the need to control for responses within participants, a mixed-model nested analysis was conducted in which responses on the show-up and line-up tasks across the three conditions of interest were nested within participants. In this nested design, the appropriate procedure is to conduct a preliminary analysis to assess whether the variance attributable to responses nested within participants significantly exceeds the variance due to the responses across participants. If the preliminary analysis indicates that this is the case, then the nested factor and individual responses cannot be pooled, and the effects of interest must be tested with the larger nested variance. Conversely, if the preliminary analysis finds no significant effect for the nested factor, then the two error terms can be pooled (cf. Hopkins, 1982; Kenny & La Voie, 1985). We predicted that a significant proportion of variance would be associated with the participant factor, and that the effects of our independent variables would thus be tested from within this pool of variance. As expected, a significant main effect of the nested variable was observed for both Remember, $F(158, 478) = 1.40, p < .05$, and Know, $F(158, 478) = 1.36, p < .05$, judgements. As a result, all analyses of our independent variables were conducted using the larger nested variance.

Remember judgements. A significant Show-up Choice \times Show-up Condition interaction was found for Remember judgements, $F(2, 158) = 5.73$, $p = .004$, $\eta^2 = .02$. There was no significant main effect for either Show-up Choice, $F(1, 158) = 2.53$, *ns*, or Show-up Condition, $F(2, 158) = 2.26$, *ns*. Follow-up tests demonstrated that, as predicted, choosing either the target face or the RDF from the initial show-up task significantly *increased* estimates of recollection when participants subsequently identified the same face in either the TP Show-up Control or RDF Show-up+TA Line-up condition, when compared with participants who had previously rejected the show-up identification, $ps < .05$. However, no such difference existed for identifications of the RDF when the target face was also presented in the line-up array.

Know judgements. A significant Show-up Choice \times Show-up Condition interaction was also found for Know judgements, $F(2, 158) = 4.56$, $p = .012$, $\eta^2 = .06$. There was no significant main effect for either Show-up Choice, $F(1, 158) = 3.47$, *ns*, or Show-up Condition, $F(2, 158) = 0.90$, *ns*. Follow-up tests indicated that participants who rejected either the target face or the RDF from the initial show-up task reported significantly greater estimates of familiarity when subsequently identifying the same face in either the TP Show-up Control or RDF Show-up+TA Line-up condition, when compared with participants who had previously chosen the face in the show-up identification task, $ps < .05$. Once again, no such differences emerged for identifications of the RDF when the target face was also presented in the line-up array.

DISCUSSION

The current study examined the occurrence and phenomenology of eyewitness “carryover effects” in face identification in which exposure to (and/or identification of) faces from an initial identification phase influences performance on subsequent identification tasks (see Deffenbacher et al., 2006). In the current study we used a line-up recognition paradigm to assess the influence of an initial show-up identification phase on subsequent line-up identification attempts. In this paradigm we manipulated the repetition of targets and RDFs within participants such that

participants were exposed to multiple conditions in which the presentation of the target or RDF was varied during the show-up phase, and later these faces were again presented in either a TP or TA line-up array. We were particularly interested in both demonstrating the powerful effects of repeated presentation across identification phases and understanding the cognitive processes that might inform us about the nature of such carry-over effects in each condition.

As predicted, significant carryover effects were observed, suggesting that multiple presentations of the same individual (including both the target face and an RDF) can increase the likelihood of selecting that individual in a subsequent line-up task. For example, correct identification of the target face was highest when the target had been presented in all phases of the experiment—encoding, show-up identification, and line-up identification—compared to all other Show-up conditions. In contrast, false identifications were highest when the RDF was presented in the show-up identification phase and was later re-presented in a line-up in which the original target face was absent. These findings suggest that carryover effects are particularly prominent when the target or RDF is presented as the only repeated stimulus in the second identification array. Furthermore, consistent with prior research on the “commitment” effect (e.g., Dysart et al., 2001; Memon et al., 2002), identification of the target or RDF during the initial identification phase (i.e., our show-up task) significantly increased the likelihood that they would subsequently be identified under these conditions.

In addition, our data suggest that the presentation of show-up members who are not the original targets may distract witnesses from selecting the target in subsequent line-up tasks. For example, correct identification of the target face was significantly impaired when participants had been previously exposed to the RDF show-up. Furthermore, a competitive situation appeared when both the target and RDF faces were presented together during the line-up identification phase, resulting in fewer identifications of either the target or the RDF when compared with other conditions (similar to that observed in Hinz & Pezdek, 2001).

As noted in the introduction, three theoretical accounts have been proposed to explain carryover effects: commitment effects, source confusion, and dual-process models of recognition memory. In the current study, we used a phenom-

enological approach (Remember-Know-Guess judgements; see Gardiner & Richardson-Klavehn, 2000) to provide the first direct test of dual-process theory in this paradigm. Consistent with predictions suggested by other researchers (Hinz & Pezdek, 2001; Memon et al., 2002), our results indicated that participants who falsely identified the RDF both during the show-up phase and subsequently in the line-up phase reported an increase in *false recollection* judgements when the target face was not presented in the line-up array. As such, choosing on the initial show-up task appeared to create a strong contextual basis for erroneously identifying the face on a subsequent line-up task (see Memon et al., 2002). In contrast, those who rejected the RDF in an initial show-up, but who subsequently identified the RDF in a target-absent array, were more likely to base their identification on a more general sense of *familiarity*. Similar, yet beneficial, effects occurred for re-presentation of the target face. These findings are rather consistent with those predicted from a dual-process perspective and thereby provide a phenomenological basis for eyewitness carryover effects.

Given these important findings, we also recognise that caution should be applied when drawing conclusions and application from the present research. This is one of the first studies to examine carryover effects from show-ups, and the first to provide empirical evidence for the phenomenological basis underlying these types of identification decisions. Further research is needed to replicate these findings and to examine whether the phenomenological explanations hold for other intervening tasks (i.e., mugbooks, line-ups). In addition to replication and extension, we recognise that the effects may have been influenced by the unique *line-up recognition paradigm* used in the current study (cf. Meissner et al., 2005). Although we were able to demonstrate clear within-participant carryover effects using this paradigm, we recognise that this paradigm may have maximised possible source confusion by having participants view multiple faces in the absence of strong contextual information. While we used this laboratory paradigm to better understand the phenomenological basis for carryover effects, future research would benefit from examining these effects in more ecologically relevant paradigms.

In conclusion, this study adds to the growing body of research indicating that multiple identification tasks can impede accuracy of face identi-

fication. Based on the results of this study and others, it would be prudent for police to avoid conducting multiple identifications whenever possible. There are undoubtedly situations in which conducting multiple identifications is necessary to solve a crime; however, there are many cases in which the practice can be avoided without impeding the progress of an investigation. In the case of Troy Ruffa, for example, police could have employed a show-up with only one witness and then presented line-ups to all remaining witnesses. While it is impossible to know if this process would have prevented the false identifications of Ruffa, the possibility that these false identifications were the result of suggestive carry-over effects would have been eliminated.

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