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Eyewitness Confidence Malleability: Misinformation as Post-Identification Feedback

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Objective: Feedback from lineup administrators about identification accuracy significantly impacts witness confidence. In the current studies, we investigated the effect of post-identification feedback given 1-week after an initial, pristine lineup. We tested 2 kinds of feedback: typical feedback (i.e., about identification accuracy) and misinformation feedback. Misinformation feedback came in the form of suggestive questioning that falsely suggested the participant was either more or less confident in their initial identification than they actually reported. ***Hypotheses:*** We hypothesized both confirming misinformation and typical feedback would significantly inflate witness confidence relative to no feedback controls while disconfirming misinformation and typical feedback would deflate witness confidence relative to controls. ***Method:*** Across 2 studies, participants (N = 907), recruited via Amazon Mechanical Turk, watched a mock crime video, made an identification, and reported their confidence under unbiased lineup conditions. One week later, they received either confirming or disconfirming misinformation or typical feedback. They then provided a retrospective confidence judgment. ***Results:*** Misinformation feedback caused significant confidence change. Participants given false feedback that they were more confident in their initial identification than they reported later recalled greater initial confidence. Even when pristine identification conditions were used, typical confirming feedback caused participants to later remember greater confidence than they initially reported at the time of the lineup. Even in the absence of any feedback, control participants showed significant confidence inflation over time. ***Conclusion:*** These results highlight the need for lineup administrators to both ask for and document verbatim witness confidence at the time of the initial identification.

Public Significance Statement
The current studies highlight the importance of policies and procedures that prevent lineup administrators from providing witnesses with post-identification feedback after a pristine lineup. Although further replication with varying types of lineups (e.g., target-absent) is needed, our results stress the need to both collect and document confidence verbatim at the time of the initial identification procedure.

Keywords: post-identification feedback, eyewitness confidence, misinformation, choice blindness

Supplemental materials: http://dx.doi.org/10.1037/lhb0000369.supp

One of the most powerful factors in jurors' assessments of the strength of an eyewitness' identification is the level of confidence the witness expresses (Cutler, Penrod, & Dexter, 1990). Indeed, compared with witnesses reporting low confidence, confident witnesses are remembered as having paid more attention to a crime and having had a better view of a crime (Bradfield & Wells, 2000).

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Even if expert testimony is presented emphasizing that confidence and accuracy are not always related, jurors still tend to rely on confidence (Fox & Walters, 1986). Jurors believe the testimony of highly confident witnesses and view this evidence as strongly probative of guilt. However, not all highly confident witnesses make a correct identification, or, put another way, inaccurate witnesses can be highly confident.

One reason for the complex relationship between eyewitness confidence and accuracy is that confidence is not one, fixed judgment that remains stable over time (Quinlivan, Wells, & Neuschatz, 2010). Rather, confidence is malleable and a variety of factors from the time of the crime until the conclusion of a case can influence a witness' confidence in their identification. Whereas initial confidence gathered from a pristine lineup can be highly related to accuracy, confidence reports given by witnesses at later points, such as when testifying at trial, are usually not related to accuracy (Wixted & Wells, 2017). One common mechanism by which a witness confidence may change over time is when they are exposed to post-identification feedback. This postevent information is sometimes in the form of direct feedback about whether a witness picked the suspect from the lineup or other times in the form of other information that indirectly suggests the identification was accurate.

The post-identification feedback effect describes the process by which a witness' confidence changes after their identification due to feedback or suggestion after a lineup (Wells & Bradfield, 1998). There are numerous real-world cases where confidence was relatively low at the time of an identification, but later, at trial, confidence was high (see Garrett, 2011). Notably, this change in confidence occurs without any impact on accuracy, impairing the confidence-accuracy relationship (Steblay, Wells, & Douglass, 2014). Most commonly, in laboratory studies, the effect of feedback is studied through a statement by the lineup administrator that informs the witness they either made a correct or incorrect identification (Wells & Bradfield, 1998). This feedback is typically given immediately after the witness makes their lineup decision (although see Quinlivan, Neuschatz, Douglass, Wells, & Wetmore, 2012). Witnesses who receive confirmatory feedback (i.e., that they picked the suspect from the lineup) report greater confidence compared with those receiving no feedback. Similar results, in the opposite direction, are typically found for disconfirming feedback.

Meta-analyses have shown that the effect of disconfirming feedback on confidence is smaller than the effect of confirming feedback (Steblay et al., 2014). One reason for this might be that witnesses selectively attend to confirming feedback (Charman, Carlucci, Vallano, & Gregory, 2010). People tend to seek out information that confirms their prior beliefs and scrutinize information that does not (Lord, Ross, & Lepper, 1979; Nickerson, 1998). Confirming feedback is self-relevant and ego-inflating; it tells the witness they got the right answer, and this can play into people's strong desire to view themselves in a positive light (Wells & Quinlivan, 2009). Conversely, disconfirming feedback is less relevant to people's need to maintain a positive self-image and so may be less salient and impactful.

post-identification feedback has a robust and wide-ranging effect on witness memory. Not only does feedback influence identification confidence, but it also affects witness memory in other areas including qualities of the witnessed event (e.g., view), qualities of the identification task (e.g., time to make identification), and summative qualities of the witnessed experience (e.g., willingness to testify; Wells & Bradfield, 1998). For example, witnesses who receive confirmatory feedback, relative to those who do not, report having had a better view of the crime and having paid more attention to the crime. These memory judgments are important as they are criteria used by the courts to determine the reliability of an identification (*Neil v. Biggers,* 1972). Thus, feedback not only distorts the confidence-accuracy relationship, but it also distorts other judgments that triers of fact use to determine witness reliability.

The post-identification feedback effect occurs under a variety of conditions. The confidence distorting effects of feedback occur with target-present and target-absent lineups (e.g., Bradfield, Wells, & Olson, 2002), with biased and unbiased lineup instructions (e.g., Semmler, Brewer, & Wells, 2004), for lineup identifications and lineup rejections, and for correct and incorrect identifications (Steblay et al., 2014). However, one area of the post-identification feedback literature that has received less empirical attention is the type of feedback used. In most extant studies, feedback occurs in the same form: a statement from the lineup administrator about the accuracy of the witness' identification (e.g., "good, you have identified the suspect"; Wells & Bradfield, 1998). We refer to this kind of feedback (i.e., feedback given by the lineup administrator about identification accuracy) as *typical feedback* as the vast majority of post-identification feedback studies, including those used in the most recent meta-analysis (Steblay et al., 2014), use this type of feedback.

However, the effects of feedback on confidence and witness memory are not limited to only this kind of feedback. Other, less direct, kinds of feedback produce similar effects such as telling the witness, "Thank you. You have been a really great witness." (Dysart, Lawson, & Rainey, 2012) or "This study has now had a total of 87 participants, 84 of them made the same decision as you!" (Semmler et al., 2004). Postevent information does not even need to be from the lineup administrator. For instance, if a witness learns about other evidence in the case, such as that the person they identified confessed to a crime, this can cause confidence inflation (Hasel & Kassin, 2009). That similar effects occur regardless of feedback type suggests that studies using different kinds of feedback are not investigating independent effects, but rather "that the cognitive processes involved in confidence assessment transcend the specific paradigm in which the phenomenon is examined and the specific manipulations used within those paradigms" (Charman et al., 2010, p. 214).

Reducing the Post-identification Feedback Effect

Given the power of feedback to damage memory, several solutions have been proposed for how to reduce or eliminate feedback. The most common of these recommendations are to document confidence immediately after the first identification and to use double-blind lineups (National Research Council, 2014). If lineup administrators are blind (i.e., they do not know the identity of the suspect), then they cannot provide any intentional or unintentional cues to the witness about whether they made a correct identification or have been a good witness. However, double-blind lineups only eliminate some kinds of feedback, specifically feedback that occurs at the time of the initial lineup. Post-identification feedback does not always occur at this time, rather it can happen at any time

such as during pretrial preparation, interactions with the media, or when the witness recounts the event to family or friends.

One way in which witnesses are likely to be exposed to information about whether they made an accurate identification is during pretrial preparation with prosecutors or follow-up interviews by police (Wells, Olson, & Charman, 2003). Even if an initial lineup was conducted in a double-blind manner, later interviews with a witness are likely to be conducted by an officer associated with the case. Thus, even if the first identification and statement of confidence occur under double-blind conditions, this later interview may contain feedback or suggestion that can influence a witness' confidence and affect their memory about their witnessed experience. This is especially problematic if law enforcement does not document confidence at the first identification procedure and instead rely on retrospective confidence, which may occur in a substantial minority of law enforcement agencies (Police Executive Research Forum, 2013).

During a follow-up interview, police may ask witnesses to confirm or elaborate on details of their statement or their identification and these questions may be asked in a leading manner. In one study testing this process experimentally, participants were randomly assigned to serve as either a witness or investigator (Maclean, Brimacombe, Allison, Dahl, & Kadlec, 2011). Witnesses watched a mock crime video alone and were either given confirming feedback about their identification or not. They then were interviewed by the investigator. Investigators were given general guidelines about the kinds of questions to ask the witnesses but were encouraged to develop their own questions and interviewing style. Later, a separate group of participants watched the videotaped interactions between the witness and investigator and rated the manner in which investigators asked witnesses about their confidence. Results revealed over half of investigators asked about confidence in a leading manner (i.e., "so you are pretty confident in the choice you made?"). This kind of leading question can be viewed as a kind of post-identification feedback if the officer implies in the question a greater level of confidence than the witness initially expressed.

Typical feedback at the time of the lineup may actually be decreasing in likelihood in the field. Since the 1990s, many law enforcement agencies have shifted to use unbiased lineup instructions and double-blind lineups (Kovera & Evelo, 2017; Police Executive Research Forum, 2013). These reforms both help improve the overall quality of eyewitness evidence and specifically reduce the probability of typical feedback at the time of the initial identification. As law enforcement agencies continue to adopt these reforms, the probability of typical feedback, specifically at the time of the initial identification procedure, will diminish. This highlights the need to study both the effects of feedback at later time points and to study new kinds of feedback that can occur at these times. Does delayed feedback received after an initial, pristine lineup still impact witness memory?

Current Studies

In the current studies, we expand research on the post-identification feedback effect in two main ways. First, we used a new paradigm, drawn from research on misinformation and memory blindness (Cochran, Greenspan, Bogart, & Loftus, 2016), to test the effect of feedback one week after an initial identification. Across two studies, participants completed a two-session experiment. In Session 1, they watched a mock crime video, made an identification, and rated their confidence. The lineup procedure was designed to use best practice principles: the lineup was double-blind, unbiased witness instructions were used, witnesses were allowed to reject the lineup, and confidence was gathered immediately after the identification (National Research Council, 2014). One week later, participants completed Session 2 where they received either confirming, disconfirming, or no post-identification feedback, again rated their confidence in their identification and also answered questions about their witnessed experience for the crime. Unlike most past studies that test the effect of feedback on confidence by comparing confidence between feedback and no feedback conditions at the same time point, in the current studies we tested for the effect of feedback on how remembered confidence changes over time.

Another feature of the current studies is that we investigated feedback in a new form. There are reasons to believe feedback given at a delay might differ from feedback during the initial identification procedure. At that time of the initial identification, statements about whether the witness identified the suspect might be more natural, but this kind of statement might be less likely during a follow-up interview. Thus, the current studies test both the impact of typical post-identification feedback about identification accuracy and a new type of feedback, which we refer to as *misinformation feedback*.

This misinformation feedback occurred in the form of suggestive questioning. During Session 2, we gave participants false feedback that their original confidence statement was either higher or lower than what they actually reported. As an example of this type of feedback, think of a witness who initially says he or she was "only 60% sure" but is later falsely reminded that he or she previously said, "really sure, 80% sure." We explore the extent to which this misinformation feedback has the same or similar effect on witness memory as typical feedback.

We hypothesized that misinformation feedback would have a similar effect on witness memory as typical feedback. Specifically, that confirming misinformation feedback would cause an increase in witness confidence and higher scores on the posttest questions about witnessed experience relative to those given no feedback. We also hypothesized that disconfirming misinformation feedback would cause a decrease in witness confidence and lower scores on the posttest questionnaire relative to no feedback controls but that this effect would be smaller than confirming feedback.

Study 1

Method

Participants. We recruited participants on Amazon Mechanical Turk via TurkPrime to take part in a two-session study (Litman, Robinson, & Abberbock, 2017). This study was approved by the University of California, Irvine Institutional Review Board. Of the 607 participants who completed Session 1, 523 completed Session 2 resulting in an 86% response rate. We removed seven participants from analysis due to problems with the video, one participant for responding to all free-response questions in Spanish, and two participants for withdrawing their consent after debriefing, leaving a final sample of 513. The sample included

slightly more women (55%) than men, with an average age of 37.1 years (SD = 12.4). Participants were mostly White/Caucasian (74%), with a minority identifying as Black/African American (7%), Hispanic/Latino (6%), or Asian/Asian American (10%).

Materials and procedure.

Session 1. Participants first completed an informed consent (see Appendix A for a flowchart of Study 1 procedures). The cover story for the study indicated that the purpose of the experiment was to investigate how people perceived and evaluated others. Participants watched a short (~50s) mock crime video (Murphy & Greene, 2016). In the video, a woman enters an office and searches through several items on a messy desk. During the video, she steals several objects including a laptop. After the video, participants completed filler tasks consistent with the experiment's cover story (e.g., reading short stories and responding to questions about the characters and plot of the stories).

Following these filler tasks, we informed participants that the true purpose of the study was actually to investigate eyewitness memory and that they would next answer questions about the video similar to that asked of eyewitnesses to real crimes. The memory test consisted of seven multiple-choice questions about events in the video followed by a lineup. These questions asked about relevant topics, such as the item stolen from the desk, in order to disguise the focus of the study solely on the lineup. After each of the questions, participants rated their confidence in their answers on a sliding scale from 0 to 100.

Finally, participants were shown a five-person, target-present lineup. The lineup contained unbiased instructions (e.g., the perpetrator may or may or may not be in the lineup). Extant research has shown that the effect of typical feedback is generally largely for those who made an incorrect, compared with a correct, identification (Steblay et al., 2014). We chose to use target-present lineups in the current study in order to investigate if this pattern also held for misinformation feedback. Participants could select one of the five photos or reject the lineup by using a response option labeled "none of the above." Following their identification, participants reported their confidence on a 0 to 100 sliding scale. Before finishing the study, participants answered demographic questions and received a reminder about Session 2.

Session 2. One week after completing Session 1, Session 2 became available to participants. At this time, participants received a reminder e-mail that asked them to complete the study that day. They also received a follow-up e-mail that afternoon. For each remaining day for five days, participants who had not yet completed the study received a reminder e-mail. The average time between completion of the two sessions was 7.0 days (SD = 0.8), indicating most participants had the same one-week retention interval between completing the lineup in Session 1 and receiving feedback in Session 2.

At the beginning of Session 2, participants were told that we were interested in their memory of the video and they began by answering three free-response questions. These questions asked them about their confidence in their answers to the questions about the video in Session 1.

For the first question, we reminded participants of their answer to one of the filler multiple-choice questions from Session 1 and their confidence in that answer. They were then asked to explain more about their confidence. In Session 1, one of the multiple-choice questions asked about what item was stolen from the office. If a participant answered that the item stolen was a laptop and that they were 80% confident in this answer, the prompt read as follows:

> In Session 1, you saw the female thief search through several items on the desk. Before she left, she stole something off the desk and left with it. Last session, we asked you about your memory for the theft. You reported that the item she stole was a laptop and that on a 0 to 100 scale you were 80% certain in that answer. Can you tell us more about why you felt you were 80% certain that she stole a laptop? Please try to be as detailed as possible in your response.

Participants elaborated on the reasons for their confidence using a free-response box. Following this, participants answered a second free-response question asking them to elaborate on their confidence to another one of the filler, multiple-choice questions from Session 1. The purpose of these two questions was to acclimate participants to the task and build trust before the manipulation.

At this point, participants were randomly assigned to one of three conditions: misinformation increase (MI), misinformation decrease (MD), or control. The MI condition was designed to mirror typical confirming feedback (TCF) and the MD condition was designed to mirror typical disconfirming feedback (TDF). However, because misinformation feedback does not directly give confirming or disconfirming information about a witness' identification decision, we use the terms misinformation increase and misinformation decrease to describe these conditions. We used modified random assignment on a 2:2:1 ratio such that for every participant assigned to the control condition, two would be assigned to the MI condition and two to the MD condition. The purpose of this modified random assignment was to maximize power in the misinformation conditions.

In the MI and MD conditions, participants were asked a third elaboration question, which was to elaborate on their confidence in their identification. The following prompt for this question was like that of the preceding two:

> Near the end of Session 1, you were shown several photographs and asked to identify the female thief. You were then asked to rate your certainty in this choice on a 0 to 100 scale. You told us you were X% certain in your identification choice. Can you tell us more about why you were X% certain in your answer? Please try to be as detailed as possible in your response.

In the MI condition, the number displayed in the prompt was 20 points higher than what the participant originally reported in Session 1. In the MD condition, the number displayed in the prompt was 20 points lower than what the participant originally reported in Session 1. Following these elaboration questions, participants completed a posttest questionnaire.

Participants in the MI and MD conditions who gave certainty judgments near the endpoints of the scale represented a unique subset of cases. Participants in the MI condition who gave a confidence judgment of 81 or higher and participants in the MD condition who gave a confidence judgment of 19 or lower could not have their confidence manipulated a full 20 points as this would result in a response beyond the range of the scale. Thus, participants in the MI condition who gave a confidence judgment of 81 or higher were assigned to receive feedback that they rated their confidence as a 98. For the MD condition, participants who originally gave a confidence judgment of 19 or lower were as-

signed to receive feedback that they originally rated their confidence as a 2. Two and 98 were chosen rather than 0 and 100 as these numbers are particularly salient responses and thus may have stood out to participants.[1]

Participants in the control condition were not asked the third question about identification confidence. In the control condition, after completing the two filler elaboration questions, participants moved on to complete the posttest questions.

The posttest questionnaire was designed to assess the witness' retrospective memory about their witnessed experience (see the online supplemental material; Smalarz & Wells, 2014; Wells & Bradfield, 1998). Example questions asked included "How good of a view did you get of the thief?" and "How easy or difficult was it for you to figure out which person in the photo lineup was the thief from the video?" These questions were answered on a 0 to 10 scale with higher numbers indicating a better witnessed experience. Crucially, this is where witnesses provided a second confidence judgment. This confidence statement was retrospective in nature. Specifically, witnesses were asked the following question: "At the time you answered the memory questions in Session 1, how certain were you that the person you identified from the photo lineup was the person you saw in the video?" They answered this question on a 0 to 100 sliding scale.

Finally, participants completed a funneled debriefing procedure to assess whether they detected, or noticed, the misinformation feedback (see the online supplemental material). Debriefing began with vague questions that first probed whether the participant noticed anything odd during the study. The questions became increasingly specific, asking if there was anything strange specifically about the elaboration task. This funneled debriefing process mirrored that of past research that used this kind of false feedback paradigm (Johansson, Hall, Sikström, & Olsson, 2005). At the end of the study, all participants were fully debriefed and allowed to withdraw their consent.

Measures.

Confidence change. Confidence change was defined as the difference between participants' initial confidence at Session 1 and their retrospective confidence reported at Session 2. To calculate, we computed a difference score by subtracting participants' Session 1 confidence from their Session 2 confidence. A positive confidence change score indicated confidence inflation over time (i.e., higher confidence at Session 2 than at Session 1). A witness showing confidence inflation would be one who remembered greater confidence at Session 2 than they initially expressed at Session 1. A negative confidence change score indicated confidence deflation over time (i.e., lower confidence at Session 2 than at Session 1).

Detection. We assessed whether participants noticed, or, detected the misinformation feedback in two main ways: concurrent detection and retrospective detection (Johansson et al., 2005). Concurrent detection was defined as detection that occurred immediately at the time the feedback was presented. This was assessed based on participants' responses when they were asked to elaborate on their identification confidence at the beginning of Session 2 (see Table 1). Concurrent detection was measured independently by two research assistants. Coders, blind to condition, read participants' responses when they elaborated on their confidence in their identification and coded whether participants reported noticing that the confidence displayed in the prompt differed from their Session 1 confidence. Retrospective detection was coded based on participants' responses to the funneled debriefing (see the online supplemental material for a full description of retrospective coding). Participants were coded as retrospectively detecting the manipulation if they reported during the funneled debriefing that they were aware of the misinformation feedback.

Posttest questionnaire. The posttest questionnaire contained 13 questions asking about the participants witnessed experience. One of these was the retrospective confidence question which was assessed separately. The remaining 12 questions contained a mixture of subjective questions, for which there is no correct answer (e.g., "How much attention were you paying to the thief's face while watching the video?"), and objective questions, for which there is a correct answer (e.g., "How much time would you estimate that you saw the thief's face for?"). Past research has shown that typical post-identification feedback affects witnesses responses to subjective, but not objective posttest questions (Douglass, Brewer, & Semmler, 2010). Thus, we combined the 10 subjective questions into a composite variable ($\alpha = .86$) to test for the effects of feedback on subjective witnessed experience questions. Higher numbers on the posttest composite indicate the witness had a better view, paid more attention, et cetera. The effect of feedback on the two objective questions was tested separately.

Results

Lineup. In this study, we were primarily interested in the memory reports of witnesses who made an identification from the lineup. Past research has shown that post-identification feedback influences witnesses that both make a lineup selection and reject the lineup (Semmler et al., 2004). However, in the current study, we made an a priori decision to focus on only witnesses making a lineup selection. Unlike typical feedback that can occur after both a lineup selection and a lineup rejection, the kind of misinformation feedback we used here seems unlikely to occur for witnesses making a lineup rejection. That is, if a witness makes a lineup rejection, it would be unlikely for them to be asked about their confidence in their rejection during a follow-up interview. One way to ensure all witnesses make a lineup selection is to use biased witness instructions. We chose to use unbiased witness instructions here because we wanted to approximate best practice procedures in the field which recommend using unbiased instructions and allowing for lineup rejections. Thus, we excluded participants who made a lineup rejection ($N = 131$) and did not analyze their data.

Most participants who made an identification identified the suspect in the lineup (66%). Rates of filler identifications indicate no one filler received a disproportionate number of identifications

[1] For the 25 participants in the MI group who received the partial manipulation, the manipulated confidence displayed in the question prompt was average of 8.0 points ($SD = 6.1$) higher than their Session 1 confidence. For the 21 participants in the MD group who received the partial manipulation, the manipulation displayed in the question prompt was average of 7.0 points ($SD = 5.3$) lower than their Session 1 confidence. This modified manipulation did create another issue for participants in the MI group who rated their initial confidence as 98 or above and participants in the MD group who rated their initial confidence as 2 or below. For this small subset of participants, the displayed confidence in the feedback prompt either correctly displayed their initial confidence or displayed a number in the opposite direction of their feedback condition. Because of this, we removed these participants from further analysis ($N = 5$).

Table 1
Example Responses to Confidence Elaboration in Study 1

Response	Condition	Session 1 confidence	Session 2 confidence	Concurrent detector	Retrospective detector
Did I? 100%? I remember a nice-looking girl with gray eyes and dark hair. I do not remember selecting 100%, honestly.	MI	80	49	Yes	Yes
I felt this match the same size and facial features of the perpetrator. Also, the image struck right out to me.	MI	63	74	No	Yes
I believe it was at only 62% because there were other faces that looked to have had similar characteristics to the one I chose.	MD	82	70	No	Yes
The girl's features were same and she looked like the same girl who stole things. Her expressions were different so a bit of confusion.	MD	98	91	No	No

Note. Minor changes were made to the responses for spelling and clarity. MI = misinformation increase; MD = misinformation decrease.

(10%, 8%, 6%, 10%). Initial lineup confidence was near the midpoint of the scale (M = 53.4, SD = 26.3). An independent samples t test was conducted to investigate whether Session 1 confidence differed between those making a target and filler identification. Results revealed that participants making a target identification (M = 55.8, SD = 26.3) reported significantly higher confidence than those making a filler identification (M = 48.5, SD = 25.7), $t(374) = 2.58$, $p = .010$, $d = 0.28$, 95% CI [0.07, 0.49].

Detection. Concurrent detection was assessed via participants' responses when elaborating on their identification confidence during Session 2. Two coders evaluated these responses and were highly consistent, only disagreeing on one participant's response. Given the small number of detectors, in instances of disagreement, the participant was coded as a detector.

Of the 153 participants in the MI condition, three were coded as concurrently detecting the manipulation. Of the 149 participants in the MD condition, two were coded as concurrently detecting the manipulation. While this detection rate is lower than some past studies using this type of false feedback manipulation (e.g., Sagana, Sauerland, & Merckelbach, 2014), other studies using a 20-point manipulation on a 0 to 100 scale have similarly found low rates of concurrent detection (Urban et al., 2019).

In the MI condition, 27% of participants were coded as retrospectively detecting the manipulation compared with 34% in the MD condition. It is important to note that while concurrent detection may underestimate the true number of detectors (in that participants may notice the manipulation but not report it), retrospective detection likely overestimates the true number of detectors. Participants may simply be guessing in response to these questions or may be influenced by demand characteristics. Retrospective detection may best be thought of as an upper-bound limit on detection and the true number of detectors is likely somewhere between the concurrent and retrospective estimates (Taya, Gupta, Farber, & Mullette-Gillman, 2014; Urban et al., 2019). Overall, these results indicate that the majority of participants failed to detect the misinformation feedback.

Confidence change. Confidence ratings in Session 1 and Session 2 are displayed in Table 2. To begin our analyses, we conducted a series of paired-sample t tests to investigate whether confidence changed significantly in each condition over time. In the control condition, participants' confidence at Session 2 did not change significantly from their confidence at Session 1. However, in the misinformation conditions, results showed evidence of significant confidence change over time. In the MI condition, participants' confidence at Session 2 was significantly greater than their confidence at Session 1. In the MD condition, participants' confidence at Session 2 was significantly lower than their confidence at Session 1. This provides initial evidence that our manipulation significantly affected participants' Session 2 confidence ratings.

To further analyze confidence change over time, we calculated a confidence change score by subtracting participants' Session 1 confidence from their Session 2 confidence. Positive numbers on the confidence change score indicate confidence inflation and negative numbers indicate confidence deflation. To test whether confidence change scores differed between conditions, we conducted a one-way analysis of variance (ANOVA). Results revealed a significant effect of condition, $F(2, 374) = 34.68$, $p < .001$, $\eta_p^2 = 0.16$, 95% CI [0.09, 0.22]. We then conducted planned, post hoc Dunnett tests comparing the misinformation conditions to the control condition. We found only partial support for our hypothesis. The MD condition differed significantly from the control condition ($p < .001$), but there was no significant difference between the MI and control conditions ($p = .256$).

Table 2
Confidence Change in Study 1

Condition	N	Session 1 M (SD)	Session 2 M (SD)	t	df	p	d	[95% CI]
Control	75	53.4 (27.3)	56.4 (24.0)	1.18	74	.241	0.13	[−0.19, 0.45]
MD	149	53.6 (27.6)	42.1 (29.5)	7.03	148	<.001	0.55	[0.32, 0.78]
MI	153	53.1 (24.5)	60.0 (27.1)	4.62	152	<.001	0.40	[0.18, 0.63]

Note. Table shows the results of paired sample t tests. MD = misinformation decrease; MI = misinformation increase.

We predicted that the effect of the manipulation on confidence change would be greater for those in the MI condition than those in the MD condition. To test this, the confidence change scores in the MD group were multiplied by −1 for this analysis to test overall change in the predicted direction (i.e., how many points on the confidence scale the participant moved in the direction of the manipulation). Results did not support our hypothesis. An independent samples *t* test revealed the degree of change in the MD condition was actually significantly greater than it was in the MI condition, $t(300) = 2.08$, $p = .039$, $d = 0.24$, 95% CI [0.01, 0.47]. Participants in the MD condition moved an average of 11.5 points ($SD = 20.1$) from Session 1 to Session 2, whereas participants in the MI condition moved an average of 6.9 points ($SD = 18.5$).

Past research has shown that the effect of TCF is greater for filler identifications than for target identifications as those making a filler identification may have a weaker initial memory to begin with (Bradfield et al., 2002). To test whether this result was replicated in the current study, a 3 (condition: MI, MD, control) × 2 (identification decision: target, filler) ANOVA was conducted. Results revealed a significant main effect of condition, $F(2, 370) = 30.45$, $p < .001$, $\eta_p^2 = 0.14$, 95% CI [0.08, 0.20], and a significant main effect of identification decision, $F(1, 370) = 5.68$, $p = .018$, $\eta_p^2 = 0.02$, 95% CI [0.00, 0.05]. However, these were qualified by a significant condition by identification decision interaction, $F(2, 370) = 3.28$, $p = .039$, $\eta_p^2 = 0.02$, 95% CI [0.00, 0.05], see Table 3.

To investigate this interaction further, we investigated simple effects by conducting independent sample *t* tests (see Table 3). For the MI and MD conditions, there was no significant difference in confidence change between those who made a target and filler identification. The interaction was primarily driven by participants in the control condition. Participants in the control condition who made a filler identification showed significantly greater confidence inflation than participants who made a target identification. Indeed, control participants who made a target identification did not change their confidence significantly from Session 1 ($M = 58.2$, $SD = 26.5$) to Session 2 ($M = 57.3$, $SD = 24.1$), $t(51) = 0.28$, $p = .780$, $d = 0.04$, 95% CI [−0.35, 0.42]. On the other hand, control participants who made a filler identification were significantly more confident at Session 2 ($M = 54.2$, $SD = 24.2$) than they were at Session 1 ($M = 42.4$, $SD = 26.2$), $t(22) = 3.52$, $p = .002$, $d = 0.47$, 95% CI [−0.12, 1.05]. We called this finding of confidence inflation even in the absence of suggestive feedback "natural confidence inflation."

Posttest questions. We next tested whether our misinformation feedback manipulation would affect responses to posttest questions about witnessed experience. We first created a composite of the 10 subjective posttest questions ($\alpha = .86$, $M = 5.4$, $SD = 1.7$), see the online supplemental material for more information on individual items. Higher scores on the posttest composite indicate the witness had a better witnessed experience (e.g., better view, more willing to testify). We predicted that scores on the posttest composite would differ between conditions. Results supported our hypothesis. A one-way ANOVA revealed a significant main effect of condition, $F(2, 374) = 6.82$, $p = .001$, $\eta_p^2 = 0.04$, 95% CI [0.01, 0.08]. We then conducted planned, post hoc Dunnett tests. Similar to the findings regarding confidence change, there was a significant difference in the posttest composite between the control and MD conditions ($p = .012$), but not the control and MI conditions ($p = .999$). Participants in the MD condition ($M = 5.0$, $SD = 1.7$) reported a significantly worse witnessed experience than participants in the control condition ($M = 5.7$, $SD = 1.4$).

Next, we tested whether the manipulation affected participants responses to the two objective questions not usually affected by typical post-identification feedback. Neither ratings of viewing time, $F(2, 374) = 1.52$, $p = .221$, $\eta_p^2 = 0.01$, 95% CI [0.00, 0.03], nor viewing distance, $F(2, 374) = 0.45$, $p = .636$, $\eta_p^2 < 0.01$, 95% CI [0.00, 0.02], were significantly affected by condition. This provides good divergent validity that our novel manipulation operated similarly on subjective and objective witnessed experience questions as typical post-identification feedback.

Discussion

The results of Study 1 demonstrate that misinformation feedback given one week after an initial, pristine lineup influences witness memory. Participants who received misinformation feedback that their confidence was higher than they originally reported later reported remembering more confidence in their identification. Similarly, participants who received the suggestion that their confidence was lower than they originally reported later reported remembering less confidence in their identification.

We predicted that confidence change in the MI condition would be greater than that of controls and that confidence change in the MD condition would be less than that of controls. We also predicted this pattern of findings would occur for the posttest questionnaire. Although the results were in the predicted direction for both the MI and MD conditions, only the comparison between the MD and control condition was statistically significant. One reason for this might be the unexpected pattern of results in the control condition. The control condition was designed to be a neutral comparison group. We did not predict to find natural confidence inflation for filler identifications in the control group. Most past studies investigating the post-identification feedback effect have compared the confidence of participants who have received feedback to those participants who have not at the same time point. In

Table 3
Confidence Change by Condition and Lineup Decision in Study 1

Condition	Filler ID *n*	Filler ID *M* (*SD*)	Target ID *N*	Target ID *M* (*SD*)	*t*	*df*	*p*	*d*	[95% CI]
Control	23	11.8 (16.1)	52	−0.9 (23.2)	2.38	73	.020	0.60	[0.10, 1.10]
MD	55	−8.0 (23.1)	93	−13.7 (17.9)	1.67	146	.096	0.28	[−0.05, 0.62]
MI	50	5.5 (19.0)	103	7.6 (18.4)	0.64	151	.521	0.11	[−0.23, 0.45]

Note. Table shows the results of independent sample *t* tests. ID = identification; MD = misinformation decrease; MI = misinformation increase.

this study, our focus was on comparing confidence change over time between feedback conditions. Whereas this revealed the notable and important finding of natural confidence inflation, it may have also affected the purpose of the control condition to serve as a baseline comparison. Because of the potential implications of this finding, we sought to replicate it in Study 2.

Based on past research on the effect of typical confirming and disconfirming feedback (Steblay et al., 2014), we predicted that MI feedback would have a stronger impact on confidence than MD feedback. However, results did not support this hypothesis. Overall confidence change in the MD condition was greater than that of the MI condition. This may have been a result of the novel paradigm used here. Thus, a major goal of Study 2 was to compare the effects of both misinformation feedback and typical feedback on confidence within a single experimental study. We hypothesized that both typical and misinformation confirming feedback would cause significant confidence inflation compared with no feedback controls and that typical and misinformation disconfirming feedback would cause significant confidence deflation compared with no feedback controls.

Study 2

Method

Participants. We recruited participants for Study 2 in the same manner as in Study 1 and the study was approved by the University of California, Irvine Institutional Review Board. In Session 1, 797 participants completed the survey. Of these, 697 also completed Session 2 leading to an 87% response rate. We removed three participants from analysis for withdrawing their consent after the final debriefing and two for responding to all free-response questions in Spanish. As in Study 1, we were primarily interested in the effect of feedback on identification confidence, so we did not analyze data for participants who made a nonidentification ($N = 153$). This resulted in a final sample of 539.

Participants were on average 36.7 years old ($SD = 12.5$, 55% female). Most participants identified as White/Caucasian (71%), with a minority identifying as Black/African American (12%), Asian/Asian American (7%), or Hispanic/Latino (5%).

Materials and procedure. Study 2 took place in two sessions, one week apart (see Appendix B for a flowchart of Study 2 procedures). The procedure for Session 1 of Study 2 was the same as Session 1 of Study 1. Participants completed an informed consent, watched the same mock crime video, completed filler tasks, and then finished with a memory test including making an identification from the same five-person, target-present lineup.

At the beginning of Session 2, all participants again completed an informed consent. Following this, we reminded participants about the video from Session 1 and asked them to elaborate on their confidence in their answers to two of the filler, multiple-choice, memory questions from Session 1. All participants completed these two free-response questions in the same manner as in Study 1.

At this point, participants were randomly assigned to one of five conditions: control, MI, MD, TCF, or TDF (see Table 4). Modified random assignment was not used in Study 2 as one of the goals of the study was to explore natural confidence inflation in the control condition.

The MI and MD conditions in Study 2 mirrored that of Study 1. Participants in these conditions, after answering the two filler memory elaboration questions, answered a third question about their identification confidence. They were "reminded" of their confidence in their identification at Session 1 and asked to elaborate on why they expressed this level of confidence. In the MI condition, the "reminder" indicated a confidence score that was 20 points higher than what the participant reported in Session 1 and in the MD condition the reminder was 20 points lower than what participants originally reported in Session 1. Participants near the endpoints of the scale who could not be manipulated a full 20 points were treated in the same manner as in Study 1.[2] After this third elaboration question, participants in the misinformation conditions completed the posttest questionnaire.

In the two typical feedback conditions, participants completed the two filler elaboration questions but were not shown the third question about identification confidence. Instead, after completing the two filler questions, they received further instructions that read as follows:

> Near the end of Session 1, you were shown several photographs and asked to identify the female thief. You selected one of the women in the lineup and then rated how certain you were that she was the thief on a 0 to 100 scale. Many participants are interested in whether the person they picked was the actual thief from the video.

For participants in the TCF condition, these instructions were followed by the statement, "Good job, you correctly identified the actual thief from the video." For participants in the TDF condition, the statement instead read, "Sorry, you did not correctly identify the actual thief from the video." The survey required participants to stay on this page for a short period of time before advancing to ensure they did not simply click through the feedback. Participants then completed the posttest questionnaire.

Participants in the control condition were not shown the third, free-response question about identification confidence and did not receive any feedback about the accuracy of their identification. Instead, after completing the two filler elaboration questions, participants in the control condition moved on to complete the posttest questions.

The posttest questionnaire all participants completed contained the same questions as in Study 1. After this, all participants completed a funneled debriefing that explained the true purpose of the study, allowed participants to withdraw their consent, and, for the misinformation conditions, tested whether participants retrospectively detected the misinformation.

[2] In the MI condition, 15 participants did not receive the full manipulation. The manipulated confidence displayed to these participants was an average of 9.6 ($SD = 5.0$) points higher than their Session 1 confidence. In the MD condition, four participants did not receive the full manipulation. The manipulated confidence displayed to these participants was an average of 10.0 ($SD = 4.6$) points lower than their Session 1 confidence. Eight participants in the MI condition and one participant in the MD condition were removed from analysis because they were so near the end of the scale that the displayed confidence in the feedback prompt either correctly displayed their initial confidence or displayed a number in the opposite direction of their feedback condition.

Table 4
Feedback Conditions in Study 2

Misinformation increase	Misinformation decrease	Typical confirming feedback	Typical disconfirming feedback	Control
You told us you were [X + 20]% certain in your identification choice. Can you tell us more about why you were [X + 20]% certain in your answer?	You told us you were [X − 20]% certain in your identification choice. Can you tell us more about why you were [X − 20]% certain in your answer?	Good job, you correctly identified the actual thief from the video.	Sorry, you did not correctly identify the actual thief from the video.	

Results

Lineup. For participants who made a lineup identification, 65% identified the target. Filler identifications were roughly evenly distributed across the four fillers (11%, 8%, 7%, 9%). On average, participants reported a moderate amount of confidence in their identification during Session 1 ($M = 55.5$, $SD = 25.4$). Participants who made a target identification ($M = 57.3$, $SD = 25.3$) were significantly more confident in their identification than participants who made a filler identification ($M = 52.1$, $SD = 25.3$), $t(528) = 2.27$, $p = .024$, $d = 0.21$, 95% CI [0.03, 0.38].

Detection. Concurrent and retrospective detection was measured in the same manner as in Study 1. One participant in the MI condition and five participants in the MD condition were coded as concurrently detecting the misinformation feedback. For retrospective detection, 41% of participants in the MI condition were coded as retrospective detectors and 48% of those in the CD condition. This replicates the results of Study 1 in that most participants failed to notice the misinformation feedback.

Confidence change. We first tested whether confidence change occurred in each condition by conducting paired sample *t* tests, see Table 5. For the misinformation conditions, participants' confidence changed significantly over time. Participants in the MI condition reported significantly greater confidence at Session 2 than at Session 1, whereas participants in the MD condition reported significantly lower confidence at Session 2 than at Session 1. We found only partial support for our hypotheses in the typical feedback conditions. While participants in the TCF condition showed significant confidence inflation over time, no significant confidence change occurred in the TDF condition.

One of the main goals of Study 2 was to further investigate natural confidence inflation. Study 1 found evidence of significant confidence inflation over time but only for participants making a filler identification. The results of this study showed evidence of natural confidence inflation in the control condition collapsed across identification outcome. Control participants at Session 2 reported remembering greater confidence in their initial identification than they reported during Session 1.

A one-way ANOVA with condition serving as the independent variable and confidence change serving as the dependent variable revealed a significant main effect of condition, $F(4, 525) = 34.45$, $p < .001$, $\eta_p^2 = 0.21$, 95% CI [0.15, 0.26]. Planned Dunnett comparisons were conducted comparing the control condition to each of the four feedback conditions. These post hoc tests revealed that confidence change in the MD condition was significantly greater than the control condition, $p < .001$, but, similar to Study 1, confidence change in the MI condition did not differ significantly from the control condition ($p = .064$). Participants in the TCF condition showed significant confidence inflation relative to controls ($p < .001$). However, confidence change in the TDF condition did not differ significantly from controls ($p = .253$).

In Study 1, overall confidence change in the MD group was greater than that of the MI condition. To test whether this was the case in Study 2, we multiplied the difference score for those in the MD group by −1 to create a variable measuring overall confidence change in the direction of the manipulation. We found that overall change in the MD group ($M = 12.7$, $SD = 15.4$) was not significantly different than overall change in the MI group ($M = 14.3$, $SD = 17.2$), $t(199) = 0.70$, $p = .484$, $d = 0.10$, 95% CI [−0.18, 0.37]. We also predicted that confidence change in the TCF condition would be greater than that of the TDF condition. We multiplied the change score for those in the TDF condition by −1 to again assess overall confidence change in the direction of the manipulation. Results supported our hypothesis with overall change in the TDF condition ($M = −0.4$, $SD = 27.3$) being significantly less than change in the TCF condition ($M = 18.7$, $SD = 26.5$), $t(216) = 5.24$, $p < .001$, $d = 0.71$, 95% CI [0.44, 0.98].

Table 5
Confidence in Session 1 and 2 in Study 2

Condition	*n*	Session 1 *M* (*SD*)	Session 2 *M* (*SD*)	*t*	*df*	*p*	*d*	[95% CI]
Control	111	58.9 (25.8)	64.4 (23.1)	2.88	110	.005	0.26	[−0.01, 0.53]
MD	103	60.4 (24.4)	46.0 (27.8)	8.44	102	<.001	1.00	[0.71, 1.29]
MI	98	50.4 (25.1)	63.1 (26.8)	8.18	97	<.001	0.78	[0.49, 1.07]
TDF	110	54.3 (25.5)	54.7 (28.3)	0.16	109	.872	0.01	[–0.25, 0.28]
TCF	108	53.3 (25.4)	72.0 (19.7)	7.33	107	<.001	0.73	[0.45, 1.01]

Note. Table displays results of paired sample t-tests. MD = misinformation decrease; MI = misinformation increase; TDF = typical disconfirming feedback; TCF = typical confirming feedback.

We next investigated whether confidence change by condition differed based on whether participants made a target or filler identification. As shown in Table 6, the degree of confidence change for the control, MI, MD, and TDF conditions was similar for those making a target and filler identification. However, there is a noticeable difference in confidence change between target and filler identifications in the TCF condition. Participants in the TCF condition making a filler identification had a confidence change score an average of 11.4 points higher than TCF participants making a target identification. However, results of a 5 (condition: control, MD, MI, TCF, TDF) × 2 (identification: target identification, filler identification) ANOVA showed that although the main effect of feedback condition was statistically significant, $F(4, 520) = 31.90$, $p < .001$, $\eta_p^2 = 0.20$, 95% CI [0.14, 0.25], there was no significant effect of identification decision, $F(1, 520) = 1.93$, $p = .165$, $\eta_p^2 < .01$, 95% CI [0.00, 0.02], and there was no significant interaction, $F(4, 520) = 1.46$, $p = .214$, $\eta_p^2 = 0.01$, 95% CI [0.00, 0.03].

Posttest questions. As in Study 1, participants' responses to the 10, subjective posttest questions were combined into a composite variable to test the overall effect of the manipulation on their perceptions of their witnessed experience ($\alpha = .88$), see the online supplemental material for more information about individual items. Higher scores on the posttest composite indicated a better witnessed experience. The two, objective posttest questions were then tested separately.

We hypothesized that the four feedback conditions would differ significantly from the control condition. We found only partial support for our hypothesis. Results of a one-way ANOVA revealed a significant main effect of condition, $F(4, 525) = 6.59$, $p < .001$, $\eta_p^2 = 0.05$, 95% CI [0.01, 0.08]. Planned post hoc Dunnett tests were then conducted investigating differences between the control and each of the four feedback conditions. The only statistically significant comparison was between the TDF and control conditions. Participants in the TDF condition ($M = 5.4$, $SD = 2.1$) reported a significantly worse witnessed experience than participants in the control condition ($M = 6.0$, $SD = 1.4$; $p = .044$).

Next, we tested whether the manipulation affected participants responses to the objective measures not usually affected by typical post-identification feedback. As in Study 1, neither viewing time, $F(4, 525) = 0.15$, $p = .961$, $\eta_p^2 < 0.01$, 95% CI [0.00, 0.00], nor viewing distance, $F(4, 525) = 2.32$, $p = .056$, $\eta_p^2 = 0.02$, 95% CI [0.00, 0.04], were significantly affected by condition.

Table 6
Confidence Change by Condition and Lineup Decision in Study 2

	Filler identification			Target identification		
Condition	*n*	*M*	*SD*	*N*	*M*	*SD*
Control	37	4.7	24.1	74	5.9	18.1
MD	33	−11.9	18.8	70	−15.5	16.4
MI	38	11.5	17.0	60	13.5	14.3
TDF	38	1.9	24.1	72	−0.4	28.9
TCF	39	25.9	23.8	69	14.6	27.2

Note. MD = misinformation decrease; MI = misinformation increase; TDF = typical disconfirming feedback; TCF = typical confirming feedback.

General Discussion

Across two studies, we investigated the effects of post-identification feedback given to witnesses one week after an initial, pristine identification procedure. Additionally, we tested a new type of feedback: misinformation feedback in the form of suggestive questioning. Overall, we found that misinformation feedback had a measurable, significant effect on witness confidence. When witnesses were told that they were more confident in their initial identification than they actually were, they later recalled having greater confidence in their initial identification. When witnesses were told that they were less confident in their initial identification than they were, they later recalled less confidence. This occurred despite the fact most participants reported being unaware of the suggestive feedback.

One unexpected result emerged from the control condition. In Study 1, we found that participants in the control condition who made a filler identification showed significant confidence inflation over time. In Study 2, we found evidence of confidence inflation for control participants who made either a target or filler identification. It is important to note that participants in the control condition simply went through a pristine lineup, and then, one week later, were asked to recall their confidence at the time of the identification. The identification procedure was designed to be nonsuggestive and they received no feedback. We call this finding demonstrating that participants, even in the absence of feedback, remember being significantly more confident in their initial identification over time *natural confidence inflation*.

Most extant post-identification feedback studies have provided participants with feedback immediately after their identification. A handful of studies have investigated the effect of feedback given at a delay (e.g., Quinlivan et al., 2012). However, like post-identification feedback studies measuring the effect of immediate feedback, studies investigating the effect of feedback at a delay typically assess the effect of feedback by comparing a single confidence report given by participants who do and do not receive feedback (although see Wells & Bradfield, 1998). In the current study, we assessed confidence twice and focused on the effect of feedback on confidence change over time. This design specifically enabled us to document the pattern of natural confidence inflation.

There are several possible explanations for this finding. Participants were asked to give their confidence statement twice over the course of the study. Repeated questioning can lead to confidence inflation (Odinot, Wolters, & Lavender, 2009; Shaw, 1996). Another explanation is that this confidence inflation is partially caused by a dissonance process (Festinger, 1962). Witnesses made an identification and then felt the need to justify that decision and did so by recalling greater confidence in that choice. Given the novel nature of this finding and the inconsistency between target and filler identifications in Studies 1 and 2, replication is needed for further clarification regarding the robustness and boundary conditions of this finding. Even so, natural confidence inflation plays an important role in the discussion regarding eyewitness confidence malleability. Although it is widely agreed that confidence changes over time, there has been only limited research regarding the mechanisms by which this process occurs. Most of this research has focused on the effects of feedback. However, the results of the current study emphasize the need to explore other mechanisms that may influence confidence reporting.

We predicted that the MI and MD conditions would show greater confidence change compared with the control condition. Although our overall pattern of results supports this hypothesis, only the difference between the MD and control condition was statistically significant. Natural confidence inflation may help explain why this occurred. We expected the control condition to serve as our baseline comparison. The natural confidence inflation in the control condition could help explain why confidence change in the MI condition did not differ significantly from controls.

Past research has shown that the effect of typical feedback is generally smaller for those given disconfirming, rather than confirming, feedback (Steblay et al., 2014). This is predicted by the selective cue integration framework (SCIF; Charman et al., 2010). This framework proposes that witnesses actively seek out cues that support, rather than oppose, their identification decision. Thus, one reason why TCF has such a powerful influence is not only that it activates individuals' needs to be competent and accurate in their decision making, but also that witnesses are naturally inclined to be opposed to disconfirming information (Charman et al., 2010; Wells & Quinlivan, 2009).

However, this pattern was not replicated for misinformation feedback. The SCIF provides some predictions as to why this occurred. Unlike typical feedback, misinformation feedback does not activate self-presentation goals in the same way. In fact, our results show that most participants fail to even detect misinformation feedback. Thus, the SCIF's predictions about a selective search for confirming as opposed to disconfirming information would not apply in the same way as with typical feedback. Overall, our results do support the claim that "cognitive processes involved in confidence assessment transcend the specific paradigm in which the phenomenon is examined and the specific manipulations used within those paradigms" (Charman et al., 2010, p. 214). Not only did misinformation and typical feedback affect confidence, but we found some evidence they also affected reports of witnessed experience. Specifically, like typical feedback, misinformation feedback affected only subjective, and not objective, posttest measures.

One way to conceptualize the present results is not only in the context of the post-identification feedback effect but also in the context of the misinformation effect more broadly. In many ways, the post-identification feedback effect can be seen as a subtype of the misinformation effect. In both misinformation and post-identification feedback studies, participants see an event, are exposed to misleading postevent information, and this postevent information impacts the witness' original memory (Loftus, 2005). Indeed, while past research has not directly investigated whether the misinformation effect is affected by the direction of the manipulation, at least one study has shown that detection is not affected by the direction of the manipulation on continuous scales (Sauerland, Schell-Leugers, & Sagana, 2015).

In Study 2, we further tested the effects of typical and misinformation feedback. We showed that TCF significantly inflated confidence, even after an initial pristine lineup. This suggests that although the use of best practice procedures like unbiased witness instructions and double-blind lineups protect against feedback effects at the time of the identification, they do not seem to serve any protective effect against confidence change due to feedback at a later time. On the other hand, the effect of disconfirming feedback on confidence change was not statistically significant. However, future research and replication are likely needed before claims that TDF does not influence confidence when given at a delay can be made.

It is important to note that the misinformation and typical feedback conditions in Study 2 were not directly compared with each other. In the misinformation conditions, participants were both provided feedback and were asked to elaborate on their confidence. In the typical feedback conditions, participants were only provided feedback and did not elaborate on their confidence. The purpose of the confidence elaboration in the misinformation conditions was to capture concurrent detection. Past research has shown that the effects of false feedback manipulations on later memory occur particularly for those participants who fail to concurrently detect the manipulation and so it was central to document concurrent detection at this time (Cochran et al., 2016). Given the very small number of concurrent detectors, we were unable to test whether confidence change over time differed between those who did and did not concurrently detect the manipulation. The goal of Study 2 was to test both typical and misinformation feedback in the same paradigm rather than to test whether typical feedback has a greater effect on confidence than misinformation feedback. More research is needed to directly compare the strength of different kinds of feedback.

The present studies highlight the need for law enforcement officers to both collect and document witness confidence statements at the time of the initial identification. Our results demonstrate that using pristine lineup procedures (e.g., double-blind lineups and standardized witness instructions) is not enough to prevent later confidence inflation. Additionally, our results suggest that not only should this confidence statement be documented immediately but that it also should be documented verbatim. Regardless of whether the witness expresses their confidence in words or numbers, the confidence statement that is recorded should be identical to what the witness reports. This reduces the chances that the statement may be rephrased later in a manner that suggests a different meaning than what the witness initially intended.

Limitations and Directions for Future Research

A few limitations to the current studies are worth mentioning. Both studies were online experiments using MTurk participants. However, online research has been found to replicate the results of in-lab studies in general and in false memory and psychology and law studies in particular (Irvine, Hoffman, & Wilkinson-Ryan, 2018; Zwaan et al., 2018). We had a high return rate across a one-week period suggesting participants were interested in and attentive to study materials.

Confidence in the current study was gathered using a numeric scale. Police in the field are advised to document confidence verbally, in the witness' own words (National Research Council, 2014). However, even when witnesses are instructed to use words to explain their confidence, they often spontaneously use numbers (Dobolyi & Dodson, 2018). We chose to use a numeric scale to document confidence given the nature of the misinformation feedback. Verbal confidence statements are inherently vague and not all individuals have a similar understanding of what these statements mean (Beyth-Marom, 1982). For instance, a statement that a witness was "very confident" in their identification could mean 70% confident to one person and 90%

to another. Thus, it would be difficult to provide reliable, consistent misinformation feedback that manipulated initial verbal confidence to the same degree for all participants. With numeric confidence reports, we ensured that the false feedback we provided to participants in the misinformation conditions was consistent for all participants. Although participants reported their confidence numerically, the type of suggestive questioning we used here may be more likely to occur in the field when confidence is documented verbally. Because not all people have a common understanding of verbal confidence statements, the way an officer rephrases confidence at a later interview may imply more confidence than the witness felt, not because of an intentional manipulation but because of a misunderstanding about the intended meaning behind the confidence statement. Future research is needed to explore the effects of misinformation feedback with verbal expressions of confidence.

A result of using numeric confidence was that participants reporting very high confidence in the MI condition or very low confidence in the MD condition received suggestive feedback that was weaker than the remainder of participants. However, even if we remove these participants from analysis, results still demonstrate significant confidence inflation over time in the MI condition and significant confidence deflation over time in the MD condition. In fact, our study may underestimate the true effect of misinformation feedback because not all participants received the full manipulation.

In the current studies, we used a target-present lineup with a focus on lineup choosers. Although target-absent lineups are more common in the post-identification feedback literature, a significant minority of studies use target-present lineups (see Steblay et al., 2014). We chose to use target-present lineups in the present studies to investigate potential differences in the effect of misinformation feedback on those making a target and filler identification. However, it is important to note that witnesses making a filler identification in a target-present lineup may differ in important ways than witnesses making a filler identification in a target-absent lineup. Witnesses who make a filler identification in a target-present lineup may have worse memories than those who make the same identification in a target-absent lineup in that they identify a filler even when the true perpetrator is present. Thus, future research should explore the effect of misinformation feedback in target-absent lineups, not only as witnesses making filler identifications in target-present and target-absent lineups might differ but also as it is particularly when witness confidence is inflated for incorrect identifications that wrongful convictions can occur (Quinlivan et al., 2012). More research is also needed to investigate the effect of misinformation feedback on lineup rejections. Such research would further help explore whether misinformation feedback operates similarly as typical feedback.

Additionally, future research is needed to replicate our findings regarding natural confidence inflation. In the present studies, natural confidence inflation occurred only for those making a filler identification in Study 1 but for all participants in the control condition in Study 2. Due to the relatively smaller number of participants making a filler, as opposed to a target-identification, there was low power in some of these analyses.

Conclusion

The current studies demonstrate that both typical and misinformation feedback can have a powerful effect on witness memory. Notably, the use of best practice lineup procedures, including unbiased witness instructions and blind, computerized, lineup administration, did not protect against later feedback-induced confidence change. This highlights the need to both collect and document confidence immediately after a witness makes an identification decision. Even if the lineup procedure is pristine, our findings regarding natural confidence inflation demonstrate that retrospective confidence reports are not a substitute for initial confidence statements. Only confidence reported and documented at the time of the identification can be relied upon as a cue to accuracy as confidence gathered at any later point may be affected by feedback from officers, suggestive questions, or simply the effects of time.

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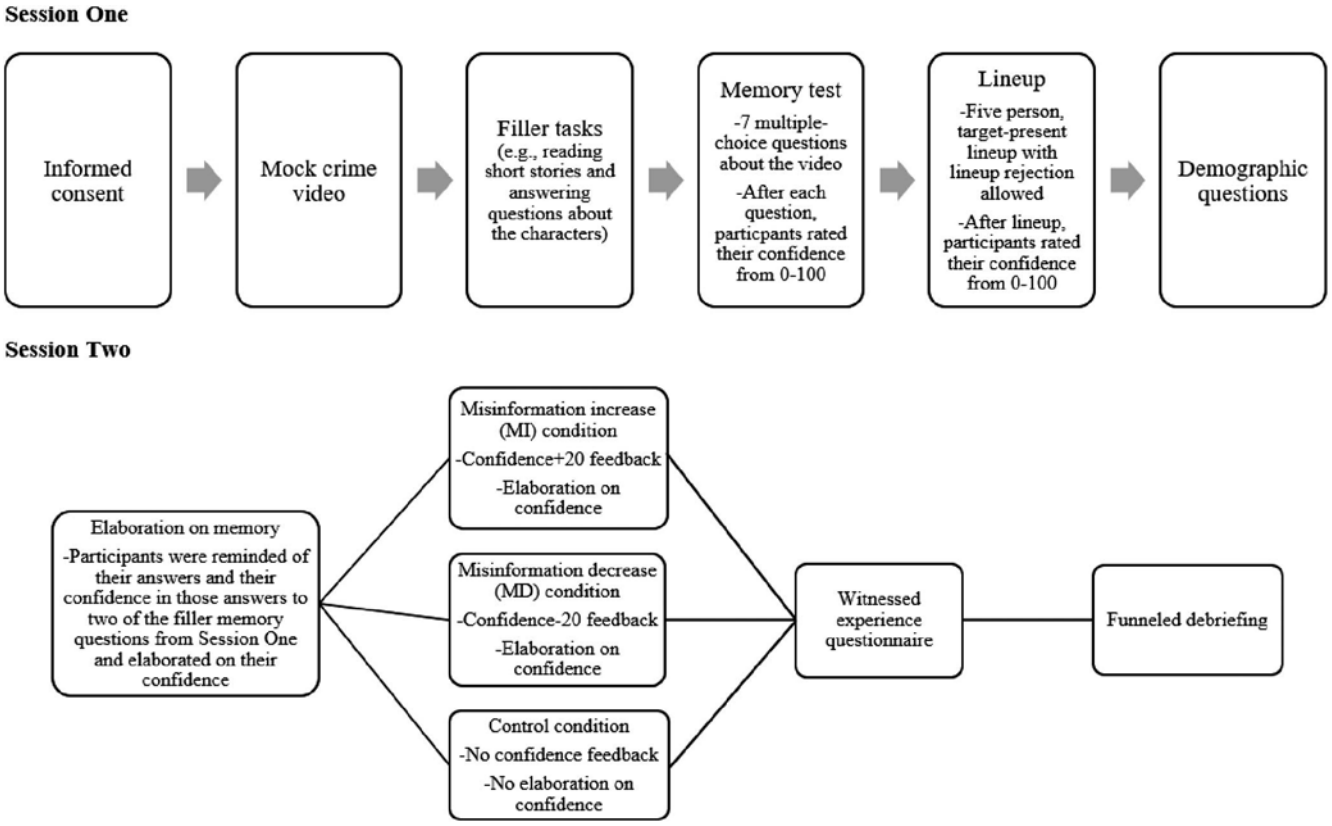
Appendix A

Study 1: Procedure Flow Chart

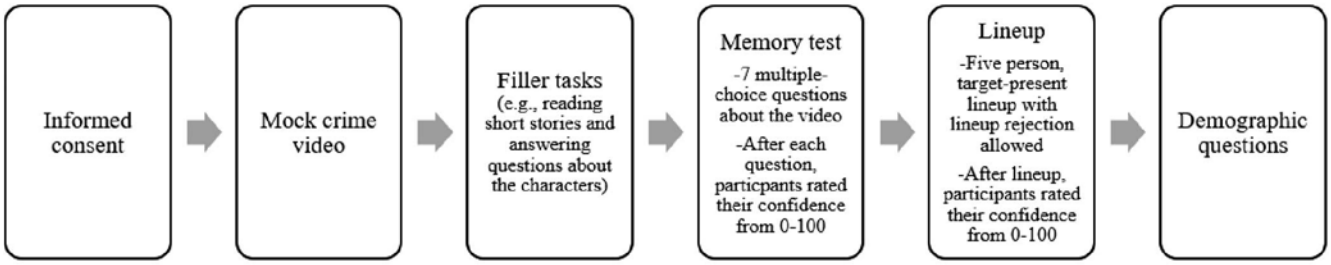


(*Appendices continue*)

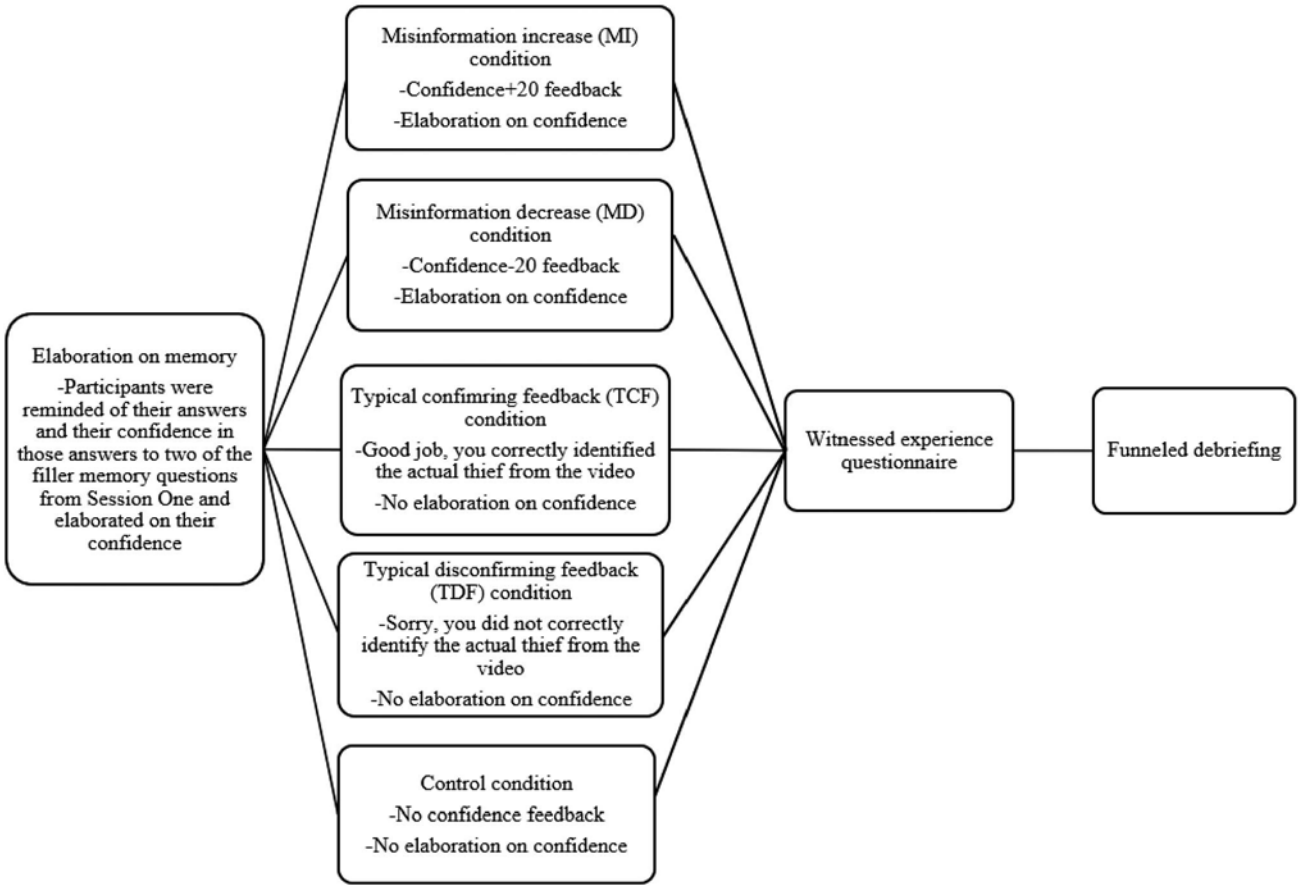
Appendix B

Study 2: Procedure Flow Chart

Session One



Session Two



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