



**The Effects of Co-witness Discussion and Misinformation on Confidence and Precision in Eyewitness Memory Reports**

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Manuscripts

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3 **The Effects of Co-witness Discussion and Misinformation on Confidence and**  
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5 **Precision in Eyewitness Memory Reports**  
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### 25 26 27 **Disclosure of Interest**

28  
29 The authors report no conflicts of interest.  
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**Abstract**

In two experiments, we examined the influence of co-witness discussion and misinformation on the meta-memorial processes that regulate memory reporting. Participants (total  $N = 158$ ) watched a crime video. In Experiment 1, a confederate confidently agreed (confirming feedback) or disagreed (disconfirming feedback) with the participants' answers to questions regarding the content of the stimulus crime. Participants who received disconfirming feedback reported fewer fine-grain details on a subsequent recall task than those in the confirming and control conditions. In Experiment 2, participants watched two versions of a crime video that differed with respect to two critical items. Some participants then discussed the stimulus crime in pairs (discussion group) while others did not (control group). Participants who received misinformation through discussion with a co-witness were less accurate when answering questions about the critical items than participants in the control group. Unexpectedly, participants in the discussion group did not provide fewer fine-grain details in a subsequent memory report than participants in the control condition. The results of these experiments indicate that existing models may not reliably depict the metacognitive selection of information reported from memory in situations involving social interaction. Further research is needed to explore the effects of social influences on metamemory.

Key words: memory, metacognition, misinformation, eyewitness testimony, witness conformity, social influence

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3 The Effects of Co-witness Discussion and Misinformation on Confidence and  
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5 Precision in Eyewitness Memory Reports  
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8 It is a well-established finding in the eyewitness literature that people's memory  
9 reports can be distorted by exposure to post-event information (PEI; Wright, Self, &  
10 Justice, 2000; Frenda, Nichols, & Loftus, 2011). Eyewitnesses may include PEI in  
11 their reports because they mistakenly believe that it originates from the event, a  
12 phenomenon called the *source misattribution effect* (Zaragoza & Lane, 1994).  
13  
14 Alternatively, eyewitnesses may knowingly incorporate PEI in their reports following  
15 discussions with co-witnesses, exhibiting *memory conformity* (Gabbert, Memon, &  
16 Allan, 2003). In criminal cases involving multiple witnesses, memory conformity may  
17 lead investigators to devote time and resources to false leads, or worse, result in the  
18 conviction of an innocent suspect.  
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29 There are several reasons why memory conformity between co-witnesses may  
30 occur. In some instances, one witness may report details learned from another in order  
31 to avoid the perceived social costs of disagreeing (Cialdini & Goldstein, 2004), a form  
32 of conformity known as *normative influence* (Deutsch & Gerard, 1955). Memory  
33 conformity may also be the result of *informational influence*, which occurs when one  
34 person reports information she has learned from another because she feels this  
35 information is accurate (Deutsch & Gerard, 1955). Finally, memory conformity may  
36 be the result of memory distortion (Gabbert, Wright, Memon, Skagerberg, &  
37 Jamieson, 2012). As mentioned earlier, witnesses may forget the source of the  
38 information they are reporting, and include details they have learned through  
39 discussion with a co-witness.  
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53 Memory conformity resulting from normative and informational social  
54 influences does not necessarily reflect an alteration of the memory itself, but rather, of  
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3 the memory report (Blank, 2009; Blank, Walther & Isemann, 2017). According to the  
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5 revised dual-criterion model, the content of memory reports is determined by  
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7 metacognitive processes (Ackermann & Goldsmith, 2008; Goldsmith, Koriat, &  
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9 Weinberg-Eliezer, 2002; Koriat & Goldsmith, 1996). When choosing which details of  
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11 an event to report from memory, people assess the potential accuracy of candidate  
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13 responses, as well as how informative they are likely to be for a receiver (Ackerman  
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15 & Goldsmith, 2008). The precision (level of detail, or grain size) of a response is  
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17 adjusted until it meets personally established criteria for accuracy and  
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19 informativeness. These criteria can be met by reporting either detailed fine-grain or  
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21 less detailed coarse-grain information. Furthermore, individuals may improve the  
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23 accuracy of their recall by withholding candidate responses that do not meet these  
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25 criteria (Ackerman & Goldsmith, 2008; Koriat & Goldsmith, 1996).  
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30 Eyewitness reports can make a critical contribution to the success of criminal  
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32 investigations (Semmler, Brewer, & Bradfield Douglass, 2012); it is therefore  
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34 important to understand if and how PEI exchanged between co-witnesses influences  
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36 the metacognitive processes that govern memory reporting. The possible effects of  
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38 co-witness discussion on metacognitive monitoring and control processes in memory  
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40 reporting have yet to be empirically tested. In two experiments, we manipulated (i)  
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42 agreement/disagreement with a co-witness and (ii) misinformation exchanged  
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44 between co-witnesses to examine the effect of these manipulations on participants'  
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46 confidence in their recall, as well as the quantity and precision of the information they  
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48 chose to report. It is important to note that the focus of the present research is memory  
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50 *reporting*, or what witnesses say when questioned about their memory for an event, as  
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52 opposed to their actual memory for the event (which may include different or more  
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54 details than what they choose to explicitly report). While there is research evidence  
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3 that memory for events can be altered through discussion (see Hirst & Echterhoff,  
4 2012 for a review), our focus here is on how discussion between co-witnesses may  
5 affect memory reports, specifically through its potential effects on the metacognitive  
6 monitoring and control processes responsible for the selection of reported details.  
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11 To examine memory conformity, many studies have used a paradigm in which  
12 members of a co-witness dyad are exposed to versions of stimuli that differ in some  
13 respects (critical items) (Gabbert, Memon, & Allan, 2003; Gabbert, Memon, &  
14 Wright, 2007; Wright et al., 2000, experiment 2; Wright, Gabbert, Memon, &  
15 London, 2008). They are then instructed to discuss what they have seen prior to  
16 having their recall tested. Members of each co-witness dyad are given the impression  
17 that they have seen the same stimuli, when in fact they have each seen a different  
18 version. For example, in Gabbert et al. (2003), participants watched one of two videos  
19 of a theft shot from different perspectives, each of which included unique details.  
20 Results showed that over 70% of participants later reported details they had not seen  
21 in the video, but were only exposed to through discussion with their co-witness.  
22 Subsequent research has replicated Gabbert et al.'s findings, demonstrating a robust  
23 memory conformity effect (Wright, Memon, Skagerberg, & Gabbert, 2009).  
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41 Certain factors may increase the likelihood, or predict the occurrence of,  
42 memory conformity. For example, Gabbert, Memon, Allan, and Wright (2004) found  
43 that PEI encountered through face-to-face communication was more misleading than  
44 PEI embedded in a written narrative. Further studies have shown that witnesses who  
45 volunteer information first in the course of a discussion are more likely to influence  
46 their co-witnesses' memory reports, and that members of co-witness dyads are more  
47 likely to conform to information provided by the more confident member (Gabbert et  
48 al., 2006, experiment 1; Wright et al., 2000). Gabbert et al., (2007) found that  
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3 participants' beliefs about the quality of their memory in comparison to a co-  
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5 witnesses' affected their susceptibility to misinformation. Participants who were told  
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7 they had encoded a set of pictures for half as long as a co-witness were more likely to  
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9 report erroneous details mentioned by that co-witness (cf. participants who were told  
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11 they had encoded the pictures for twice as long). Participants who believed they had  
12  
13 seen pictures for twice as long mentioned more details during a discussion with a co-  
14  
15 witness, and were more likely to mention critical items first. More recently, research  
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17 on witness conformity has found that both directly (via a co-witness) and indirectly  
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19 (in a written report) encountered PEI can result in memory conformity (Blank, Ost,  
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21 Davies, Jones, Lambert, & Salmon, 2013); that conformity effects are increased when  
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23 the source of information is seen as highly credible (Horry, Palmer, Sexton, &  
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25 Brewer, 2012); and that participants' confidence in the accuracy of their memory  
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27 reports can be influenced by a confederate's expressed confidence (Ost, Ghonouie,  
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29 Cook, & Vrij, 2008; Goodwin, Kukucka, & Hawks, 2013).

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34 When reconstructing a memory, individuals may seek information from  
35  
36 external sources to bolster their accuracy and informativeness when internal evidence  
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38 is weak (Horry et al., 2012; Jaeger, Lauris, Selmecezy, & Dobbins, 2012). Once a  
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40 memory has been retrieved and reconstructed, rememberers determine which details  
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42 to report through metacognitive monitoring and control processes (Koriat &  
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44 Goldsmith, 1996). A few studies have examined the effects of metacognitive  
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46 monitoring and control processes on eyewitness reporting of episodic memories  
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48 (Evans & Fisher, 2011; McCallum, Brewer, & Weber, 2016; Sauer & Hope, 2016;  
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50 Weber & Brewer, 2008). The two-phase paradigm used in most of these studies was  
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52 adapted from Koriat and Goldsmith (1996). In the first phase of the paradigm,  
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54 participants give fine- and coarse-grain answers to questions, and provide ratings of  
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3 their confidence in the accuracy of these answers (0-100%); in the second phase, they  
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5 select one of their answers as a preferred response, and are sometimes given the  
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7 option to withhold a response. Using this paradigm, in two experiments, Weber and  
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9 Brewer (2008) found that the level of detail participants chose to report was related to  
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11 their confidence in their fine-grain answers. If participants were highly confident that  
12  
13 a detailed answer was accurate, they were more likely to report it.  
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16 McCallum et al. (2016) investigated grain size volunteering and recall  
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18 confidence in different social conditions. In two experiments, participants answered  
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20 questions about a witnessed mock crime in the two-phase question format. The results  
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22 of Experiment 1 showed that confidence significantly predicted response accuracy.  
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24 Furthermore, participants who were told that their responses would remain private  
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26 were nearly twice as likely to volunteer fine-grain responses as participants who were  
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28 told that they would have to respond to questions publicly. In Experiment 2, a  
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30 monetary incentive with penalties for inaccurate responses was introduced. When  
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32 there was no penalty for inaccurate reporting, participants showed a bias for  
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34 volunteering fine-grain answers. In a related vein, Sauer and Hope (2016) examined  
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36 the strategic regulation of memory reporting for information that had been encoded in  
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38 conditions of full and divided attention. They found that participants in the divided  
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40 attention condition provided fewer fine-grain responses, volunteered less accurate  
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42 fine-grain responses and expressed lower confidence in their fine-grain responses than  
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44 participants in the full attention condition suggesting that they monitored the accuracy  
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46 of their responses successfully, but chose to sacrifice accuracy for informativeness. In  
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48 line with the revised dual-criterion model, findings from these experiments show that  
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50 individuals place a heavy emphasis on informativeness.  
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3 In an attempt to be as informative as possible, individuals may draw on  
4 information from various sources, including PEI they have encountered through  
5 discussion with co-witnesses. Individuals control the content of their memory reports  
6 through metacognitive monitoring and control processes, and can improve the  
7 accuracy and informativeness of their reports by these means. It is, therefore, possible  
8 that co-witness discussion affects memory reporting through its influence on the  
9 metacognitive processes underlying the selection of reported details. In two  
10 experiments, we examined whether disagreement among participants over details of  
11 jointly witnessed mock crime events influenced their metacognitive regulation of their  
12 memory reports. In addition to informing theory, investigating metacognitive decision  
13 processes that potentially underlie the witness conformity effect can inform the  
14 development of investigative interviewing techniques. Additionally, such an  
15 investigation may further our understanding of how these processes operate in various  
16 conditions, which is of theoretical value.

### Experiment 1

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36 In Experiment 1, we examined the effects of social comparative feedback  
37 provided by a co-witness on participants' a) confidence in the accuracy of their recall,  
38 b) volunteering of fine- and coarse-grain responses, c) withholding of responses, and  
39 d) response accuracy in a subsequent memory assessment. Our primary interest was  
40 not the actual content/accuracy of individual responses – but rather whether the social  
41 manipulation affected confidence, thereby influencing the selection of details to be  
42 volunteered or withheld. We predicted that, relative to confirming feedback and no  
43 feedback, receiving disconfirming feedback from a co-witness would decrease  
44 participants' confidence in the accuracy of their memory at Phase I, and therefore  
45 reduce the proportion of fine-grain responses they volunteered at Phase II (Ackerman  
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3 & Goldsmith, 2008; Weber & Brewer, 2008). We expected that participants who  
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5 received confirming feedback would show increased confidence in the accuracy of  
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7 their answers at Phase I, and therefore be likely to volunteer more fine-grain  
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9 responses at Phase II than participants in the disconfirming feedback group. We also  
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11 examined the effect of feedback on participants' withholding of details. Lower  
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13 confidence in the accuracy of a candidate response reduces the chances that it will be  
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15 reported (Ackerman & Goldsmith, 2008). We therefore predicted that participants  
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17 who received disconfirming feedback would withhold more responses than  
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19 participants in the confirming and no feedback groups. Participants in this experiment  
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21 were not given misinformation about details they were subsequently questioned  
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23 about. We therefore did not expect the accuracy of their answers to questions on the  
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## Method

### Design

In a between-subjects design, we manipulated feedback across three conditions: confirming feedback ( $n = 32$ ), disconfirming feedback ( $n = 30$ ), or no feedback ( $n = 30$ ), and examined the effects on participants' confidence, the grain size of the details they volunteered, and their likelihood of withholding details.

### Participants

Ninety-two individuals participated in the study (64 females, 28 males,  $M_{age} = 30.1$  years;  $SD = 12.9$ ). Participants were either staff or students at the primary investigator's university. Criteria for participation included being 18 years of age or older, being fluent in English, and having normal, or corrected to normal vision. Ethical approval for the experiment was obtained from the university's science faculty research ethics committee.

## Materials

**Stimulus event.** Participants viewed a three-minute video event depicting a theft. In the event, a man gains access to an elderly couple's house under the pretense of adjusting their electricity meter. He distracts them while an accomplice surreptitiously enters the house and steals valuables from the second floor of the property.

**Recall questions.** Questions on both the practice task and the cued recall task referred to details from the video. In the practice task, participants were asked to provide both fine- and coarse-grain written answers to six questions. They were also asked to provide a rating of their confidence in the accuracy of each answer on a scale of 0-100% (10% increments). These questions referred to the male victim in the video (e.g., "What was the colour of the male victim's vest?" A fine-grain answer to this question might be "navy blue", while a coarse-grain answer might be "dark"). The practice task questions were presented in a paper booklet.

The cued recall task was modeled after the standard two-phase approach used in previous studies of metacognitive monitoring and control of memory reports (Ackerman & Goldsmith, 2008; Goldsmith et al., 2002; Weber & Brewer, 2008). The task was comprised of 22 cued recall questions (e.g., What colour was the getaway car?; How many items did the perpetrators steal from the home?), and was completed electronically.

## Procedure

After signing an informed consent form, participants were randomly allocated to one of the three conditions (confirming feedback, disconfirming feedback, no feedback). Participants in the no feedback condition then viewed the video in pairs. Participants in the disconfirming and confirming feedback conditions viewed the

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3 video in the presence of a confederate who they were led to believe was another  
4 participant recruited in the same manner. All participants then completed the practice  
5 task together. Participants were told that the purpose of the practice task was to  
6 familiarise them with the format of the questions they would be answering on the  
7 cued recall task. While the practice task did include instructions about what coarse-  
8 and fine-grain responses were, it was primarily a means for delivering social  
9 comparative feedback prior to the cued recall task. Afterwards, participants in the two  
10 feedback conditions took turns with the confederate in verbally relaying their answers  
11 to the practice task questions in the presence of the experimenter. The experimenter  
12 asked the participant to begin, so that he/she always provided answers and confidence  
13 ratings before the confederate. Depending on the condition, the confederate either  
14 agreed or disagreed with the majority (4/6) of the fine-grain answers provided by the  
15 participant (by giving the same or a different answer), and expressed high confidence  
16 in these responses (by verbally stating a confidence rating of 80, 90 or 100%).  
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18 Selection of items for agreement/disagreement and ordering of the questions was  
19 determined based on feedback from a pilot focus group ( $N = 6$ ). Participants in the  
20 control condition did not report their answers to the practice questions aloud.

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After completing the practice task portion of the experiment, all participants moved into another room to individually complete the cued recall task. In Phase I of the task, participants provided fine- and coarse-grain answers with confidence ratings ranging from 0-100% in 10% increments (higher ratings indicating increased confidence) to each of the 22 questions. In Phase II, participants were presented with their answers from Phase I (without confidence ratings), and instructed to select either the fine- or coarse-grain response for each question as their final answer. Participants again provided confidence ratings for their volunteered answers. Phases I and II of the

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3 task were forced-report. Previous research has shown that individuals can improve the  
4 accuracy of their memory reports if they have the option to withhold responses  
5 (Koriat & Goldsmith, 1996). Therefore, in Phase III, participants were shown the  
6 answers they provided in Phase II of the task (final answers), and asked to identify if  
7 they would have preferred to withhold their responses to any of the questions. Upon  
8 completion of the cued recall task, all participants were thanked and debriefed. The  
9 entire procedure took approximately 30 minutes.  
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### 18 Results

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20 Data were roughly normally distributed with no outliers on any of the dependent  
21 variables. One-way ANOVAs were conducted comparing group means for the  
22 confirming feedback, disconfirming feedback, and control (no feedback) conditions  
23 for the following dependent variables: expressed confidence in the accuracy of fine-  
24 and coarse-grain responses at Phase I, volunteering of fine- and coarse-grain  
25 responses at Phase II, response withholding (selection of 'I don't know') at Phase III,  
26 and the accuracy of fine- and coarse-grain responses at Phase I. Table 1 shows  
27 control, disconfirming, and confirming group means and standard deviations for all  
28 dependent variables. Below, the results of the analyses are reported with conventional  
29 statistics alongside effect sizes.  
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43 < Table 1 here >

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45 The results of the ANOVAs showed a significant difference between groups  
46 for coarse-grain confidence at Phase I,  $F(2, 89) = 3.32, p = .04, \omega = .30$ , with a  
47 moderate effect size (Field, 2009). Planned contrasts revealed that participants who  
48 received confirming feedback expressed significantly higher confidence in the  
49 accuracy of their coarse-grain answers at Phase I ( $M = 78.9, SD = 8.5$ ), than  
50 participants who received disconfirming feedback ( $M = 73.6, SD = 11.5$ ),  $t(89) =$   
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3 2.00,  $p = .05$ ,  $d = 0.53$ . There was no significant group difference in fine-grain  
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5 confidence,  $F(2, 89) = 1.36$ ,  $p = .26$ ,  $\omega = .09$ . There was a significant effect of the  
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7 manipulation on both fine-grain and coarse-grain volunteering at Phase II,  $F(2, 89) =$   
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9 4.95,  $p = .009$ ,  $\omega = .28$ , with a moderate effect size. A choice between fine- and  
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11 coarse-grain answers was forced in Phase II, meaning that an increase in volunteering  
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13 for one type of answer necessitated a decrease for the other. Planned contrasts showed  
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15 that there was a significant difference between the confirming and disconfirming  
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17 groups for volunteering fine- and coarse-grain answers at Phase II,  $t(89) = 2.02$ ,  $p =$   
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19  $.05$ ,  $d = 0.54$  and a significant difference between the control and confirming and  
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21 disconfirming groups for this variable,  $t(89) = 2.45$ ,  $p = .016$ ,  $d = 0.30$   
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23 (control/confirming),  $d = 0.81$  (control/disconfirming). Participants in the  
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25 disconfirming feedback group volunteered more coarse-grain and fewer fine-grain  
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27 answers (coarse-grain  $M = 11.7$ ,  $SD = 2.7$ ; fine-grain  $M = 10.3$ ,  $SD = 2.7$ ) than  
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29 participants in the confirming feedback group (coarse-grain  $M = 10.3$ ,  $SD = 2.6$ ; fine-  
30  
31 grain  $M = 11.7$ ,  $SD = 2.6$ ). Furthermore, participants in both the confirming and  
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33 disconfirming feedback groups volunteered more coarse-grain and fewer fine-grain  
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35 answers than participants in the control group (coarse-grain  $M = 9.5$ ,  $SD = 2.8$ ; fine-  
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37 grain  $M = 12.5$ ,  $SD = 2.8$ ). There was no overall significant difference between  
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39 groups for response withholding at Phase III,  $F(2, 89) = 2.28$ ,  $p = .11$ ,  $\omega = .26$ . There  
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41 were no other significant differences between groups, or effect sizes of note,  
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43 including for accuracy.  
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## 50 Discussion

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52 Consistent with our predictions, we found that participants in the  
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54 disconfirming condition reported significantly fewer fine-grain details than  
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56 participants in the confirming or control conditions. Contrary to our expectation  
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3 however, this decrease in fine-grain responding did not correspond with a decrease in  
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5 participants' expressed confidence in the accuracy of their fine-grain answers at Phase  
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7 I. This is surprising, as previous research shows that fine-grain confidence at Phase I  
8  
9 is the primary determinant of whether a fine-grain option is volunteered at Phase II  
10  
11 (Ackerman & Goldsmith, 2008; Goldsmith, et al., 2002; Weber & Brewer, 2008). We  
12  
13 also expected that having the confederate challenge the participant on fine-grain  
14  
15 details would make the participants less confident in the accuracy of those details. It  
16  
17 appears from the results that this was not necessarily the case. The significant  
18  
19 decrease in fine-grain volunteering in the absence of a decrease in confidence shown  
20  
21 by participants in the disconfirming group could be due to the influence of the social  
22  
23 feedback manipulation on these participants' metacognitive control decisions.  
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27  
28 Participants' answers to the cued recall task were private, so it is unlikely that  
29  
30 they altered their reporting strategy over concerns that their answers would conflict  
31  
32 with those of their co-witness, as might occur in a situation where normative  
33  
34 influences are in effect (Cialdini & Goldstein, 2004; Deutsch & Gerard, 1955).  
35  
36 However, it is possible that disagreement with the co-witness (confederate) over the  
37  
38 majority of answers on the practice task affected participants' memory self-efficacy.  
39  
40 Feedback from others can affect one's memory self-efficacy (Berry, 1999); and  
41  
42 memory self-efficacy impacts memory performance (Beaudoin & Desrichard, 2011).  
43  
44 Decreased memory self-efficacy may have led participants in the disconfirming group  
45  
46 to take a more cautious approach to reporting, if only because coarse-grain responses  
47  
48 are more likely to be accurate than fine-grain responses (Yaniv & Foster, 1995, 1997).  
49  
50 Lower memory self-efficacy may also have led participants to withhold more  
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52 responses that they were uncertain about.  
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3 Participants in the confirming feedback condition expressed higher confidence  
4 in the accuracy of their coarse-grain responses at Phase I than participants in the  
5 disconfirming feedback condition. This finding partially supports our hypothesis that  
6 co-witness feedback would affect participant's confidence in their memory for the  
7 stimulus event. There was no effect of feedback on participants' confidence in their  
8 fine-grain answers. Why coarse-grain confidence was affected by feedback but fine-  
9 grain confidence was not is unclear, and merits further investigation. Finally, in  
10 comparison with the control group, participants in the confirming and disconfirming  
11 feedback conditions volunteered fewer fine-grain responses. One possible explanation  
12 for this is that publicly reporting results and engaging in comparison with the  
13 confederate placed an emphasis on accuracy. Previous research has shown that public  
14 (as opposed to private) reporting can influence metacognitive monitoring and control  
15 decisions, such as the precision with which rememberers report details from memory,  
16 as well as the level of confidence participants express in the accuracy of their recall  
17 (McCallum et al., 2016; Shaw et al., 2007). The results of Experiment 1 suggest that  
18 the effects of public reporting may extend beyond the immediate reporting of details,  
19 to subsequent memory reports.

## 40 Experiment 2

41  
42 To further investigate the findings of Experiment 1, we sought to replicate  
43 them in a second experiment using a more ecologically valid design. In real life,  
44 witnesses do not engage in 'practice' conversations—they just start talking about the  
45 to-be-remembered event. We therefore eliminated the practice task in Experiment 2.  
46 Furthermore, witnesses may discuss many of the details they will later be questioned  
47 about (by investigators) with each other (Paterson & Kemp, 2006). In Experiment 1,  
48 the practice task questions for which participants had received feedback did not  
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3 appear on the cued recall task. In Experiment 2, we had participants engage in a  
4  
5 naturalistic conversation with another participant who had seen a slightly altered  
6  
7 version of the same event. We expected that the differences in the versions of the film  
8  
9 would be points of disagreement, and lead to the exchange of misinformation between  
10  
11 participants, as found in previous research using this memory conformity paradigm  
12  
13 (e.g. Gabbert et al., 2003). Our aim was to examine the effects of co-witness  
14  
15 discussion of a mock crime event on participants' confidence in their recall, grain-size  
16  
17 selection, answers withheld, and accuracy on a subsequent memory task.  
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20  
21 In line with findings from Experiment 1, we expected that disagreement over  
22  
23 the critical items in the videos would lead participants in the co-witness discussion  
24  
25 condition to volunteer more coarse-grain and fewer fine-grain answers to critical item  
26  
27 questions at Phase II of the cued recall task than participants in the control condition.  
28  
29 In light of findings from the eyewitness literature (e.g., Wright et al., 2009), and the  
30  
31 classic literature on the misinformation effect (e.g., see review by Frenda et al., 2011),  
32  
33 we expected that participants in the co-witness discussion condition would be more  
34  
35 likely to volunteer inaccurate responses (reported by their co-witness) to critical item  
36  
37 questions than participants in the no discussion group. As in Experiment 1, we did not  
38  
39 expect accuracy for non-critical item questions to be affected by the manipulation.  
40  
41 Finally, research on the strategic regulation of memory reporting shows that  
42  
43 individuals can improve the accuracy of their reports if they are given the option to  
44  
45 withhold responses (Koriat & Goldsmith, 1996). We therefore predicted that  
46  
47 participants in the co-witness condition would be more likely to withhold answers to  
48  
49 critical item questions when given the opportunity to do so (in Phase III), due to  
50  
51 disagreement with the co-witness regarding the answers to these questions. This  
52  
53 hypothesis is also derived from the results of Experiment 1, in which participants in  
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3 the disconfirming feedback condition withheld more responses at Phase III than those  
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5 who received confirming feedback. We made no predictions regarding effects on  
6  
7 confidence, as results from Experiment 1 were inconsistent for fine- and coarse-grain  
8  
9 responses.  
10

## 11 Method

### 12 Design

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15 In a between subjects design, we manipulated co-witness discussion across  
16  
17 two conditions: no discussion ( $n = 32$ ) and discussion ( $n = 34$ ) and examined its  
18  
19 potential effects on confidence, grain size, accuracy, and response withholding in  
20  
21 participants' recall reports.  
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### 25 Participants

26  
27 Sixty-six undergraduate students participated in the study in exchange for  
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29 course credit (43 females, 23 males,  $M_{age} = 21$  years;  $SD = 7.3$ ). Participants were  
30  
31 recruited primarily through the Psychology department's student participant pool.  
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33 Inclusion criteria were the same as for Experiment 1.  
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### 36 Materials

37  
38 **Stimulus event.** Each participant viewed one of two versions of a video  
39  
40 depicting a distraction theft. In the video, a female perpetrator distracts a male victim  
41  
42 while her male accomplice steals the victim's belongings. The two versions differ  
43  
44 with respect to two critical items: the colour of the male perpetrator's top, and the  
45  
46 colour of the mobile phone that was stolen; the event depicted in the videos was  
47  
48 otherwise the same. Each version of the video was 2 mins 29 secs long.  
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51  
52 **Recall questions.** Participants in the discussion condition were each given a  
53  
54 copy of a discussion prompt containing a list of talking points. The discussion prompt  
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56 was intended to guide the conversation between the pair through the key aspects of  
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3 the event, including the (differing) critical items. An example of a prompt from the  
4 list is: “What did the perpetrators look like? Consider gender, skin colour, hair colour,  
5 height, age, and the colour and type of clothing worn”. Participants in the control  
6 condition did not discuss the event with a co-witness. Instead, they were given a  
7 contemplation prompt with the same points on it as the co-witness pairs’ discussion  
8 prompt, and were instructed to read over it and think about the points.  
9

10  
11 The phased format of the cued recall task was the same as that used in  
12 Experiment 1, except that it contained twenty-five questions relevant to the stimulus  
13 video used in this experiment. Additionally, after completing the task, participants  
14 answered a series of open-ended questions serving as a manipulation check (e.g.,  
15 What do you think the purpose of this study is? If you discussed the video with a co-  
16 witness, did the two of you disagree on any aspects?).  
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### 29 **Procedure**

30  
31 Participants were randomly allocated to one of the two conditions. They then  
32 viewed a version of the video either in the same room as another participant  
33 (discussion condition), or individually (control condition). Participants in the  
34 discussion condition were seated at opposite ends of a table, with their laptop screens  
35 facing away from each other. Sound was played through headphones. Following  
36 previous co-witness methodology (e.g. Gabbert et al., 2003), they were given the  
37 impression that they had seen the same video as their co-witness.  
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47 After viewing the video, all participants completed a ten-minute filler task  
48 comprised of unrelated questionnaires. This created a time interval between encoding  
49 and recall. Participants in the discussion condition then discussed the event depicted  
50 in the video with a co-witness (another participant recruited in the same manner)  
51 using the discussion prompt as a guide. To control for length of interaction,  
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3 discussions were limited to five minutes. Participants in the control condition were  
4  
5 given five minutes to consider the points in the contemplation prompt, so that their  
6  
7 rehearsal of the information and the delay between encoding and recall was similar to  
8  
9 that of participants in the discussion condition. All participants then completed the  
10  
11 cued recall task independently on a computer. Finally, participants were thanked and  
12  
13 debriefed about the purpose of the study.  
14  
15

### 16 Results

17  
18 Data for all variables were roughly normally distributed. Three cases were  
19  
20 excluded from analyses due to procedural errors and one participant's failure to  
21  
22 adhere to instructions. Data from the remaining 63 participants ( $n = 32$  control,  $n = 31$   
23  
24 discussion<sup>1</sup>) were analysed. Members of a dyad share a common experience that may  
25  
26 mean their scores (on the dependent variables measured) are more similar to each  
27  
28 other than those of other participants. We therefore used the syntax provided in  
29  
30 Alferes and Kenney (2009), to run Pearson product-moment correlations to assess the  
31  
32 independence of data within dyads. None of the resultant  $r$  values exceeded the  
33  
34 conventional cutoff for a small correlation (Cohen, 1988). Moreover, all  $r$  values were  
35  
36 non-significant, with confidence intervals that crossed zero. We therefore treated data  
37  
38 from participants in the co-witness discussion pairs as independent. Table 2 displays  $r$   
39  
40 values, their 95% confidence intervals,  $t$  values, degrees of freedom and associated  $p$   
41  
42 values for the dyadic data analysis.  
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47 < Insert table 2 here >  
48

49 We ran an independent samples t-test comparing the control (no discussion)  
50  
51 and co-witness discussion groups on confidence in fine- and coarse-grain responses at  
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56 <sup>1</sup> One participant in a dyad was excluded because he failed to comply with instructions and exited the  
57  
58 cued recall task. The problem occurred after the discussion, and so did not affect results from the other  
59  
60 dyad member. Data from the latter was retained, which is why the discussion group  $n$  is odd.

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3 Phase I, volunteering of fine- and coarse-grain responses at Phase II, and withholding  
4 ('I don't know') at Phase III for all items on the cued recall task. Each of these  
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7 variables, as well as the total number of accurate fine-grain responses participants  
8  
9  
10 provided to critical item questions at Phase I, were entered into a separate analysis for  
11  
12 critical item questions. We examined fine-grain accuracy for the critical item  
13  
14 questions because we expected that it would be decreased by the misinformation  
15  
16 exchanged between participants in the co-witness discussion condition. However,  
17  
18 based on the results of Experiment 1, we did not expect that accuracy for non-critical  
19  
20 item questions would be affected, and so we did not examine this variable. Table 3  
21  
22 displays group means and standard deviations for all dependent variables.  
23  
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25 < Insert Table 3 here >  
26

### 27 **Analyses for all cued recall questions**

28  
29 There were no significant differences between groups for confidence in  
30  
31 coarse-grain responses,  $t(61) = 0.36, p = .72, d = 0.09$ , and fine-grain responses,  $t(61)$   
32  
33  $= 1.41, p = .17, d = 0.38$ , at Phase I; volunteering of coarse-grain responses,  $t(61) = -$   
34  
35  $1.40, p = .17, d = 0.33$ , and fine-grain responses,  $t(61) = 1.40, p = .17, d = 0.33$ , at  
36  
37 Phase II; withholding responses at Phase III,  $t(61) = -0.06, p = .95, d = 0.02$ ; or  
38  
39 accuracy of fine-grain responses at Phase I,  $t(61) = 0.40, p = .69, d = 0.10$ .  
40  
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42

### 43 **Analyses for critical item questions**

44  
45 To explore the possibility that any effects of the manipulation may have been limited  
46  
47 to critical item questions, further t-tests were run to assess group differences for  
48  
49 dependent variables related to these items. Results showed that for critical item  
50  
51 questions, there was no significant difference between groups for confidence in  
52  
53 coarse-grain responses,  $t(61) = 1.62, p = .11, d = 0.47$ , and fine-grain responses,  $t(61)$   
54  
55  $= 1.34, p = .19, d = 0.37$ , at Phase I; and Phase III response withholding,  $t(61) = -0.96$ ,  
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3  $p = .34, d = 0.32$ . There was also no significant group difference in Phase II  
4  
5 volunteering of coarse-grain responses,  $t(61) = -1.91, p = .06, d = 0.51$ , and fine-grain  
6  
7 responses,  $t(61) = 1.90, p = .06, d = 0.49$ . However, the associated effect sizes were  
8  
9 moderate (Cohen, 1988, 1992), and  $p$  values approached significance. On a  
10  
11 descriptive level, participants in the co-witness discussion condition volunteered more  
12  
13 coarse- ( $M = .90, SD = .75$ ) and fewer fine-grain answers ( $M = 1.1, SD = .75$ ) to  
14  
15 critical item questions at Phase II than participants in the control group (coarse  $M =$   
16  
17  $.56, SD = .67$ ; fine  $M = 1.4, SD = .67$ ). Participants in the discussion condition ( $M =$   
18  
19  $1.2, SD = .60$ ) gave fewer accurate answers to critical item questions than those in the  
20  
21 control condition ( $M = 1.7, SD = .48$ ),  $t(61) = 3.75, p = .001, d = 0.98$ .

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25 Finally, the results of a chi square analysis showed a significant association  
26  
27 between reporting PEI and the discussion condition,  $\chi^2(1, 63) = 4.59; p = .03, V = .27$ .  
28  
29 Participants in the discussion condition were significantly more likely to incorporate  
30  
31 at least one unseen detail pertaining to a critical item (mentioned by the co-witness)  
32  
33 than participants in the no discussion group. Over 35% of participants in the co-  
34  
35 witness discussion group conformed to at least one critical item detail reported by  
36  
37 their co-witness.  
38  
39

## 40 Discussion

41  
42  
43 In Experiment 2, we found no significant differences between groups for  
44  
45 confidence, grain-size volunteering, response withholding, and accuracy when all  
46  
47 cued recall questions were examined. However, when analyses were focused on  
48  
49 participants' responses to critical item questions we found that participants in the  
50  
51 discussion condition reported significantly more inaccurate answers to critical item  
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53 questions than participants in the no discussion condition. As expected, we found a  
54  
55 misinformation effect with respect to the critical items, which likely underlies the  
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3 discussion group's decreased accuracy. Moreover, participants in the discussion group  
4  
5 tended to volunteer fewer fine grain details to critical item questions at Phase II than  
6  
7 participants in the control group. However, this difference only approached  
8  
9 significance. Thus, our prediction that disagreements arising between co-witnesses in  
10  
11 the discussion condition would result in their reporting fewer fine-grain details was  
12  
13 not supported. Finally, we found no significant difference between participants in the  
14  
15 discussion and no discussion conditions with regard to their confidence in the  
16  
17 accuracy of the responses they volunteered at Phase I, and their tendency to withhold  
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19 responses at Phase III.  
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23 It is possible that the lack of significant findings in Experiment 2 resulted from  
24  
25 there being only two critical items upon which the social interaction could have  
26  
27 exerted an effect. However, it is worth noting that previous similar research has  
28  
29 typically only used a small number of critical items (e.g., Gabbert et al., 2007;  
30  
31 Oeberst & Seidmann, 2014). Another potential factor underpinning these results is the  
32  
33 extent of disagreement and agreement among the co-witness pairs. In the course of  
34  
35 their discussions, participants in the discussion condition agreed (had their report  
36  
37 confirmed by their co-witness) more often than they disagreed, which may have  
38  
39 weakened the effect of the social interaction on meta-memorial monitoring and  
40  
41 control processes. Finally, it could be that the expected reduction in reporting of fine-  
42  
43 grain details for critical items was offset by an increase in participants' reporting of  
44  
45 fine-grain details mentioned by the co-witness. Previous research has shown that  
46  
47 individuals strive to be informative, even at the cost of accuracy, and are reluctant to  
48  
49 answer 'I don't know' too often (Ackerman & Goldsmith, 2008). It is possible that  
50  
51 participants in the co-witness discussion group preferred to volunteer the fine-grain  
52  
53 answers reported by their co-witness rather than offer less informative coarse-grain  
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3 answers when the accuracy of their own fine-grain answers to the critical item  
4  
5 questions was challenged.  
6

### 7 8 **General Discussion**

9  
10 Experiments 1 and 2 examined social influence effects on the metacognitive  
11 processes that regulate memory reporting. Specifically, these two experiments  
12 examined the effects of (i) receiving confirming or disconfirming feedback about the  
13 accuracy of one's memory, and (ii) receiving post-event misinformation on  
14 participants' reported confidence, grain-size volunteering, and response withholding  
15 in a subsequent recall task. In Experiment 1, participants who received disconfirming  
16 feedback from a confederate about their answers on a practice recall task reported  
17 fewer precise (fine-grain) details on a subsequent recall task. Unexpectedly, this  
18 decrease in fine-grain reporting was not accompanied by a decrease in participants'  
19 confidence in the accuracy of their fine-grain responses. The results of Experiment 1  
20 indicate that receiving social comparative feedback about one's memory performance  
21 can affect subsequent reporting of details. While participants in the disconfirming  
22 group did not express significantly lower confidence in the accuracy of their memory  
23 for fine-grain details than participants in the confirming and control group, they did  
24 volunteer significantly fewer fine-grain details. This discrepancy between expressed  
25 confidence and selection of details to be reported is not consistent with the predictions  
26 of the revised dual-criterion model (Ackerman & Goldsmith, 2008). However, there  
27 are a number of potential contextual reasons why this might be the case. The model  
28 was initially developed in experiments involving participants individually answering  
29 general knowledge questions, it therefore may not adequately predict metamemorial  
30 decision making that occurs immediately before, after, or during social interactions.  
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3 In light of these results, further testing of the revised dual-criterion model's predictive  
4 value in social reporting conditions is warranted.  
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7 One possible explanation for our findings in Experiment 1 is that memory  
8 self-efficacy was lowered by disconfirming feedback. In light of this, participants in  
9 the disconfirming condition may have volunteered fewer fine-grain details in an  
10 attempt to increase the likelihood of their responses being correct. Future research  
11 should explore the role of memory self-efficacy in metamemory.  
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18 In Experiment 2, participants who discussed a stimulus event with a co-  
19 witness later reported more incorrect details about the event (mentioned by the co-  
20 witness) in their individual responses than participants who did not discuss the event.  
21 Contrary to our predictions, participants in the discussion group did not report lower  
22 confidence in the accuracy of their memory for fine-grain details, volunteer fewer  
23 fine-grain details, or withhold more information than participants in the no discussion  
24 group.  
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34 In demonstrating a robust misinformation effect, the results of Experiment 2  
35 replicate the findings from the literatures on the misinformation (see Frenda et al.,  
36 2011; and Loftus, 2005, for reviews) and witness conformity effects (Gabbert et al.,  
37 2003; Wright et al., 2000). However, despite conforming to misinformation  
38 communicated by a co-witness, participants in Experiment 2 did not show an  
39 associated pattern of effects on the metacognitive monitoring and control strategies  
40 that regulate memory reporting. It is possible that, after the monitoring process,  
41 participants decided that their candidate responses to critical item questions were  
42 either unlikely to be accurate, or were not informative enough. Driven to be as  
43 informative as possible, these participants may have reported the misinformation  
44 provided by a seemingly confident co-witness (Deutsch & Gerard, 1955; Cialdini &  
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3 Goldstein, 2004). Misinformation may have been volunteered without undergoing the  
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5 usual monitoring process, which may explain the lack of consistent effects on  
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7 monitoring and control in Experiment 2. The results of these studies do not confirm  
8  
9 this explanation, but they certainly present an interesting avenue for future research.  
10  
11 In order to test this suggestion an experimental design with conditions that motivate  
12  
13 both informational and normative conformity is needed. If participants are reporting  
14  
15 misinformation from a co-witness because they believe it to be accurate, then their  
16  
17 confidence in the accuracy of this misinformation is not likely to differ from their  
18  
19 confidence in the correct details they report from their own memory. However, in  
20  
21 cases of normative conformity to misinformation, the rememberer, not being privately  
22  
23 convinced of the veracity of discrepant information from the co-witness, should report  
24  
25 lower confidence in its accuracy, and perhaps be less likely to volunteer fine-grain  
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27 details about items for which they have conformed to misinformation.  
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32 The lack of significant group differences in confidence, grain-size selection,  
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34 and response withholding in Experiment 2 may also be due to participants not overtly  
35  
36 stating their confidence in the accuracy of their responses. In Experiment 1,  
37  
38 confederates directly expressed high degrees of confidence in the accuracy of their  
39  
40 contradictory responses. It may be that the effect on fine-grain responding found in  
41  
42 Experiment 1 was driven by the confederates' high reported confidence in the  
43  
44 accuracy of their answers. In Experiment 2, the lack of overt expressions of  
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46 confidence during co-witness discussions may have made the manipulation weaker  
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48 than in Experiment 1, resulting in an effect on fine-grain responding that only  
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50 approached significance.  
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54 The results of the two experiments reported here suggest that discussion  
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56 between co-witnesses can affect their individual metacognitive monitoring and  
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3 control strategies during a subsequent recall report. The social manipulations in these  
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5 two experiments elicited metamemorial strategies that did not align with those  
6  
7 predicted by the preeminent theoretical model. These findings have important  
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9 theoretical implications. Future research should assess the validity of existing models  
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11 of metamemory in the social contexts in which memory reporting often occurs.  
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Table 1

*Experiment 1: Means, Standard Deviations, and 95% Confidence Intervals for Control, Confirming and Disconfirming Conditions*

Dependent variable	Control ( $n = 30$ )		Confirming ( $n = 32$ )		Disconfirming ( $n = 30$ )	
	$M (SD)$	95% CI	$M (SD)$	95% CI	$M (SD)$	95% CI
Phase I CG confidence	72.5 (11.3)	[68.3; 76.8]	78.9 (8.5) <sup>a</sup>	[75.8; 82.0]	73.6 (11.5) <sup>a</sup>	[69.3; 77.9]
Phase I FG confidence	65.5 (10.6)	[61.6; 69.5]	69.3 (10.2)	[65.6; 72.9]	65.2 (11.7)	[60.8; 69.6]
Phase II CG volunteering	9.5 (2.8) <sup>b</sup>	[8.5; 10.5]	10.3 (2.6) <sup>b</sup>	[9.3; 11.2]	11.7 (2.7) <sup>b</sup>	[10.7; 12.7]
Phase II FG volunteering	12.5 (2.8) <sup>c</sup>	[11.5; 13.5]	11.7 (2.6) <sup>c</sup>	[10.8; 12.7]	10.3 (2.7) <sup>c</sup>	[9.3; 11.3]
Phase III withholding	6.3 (2.9)	[5.2; 7.4]	5.6 (2.7)	[4.8; 6.7]	7.4 (3.4)	[6.1; 8.6]
Phase I CG accuracy	16.4 (3.1)	[15.3; 17.6]	17.4 (2.2)	[16.6; 18.2]	16.7 (2.8)	[15.6; 17.7]
Phase I FG accuracy	12.9 (3.0)	[11.7; 14.0]	13.2 (2.8)	[12.2; 14.2]	12.6 (3.1)	[11.4; 13.7]

*Note.* CI = confidence interval; CG = coarse-grain; FG = fine-grain. Means in a row sharing the same superscript differ at  $p < .05$ .

Table 2  
 Experiment 2: Values, 95% CIs, *t* Values (Degrees of Freedom), and *p* Values  
 Assessing Independence of Data Within Dyads

Dependent variable	<i>r</i>	95% CI	<i>t</i> (df)	<i>p</i>
FG confidence	-.04	[-.52; .47]	-0.14 (14)	.89
FG volunteering	.23	[-.30; .65]	0.90 (14)	.38
Withholding	-.10	[-.57; .42]	-0.37 (14)	.72
FG confidence critical	-.10	[-.57; .42]	-0.37 (14)	.72
FG selection critical	-.02	[-.51; .48]	-0.09 (14)	.93
Withholding critical	-.08	[-.55; .44]	-0.28 (14)	.78
Accuracy critical	-.21	[-.64; .32]	-0.81 (14)	.43

*Note.* CI = confidence interval; CG = coarse-grain; FG = fine-grain.

Table 3

*Experiment 2: Means and Standard Deviations, and 95% Confidence Intervals for the No Discussion and Discussion Conditions*

Dependent variable	No discussion ( $n = 32$ )		Discussion ( $n = 31$ )	
	$M (SD)$	95% CI	$M (SD)$	95% CI
Phase I CG confidence	81.5 (8.5)	[78.7; 84.6]	80.7 (12.1)	[66.1; 74.8]
Phase I FG confidence	74.6 (10.6)	[71.2; 78.3]	70.6 (12.1)	[66.3; 74.7]
Phase II CG volunteering	10.41 (4.46)	[8.8; 11.9]	11.9 (3.8)	[10.5; 13.3]
Phase II FG volunteering	14.6 (4.5)	[13.1; 16.1]	13.1 (3.8)	[11.7; 14.5]
Phase I FG accuracy	15.1 (2.1)	[14.3; 15.7]	14.8 (2.4)	[14.0; 15.6]
Phase III withholding	4.3 (2.7)	[3.4; 5.2]	4.3 (2.5)	[3.3; 5.2]
Phase I CG confidence critical	80.5 (16.1)	[75.0; 86.1]	72.9 (20.7)	[65.9; 79.7]
Phase I FG confidence critical	73.9 (19.5)	[67.1; 80.9]	66.8 (22.8)	[58.1; 75.0]
Phase II CG volunteering critical	.56 (.67)	[.33; .81]	.90 (.75)	[.64; 1.2]
Phase II FG volunteering critical	1.4 (.67)	[1.2; 1.7]	1.1 (.75)	[.83; 1.3]
Phase II FG accuracy critical	1.7 (.48) <sup>a</sup>	[1.5; 1.8]	1.2 (.60) <sup>a</sup>	[1.0; 1.4]
Phase III withholding critical	.25 (.44)	[.10; .40]	.39 (.68)	[.16; .64]

*Note.* CI = confidence interval; CG = coarse-grain; FG = fine-grain. Means in a row sharing the same superscript differ at  $p < .05$ .