Social influences on the metacognitive regulation of eyewitness memory reports

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Social Influences on the Metacognitive Regulation of Eyewitness Memory Reports

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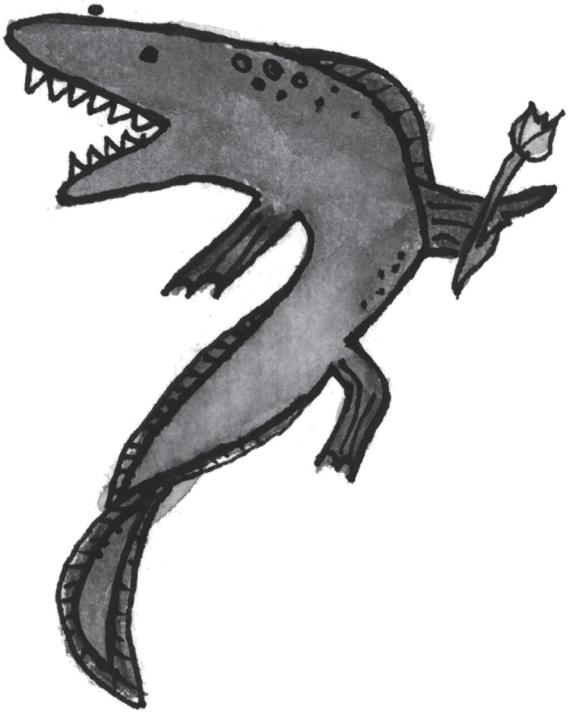

Eyewitness testimony is important to legal procedures. However, eyewitnesses are sometimes exposed to post-event factors that can distort their memory reports. The aim of this thesis was to explore the effects of social influences on the metacognitive monitoring and control processes that regulate memory reporting. In five experiments, we exposed participants to social comparative information (Experiments 1, 2 and 3) and misinformation from a co-witness (Experiments 4 and 5) and examined the effects of these manipulations on i) participants' subjective confidence in the accuracy of their recall, ii) the precision of the details they volunteered, and iii) their tendency to withhold responses. In **Experiment 1**, participants (N = 87) were given negative, positive, or no information about a co-witness's performance on a cued recall task comprised of questions about a mock crime. Participants then independently answered cued recall questions about the event. Participants exposed to information about a co-witness' performance (negative or positive) reported more precise (fine-grain) details than those in the no information control group. Selection of fine-grain responses positively correlated with participants' confidence in the accuracy of these responses. However, confidence in fine-grain responses did not differ significantly between participants in the control and experimental groups. In **Experiment 2**, participants (N = 90) watched a video of a mock crime event and then completed a practice task in which they answered questions about the event. Participants in the experimental groups received either positive or negative feedback about their accuracy on the practice task, which compared their performance to that of others. Control participants received no feedback. Receiving feedback did not significantly affect participants' confidence, accuracy, or their grain size selection in comparison to the control group. In **Experiment 3**, participants (N = 92) watched a video of a mock crime event and completed cued recall questions about one of the characters in the video. Participants in the experimental groups then took turns verbally reporting their answers with a confederate who either confidently agreed (confirming condition) or disagreed (disconfirming condition) with the majority of their answers. Participants in the control condition did not report their answers verbally. Participants then completed another set of cued recall questions about the event and provided confidence ratings. Participants in the disconfirming condition included fewer fine-grain details in their memory reports (cf. those in the confirming and control conditions). In **Experiment 4**, participants (N = 66) watched one of two versions of a video depicting a mock crime event. Video versions differed with respect to two critical items. Participants in the discussion condition then discussed the event with a co-witness who had seen a different version of the video; participants in the control condition did not discuss the event. Participants then completed a cued recall task comprised of questions about the crime. Participants who discussed the event with a co-witness reported more incorrect details (mentioned by the co-witness) in

the cued recall task than those in the control condition. Co-witness discussion did not significantly affect the meta-cognitive regulation of participants' subsequent memory reports. In **Experiment 5**, participants (N = 60) watched a video of a mock crime event and then read one of two versions of a bogus co-witness report, each of which contained three different items of misinformation. Participants then answered cued recall questions about the event. Participants were significantly less accurate when answering questions about critical items (cf. non-critical items), but confidence, fine-grain volunteering, and response withholding were not significantly different for critical item questions (cf. non-critical item questions). Overall, the results of the present thesis demonstrate that social conditions can affect meta-cognitive regulation of the content of individual memory reports. The five experiments that comprise this thesis represent the first programme of research to examine social influence effects on the meta-memorial monitoring and control processes that govern memory reporting. Avenues for further research on this topic are discussed in light of the present findings.

Chapter 1

Introduction

This chapter is an adapted and extended version of the following article:
Rechdan, J., Sauerland, M., Hope, L., & Ost, J. (2016). Was that how it happened?: Shaping our memory for personal experiences in conversation with others. *The Inquisitive Mind, 7(31).* Retrieved from: http://www.in-mind.org/article/was-that-how-it-happened-shaping-our-memory-for-personal-experiences-in-conversation-with

In the wake of the Watergate scandal in the United States, John Dean, a former counsel to President Nixon, testified before the Watergate Investigating Committee. Dean gave the committee detailed information about discussions he had been privy to during numerous meetings. Dean's memory for these conversations, which had taken place months prior, seemed so sharp that some news outlets dubbed him the "human tape recorder" (Neisser, 1981). It was later discovered that the meetings had in fact been tape-recorded, thus offering the perfect opportunity to compare Dean's retellings with what had been said. After conducting an in-depth assessment of Dean's testimony and the transcribed recordings, psychologist Ulric Neisser found that Dean had accurately reported the overall gist of the conversations. However, Dean's detailed recollection of specific conversations was fraught with inaccuracy (Neisser, 1981, 2007).

Dean's errors should not surprise us, it is now widely acknowledged that human memory does not function like a tape or video recorder. Long before Neisser's investigation, F.C. Bartlett published *Remembering: A study in experimental and social psychology,* in which he proposed that our memories are often reconstructions - rather than faithful reproductions - of past events (Bartlett, 1932; Ost & Costall, 2002). In one set of studies, Bartlett's participants were asked to read and then write down a Native North American folk tale called "War of the Ghosts". He observed that when these participants re-wrote the story after time delays, their versions included departures from the original tale. Specifically, participants omitted and altered details in a way consistent with their own cultural *schemas*. Schemas are general organized structures that aid in the creation of memories and guide their later retrieval (Roediger & DeSoto, 2015).

In addition to personal schemas, the reconstruction of memories can be influenced by the social context in which it occurs. Bartlett emphasized the social nature of remembering. More recently, research has shown that people often discuss and form memories in the presence of others (Hirst & Echterhoff, 2012), regardless of whether those events are mundane (e.g., everyday events recorded in a diary; Pasupathi, McLean, & Weeks, 2009) or more noteworthy (e.g., criminal events witnessed in person; Paterson & Kemp, 2006a; Skagerberg & Wright, 2008). In sum, most remembering is a schema-driven process of reconstruction that often occurs in a social context.

Approaches to the Study of Memory

Traditional approaches to the study of memory have mainly focused on encoding, retrieval, and reconstruction of details. Middleton and Edwards (1990) proposed a 'meta-cognitive construction' of conversation in which social norms, and the

broader social context of communication are considered. In line with Bartlett (1932), these authors described remembering and forgetting as inherently social. In accordance with this, the *social communication approach* to the study of memory is focused on the pragmatics of conversation as they relate to social context (e.g., the considerations of a speaker before responding to a listener's question). When reporting information from memory, speakers adhere to the maxims of relevance (mentioning what the listener does not already know), quantity (providing an appropriate level of detail) and quality (giving accurate or reliable information; Grice, 1975). Moreover, speakers tailor their communication to the listener (Hyman, 1994; Pasupathi, 2001) and use a "language of storytelling", often embellishing certain aspects and omitting others for the purpose of entertainment (Dudukovic, Marsh & Tversky, 2004; Marsh & Tversky, 2004). The *meta-cognitive approach* combines the traditional and social communication approaches, by considering the speaker's personal and social goals for communication in addition to the meta-cognitive monitoring and control that underlies the selection of volunteered responses (Ackerman & Goldsmith, 2008). The term *meta-cognition* has broadly been used to refer to the knowledge, beliefs, feelings, and thoughts we have about our own cognitions (Flavell, 1979). Following the meta-cognitive approach, the experiments in this thesis consider both the socially motivating conditions in which memory reporting occurs, as well as the meta-cognitive monitoring and control processes that regulate memory output.

In five empirical studies, this doctoral research examined how manipulations that motivate social comparison and conformity affect individuals' regulation of their memory reports through meta-cognitive monitoring and control. In this chapter, I will discuss theories of social influence, as well as research examining various forms of social influence effects on eyewitness memory reports (Part I). I will then describe theoretical models of the meta-memorial regulation of memory reporting and review relevant research in the area of eyewitness memory (Part II). Finally, I will describe the aims of the present research, the research questions that arise from them, and the experiments conducted to address these questions (Part III).

Part I: Theoretical Background and Forms of Influence

Remembering is a reconstructive process that often occurs in a social setting, and as such, research has shown that memory is subject to social influence (Bartlett, 1932; Gabbert, Wright, Memon, Skagerberg, & Jamieson, 2012; Roediger & DeSoto, 2015). Here, I will discuss classic theories of two forms of social influence that are pertinent to this thesis: social comparison (Festinger, 1954) and conformity (Asch, 1951) and some of the research into their effects on memory.

In his seminal theory of social comparison, Festinger (1954) proposed that people are innately driven to evaluate their opinions and abilities, and in the absence of otherwise objective means for such evaluations, they do so by comparing their opinions and abilities to those of others. Depending on the situation, people may be motivated to resolve discrepancies in judgment by adjusting their opinions and beliefs to match, or more closely approximate those of others. Cognitive appraisals such as opinions, beliefs, and evaluations of our abilities, influence our behavior (Festinger, 1954). Social comparison theory therefore outlines the mechanism through which our cognitions, and subsequently our behaviors, are influenced by other individuals and groups. Based on the assertions in social comparison theory, this thesis examines how the meta-cognitive monitoring and control of memory reporting are influenced by social comparative information.

In a focused investigation of the effects of social comparison on behavior, Asch (1951) conducted a series of studies in which he examined group influences on individual judgment. In his now classic paradigm, Asch assembled groups of participants in a room (initially between seven and nine males). All but one of the participants were confederates. The participants were shown two white cards; one with three straight black lines of varying lengths, the other with just one line. Participants were asked to judge which of the three lines was identical in length to the individually presented line (henceforth referred to as the target line). One of the three lines was the same length as the target line; the other two were notably different. On 12 out of a total of 18 trials, the confederates responded unanimously in error, each of them reporting their choice of line publicly before the real (naïve) participant has had his turn. Asch found that 75% of participants (total $N = 123$) yielded to majority consensus at least some of the time. At one extreme, 25% of participants maintained their individual judgments, disagreeing with the confederates on all 12 of the rigged trials. At the other extreme were individuals who yielded to the incorrect selection made by the majority in all trials. Overall, participants conformed to the incorrect judgment made by the confederates in 37% of the trials. In comparison, participants engaging in the line task independently made errors of judgment less than 1% of the time. The conformity of participants to incorrect answers given by the majority, despite being faced with unambiguous stimuli, is a marked demonstration of the power of social influence.

Intrigued by Asch's findings, but unconvinced that his method had invoked a sense of group membership in participants, Deutsch and Gerard (1955) conducted their own examination of group influences on individual judgment. Using a variation of the Asch paradigm, the researchers examined the conditions that gave rise to two distinct forms of influence. The type of influence most commonly seen in groups, *normative social influence,* occurs when an individual conforms to the attitudes or opinion of others to present themselves agreeably, or avoid the negative social

consequences of non-conformity (e.g., rejection or disapproval). *Informational social influence* occurs when a person conforms to the attitudes or opinion(s) of others because they believe these others are trustworthy, or that their position is likely correct (Deutsch & Gerard, 1955).

In Deutsch and Gerard's (1955) study, participants were randomly allocated to a face-to-face condition (similar to Asch's original paradigm), an anonymous condition, in which they were separated from implied co-participants by a partition and selected answers by pressing a button, or a group condition in which group membership was emphasized by setting a common goal for members: to attain a high accuracy rate with the incentive of winning a prize. Additionally, some participants recorded their answers privately before sharing them with the group, while others did not. All participants made decisions on 18 trials with the stimuli visible (the cards depicting the lines), and 18 trials with the stimuli removed (relying on their memory). Results showed that normative influence a) was significantly lower in the anonymous condition compared to the face-to-face and group situations, b) writing down an answer prior to responding was associated with decreased conformity, and c) participants were more influenced by the judgment of others when making a decision based on their memory for the lines, as opposed to when the stimuli were present. The authors concluded that individuals are more susceptible to social influences in conditions that increase their uncertainty in the accuracy of their own judgments.

In sum, social comparison theory and research on conformity demonstrate that others can influence the cognitions and behavior of individuals. When the social costs of disagreeing with another individual or group are high, influence is likely to be normative. In situations of uncertainty or ambiguity, influence is likely to be informational. In the next section, I discuss research on when and how social influences can affect memory.

Setting the Stage for Social Influence Effects on Memory

Retrieving and reconstructing an event from memory involves both internal (cognitive) and external (social) processes (Blank, 2009). In this section, I briefly discuss Blank (2009)'s social cognitive model of memory, which outlines the stages of memory recall from retrieval to reporting, and highlights where social influence might shape the process. I then discuss conditions that can increase a remember-er's susceptibility to social influence, such as stimulus memorability, social consensus, and subjective confidence in the accuracy of details recalled. Finally, I review some of the research on social influences on memory in the eyewitness memory literature.

Blank (2009) proposed a model for the integration of cognitive and social psychological processes involved in memory reporting. In his integrative framework of remembering, individuals access the memory via retrieval cues (Stage 1), seek external validation of their recall from social information (Stage 2), and communicate the information, considering social costs/benefits, if prompted to do so in a social exchange (Stage 3; for an earlier, similar model, see Smith & Clark, 1993). It is important to note that the model makes a distinction between retrieval and reporting. The primary aim of the present thesis is to investigate social influence effects on the selection of details to be reported from memory, or Stages 2 and 3 in the model. According to Blank (2009), informational influence is likely to occur at stage 2, and normative influence at stage 3. While social conditions may influence individuals' memory reports, they do not necessarily alter their underlying memory for an event or stimulus.

There are certain conditions that increase the likelihood of social influence effects on memory reporting, such as memorability of the information to be recalled (Bless, Strack & Walther, 2000), confidence in the accuracy of one's memory for the original stimulus or event (Jaeger, Lauris, Selmeczy, & Dobbins, 2012), social consensus about the information or response (Betz, Skowronski, & Ostrom, 1996), perceptions of the speaker's confidence (Allan & Gabbert, 2008), and credibility (Gabbert, Memon, & Wright, 2007), and speaking order (Wright & Carlucci, 2011), to name a few.

In four experiments, Bless et al. (2000) tested participants' recognition memory for previously presented items in different conditions of social influence (Strack & Bless, 1994; Walther, Bless, Rackstraw, & Wagner, 2000 as cited in Bless et al., 2000). Participants were exposed to pictures of items that varied in distinctiveness (experiments 1-4), and salience (experiments 2-4). Participants then completed a recognition task in which they distinguished between previously viewed and novel items. Some of the questions on the recognition test included misleading information, introduced using a definite article (e.g., did you see *the* hammer?, experiments 1-4). In experiments 3 and 4, participants were also exposed to the responses of bogus co-participants on the recognition test. These bogus responses were either unanimously incorrect, or included two accurate dissenters. Additionally, in experiment 4 participants were either given an incentive for accuracy, or told that they would be discussing their answers with co-participants after the recognition task. The results of experiments 1 and 2 showed that for non-salient and non-distinctive items (items of low memorability), participants' judgments were influenced by the information conveyed in the questions (i.e., they were more likely to judge these items as previously seen when a definite article was used). In experiment 3, participants were significantly more likely to conform to the incorrect judgments of co-participants for low memorability items. This effect increased when the responses

of the co-participants were unanimous, and greater in number (10 as opposed to 5 individuals). The results of experiment 3 were replicated in experiment 4, with no significant effect of the group discussion and accuracy incentive instructions. Based on these results, the researchers proposed that participants' confidence in the accuracy of their recollections mediated their susceptibility to social influence. Moreover, results indicated that participants experienced informational social influence, given that the presence of dissenters in experiment 3 decreased but did not eliminate conformity, and instructions designed to increase normative pressures in experiment 4 did not increase conformity (Bless et al., 2000).

In a similar vein, Betz, Skowronski, and Ostrom (1996) asked participants to read a story and then complete a recognition assessment of their recall for facts from the story. After answering some of the test items, participants were shown tallies (controlled by the experimenter) of others' answers to the same questions. When participants' memory for story facts was later re-assessed in a cued recall test, many of them changed their responses to match the answer selected by the majority of others. This majority consensus effect was highest when item memorability was low, or when the question assessed knowledge for information not present in the story (conditions of high ambiguity). In study 2, response alterations persisted even when participants were explicitly told that the responses of others were fabricated. Taken together, these findings suggest that information gleaned from others can greatly affect peoples' memory reports, particularly for stimuli that is poorly encoded, or non-distinctive.

More recent research by Jaeger, Lauris, Selmeczy, and Dobbins (2012) also examined the influence of judgments made by external sources on participants' memory. In two experiments, participants studied a list of words and then completed a computerized recognition task in which they had to identify words on a subsequent list as previously studied ('old') or newly presented ('new'). Participants made recognition judgments along a six-point confidence scale. For some of the words, participants were led to believe that they were shown judgments (referred to as cues) made by students who had previously completed the source recognition task. These cues from external sources (student A and student B) appeared on screen just before the target word. In reality, the cues were generated by the computer program, and were accurate on 75% of trials for one source (the "reliable" source), and 50% of trials for another source (the "unreliable" source). In single cue trials, participants saw the judgment of one of the sources (either A or B), in double cue trials, participants saw judgments from both of the sources, and on control trials, participants were not shown any information from the sources. Results showed that participants' judgment for words shown after cues from the "reliable" source were more accurate than words shown after cues from the "unreliable" source and words shown with no preceding cue. Surprisingly, the accuracy

of participants' judgment for words shown with cues from the "unreliable" source did not differ significantly from the accuracy of their judgment on control trials. Hence, conformity to cues from the "reliable" source improved accuracy, while conformity to cues from the "unreliable" source did not hinder or improve accuracy relative to participants' baseline recognition performance (on control trials). Moreover, participants conformed to judgments made by the "unreliable" source about as often as they conformed to judgments made by the "reliable" source, indicating that they did not seem to distinguish between the reliability of the two sources. Thus, it seems that in a social comparative context, people are not very good at determining the recall accuracy of others. Drawing on participants' reported confidence for accurate and inaccurate judgments made during the control trials, the researchers determined through modeling that on cued trials, participants conformed to judgments made by the external sources when their confidence in the accuracy of their own memory was low. Jaeger et al. (2012) refer to this strategy as *low confidence outsourcing*.

In an adaptation of the paradigm used by Jaeger et al. (2012), Zawadzka, Krogulska, Button, and Higham (2015) found that when participants were given feedback regarding the accuracy of the sources they were getting information from, they were able to distinguish between the reliable and unreliable source, as evidenced by their meta-cognitive control decisions. Following performance feedback, participants conformed to the judgments of the reliable source more often than those of the unreliable source, and also withheld more responses on trials with a cue from an unreliable source compared to trials with a cue from a reliable source. Zawadzka et al. (2015) replicated the finding that conformity to judgments from external sources predominantly occurred when participants' confidence in their own memory for a presented word was low.

Combined, the results of Jaeger et al. (2012) and Zawadzka et al. (2015) show that people tend to conform to the memory judgments of external sources when their confidence in their own memory is low. Moreover, people are more likely to conform to sources they perceive as reliable, though overall, people are poor judges of source reliability. In the real world, rememberers usually have no objective indications of an external sources' reliability. The low confidence outsourcing strategy can therefore lead rememberers to incorporate potentially errant post-event information (PEI) when they cannot confidently remember certain details.

In support of the low confidence outsourcing hypothesis, Wright and Villalba (2012) found that participants shown computer-generated responses from a bogus participant on a recognition task conformed to these responses when their confidence in their own memory for a presented item was low. These authors concluded that memories held with uncertainty are more malleable than memories held with confidence. Moreover, the susceptibility of a memory to conformity effects

was moderated by its accuracy; individuals were more likely to conform to information from an external source for inaccurate memories than for accurate memories (Wright & Villalba, 2012). In sum, memories that are poorly recalled are more likely to be altered by social influence than are memories recalled with confidence.

The results of Jaeger et al. (2012), Zawadzka et al. (2015), and Wright and Villalba (2012), may underestimate the occurrence of memory conformity in real life situations. The conditions in which people encode memories in real life (e.g with poor lighting, from a long distance, viewing from a difficult angle, etc.) can be far less optimal than the laboratory conditions in which research participants view stimuli. Recall also often occurs long after memory for a stimulus has been encoded. The less than ideal conditions real-life rememberers experience at both encoding and recall may therefore reduce their confidence in their memory for details of the stimulus, and increase their reliance on external sources—irrespective of the reliability of these sources.

Social Influences Explored in Eyewitness Memory Research

While it is interesting to examine social influence effects on memory for everyday life events, it is especially important to do so when accurate recall of an event is of great consequence. One such example is the testimony of witnesses to a crime. The criminal justice system in many countries gives much credence to eyewitness reports, though research has demonstrated that eyewitness memory is malleable and sometimes fallible (Frenda, Nichols, & Loftus, 2011; Loftus, 2005; Penrod & Cutler, 1995; Skolnick & Shaw, 2001). Notably, Elizabeth Loftus and her colleagues have conducted several classic studies in which participants were shown videos of events and then exposed to misinformation via a confederate or written narrative. On subsequent memory tests, a significant number of individuals reported misleading post-event information in their account of the original event (see Loftus, 2005, for a review). This phenomenon is referred to as the *misinformation effect*.

Effects of Performance Feedback on Subsequent Recall

Socially encountered misinformation is one of many ways in which social factors can influence eyewitness' memory reports. A few studies have also investigated how giving mock witnesses social comparative feedback (usually communicated by an experimenter) regarding their memory performance can affect their subsequent reports. Roper and Shewan (2002) tested participants' recall before and after arbitrarily labeling them as 'good' or 'poor' eyewitnesses. Participants who received

positive feedback ('good' label) improved their recall performance on a second assessment. Participants who received negative feedback ('poor label') were more likely to comply with leading questions.

Using a feedback manipulation similar to that of Roper and Shewan (2002), Dixon and Memon (2005) had participants view a video of a staged robbery before asking them to identify a perpetrator from a target-absent line-up (i.e., all participants made an incorrect identification). The experimenters then informed half of the participants that they were 'good eyewitnesses', who had correctly identified the perpetrator, and the other half of participants that they were 'poor eyewitnesses', who had made an incorrect identification. After receiving this feedback verbally and in writing, participants were asked to provide details of the crime and perpetrator. Participants who received negative feedback expressed decreased confidence in the accuracy of their recall; however, this decrease in confidence did not affect the quantity or accuracy of the information they provided. The authors concluded that feedback concerning recall exerts an effect on eyewitness' confidence in their memory.

In another investigation of social comparative feedback on eyewitness memory, Leippe, Eisenstadt, Rauch, and Stambush (2006) had participants view a video of a crime in the presence of a co-witness. Participants then either verbally reported what they had seen to a confederate (experiment 1) or completed a computerized memory assessment about the video (experiment 2). Afterwards, participants received negative, positive, or no feedback regarding the similarity of their memory report to that of their co-witness (experiment 1), or they received feedback about the accuracy of their responses to the computerized memory assessment (experiment 2). Participants who received positive feedback subsequently made faster, more accurate identifications from a lineup, and reported a higher level of confidence in the accuracy of their recall than participants who received no feedback. Despite being associated with decreased recall confidence, negative feedback did not slow down or render participants' reports less accurate. The authors concluded that participants' belief in the accuracy of their memory was affected by the social comparative feedback. Positive feedback boosted belief in memory accuracy, while negative feedback lowered it, as measured by confidence. These changes in memory confidence were reflected in participants' retrospective reports of the witnessing experience. Participants who had received negative feedback recalled having a poorer view of the perpetrator, and a shorter viewing duration of the event than those in the positive and no feedback conditions.

In sum, giving participants positive feedback may have some beneficial effects on later recall performance. Conversely, the provision of negative feedback is associated with participants' decreased confidence in the accuracy of their memory for the witnessed event. If decreased confidence is taken to indicate increased uncer-

tainty, then according to social comparison theory, it will render individuals more susceptible to social influence effects. Indeed, research on the *low confidence outsourcing effect* demonstrates that individuals are more likely to conform to the judgments of external sources when their confidence in the accuracy of their own judgments is low (Jaeger et al., 2012).

Memory Conformity and Misinformation

Co-witness conformity is a topic that has received considerable attention, as it has great bearing on the criminal justice system. Witnesses to a crime often discuss the event with each other, sometimes introducing PEI that can subsequently influence their individual memory reports (Skagerberg & Wright, 2008; Wright, Memon, Skagerberg, & Gabbert, 2009). This has been termed *memory conformity*. This sometimes reflects an unintentional occurence, such as misattribution of the source of the information (Zaragoza & Lane, 1994). However, sometimes, one witness may conform to the opinion of another because his confidence in his own accuracy is low, or he believes that a co-witness is right (informational influence; Gabbert, Wright, Memon, Skagerberg, & Jamieson, 2012). When under pressure to achieve unanimity, witnesses may fall prey to normative influence, and agree with others in order to attain social approval and appear more likeable (Cialdini & Goldstein, 2004).

Wright, Self, and Justice (2000; experiment 2) empirically investigated how co-witnesses accounts may converge. Participants were shown a series of pictures depicting two versions of a theft. In co-witness dyads, one participant viewed a version of events that included an accomplice, while the other viewed a version with no accomplice. Co-witnesses were given the impression that they had viewed the same set of pictures. Each witness then completed a recognition task in which they provided true/false answers indicating whether or not items were present in the pictures, along with confidence ratings. Subsequently, participants were told to discuss the event with their co-witness and provide a joint account. After this discussion, each witness again completed the recognition task individually. Results showed that, despite initially high scores on the recognition task, 15 out of 19 co-witness pairs came to agree on the presence of an accomplice. Pairs were more likely to conform to the information provided by the more confident member.

To extend these findings, Gabbert, Memon, and Allan (2003) had participants view a video of a theft from one of two perspectives, each of which included unique details. Participants in the experimental condition were then instructed to discuss what they had seen with a co-witness who, unbeknownst to them, had viewed a different version of the theft. Participants in the control condition did not engage in a discussion. All participants then completed a recall test individually.

Over 70% of participants in the experimental group reported details they had not seen in the video, but were exposed to through discussion with their co-witness. These results demonstrate a robust witness conformity effect.

In a similar study, Gabbert, Memon, and Wright (2006, experiment 1) had participants view four pictures of complex scenes. There were two versions of each picture, and these versions differed with respect to two critical items, with eight critical items in total. Participants were grouped in dyads, and were told that they had seen the same set of pictures. In actuality, each dyad member had seen a different version of the pictures. Dyad members jointly discussed what they had seen in each picture before completing an individual free recall test. Results showed that witnesses who volunteered information first in the course of a discussion were more likely to influence their co-witnesses' memory report. Influence was defined as one dyad member reporting an incorrect critical item suggested by the other. The researchers suggested that characteristics of the individual and the task may motivate some individuals to respond first, and others to conform to incorrect PEI.

In a second experiment, the researchers had participants view one of four versions of a crime video. The versions differed with respect to four critical items. Participants were grouped in dyads and randomly allocated to one of two conditions. In the addition/omission condition, each dyad member saw two critical items that the other member had not seen. In the contradiction condition, dyad members saw four contradicting details. Dyads were then instructed to discuss the witnessed event in as much detail as possible, before completing an individual free recall test. The response order effect found in experiment I was replicated. Furthermore, results showed that participants' reports were most influenced by added items mentioned by the other dyad member. Contradictory information also influenced participants' memory reports, but to a lesser degree, as did omissions. The results of these two experiments shed light on some of the conversational dynamics that lead to co-witness conformity.

Research has found that variations in the recall instructions witnesses are given can influence their susceptibility to memory conformity. Wright, Gabbert, Memon, and London (2008, experiment 1), showed participants four pictures of detailed scenes, and then engaged them in joint recall with a co-witness. Co-witness dyads were given the impression that they had both seen identical stimuli. In reality, they had seen images that differed with respect to two details (critical items) per scene. Participants then completed an individual recall test. In the *strict* condition, participants were instructed to report only details that they were confident were accurate. By contrast, those in the *lenient* condition were instructed to report everything that they could recall about the scenes without worrying about accuracy. The results showed that participants in the *strict* condition were less likely to report errant PEI mentioned by their co-witness than participants in the *lenient* condition. However,

strict instructions also reduced the amount of accurate details participants reported. This finding indicates that changing the response criterion by placing emphasis on the accuracy of reported details can reduce memory conformity.

Perceptions of the quality of a co-witness' memory can also play a role in memory conformity. Gabbert, Memon, and Wright (2007) told participants that they had viewed a set of pictures depicting a crime event for either half as long, or twice as long as a co-witness. Participants were grouped in dyads; each dyad member had seen slightly different versions of the pictures, but both members had actually seen the pictures for an equal amount of time. Dyad members discussed the pictures and completed an individual free recall test. Participants who believed they had seen the pictures for twice as long as the other dyad member mentioned more details during the discussion, and were more likely to mention critical items first. Participants who mentioned critical items first were less likely to report errant PEI. Though participants who believed they had seen the pictures for half as long as their discussion partner reported more incorrect PEI, the effect was mediated through response order. The researchers noted that the feedback manipulation seemed to have influenced the social dynamics of the discussions. Moreover, beliefs about the quality of one's memory (better or worse than the co-witnesses' depending on duration of encoding time) appear to affect susceptibility to misinformation. A source-monitoring test revealed that participants mistakenly believed they had seen reported items of misinformation in the scenes 50% of the time.

In a similar experiment, Allan, Midjord, Martin, and Gabbert (2012) showed participants three scenes, each for a different duration (30s, 60s, and 120s). In one condition, participants were told that they would view each scene for half as long as an implied co-witness; in another, participants were told that they would view the scenes for twice as long as an implied co-witness. Actual viewing durations were the same for all participants (but different for each scene). Participants then completed a memory test in which they were shown an accurate, inaccurate, or no response from the implied co-witness before selecting their answer. Results showed that participants who believed that they had encoded the scenes for half as long as their co-witness conformed to responses provided by the co-witness more often than participants who believed they had viewed the scenes for twice as long. This finding replicates that of Gabbert et al., (2007). Furthermore, compared to participants who thought that they had encoded the scenes for twice as long as an implied co-witness, those who thought that they had encoded them for half as long were more likely to conform to responses provided by the co-witness for scenes they had encoded for shorter durations. In the 'half as long' group, conformity to the co-witnesses' responses increased as scene encoding duration decreased (i.e., conformity was higher for the 30s scene than the 60s scene, and lowest for the 120s scene). The researchers concluded that we supplement our memory with that

of others strategically, conforming to information from sources we perceive as reliable when our own memory is not.

Taken together, the findings from the witness conformity literature demonstrate the susceptibility of memory to social influence; specifically to conformity and the effects of social comparative feedback. The proliferation of research on memory conformity in the past decade or so has found that rememberers are more likely to report information received from a familiar co-witness than a stranger (Hope, Ost, Gabbert, Healey, & Lenton, 2008), that conformity can affect memory for actions (Wright & Schwartz, 2010), that people in more powerful social positions (e.g., managers) are more susceptible to conformity effects than their subordinates (Carol, Carlucci, Eaton, & Wright, 2013), and that conformity between witnesses may result from informational influence, as participants in one study were aware of the source of the misinformation they reported (Oeberst & Seidmann, 2014). New research on memory conformity continues to replicate, and shed light on the underlying mechanisms of this robust effect.

In this part, I have discussed the social psychological theories of social comparison and conformity, and reviewed some of the literature examining their influence on individual memory reports. In the next part, I will outline theoretical models of the meta-cognitions underlying the control of memory reporting and discuss research on the strategic regulation of eyewitness memory reports.

Part II: Meta-cognitive Monitoring and Control of Memory Reporting

Early memory research relied primarily on the quantity of information recalled by participants (e.g., serial reproduction studies), as an indicator of the successful retention of input items (Koriat & Goldsmith, 1994). More recently, an accuracy-oriented approach has gained momentum (Koriat, Goldsmith, & Pansky, 2000). The primary outcome measure in accuracy-oriented research is the correspondence of recalled information to past events, reflecting the probability that each reported item is correct (Koriat & Goldsmith, 1994). Outcomes in accuracy and quantity-oriented approaches differ based on *report option:* whether participants are required to answer all items in a memory assessment, or are free to withhold information by either responding 'don't know' or simply not supplying any answer at all (Koriat & Goldsmith, 1996).

According to Koriat and Goldsmith's (1996) model of the strategic regulation of memory reporting, people decide which items of information to volunteer or withhold through monitoring and control mechanisms. Assessing likely accuracy is labeled *monitoring*, and determining whether to volunteer or withhold an answer is

labeled *control*. Retrieval and monitoring produce a 'best candidate' response, accompanied by an assessment of this response's probable accuracy, known as *response criterion probability*. The control decision is a product of a combination of factors, including the effectiveness of monitoring assessments, the sensitivity of the control mechanism to the monitoring outcome, and incentives for providing an accurate answer. The latter dictate how conservative the response criterion needs to be. Answers that satisfy the response criterion are offered; those that do not are withheld. Individuals are effective, but not perfect at monitoring the correctness of their answers, hence memory reports can sometimes be inaccurate.

In two experiments, Koriat and Goldsmith (1996) tested participants' performance on a general knowledge test under forced and free report conditions. Results showed that memory accuracy was considerably improved by allowing individuals to withhold responses in both recall and recognition assessments. However, given that input (information at encoding) usually exceeds output, increased accuracy was accompanied by a reduction in the number of correct answers provided (i.e., memory *quantity*). In sum, meta-cognitive regulation can increase accuracy in free report situations, but may result in memory reports that do not necessarily fully correspond to encoded and retrieved details of a stimulus or event.

The Satisficing Model

Building on their earlier work, Goldsmith, Koriat, and Weinberg-Eliezer (2002) proposed the satisficing model for the regulation of grain size in memory reports. According to this model, respondents strive to provide as much information as possible, as long as it meets a minimum confidence criterion (i.e., a minimum level of likely accuracy). Participants adjust the grain size (acuity of detail) of information until they are confident that the range of answers provided contains the true value. If confidence in the accuracy of a fine-grain (detailed) answer is high, then it is volunteered. Otherwise, individuals may choose a coarser (less specific) response, or in some cases, refrain from responding.

Goldsmith et al. (2002) used a two-phase paradigm adapted from Koriat and Goldsmith (1996) to examine monitoring and control in memory reporting. In this paradigm, participants provide both fine- and coarse-grain responses to questions at Phase I, along with corresponding estimates of their subjective confidence in the accuracy of these responses. At Phase II, participants are shown the responses they provided at Phase I, with confidence ratings removed. Participants are then instructed to select their preferred response (fine- or coarse-grain), and can also be given the option to refrain from volunteering a response to the question.

The researchers conducted three experiments in which participants answered 40 general knowledge questions (with Phase I response confidence measured in experiments 2 and 3). Results showed that participants tended to provide coarse-grain answers to questions when their fine-grain answers were likely to be incorrect (as indicated by self-reported confidence). Participants were moderately successful at monitoring accuracy, which was higher at Phase II than it would have been had participants chosen only fine-grain answers, but lower than it would have been had they chosen only coarse-grain answers. Even when a monetary incentive was offered and a penalty for incorrect responses imposed (Experiment 3), participants' selection of volunteered responses corresponded with their expressed confidence. Participants did try to achieve a balance between accuracy and informativness when selecting their answers. However, increased confidence in both the fine- and coarse-grain answers usually resulted in volunteering the fine-grain response, indicating a preference for informativeness over accuracy.

The Revised Dual-Criterion Model

In light of the results of Goldsmith et al. (2002), Ackerman and Goldsmith (2008) proposed the addition of a criterion for informativness to the satisficing model. According to their revised dual-criterion model, people volunteer information from memory that satisfies both confidence and informativeness criteria. When rememberers feel reasonably confident of the accuracy of a response, and when that response is at a grain-size that renders it acceptably informative in the context of a social exchange, it is volunteered. If the grain-size of a response that satisfies our minimum confidence criterion is too coarse to be of any perceived value to a receiver, we are likely to withhold it. When it is an option, responding with "I don't know" (IDK) can help to maintain a higher level of accuracy, but people seem to use IDK responses sparingly, as overuse violates implicit communication norms.

When people are in a satisficing knowledge state, their level of knowledge is sufficient enough that they may volunteer information that satisfies both accuracy and informativeness criteria. Conversely, people in an unsatisficing knowledge state are unable to satisfy both criteria, and according to the model, are likely to sacrifice accuracy in an attempt to be informative. This accuracy-informativeness tradeoff was first identified by Yaniv and Foster (1995, 1997). They found that participants preferred fine-grain responses that approximated (but did not include) accurate responses to less precise, accurate coarse-grain responses.

To test the dual criterion model, Ackerman and Goldsmith (2008) gave participants varying degrees of control over the grain size of their responses to general knowledge questions in a series of experiments. Results showed that when possi-

ble, participants reported a grain size that satisfied both accuracy and informativeness criteria. However, when participants were unable to satisfy both criteria, they were likely to violate the accuracy criterion to offer an informative, but less reliable answer. Given the option to withhold responses, participants did so in situations where desired levels of accuracy and informativeness could not be achieved. In sum, the content of memory reports is under personal control, and people strive to provide accounts that satisfy criteria for both accuracy and informativeness.

Though originally tested with semantic memory (general knowledge questions), the revised dual-criterion model has been applied to episodic memory in several experiments, with similar results (Evans & Fisher, 2011; McCallum, Brewer, & Weber, 2016; Sauer & Hope, 2016; Weber & Brewer, 2008). I will now discuss some of the applications of this model to eyewitness memory research.

Applying the Models to Eyewitness Memory Research

Weber and Brewer (2008) had participants view a short video of a non-violent crime and then answer questions about it using the two-phase paradigm. In Phase 1, participants were prompted to provide both a fine and a coarse-grain answer for each question. Immediately afterwards, they were asked to rate their level of confidence in the accuracy of each of the answers they provided on a scale of 0-100% (increasing confidence). The order of the questions was randomized, and the order of requests for either fine-grain or coarse-grain answers was counterbalanced. Phase 1 was forced-report. In Phase 2, participants were asked the same questions, and were presented with the answers they provided in Phase 1 (with the original confidence ratings removed) as response alternatives. They were instructed to imagine that they were making a statement to the police with regard to the witnessed crime, and to select the response alternative they wished to volunteer. In a second experiment, participants were given the option to withhold responses at Phase 2 (e.g., respond "I don't know"). Across the two experiments, the level of detail provided by participants at Phase 2 was strongly, positively correlated to confidence in the accuracy of their fine-grain response alternatives at Phase 1. Additionally, when participants were given the option to withhold responses at Phase 2, they withheld information that failed to meet an implicitly established confidence criterion. In sum, Weber and Brewer (2008) found that the dual criterion model (Goldsmith et al., 2002) accurately predicted the meta-cognitive regulation of mock eyewitness' memory reports.

In real life investigations, eyewitness interviews may take place long after the event in question. Evans and Fisher (2011) had participants view a mock crime and interviewed them about it (using free recall, cued recall, or yes/no questions) after

ten minutes, or one week. Participants were more likely to provide coarse-grain responses to questions, or refrain from responding altogether after the delay. Such responding decreased the level of detail participants provided, but helped maintain the accuracy of their reports. The authors concluded that meta-cognitive monitoring and control allow individuals to maintain the accuracy of their memory reports over time.

In addition to delayed reporting, conditions at the time of encoding the event may impede detailed and/or accurate recall. In two experiments, Sauer and Hope (2016) examined the strategic regulation of memory reporting following optimal and sub-optimal encoding conditions (full and divided attention). In experiment 1, participants viewed drawings of complex scenes for 1 minute and answered cued recall questions about each following a 10 second retention interval. Participants had the option of volunteering a fine-grain, coarse-grain, or "I don't know" response to each answer. After volunteering a response, participants rated their confidence in its accuracy (0-100%). During encoding, participants in the divided attention condition listened to a recording of numbers being read and were instructed to press the spacebar of the computer keyboard when they heard odd numbers. Results showed that participants in the divided attention condition volunteered fewer fine-grain responses, and less accurate fine-grain responses, than participants in the full attention condition. Participants in the divided attention condition also expressed lower overall mean confidence ratings for their fine-grain responses, indicating that they had monitored the potential accuracy of candidate responses successfully, but chose to sacrifice accuracy for informativeness.

The procedure for experiment 2 was similar to that of experiment 1, with the addition of a condition that included a two-phase reporting procedure. The results of experiment 1 were replicated. Additionally, participants in the two-phase reporting condition exhibited a more conservative control strategy than participants in the non-phased reporting condition, which resulted in decreased fine-grain responding and increased accuracy. This finding has implications for the interpretation of results from previous studies in the area, many of which employed the two-phase paradigm. Sauer and Hope's (2016) comparison of two-phased and non-phased reporting, and examination of the effects of divided attention offer new insights on strategic monitoring and control of memory reporting in conditions that more closely approximate real life eyewitness encoding and reporting experiences.

The motivation to be informative, even when incorrect, may lead people to withhold potentially useful, correct coarse-grain responses. McCallum, Brewer, and Weber (2016) conducted two experiments to investigate the social conditions that promote or inhibit coarse-grain responding. In experiment 1, participants viewed a video of a mock crime and then answered 20 questions about details from the video. As in Weber and Brewer (2008), participants provided both fine and coarse-

grain answers and confidence ratings (0-100%) in Phase I, and selected one of their answers as a preferred response in Phase II. Participants in the public reporting condition were told that they would have to report their responses to the questionnaire aloud in front of the experimenter and two other participants (though this did not actually occur). Participants in the private reporting condition were instructed that their responses to the questionnaire items would remain confidential. Participants were further informed that a police officer (high authority condition) or a research assistant (low authority condition) would score their questionnaire. Results showed that confidence significantly predicted response accuracy. Participants in the response privacy condition were nearly twice as likely to volunteer fine-grain responses as those in the public response condition. Authority of the individual supposedly scoring the questionnaire did not significantly affect participants' grain-size choices.

The procedure for experiment 2 was similar to experiment 1, except that expectations regarding the authority of the questionnaire scorer were not manipulated, the cued recall questionnaire included only ten questions, and a monetary incentive with penalties for inaccurate responses was introduced. Participants in the no penalty group were informed that they would receive $15 for participation, while those in the penalty group were told that $1 would be deducted from this amount for every incorrect response they volunteered. The effect of response privacy in experiment 1 was not replicated in experiment 2. The authors speculated that the initial effect was small and positive, and potentially explained by measurement error. When there was no penalty for inaccurate reporting, participants showed a bias for volunteering fine-grain answers, and tendency to underreport coarse-grain information. The latter finding is indicative of participants' striving for informativeness, in line with the dual-criterion model (Ackerman & Goldsmith, 2008). McCallum et al.'s (2016) investigation of social presence effects during memory reporting (public vs. private) encourages further exploration of social influence effects on meta-memory.

Investigations of the strategic regulation of memory reports have revealed that eyewitnesses vary the granularity of volunteered responses to meet set criteria for accuracy and informativeness (Weber & Brewer, 2008). When the competing demands of accuracy and informativeness cannot both be satisfied, eyewitnesses tend to favor informativeness over accuracy (McCallum et al., 2016; Sauer & Hope, 2016; Weber & Brewer, 2008). Additionally, when eyewitnesses have the option to withhold details they are uncertain about, they can better maintain the accuracy of their memory reports (Evans & Fisher, 2011; Koriat & Goldsmith, 1996). In sum, Ackerman and Goldsmith's (2008) findings in relation to the revised dual-criterion model replicate when applied to episodic memory in eyewitness scenarios. In this thesis, the revised dual-criterion model is used as a framework for interpreting participants' self-reports of meta-cognitive monitoring and control.

Part III: Overview of the Research Project

Memory encoding, retrieval, and reporting occur within, and are influenced by, an individual's social context. Research in the eyewitness literature shows evidence of the effect that social factors can have on eyewitnesses' memory reports – the contents of which are governed by meta-cognitive monitoring and control strategies. The aim of this thesis was to examine whether, and how, these strategies are subject to social influence effects. In Experiments 1 and 2, we aimed to motivate participants to engage in social comparison by giving them information about a co-witness' performance on a recall task (Experiment 1), or feedback regarding their own performance with respect to that of other participants on a practice recall task (Experiment 2). In Experiments 3, 4 and 5, we examined whether participants would report misinformation communicated by a confederate (Experiment 3), another participant (Experiment 4), or written in the bogus report of a co-witness (Experiment 5). More specifically, we examined the effects of social comparison and conformity on participants' i) confidence in the accuracy of their memory reports, ii) willingness to volunteer precise (fine-grain) information, iii) tendency to withhold information, and iv) recall accuracy. What follows is a concise summary of the five studies that comprise this thesis.

Experiment 1

In a between-subjects design, participants were randomly assigned to one of three conditions: High score, Low score, or Control (no score). After watching a video of a mock crime event, participants were ushered into another room to complete a recall task. As participants in the High and Low score conditions sat down at a computer to begin the task, the screen displayed the bogus score of a previous participant. Participants saw a score that indicated that a previous participant had performed either very well on the recall task (High score condition), or poorly (Low score condition). For participants in the control condition, the computer screen was set to the first part of the task, so they did not see a score. Our aim in this study was to examine whether receiving social comparative information (about the recall performance of another participant) would affect participants' meta-memorial monitoring and control. Social influence effects on meta-memory have not yet been investigated in a similar way in the memory literature, therefore this study was largely exploratory.

Experiment 2

In a between subjects design, participants were randomly assigned to one of three conditions: High score, Low score, or Control (no score). After watching a video of a mock crime event, participants completed a "practice" recall task comprised of six questions about one of the characters in the video. At the conclusion of the task, participants in the High score condition received positive feedback indicating that their recall performance was highly accurate and informative overall, and in comparison to that of others who had completed the task. Participants in the Low score condition received negative feedback indicating that their recall performance was not very accurate or informative overall, and poor in comparison to that of others who had completed the task. Participants in the control condition did not receive any feedback about their performance on the recall task. We predicted that participants who received negative feedback would report lower confidence in the accuracy of their answers (Hypothesis1), volunteer fewer fine-grain responses (Hypothesis 2), and withhold more responses on the recall task (Hypothesis 3) compared to the positive feedback and control groups. We expected that receiving positive feedback would have the opposite effect. We did not expect the manipulation to have an effect on the accuracy of participants' memory reports.

Experiment 3

In a between subjects design, participants were randomly assigned to one of three conditions: Confirming feedback, Disconfirming feedback, or No Feedback (control). After watching a video of a mock crime event, participants completed a practice recall task consisting of six questions about one of the characters from the video. Participants in the Confirming and Disconfirming feedback conditions then took turns reporting their answers to practice task questions with a confederate. The participant always went first. In the Confirming condition, the confederate confidently agreed with the majority (4/6) of the answers provided by the participant. In the Disconfirming feedback condition, the confederate confidently disagreed with the majority (4/6) of the answers provided by the participant. Participants in the control condition did not verbally report their answers. All participants then completed another recall task comprised of different questions about the characters and events in the video. We predicted that receiving disconfirming feedback from a confederate would decrease participants' confidence in the accuracy of their recall (Hypothesis 1), and volunteering of fine-grain responses (Hypothesis 2), and increase their response withholding (Hypothesis 3) compared to participants who received confirming or no feedback. We expected that partici-

pants who received confirming feedback would show increased confidence in the accuracy of their recall (Hypothesis 4), and volunteer more fine-grain responses than participants who received disconfirming or no feedback (Hypothesis 5).

Experiment 4

In a between subjects design, participants were randomly assigned to either a No discussion (control) or Discussion condition. After watching one of two versions of a mock crime video, participants either discussed what they had witnessed in pairs (Discussion condition), or engaged in individual contemplation of the event (No discussion condition). In the Discussion condition, each dyad member witnessed a different version of the mock crime video. The two versions of the mock crime video differed with respect to two details (critical items). We predicted that disagreement over critical items would lead participants in the Discussion condition to volunteer more coarse-grain and fewer fine-grain answers to critical item questions on the cued recall task (Hypothesis1) and withhold more answers to critical item questions (Hypothesis 2) than participants in the No discussion condition. We also expected that participants in the Discussion condition would be more likely to volunteer inaccurate responses (reported by their co-witness) to critical item questions than participants in the No discussion condition (Hypothesis 3). We did not expect accuracy for non-critical item questions to be affected by the manipulation.

Experiment 5

In a within subjects design, participants watched a video of a mock crime event and then read one of two versions of a bogus co-witness report about the event. Each version of the co-witness report contained three critical items of misinformation about details from the event. We included different critical items in each version of the report to control for item specific effects. After reading the report, participants completed a recall task containing questions about the event. We expected that participants would report more coarse and fewer fine-grain responses (Hypothesis1), more inaccurate answers (conforming to the misinformation seen in the co-witness report) (Hypothesis 2), and withhold more responses (Hypothesis 3) to critical item questions than questions about items for which no misinformation was provided in the co-witness report.

Experiments 1 and 2 are presented together in Chapter 2. In these studies, the effect of social comparative information delivered through a non-social means

(computerized) is explored. Experiments 3, 4, and 5 are presented together in Chapter 3. These three experiments explore the effects of social comparative information and misinformation that is communicated through social means; either face-to face or in writing. The results of all five experiments, their theoretical implications, and ties to existing research are discussed in Chapter 4.

Chapter 2

The Effects of Social Comparative Information on Confidence and Precision in Eyewitness Memory Reports

This chapter is an adapted and extended version of the following submitted manuscript:
Rechdan, J., Sauer, J.D., Hope, L., Sauerland, M., Ost, J., & Merckelbach, H. (2017). The effects of social comparative feedback on confidence and precision in eyewitness memory reports. Manuscript submitted for publication.

Our memory for experienced events is the result of a reconstructive process that can be influenced by social factors (Bartlett, 1932). The presence of others can affect peoples' confidence in their memory, and discussion of an event between two or more individuals can cause their accounts to converge (Gabbert et al., 2003; Shaw, Appio, Zerr, & Pontoski, 2007; Wright et al., 2000; Wright et al., 2009). These findings accord with the theory of social comparison, which posits that in the absence of objective means for assessing our opinions and abilities, we do so by comparing them to those of others (Festinger, 1954). When recalling events for which the ground truth cannot be determined, we may compare our memory to that of others who have experienced the same event in an attempt to produce an accurate account (Bless et al., 2001). Accuracy and informativeness of recall is monitored by meta-cognitive assessments, through which rememberers determine which details to report or withhold (Ackerman & Goldsmith, 2008). In Experiments 1 and 2, we examined how receiving social comparative information (i.e., information about the memory reports of others—or how our memory compares to that of others) affects the meta-cognitive decisions that underlie memory reporting.

Memory reporting is governed by meta-cognitive processes, which allow individuals to monitor and control the information they volunteer (Koriat & Goldsmith, 1996). Ackerman and Goldsmith (2008) proposed the revised dual-criterion model of the meta-cognitive monitoring and control processes involved in memory reporting. According to this model, respondents provide information from memory when they feel reasonably confident of its accuracy, and when the information is at a grain-size (level of detail) that renders it acceptably informative. In a series of studies, Ackerman and Goldsmith (2008) gave participants varying degrees of control over the grain size of their responses to general knowledge questions. Results showed that when possible, participants reported a grain size that satisfied both accuracy and informativeness criteria. However, when participants were unable to satisfy both criteria, they were likely to violate the accuracy criterion to offer an informative, but less reliable answer. Given the option to withhold responses, participants did so in situations where desired levels of accuracy and informativeness could not be achieved. The experimental paradigm used by Ackerman and Goldsmith (2008; and previously by Goldsmith et al., 2002, 2005) offers an excellent means for examining meta-cognitive monitoring and decision-making regarding memory reporting. The theoretical model examines the *role of confidence in the regulatory process*, whereas much of the research in the eyewitness literature has focused on the *role of confidence in diagnosing the accuracy of responses* (Roberts & Higham, 2002; Vredeveldt & Sauer, 2015).

Weber and Brewer (2008) applied an earlier version of the model to examine the role of confidence in the strategic regulation of eyewitness memory. In two studies, they found that the level of detail provided by participants was strongly,

positively correlated with their confidence in the accuracy of their fine-grain responses. Additionally, when participants were allowed to choose whether to report or withhold responses, they withheld information that failed to meet an implicitly established confidence criterion. These results indicate that confidence in the accuracy of fine-grain details recalled is a primary determinant of what participants choose to report. Extending this work, Evans and Fisher (2011) found that meta-cognitive monitoring and control allow individuals to maintain the accuracy of their memory reports over time. They tested participants' memory for a crime event immediately, and after a one-week delay. Participants were more likely to provide coarse-grain responses to questions, or refrain from responding altogether after the delay. Such responding decreased the level of detail participants provided, but helped maintain the accuracy of their reports.

Meta-cognitive monitoring and control demonstrably aid individuals in balancing the competing demands for informative, but accurate memory reports. However, the efficacy of these processes has only been examined in relation to recall that occurs in experimental settings free of potential social influence. Remembering, however, often occurs in the presence of others, and research demonstrates that various forms of social influence affect memory performance. For example, Betz et al. (1996) asked participants to read a story and complete a recognition task. During the recognition task, participants were exposed to bogus tallies representing how many of six other participants selected each of the response options. On a subsequent cued recall task, participants were more likely to provide answers selected by the implied majority, especially for less-memorable, non-distinctive items. This effect persisted even when participants were instructed to ignore the answers provided by others, underscoring the persuasiveness of this information source. These findings demonstrate one type of social influence effect—that of conformity—on memory. Conformity occurred even though the social information provided came from implied (as opposed to physically present) others, suggesting that the mechanism in this case was a desire for accuracy (e.g., informational influence), rather than for affiliation (e.g., normative influence).

Bless et al. (2001) explored the boundary conditions of social comparison effects on memory and found that low confidence in one's own memory appears to increase the tendency to engage in social comparison. When participants were not confident that their lack of recall for a stimulus indicated its absence from a previously studied list, they tended to rely on others to determine whether or not the stimulus had indeed been presented. This susceptibility to social influence was dependent on conditions such as exposure time and the salience of stimuli. Sub-optimal encoding of details therefore seems to increase the influence of social factors on subsequent recall. Even perceptions of encoding quality can increase rememberers' susceptibility to social influence (Gabbert et al., 2007). Gabbert et

al., (2007) told participants that they had viewed a set of pictures either for half as long, or twice as long as a co-witness. In actuality, participants had viewed a slightly different set of pictures than their co-witness, but for the same amount of time. The participant and the co-witness then discussed the pictures before providing a free recall report. Participants who believed they had viewed the material for a shorter duration were more likely to incorporate incorrect information mentioned by the co-witness into their own accounts.

Findings from Gabbert et al. (2007) extend those of previous studies of social influence factors affecting recall and memory reporting in the eyewitness memory literature. Co-witnesses to a crime frequently discuss the event with each other, and this has been found to influence their subsequent reports (Paterson & Kemp, 2006a; Skagerberg & Wright, 2008; Wright et al., 2009). Social information provided by authorities in the form of feedback can also affect witnesses' confidence in their recall, and their judgments regarding the quality of the witnessing experience (goodness of view, duration of encoding time, etc.; Dixon & Memon, 2005; Leippe et al., 2006; Wells & Bradfield, 1998). The present research is concerned specifically with social feedback effects on recall (but for a meta-analysis of feedback effects on recognition see Douglass & Steblay, 2006).

The existing literature provides some guidance regarding the effects of feedback on the accuracy of individuals' memory reports, and their reported confidence. Roper and Shewan (2002) tested participants' recall before and after labeling them as 'good' or 'poor' eyewitnesses. These labels were randomly assigned, and did not reflect participants' genuine performance. Providing participants with positive feedback ('good' label) improved their recall performance on a second assessment. Participants who received negative feedback ('poor label') were more likely to comply with leading questions. In another study, participants viewed a video of a staged robbery and made a forced-choice identification of the perpetrator from a target-absent line-up (i.e., all identifications were incorrect). The experimenters then informed half of the participants that they were 'good eyewitnesses', who had correctly identified the perpetrator, and the other half of participants that they were 'poor eyewitnesses', who had made an incorrect identification (Dixon & Memon, 2005). After receiving this feedback verbally and in writing, participants were asked to provide details of the crime and perpetrator. Participants who received negative feedback expressed decreased confidence in the accuracy of their recall, yet this decrease in confidence did not affect the quantity or accuracy of information provided. The authors concluded that feedback concerning recall exerts an effect on eyewitness' confidence in their memory.

While the feedback provided in Roper and Shewan (2002) and Dixon and Memon (2005) was self-relevant and categorical, feedback of a comparative nature can also affect individuals' confidence in their memory and their subsequent

memory reports. Leippe et al. (2006) gave participants either negative or positive feedback regarding the accuracy of their memory reports for a videotaped theft in comparison to that of co-witnesses. Participants who received positive comparative feedback later made faster identifications with increased accuracy, and reported a higher level of confidence in the accuracy of their recall than participants who had received no feedback. Despite being associated with decreased confidence, negative feedback did not slow down or render participants' reports less accurate. The authors concluded that participants' belief in the accuracy of their memory was affected by the social comparative feedback. Positive feedback boosted belief in memory accuracy, while negative feedback lowered it, as measured by confidence. These changes in confidence were reflected in participants' retrospective reports of the witnessing experience (those who received negative feedback described poorer conditions for encoding). A similar effect of post-feedback confidence on retrospective assessments of witnessing conditions has also been found in other studies (Wells & Bradfield, 1998; Douglass & Steblay, 2006).

Studies of social feedback effects on eyewitness' recall have focused primarily on how feedback influences the quantity (amount of detail) and accuracy of eyewitness' subsequent memory reports. Findings from these studies indicate that positive feedback can increase individuals' confidence in the accuracy of their recall, while negative feedback can decrease confidence (Dixon & Memon, 2005; Leippe et al., 2006; Roper & Shewan, 2002). Rememberers' confidence assessments greatly effect their meta-cognitive decision-making regarding which details of a memory they choose to report (Koriat & Goldsmith, 1996). However, research has yet to examine the effects of social comparative feedback on meta-cognitive mechanisms underlying the selection of reported information.

The research reviewed here has demonstrated that receiving feedback affects eyewitness' confidence in the accuracy of their subsequent recall for an event (Dixon & Memon, 2005; Leippe et al., 2006), and confidence in the accuracy and informativeness of recall affects eyewitnesses' decisions to report or withhold details (Ackerman & Goldsmith, 2008; Koriat & Goldsmith, 1996; Weber & Brewer, 2008). Although both meta-cognitive and social factors contribute to memory output, research has yet to examine social influences on meta-memory. Social influences could affect not only the accuracy of memory reports, but also the quantity of the information reported vs. withheld, and the level of detail that individuals choose to report. Understanding how extraneous factors such as social comparative information gleaned from a co-witness or investigative interviewer affect the meta-cognitive processes underlying memory reporting could lead to more theoretically informed interviewing approaches, and a better appreciation of eyewitness memory performance.

In two experiments, we examined the effect of receiving social comparative feedback regarding a co-witness' or one's own memory performance on individuals' subsequent memory reports. We introduced a social manipulation (the provision of social comparative feedback) with the expectation that it would affect meta-cognitive monitoring and control, and participants' resulting memory reports. Experiment 1 investigated the influence of participants' perception of the quality of a co-witness' memory on the confidence and level of detail they reported regarding a witnessed event. Participants received either positive or negative feedback about the quality of a co-witness' report, before being asked to answer questions about a videotaped crime. We expected that seeing a feedback score regarding the recall performance of a co-witness would highlight the potential for social comparison, and therefore influence participants' meta-memorial reporting strategy. We predicted differences in the recall confidence, precision of details, and quantity of details reported by participants in the experimental (high and low score) and control groups.

In Experiment 2, participants watched a crime video and completed a "practice task" that involved answering a set of questions about a character from the video. Participants were then given self-relevant feedback pertaining to their performance on the practice task, before answering further questions about the crime. We expected that giving participants negative or positive feedback about their own memory performance would affect their confidence in the accuracy of their memory (Hypothesis 1), and therefore also affect the level of detail, or grain size, of the information they chose to report (Hypothesis 2). Moreover, we expected that a decrease in recall confidence would lead participants to withhold more details (respond 'I don't know) (Hypothesis 3). In line with findings from other studies of social comparative feedback effects on memory reporting, we did not expect the accuracy of participants' reports to be affected in either of the two experiments (Leippe et al., 2006). However, we do report participants' accuracy because it is of great importance in applied settings. The present experiments extend the existing literature on both social influences and meta-cognitions affecting memory reporting by examining the two phenomena jointly.

Experiment 1

Method

Design

The design was between-subjects, with three conditions: high co-witness feedback score, low co-witness feedback score, and control (no score). We manipulated exposure to the score of a co-witness and examined the effect of that exposure on participants' a) confidence in the accuracy of their recall for a crime video, b) volunteering of fine-grain and coarse-grain details, c) withholding responses to cued recall questions, and d) actual recall accuracy.

Participants

Participants (N = 87) were university students or employees (65 females; Age [M = 27.5, SD = 12.4]). They were recruited through the department of Psychology's participant pool and a database of individuals who have signed up to receive information about research participation. Conditions for participation included having normal or corrected-to-normal vision (as assessed by self-report), and being over the age of 18 years. Students were given course credit for participating; others were paid a small honorarium. Ethical approval for the experiment was obtained from the university's science faculty research ethics committee.

Materials

Stimulus event. The stimulus event was a one-minute video depicting a burglary. In the video, two young men cycle up to a house and forcibly enter through a back door. Once inside, the perpetrators steal a laptop and some money before making their escape. The clip was sourced from YouTube (Tehguns, 2011). Participants in the control condition viewed the video individually, while those in the experimental condition viewed the video in pairs. After viewing the video on a computer screen, all participants completed a written filler task (approximately 5 minutes) and then the computerized recall task individually, and in isolation.

Recall task. The recall task consisted of 24 cued recall questions. The questions related to details from the video (e.g., How old was the perpetrator who broke into the house? What colour was his top? What colour was the laptop the perpetrators stole? How many drawers did they open?). Following Weber and

Brewer (2008), questions were presented in two phases. In Phase I, participants provided a coarse and a fine-grain response to each question. For the purpose of easily eliciting these types of answers, questions required either numeric answers, or referred to the colour of an object in the video, following Weber and Brewer (2008). No specific guidance was given regarding how 'coarse' numeric responses could be, participants were simply asked to provide a range (e.g., 17-20 years old). Fine-grain responses to questions with numeric answers were restricted to specific whole numbers (e.g., 27 years old). Coarse-grain responses to questions about the colour of objects were restricted to shades (dark, light, warm, and cool). Finally, fine-grain responses to questions about the colour of an object were restricted to a specific colour (e.g., red, white). Participants were also asked to rate their level of confidence in the accuracy of each of the answers they provided on a scale of 0-100% (increasing confidence) in increments of 10%. All participants were required to answer all questions in Phase I (forced report). The order of the questions was randomized, and the presentation of fine-grain and coarse-grain answers was counterbalanced (see Appendix A).

In Phase II, participants were presented with the same questions, along with the coarse and fine-grain answers they provided in Phase I (without their original confidence ratings) as response alternatives. They were instructed to imagine that they were making a statement to the police with regard to the witnessed crime, and to select the response alternative (fine-grain or coarse-grain) that they would give to investigators. Participants were also explicitly told that they could respond 'I don't know' if they were unsure of the correct answer. They were told to be as accurate as possible without guessing.

Procedure

After being randomly allocated to one of the three conditions, participants viewed the stimulus video either individually (control condition) or in pairs (high and low score conditions). All participants then completed the filler task and recall task (all Phases) individually in separate rooms. Prior to the start of Phase 1 of the recall task, participants in the experimental groups saw either 'high' or 'low' feedback about the co-witness' performance (see Appendices B & C). This feedback was presented in the form of a test percentile that was prominently displayed in the center of the computer screen. Participants in the high feedback group saw a high accuracy score that was apparently obtained by their co-witness (i.e. 93%). Conversely, participants in the low feedback group saw a low accuracy score apparently obtained by their co-witness (i.e., 28%). We exposed participants to the score of an implied co-witness to give them the impression that the co-witness had per-

formed either very well (high feedback condition) or poorly (low feedback condition). In fact, the experimenter fabricated all scores.

The feedback manipulation was incidental in nature; that is, participants were not overtly instructed to take notice of the score. Instead, after participants in the paired viewing conditions (high and low score) signed the informed consent and viewed the video, one of them was led into another room by the experimenter. After being separated, each member of the pair completed the filler task. After completing the filler task, each participant was again moved into another room to complete the recall task. Upon entering the last room, the experimenter gave the participant about five to ten seconds to look at the computer screen, before instructing the participant to click the 'next' button to begin the recall task. The purpose of moving participants into different rooms was to give them the impression that after seeing the stimulus video, their co-witness had completed the recall task in one room while they had been working on the filler task in another. Participants in the control condition only changed rooms once; they gave informed consent and watched the video in one room, and were then moved into another room where they completed all remaining tasks.

Participants in the experimental groups were asked if they had noticed the co-witness' score at the start of the experimental session in a manipulation check at the end of the recall task. Participants were also asked what they thought the purpose of the experiment was. On completion, all participants were thanked. The complete procedure took approximately thirty minutes. Participants were debriefed once data collection was completed.

Coding

The principal investigator (PI) and an independent rater determined what constituted accurate answers to the 24 items in the recall test. This was done by watching the video, answering the questions individually, and then comparing results. Disagreements were discussed, and more than one correct answer accepted where individual answers could not be reconciled (e.g., both blue and black for the colour of the perpetrators trainers). A fine-grain answer was considered correct if it matched the answer to the question that was agreed upon by the investigator and an independent rater. A coarse-grain answer was considered correct if it contained the agreed upon answer (e.g., correct answer of three items stolen from the house is contained in the coarse-grain answer range of "2-5"). After these answers were agreed upon, the PI and rater separately coded the data for accuracy in a spreadsheet with condition identifiers removed for all participants. Inter-rater reliability was high, with an intraclass correlation (ICC) value of .90.

Results

The data from two participants were removed because they were outliers (more than three standard deviations away from the mean) for two or more of the dependent variables. A third participant's information was excluded due to failure to follow instructions for completing the recall task. Data from the remaining 84 (control = 30; high score = 27; low score = 27) participants was entered into the first analysis. Due to a glitch in the computer program, participants' answers to the final question on the cued recall task were not saved. Therefore, all analyses included participants' answers from 23 out of the 24 questions on the cued recall task.

In line with previous research, preliminary analyses revealed a positive correlation between confidence in fine-grain answers at Phase I, and volunteering of fine-grain answers at Phase II, $r(82) = .49$, $p < .01$. A one-way analysis of variance (ANOVA) revealed that there was no effect of condition (receiving high, low, or no social comparative feedback) on participants' (a) confidence in the accuracy of their fine-grain answers at Phase I, $F(2, 83) = .57$, $p = .57$, $\omega = .10$; (b) accuracy of both fine and coarse-grain responses at Phase I, $F(2, 83) = .30$, $p = .74$, $\omega = .14$; (c) total number of fine-grain responses volunteered, $F(2, 83) = 2.12$, $p = .13$, $\omega = .16$ and (d) number of responses withheld at Phase II, $F(2, 83) = 1.12$, $p = .33$, $\omega = .05$. Table 2.1 displays group means, standard deviations and confidence intervals for all dependent variables entered into the analysis.

A manipulation check revealed that 15 of the 54 participants in the high and low score conditions did not notice the manipulation (co-witness score). These 15 cases were excluded from the second analysis, which left a total of 69 participants (control = 30; high score = 19; low score = 20). To check whether participants who had not noticed the manipulation were biasing the results, we examined group means, standard deviations and confidence intervals for all dependent variables after these cases were removed (see Table 2.2).

High and Low score group means were nearly identical for all dependent variables, but differed from means for the control group. To test whether this difference was statistically significant, we collapsed data from the high and low score groups and ran an independent samples t-test. Feedback group (experimental $n = 39$; control $n = 30$) was again entered as the independent variable, with confidence, accuracy, withholding of responses and fine-grain responding as dependent variables. Results revealed a main effect of experimental condition on the volunteering of fine-grain responses at Phase II. On average, participants who had viewed a co-witness' score prior to starting the recall task volunteered more fine-grain answers at Phase II ($M = 10.3$, $SD = 3.0$) than participants in the control condition ($M = 8.6$, $SD = 3.0$). This difference, -1.71, 95% CI [-3.114, -.195] was significant, $t(67)$

= -2.33 p = .02, and represented a medium sized effect, d = 0.57. There were no significant differences between group means for any of the other dependent variables (see Table 2.3).

Table 2.1 Experiment 1: Descriptive Statistics for Dependent Variables by Condition.

	Control (n = 30)		Low score (n = 27)		High score (n = 27)	
	M (SD)	95% CI	*M (SD)*	95% CI	*M (SD)*	95% CI
Fine-grain confidence[a]	62.7 (13.4)	[57.7; 67.7]	66.0 (10.5)	[61.9; 70.2]	63.7 (11.8)	[59.0; 68.3]
Fine-grain volunteering[b]	8.6 (3.0)	[7.5; 9.7]	10.3 (3.2)	[9.0; 11.6]	9.3 (3.3)	[8.0; 10.6]
Responses withheld[c]	4.5 (3.3)	[3.2; 5.7]	3.2 (2.4)	[2.3; 4.2]	4.0 (3.7)	[2.6; 5.5]
Overall accuracy[d]	31.5 (5.5)	[29.5; 33.5]	31.7 (4.3)	[30.0; 33.4]	32.4 (4.1)	[30.8; 34.1]

Note. [a]Confidence in fine-grain answers at Phase I. [b]Number of fine-grain answers chosen at Phase II. [c]Number of responses withheld at Phase II. [d]Accuracy of fine and coarse-grain responses at Phase I.

Table 2.2 Experiment 1: Descriptive Statistics for Dependent Variables by Condition After Removal of Data from Participants in the Experimental Groups Who Did Not Notice the Manipulation.

	Control (n = 30)		Low score (n = 19)		High score (n = 20)	
	M (SD)	95% CI	*M (SD)*	95% CI	*M (SD)*	95% CI
Fine-grain confidence[a]	62.7 (13.4)	[57.7; 67.7]	66.4 (9.7)	[61.9; 71.0]	67.7 (8.0)	[63.9; 71.5]
Fine-grain volunteering[b]	8.6 (3.0)	[7.5; 9.7]	10.5 (3.0)	[9.0; 11.8]	10.2 (3.2)	[8.6; 11.7]
Responses withheld[c]	4.5 (3.3)	[3.2; 5.7]	3.4 (2.5)	[2.2; 4.5]	3.4 (2.8)	[2.0; 4.8]
Overall accuracy[d]	31.5 (5.5)	[29.5; 33.5]	31.3 (4.4)	[29.3; 33.3]	32.7 (4.7)	[30.5; 35.0]

Note. [a]Confidence in fine-grain answers at Phase I. [b]Number of fine-grain answers chosen at Phase II. [c]Number of responses withheld at Phase II. [d]Accuracy of fine and coarse-grain responses at Phase I.

Discussion

Experiment 1 examined the effects of receiving social comparative information about the quality of a co-witness' recall for a jointly encoded event on participants' meta-cognitive monitoring and control strategies in a subsequent memory report. Participants' confidence in the fine-grain (detailed) responses they provided at Phase I, as well as their likelihood of volunteering these responses at Phase II, were examined in relation to the type of feedback given. We expected that giving participants negative or positive feedback about a co-witness' memory performance would influence their confidence in the accuracy of their own memory. While descriptive statistics did reveal higher mean fine-grain confidence ratings for the experimental groups (high and low score) than the control group (no score), this group difference was not significant. However, when compared to participants in the control group (no score), participants in the experimental groups (high and low score) did volunteer significantly more detailed (fine-grain) responses at Phase

II. In line with findings from the literature on meta-cognitive regulation and reporting in memory, participants' volunteering of fine-grain answers at Phase II was positively correlated with confidence in the accuracy of these answers at Phase I across conditions (see Weber & Brewer, 2008). Finally, there was no significant difference across experimental and control groups in in terms of withholding responses.

An awareness of assessment and potential for comparison may have increased participants' motivation to provide detailed answers. If participants saw the co-witness score and anticipated that the accuracy of their own performance would be scored, one might expect that they would select more coarse-grain responses at Phase II. An emphasis on accuracy would be better served by an increase in coarse-grain responses, which are of a wider range margin and are therefore more likely to be accurate. However, it may be that participants related accuracy to precision, and thus felt that selecting fine-grain responses at Phase II would improve the overall quality of their report. It is also possible that introducing a social element activated communication norms, which increased participants' emphasis on informativeness (Ackerman & Goldsmith, 2008; Yaniv & Foster, 1995, 1997). As Ackerman and Goldsmith (2008) observed, individuals strive to achieve criterion levels of informativeness, at times violating their criterion for accuracy in order to do so. Other researchers have found that participants dislike giving coarse-grain responses, and that this may be particularly true in social exchanges, where these responses are perceived as violating implicit norms of communication (Yaniv & Foster, 1995, 1997).

Table 2.3 Experiment 1: Descriptive Statistics for Dependent Variables by Condition after Collapsing Data from Participants in the High and Low Score Experimental Groups.

	Control (n = 30)		Experimental (n = 39)	
	M (SD)	95% CI	*M (SD)*	95% CI
Fine-grain confidence[a]	62.7 (13.4)	[57.7; 67.7]	67.0 (8.8)	[64.2; 70.0]
Fine-grain volunteering[b]	8.6 (3.0)	[7.5; 9.7]	10.3 (3.0)	[9.3; 11.3]
Responses withheld[c]	4.5 (3.3)	[3.2; 5.7]	3.4 (2.7)	[2.5; 4.2]
Overall accuracy[d]	31.5 (5.5)	[29.5; 33.5]	32.0 (4.5)	[30.5; 33.5]

Note. [a]Confidence in fine-grain answers at Phase I. [b]Number of fine-grain answers chosen at Phase II. [c]Number of responses withheld at Phase II. [d]Accuracy of fine and coarse-grain responses at Phase I.

The presence of another individual in the experimental conditions may also explain the observed effect. According to the drive theory of social facilitation (Zajonc, 1965; Zajonc & Sales, 1966), the mere presence of others during task performance can increase arousal, which leads to an increase in the frequency of the dominant response in a given context. Goldsmith et al. (2002) propose that the fine-grain answer is the default response, due to its perceived informativeness. The presence

of a co-witness may therefore be responsible for the observed increase in participants' volunteering of fine-grain responses.

Participants may also have been more likely to risk providing detailed, but potentially incorrect answers due to the lack of immediate performance-related consequences in a voluntary, lab-based study. By contrast, in real-life, incorrect or imprecise memory reports can have detrimental consequences for the outcome of a police investigation. Yaniv and Foster (1997) indicated that meta-cognitive decision making during memory reporting may be influenced by differences in timing of payoffs for informativeness and correctness. The accuracy/inaccuracy of answers becomes evident at a later time, and therefore participants may have prioritized informativeness. As observed, individuals increase informativeness through the provision of fine-grain details (Ackerman & Goldsmith, 2008).

To our knowledge, this is the first study to assess the effect of social comparative feedback on the grain size of participants' responses. We therefore cannot compare the increase in volunteering of fine-grain details observed here with the results of other feedback studies we have reviewed. Future studies should examine the effect of immediate and delayed consequences/rewards for responding on the precision of participants' memory reports.

The accuracy of participants' memory reports in Experiment 1 was unaffected by the feedback manipulation, as in other feedback studies (e.g., Dixon & Memon, 2005 Leippe et al., 2006). The lack of social influence effects on the accuracy of eyewitness memory reports can be explained by participants' meta-cognitive manipulation of grain size. As in previous studies, participants' volunteering of fine-grain responses was positively correlated with their confidence in the accuracy of those responses. When participants expressed lower confidence in the accuracy of a fine-grain response, they were less likely to select it, and instead opted for a coarse-grain response, or refrained from responding. As previously mentioned, coarse-grain responses are of a wider margin, and are more likely to contain the accurate response. Finally, the findings from Experiment 1 do not replicate the effects of feedback on confidence found in previous feedback studies (Dixon & Memon, 2005; Leippe et al., 2006). It is possible that this because the feedback provided was not self-relevant, but pertained to the performance of the co-witness.

It is possible that the increase in fine-grain responding by participants in the experimental groups was motivated by a desire to outperform the co-witness, or even the expectation of receiving self-relevant social comparative feedback after completing the recall task. The small effect size for the main finding may have been due to the subtlety of the incidental manipulation; 14 participants in the experimental condition reported that they did not notice it. Therefore, in Experiment 2, we sought to increase the saliency of the social feedback manipulation. Additionally, to control for the possibility that expectation of feedback was leading to

the observed increase in fine-grain responding, participants in Experiment 2 were informed (via onscreen instructions) that their performance on the cued recall task would not be scored.

Experiment 2

The aim of Experiment 2 was to investigate the potential effects of receiving salient, self-relevant, social comparative feedback following a practice recall task on meta-cognitive regulation and reporting for a subsequent recall task. In this experiment, we sought to isolate any potential effects of social comparison on metamemory from the effects of expecting performance feedback by deliberately informing participants that their performance on the cued recall task that followed the practice task would not be scored.

After viewing a video of a mock crime event, participants completed a practice task comprised of a set of questions pertaining to one of the characters from the video. After the practice task, participants were given feedback in the form of a percentile score comparing their performance to that of others who had completed the task in terms of both accuracy and level of detail. Thus, unlike Experiment 1, feedback in Experiment 2 was both direct (not incidental in nature) and self-relevant (pertained to the participant's own performance on a memory task). Providing self-relevant feedback permits a more direct comparison of results from Experiment 2 to those of other studies exploring feedback effects on eyewitness memory reports (e.g., Dixon & Memon, 2005; Leippe et al., 2006). Additionally, to test whether the results of Experiment 1 were due to participants' expectation that their performance on the cued recall task would be scored, we indicated in the instructions for Experiment 2 that responses on the cued recall task would not be scored. The format of the cued recall task in Experiment 2 was identical to that used in Experiment 1.

Based on findings from the literature on providing self-relevant social comparative feedback to eyewitnesses (Dixon & Memon, 2005; Leippe et al., 2006; Roper & Shewan, 2002), we predicted that participants who received negative feedback would report lower confidence in the accuracy of their answers in Phase I (Hypothesis 1), and volunteer fewer fine-grain answers in Phase II of the recall task (Hypothesis 2), compared to participants who received positive or no feedback. We also predicted that participants in the negative feedback group would withhold more responses than the positive feedback and control groups at Phase II (Hypothesis 3). Conversely, we expected that participants who received positive feedback would report higher confidence (Hypothesis 4), volunteer more fine-grain details (Hypothesis 5), and withhold fewer responses than participants in the nega-

tive feedback and control groups (Hypothesis 6). We did not expect the manipulation to have an effect on the accuracy of participants' memory reports.

Method

Design

In a between-subjects design, we manipulated feedback and examined its effect on confidence (0-100%), grain size (coarse vs. fine), response withholding (number of 'don't know' responses), and accuracy in a subsequent memory assessment. Participants were randomly allocated to one of three conditions; High feedback score, Low feedback score, or no feedback/control.

Participants

Ninety undergraduate students participated in this experiment. The sample was comprised of 71 females and 19 males, between the ages of 18 and 39 (M_{age} = 22.3; SD = 3.4). Participants were recruited through the Psychology department's participant pool, and through flyers posted in various university buildings. They were either paid a small honorarium, or granted course credit. Inclusion and exclusion criteria were analogous to those in Experiment 1.

Materials

Stimulus event. Participants viewed a three-minute video depicting a distraction theft. In the video, a man enters the home of an elderly couple claiming to be a government employee who has been sent to check their electricity meter. While he distracts them, an accomplice enters the house and steals a few items from the upstairs bedroom before leaving. The first perpetrator then steals some money from the couple and leaves. In the final scene he is shown getting into a getaway car and driving off. The video was sourced from Youtube (westmerciapolicetv, 2011).

Practice task. The practice task was computerized (see Appendix D). It comprised six questions about the male victim in the video (e.g., How old is the male victim?; What colour is his shirt?). Participants provided coarse and fine-grain answers to each question, along with a rating of their confidence in the accuracy of their answers on a scale ranging from 0-100% (in 10% increments).

Recall task. The recall task contained 22 questions about the stimulus video. The structure (two-phase) and format of the questions (all referred to colours or numbers) was the same as that of the recall task in Experiment 1. In the manipula-

tion check at the end of the task, participants were asked what they thought the purpose of the experiment was. Participants in the experimental groups were also asked if they believed the score they were shown after the practice task was representative of their performance, and if they thought it had influenced their subsequent recall in any way (see Appendix D).

Procedure

After viewing the video, participants completed the practice task. At the end of the practice task, experimental participants saw a screen with the word "calculating…" displayed just beneath a download status bar that quickly moved from empty to full. Once the download bar was full, the screen displayed either a high (93%) or low (37%) accuracy percentile rank (see Appendices E & F). Control participants were not shown a download bar screen or provided with feedback. In contrast with Experiment 1, in which participants were exposed to feedback supposedly related to the recall performance of a co-participant, in Experiment 2 participants received self-relevant feedback about their own performance on the practice task. This feedback was, in fact, false and suggested to participants that they had either performed very well (high feedback score of 93% accuracy) or poorly (low feedback score of 37% accuracy).

After the practice task, participants answered a further 22 questions about the video in the recall task. They were informed that their performance on the task would not be scored. Afterwards, participants were thanked for their participation, and informed that they would receive a debrief email about the purpose of the study once data collection was completed. The entire procedure took approximately 30 minutes.

Coding

The coding procedure was the same as for Experiment 1. Inter-rater reliability was high, with an ICC value of .94.

Results

Manipulation Check and Data Screening

After screening the data for errors and outliers, one case was removed due to an error in the computer program that caused most of the participant's responses not to be recorded. Two additional cases were identified as containing outliers (more

than three standard deviations away from the mean on one or more of the dependent variables) and removed. Data from a total of 87 participants remained, 23 in the control group, 34 in the high score group, and 30 in the low score group.

Effect of Feedback on Confidence, Response Volunteering, Response Precision, and Accuracy

We conducted a one-way ANOVA with type of feedback (control, high, or low score) as the independent variable and participants' confidence in the accuracy of their fine-grain answers at Phase I, number of fine-grain responses volunteered at Phase II, and number of responses withheld at Phase II as dependent variables. We found no significant group differences for participants' (a) confidence in the accuracy of their fine-grain answers at Phase I, $F(2, 86) = .71$, $p = .50$, $\omega = 0.08$, (b) total number of fine-grain responses volunteered, $F(2, 86) = 1.51$, $p = .25$, $\omega = .11$, and (c) number of responses withheld at Phase II, $F(2, 86) = .59$, $p = .57$, $\omega = .10$.

In one of the items in the manipulation check, we asked participants what they thought the purpose of the study was. A total of 14 participants accurately guessed that the feedback they received was part of the experimental manipulation and/or expressed some suspicion as to its authenticity. The data for these participants was removed for a second analysis. Data from the remaining 73 participants (23 in the control, 26 in the low score, and 24 in the high score group) was entered into a second ANOVA with the same independent and dependent variables. Again, results revealed no significant group differences for participants' (a) confidence in the accuracy of their fine-grain answers at Phase I, $F(2, 72) = .27$, $p = .77$, $\omega = .14$, (b) total number of fine-grain responses volunteered, $F(2, 72) = .73$, $p = .48$, $\omega = .09$, and (c) number of responses withheld at Phase II, $F(2, 72) = .34$, $p = .71$, $\omega = .14$. The accuracy of participants' responses at Phase I was also unaffected by the manipulation, $F(2, 72) = .49$, $p = .61$, $\omega = .01$. Table 2.4 displays group means, standard deviations and confidence intervals for all dependent variables entered into this analysis.

Table 2.4 Experiment 2: Descriptive Statistics for Dependent Variables by Condition after Removal of Data from Participants in the Experimental Groups who Guessed the Manipulation.

	Control (n = 23)		Low score (n = 26)		High score (n = 24)	
	M (SD)	95% CI	*M (SD)*	95% CI	*M (SD)*	95% CI
Fine-grain confidence[a]	62.8 (13.3)	[57.1; 68.6]	65.2 (10.5)	[61.0; 69.5]	63.6 (12.5)	[58.3; 68.8]
Fine-grain volunteering[b]	8.7 (2.5)	[7.6; 9.8]	9.4 (2.5)	[8.4; 10.4]	8.5 (3.0)	[7.2; 9.8]
Responses withheld[c]	4.4 (3.0)	[3.2; 5.7]	3.8 (3.5)	[2.4; 5.2]	4.5 (3.0)	[3.2; 5.7]
Overall accuracy[d]	28.7 (4.6)	[26.7; 30.7]	29.8 (4.8)	[27.9; 31.8]	29.8 (3.9)	[28.1; 31.4]

Note. [a]Confidence in fine-grain answers at Phase I. [b]Number of fine-grain answers chosen at Phase II. [c]Number of responses withheld at Phase II. [d]Accuracy of fine and coarse-grain responses at Phase I.

Discussion

The results of Experiment 2 are contrary to our hypotheses. Participants in the control, high, and low feedback groups did not differ in terms of their Phase I fine-grain confidence, or their volunteering of fine-grain details and withholding of responses in Phase II. There are several potential explanations for the lack of an effect of feedback on responding.

The manipulation check questions indicated that while most experimental participants were accepting of negative feedback, many were suspicious of positive feedback. This is not altogether surprising, as research has shown that some people exhibit a stable tendency to distrust their memory, or *trait memory distrust* (Van Bergen, Jelicic, & Merckelbach, 2009). One study estimated that at least 10% of the population has a tendency toward pessimistic evaluations of their memory capacity in comparison to that of others (Crombag, Merckelbach, & Elffers, 2000). All participants who expressed suspicion about the authenticity of the score in the manipulation check were eliminated from the second analysis. However, it is possible that even those participants who did not express suspicion/guess the manipulation as reported in the manipulation check may not have been entirely accepting of the feedback score they received, which may have weakened the effect of the experimental manipulation.

Another possibility is that participants' performance on the second set of questions was unaffected by feedback because they were told that the second set of questions would not be scored. This was a deliberate methodological decision made during the design of the study to rule out the possibility that expectations about evaluations would lead to an increase in fine-grain responding. According to Feedback Intervention Theory, when individuals receive negative feedback, they are likely to increase their efforts to improve if given the opportunity on a subsequent task (Kluger & DeNisi, 1996). If the feedback received is positive, with room for improvement, performance efforts may also increase (Kluger & DeNisi, 1996). Thus, in the present experiment, (a) participants were not given a second opportunity to assess their performance and (b) those who received high feedback were not left with much room for improvement. In hindsight, the feedback manipulation may have been ineffectual for these reasons. This issue is discussed in more detail in the General Discussion.

Finally, in contrast to Experiment 1, all participants in Experiment 2 viewed the stimulus video individually. In Experiment 2, the presence of co-witnesses was merely implied. If social facilitation underpinned the effect found in Experiment 1, then failure to replicate in Experiment 2 would not be surprising. According to the theory of social facilitation, individuals perform tasks differently in the presence of others than when alone (Zajonc, 1965). More recent research by Shteynberg (2010,

2015) demonstrates that the act of two or more people simultaneously attending to a stimulus, known as shared attention, can facilitate recall. An examination of the effects the presence of others—whether implied or actual—has on meta-memory presents an interesting avenue for future research.

General Discussion

The present research investigated the effects of receiving social comparative feedback regarding the recall performance of a co-witness or oneself on participants' subsequent recall. In Experiment 1, receiving feedback of any level (high or low score) regarding the performance of a co-witness on a recall task did not affect participants' confidence in the accuracy of their recall; however, it increased the number of fine-grain (detailed) responses they reported in a subsequent memory assessment. In Experiment 2, receiving self-relevant feedback on a practice memory task did not affect participants' confidence in the accuracy of their recall, or the level of detail they provided in a subsequent memory report. While we expected that receiving self-relevant feedback in Experiment 2 would replicate and increase the effect observed in Experiment 1, this was not the case. Several of the participants who received positive feedback expressed doubts relating to the accuracy of this assessment of their performance. Additionally, participants' responses on the cued recall task that followed the feedback may have been unaltered because participants were told their performance would not be scored a second time. Thus, participants may have had no motivation to increase the level of detail they provided following the practice task. In Experiment 1, seeing a co-witnesses' score may have led participants to believe that their own performance would be scored, thereby increasing their motivation to provide a detailed memory report. In Experiment 2, we informed participants that their performance on the cued recall task would not be scored because we predicted social influence effects irrespective of whether or not participants expected that their performance on the recall task would be evaluated/scored, but this was not the case.

It is interesting to note that in Experiment 1, the experimental groups did not express significantly higher confidence in the accuracy of their fine-grain responses than the control group. However, the experimental groups did volunteer significantly more fine-grain answers than the control group. According to the revised dual-criterion model, fine-grain responses are volunteered when confidence in the accuracy of these responses is high (Ackerman & Goldsmith, 2008). While there was a positive correlation between confidence in the accuracy of fine-grain responses at Phase I and fine-grain volunteering at Phase II, the magnitude of the correlation was medium, suggesting there were other factors influencing partici-

pants' decision to volunteer fine-grain responses. Possible candidates for further investigation include mere presence effects and increased motivation resulting from expectation of feedback. Another interesting avenue for future research would be to examine the effects of direct (socially) encountered feedback on meta-cognitive monitoring and control. While previous studies have successfully demonstrated feedback and conformity effects via computerized delivery of feedback and implied co-witnesses, effects may be stronger with direct interaction (Betz et. al, 1996; Kluger & DeNisi, 1996).

The results of Experiments 1 and 2 do not provide a definitive answer regarding the mechanisms that underlie the observed effects of receiving social comparative information on participants' subsequent memory reports. However, they do highlight the potential for social comparison to affect the meta-cognitive appraisals that influence memory output. These studies represent the first attempt to examine the effects of social comparison in this area. Further work is needed to establish the most effective methodologies for investigating the effects of social comparison, and also to disentangle what are likely to be complex relationships between the effects of feedback expectancy and social comparison. Future studies should also investigate how the mere presence of a co-witness during encoding (such as in Experiment 1) can affect eyewitness' confidence in the accuracy of their recall, and the amount/degree of detail they choose to report, as well as whether these effects are strengthened through face-to-face interaction.

In the next chapter, the final three experiments that comprise this thesis are presented. Experiments 3, 4, and 5 investigate more directly communicated forms of social influence, such as social comparative feedback that is communicated face-to-face (Experiment 3), and post-event information from a co-witness (through conversation, Experiment 4; or in a written co-witness report, Experiment 5). The social conditions created in the next three experiments more closely (but not precisely) approximate situations that may occur in real life interviewing contexts.

Chapter 3

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

This chapter is an adapted and extended version of the following submitted manuscript:
Rechdan, J., Hope, L., Sauerland, M., Ost, J., Sauer, J.D., & Merckelbach, H. (2017). The effects of co-witness discussion and misinformation on confidence and precision in eyewitness memory reports. Manuscript submitted for publication.

The experiments reported in this chapter shift our investigation of social influence effects on meta-memory from the effects of computer mediated social comparative information (Experiments 1 and 2) to the effects of comparative feedback (Experiment 3) and misinformation (Experiments 4 and 5) communicated by a co-witness in person or in written form, on the meta-cognitive monitoring and control processes that regulate memory reporting.

It is a well-established finding in the eyewitness literature that people's memory reports can be distorted by exposure to post-event information (PEI; Wright, Self, & Justice, 2000; Frenda, Nichols, & Loftus, 2011). Eyewitnesses may include PEI in their reports because they mistakenly believe that it originates from the event, a phenomenon called the *source misattribution effect* (Zaragoza & Lane, 1994). Alternatively, eyewitnesses may knowingly incorporate PEI in their reports following discussions with co-witnesses, exhibiting *memory conformity* (Gabbert, Memon, & Allan, 2003). In criminal cases involving multiple witnesses, memory conformity may lead investigators to devote time and resources to false leads, or worse, result in the conviction of an innocent suspect.

There are several reasons why memory conformity between co-witnesses may occur. In some instances, one witness may report details learned from another in order to avoid the perceived social costs of disagreeing (Cialdini & Goldstein, 2004), a form of conformity known as *normative influence* (Deutsch & Gerard, 1955). Memory conformity may also be the result of *informational influence*, which occurs when one person reports information she has learned from another because she feels this information is accurate (Deutsch & Gerard, 1955). Finally, memory conformity may be the result of memory distortion (Gabbert et al., 2012). As mentioned earlier, witnesses may forget the source of the information they are reporting, and include details they have learned through discussion with a co-witness.

Memory conformity resulting from normative and informational social influences does not necessarily reflect an alteration of the memory itself, but rather, of the memory report (Blank, 2009). The content of memory reports is determined through meta-cognitive assessments (Ackermann & Goldsmith, 2008; Goldsmith, Koriat, & Weinberg-Eliezer, 2002; Koriat & Goldsmith, 1996). When choosing which details of an event to report from memory, people consider the potential accuracy of candidate responses, as well as how informative they are likely to be for a receiver (Ackerman & Goldsmith, 2008). The precision (level of detail, or grain size) of a response is adjusted until it meets personally established criteria for accuracy and informativeness. Furthermore, individuals may improve the accuracy of their recall by withholding candidate responses that do not meet these criteria (Ackerman & Goldsmith, 2008; Koriat & Goldsmith, 1996). Eyewitness reports can have great bearing on criminal investigations (Semmler, Brewer, & Bradfield Douglass, 2012); it is therefore important to understand if and how PEI exchanged

between co-witnesses influences the meta-cognitive decisions that govern memory reporting. The possible effects of co-witness discussion on meta-cognitive monitoring and control in memory reporting have yet to be empirically tested. In three experiments, we manipulated (i) agreement/disagreement with a co-witness and (ii) misinformation exchanged between co-witnesses to examine the effect of these manipulations on participants' confidence in their recall, as well as the quantity and precision of the information they chose to report.

It is important to note that the focus of the present research is memory *reporting*, or what witnesses say when questioned about their memory for an event, as opposed to their actual memory for the event (which may include different or more details than what they choose to explicitly report). While there is research evidence that memory for events can be altered through discussion (see Hirst & Echterhoff, 2012 for a review), our focus here is on how discussion between co-witnesses may affect memory reports, specifically through its potential effects on the meta-cognitive monitoring and control decisions that guide the selection of reported details.

To examine memory conformity, studies have used a paradigm in which members of a co-witness dyad are exposed to versions of stimuli that differ in some respects (critical items). They are then instructed to discuss what they have seen prior to having their recall tested. Members of each co-witness dyad are given the impression that they have seen the same stimuli, when in fact they have each seen a different version. In Gabbert et al. (2003), participants watched one of two videos of a theft shot from different perspectives, each of which included unique details. Results showed that over 70% of participants in the experimental group reported details they had not seen in the video, but were exposed to through discussion with their co-witness. Subsequent research has replicated Gabbert et al.'s findings, demonstrating a robust memory conformity effect (Wright et al., 2009).

Further research on memory conformity has identified certain factors that may increase the likelihood of, or predict, its occurrence. For example, Gabbert, Memon, Allan, and Wright (2004) found that PEI encountered through face-to-face communication was more misleading than PEI embedded in a written narrative. Furthermore, Gabbert et al. (2006, experiment 1) found that witnesses who volunteered information first in the course of a discussion were more likely to influence their co-witnesses' memory report. Another study found that members of co-witness dyads were more likely to conform to the information provided by the more confident member (Wright et al., 2000). Gabbert et al. (2007) found that participants' beliefs about the quality of their memory in comparison to a co-witnesses' affected their susceptibility to misinformation. Participants who believed they had encoded a set of pictures for half as long as a co-witness were more likely to report erroneous details mentioned by the co-witness. Participants who believed

they had seen pictures for twice as long, mentioned more details during a discussion with a co-witness, and were more likely to mention critical items first.

More recently, research on witness conformity has found that both directly (via a co-witness) and indirectly (in a written report) encountered PEI can result in memory conformity (Blank, Ost, Davies, Jones, Lambert, & Salmon, 2013); that conformity effects are increased when the source of information is seen as highly credible (Horry, Palmer, Sexton, & Brewer, 2012); and that participants' confidence in the accuracy of their memory reports can be influenced by a confederate's expressed confidence (Ost, Ghonouie, Cook, & Vrij, 2008; Goodwin, Kukucka, & Hawks, 2013). The results of these experiments shed light on some of the social dynamics that can lead to co-witness conformity.

Memories are reconstructions of past events, and these reconstructions can sometimes be erroneous (Bartlett, 1932; Roediger & DeSoto, 2015). This process of reconstruction makes memory malleable, and susceptible to social influence effects such as witness conformity (Blank, 2009). When reconstructing a memory, individuals may seek information from external sources to bolster their accuracy and informativeness when internal evidence is weak (Horry, Palmer, Sexton, & Brewer, 2012; Jaeger et al., 2012). Once a memory has been retrieved and reconstructed, rememberers determine which details to report through meta-cognitive monitoring and control (Koriat & Goldsmith, 1996). According to the revised dual-criterion model, individuals strive to provide information that meets personally established criteria for both accuracy and informativeness (Ackerman & Goldsmith, 2008). These criteria can be met by adjusting the precision of answers, such as by reporting either fine-grain (FG; detailed), or coarse-grain (CG; less detailed) information. Individuals can also improve the accuracy of their memory reports by withholding answers that do not meet established criteria (Koriat & Goldsmith, 1996).

A few studies have examined the effects of meta-cognitive monitoring and control on eyewitness reporting of episodic memories (Evans & Fisher, 2011; McCallum et al., 2016; Sauer & Hope, 2016; Weber & Brewer, 2008). The two-phase paradigm used in most of these studies was adapted from Koriat and Goldsmith (1996). In the first phase of the paradigm, participants give fine and coarse-grain answers to questions, and provide ratings of their confidence in the accuracy of these answers (0-100%); in the second phase, they select one of their answers as a preferred response, and are sometimes given the option to withhold a response. Using this paradigm, in two experiments, Weber and Brewer (2008) found that the level of detail participants chose to report was related to their confidence in their fine-grain answers. If participants were highly confident that a detailed answer was accurate, they were more likely to report it. Evans and Fisher (2011) found that participants maintained a consistent level of accuracy in their memory reports after a delay of one week by providing fewer, and less precise details.

McCallum et al. (2016) investigated grain size volunteering and recall confidence in different social conditions. In two experiments, participants answered questions about a witnessed mock crime in the two-phase question format. The results of Experiment 1 showed that confidence significantly predicted response accuracy. Furthermore, participants who were told that their responses would remain private were nearly twice as likely to volunteer fine-grain responses as participants who were told that they would have to respond to questions publicly. In Experiment 2, a monetary incentive with penalties for inaccurate responses was introduced. When there was no penalty for inaccurate reporting, participants showed a bias for volunteering fine-grain answers. In a related vein, Sauer and Hope (2016) examined the strategic regulation of memory reporting for information that had been encoded in conditions of full and divided attention. They found that participants in the divided attention condition provided fewer fine-grain responses, but also volunteered less accurate fine-grain responses than participants in the full attention condition. Participants in the divided attention condition expressed lower confidence in their fine-grain responses indicating that they monitored the accuracy of these responses successfully, but chose to sacrifice accuracy for informativeness. In line with the revised dual-criterion model, findings from these two experiments show that individuals place a heavy emphasis on informativeness.

In an attempt to be as informative as possible, individuals may draw on information from various sources, including PEI they have encountered through discussion with co-witnesses. Individuals control the content of their memory reports through meta-cognitive monitoring and control, and can improve the accuracy and informativeness of their reports by these means. It is therefore possible that co-witness discussion affects memory reporting through its influence on the meta-cognitive processes underlying the selection of reported details. In three experiments, we examined whether disagreement among participants over details of jointly witnessed mock crime events influenced their meta-cognitive regulation of their memory reports. Investigating meta-cognitive decisions that potentially underlie the witness conformity effect can inform the development of investigative interviewing techniques. Additionally, such an investigation may further our understanding of how meta-memory operates in various conditions, which is of theoretical value.

Experiment 3

In Experiment 3, we examined the effects of social comparative feedback provided by a co-witness on participants' a) confidence in the accuracy of their recall, b)

volunteering of fine and coarse-grain responses, c) withholding of responses, and d) response accuracy in a subsequent memory assessment. Our primary interest was not the actual content/accuracy of individual responses – but rather whether the social manipulation affected confidence, thereby influencing the selection of details to be volunteered or withheld. We predicted that, relative to confirming feedback and no feedback, receiving disconfirming feedback from a co-witness would decrease participants' confidence in the accuracy of their memory at Phase I (Hypothesis 1) (as with negative feedback in Dixon & Memon, 2005), and therefore reduce the proportion of fine-grain responses they volunteered at Phase II (Hypothesis 2). Research has shown that participants volunteer fine-grain responses when their confidence in the accuracy of these responses is high (Ackerman & Goldsmith, 2008; Weber & Brewer, 2008). We expected that participants who received confirming feedback would show increased confidence in the accuracy of their answers at Phase I (Hypothesis 3), and therefore be likely to volunteer more fine-grain responses at Phase II than participants in the disconfirming feedback group (Hypothesis 4). We also examined the effect of feedback on participants' withholding of details. Lower confidence in the accuracy of a candidate response increases the chances that it will not be reported (Ackerman & Goldsmith, 2008). We therefore predicted that participants who received disconfirming feedback would withhold more responses than participants in the confirming and no feedback groups (Hypothesis 5).

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 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 members 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 (contact lenses, glasses) vision. Ethical approval for the experiment was obtained from the university's science faculty research ethics committee.

Materials

Stimulus event. Participants viewed the same three-minute video of a distraction theft used in Experiment 2. In the video, a man enters the home of an elderly couple under the pretense of adjusting their electricity meter. He distracts them while an accomplice enters and steals valuables from the second floor of the home.

Recall questions. Questions on both the practice task and the cued recall task referred to details from the video, and were identical to those used in Experiment 2 (see Appendix D). Participants were told that the purpose of the practice task was to familiarize them with the format of the questions they would be answering on the cued recall task. While the practice task did include instructions about what coarse and fine-grain responses were, it was primarily a means for delivering social comparative feedback prior to the cued recall task. 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 cued recall task was modeled after the standard two-phase approach used in previous studies of meta-cognitive monitoring and control of memory reports (Ackerman & Goldsmith, 2008; Goldsmith et al., 2002; Weber & Brewer, 2008). In Phase I, participants were asked to provide fine- and coarse-grain answers (with confidence ratings for each) for 22 cued recall questions about details from the video (e.g., What colour was the getaway car?; How many items did the perpetrators steal from the home?). The cued recall task did not include questions related to the male victim, which were covered in the practice task. In Phase II of the task, participants were presented with their answers from Phase I (without the confidence ratings), and asked to select either the fine or coarse-grain response for each question as their final answer. Participants provided a confidence rating for their volunteered answers on a scale of 0-100%. Phases I and II of the task were forced-report. Previous research has shown that individuals can improve the accuracy of their memory reports if they have the option to withhold responses (Koriat & Goldsmith, 1996). Therefore, in Phase III, participants were shown the answers they provided in Phase II of the task (final answers), and asked to identify if they would have preferred to withhold their responses to any of the questions.

Procedure

After signing informed consent forms, 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 video event in the presence of a confederate who they were led to believe was another participant recruited in the same manner. After watching the video, participants were asked to complete the practice task together. Participants in the two feedback conditions then took turns with the confederate in verbally relaying their answers to the practice task questions in the presence of the experimenter. The experimenter asked the participant to begin, so that he/she always provided answers and confidence ratings before the confederate. Depending on the condition, the confederate either agreed or disagreed with the majority (4/6) of the fine-grain answers provided by the participant (by giving the same or a different answer), and expressed high confidence in these responses. Selection of items for agreement/disagreement and ordering of the questions was determined based on feedback from a pilot focus group (N = 6). Focus group members rated the ease of recalling the answer to each question on the practice task on a seven point likert scale (increasing difficulty). It was determined through discussion that having the confederate fully agree or disagree with a participant might raise suspicion. It was therefore decided that, in the disconfirming condition, confederates would disagree with the participants' responses to the majority (4/6) of the questions, and agree with participants' responses to the other two questions. Conversely, in the confirming condition, confederates agreed with the participants' responses to the majority (4/6) of the questions and disagreed with participants' responses to the other two questions. The four practice task questions that were rated as the easiest to recall and were most often answered correctly by the focus group members were chosen as the majority grouping. For these four questions, confederates were instructed to agree with participants in the confirming condition, and disagree with participants in the disconfirming condition. Participants in the control condition did not report their answers to the practice questions aloud. After completing the practice task portion of the experiment, all participants were moved into another room to individually complete the cued recall task on a computer. Upon completion of the cued recall task, all participants were thanked and debriefed. The entire procedure took approximately 30 mins.

Coding

The cued recall task in this experiment was the same as in Experiment 2. Therefore, the PI coded for accuracy of participants' responses to questions in the same manner as for Experiment 2.

Results

Data were roughly normally distributed with no outliers requiring removal for any of the dependent variables. The assumption of homogeneity of variance was met.

Table 3.1 Experiment 3: Descriptive Statistics for Dependent Variables by Condition.

	Control n = 30		Confirming n = 32		Disconfirming n = 30	
Dependent variable	*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)	[75.8; 82.0]	73.6 (11.5)	[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)	[8.5; 10.5]	10.3 (2.6)	[9.3; 11.2]	11.7 (2.7)	[10.7; 12.7]
Phase II FG volunteering	12.5 (2.8)	[11.5; 13.5]	11.7 (2.6)	[10.8; 12.7]	10.3 (2.7)	[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.

One-way ANOVAs were conducted comparing group means for the confederate agree, confederate disagree, and control (no confederate) conditions for the following dependent variables: expressed confidence in the accuracy of fine and coarse-grain responses at Phase I, volunteering of fine and coarse-grain responses at Phase II, response withholding (selection of 'I don't know') at Phase III, and the accuracy of fine- and coarse-grain responses at Phase I. Table 3.1 shows control, disconfirming, and confirming group means and standard deviations for all dependent variables. Below, the results of the analyses are reported with conventional statistics alongside effect sizes.

The results of the ANOVAs showed a significant difference between groups for coarse-grain confidence at Phase I, $F(2, 89) = 3.32$, $p = .04$, $\omega = .30$, with a moderate effect size (Field, 2009). Planned contrasts revealed that participants who received confirming feedback expressed significantly higher confidence in the accuracy of their coarse-grain answers at Phase I ($M = 79$, $SD = 8.5$), than participants who received disconfirming feedback ($M = 73.6$, $SD = 11.5$), $t(89) = 2.00$, $p = .05$. There was no significant group difference in fine-grain confidence, $F(2, 89)$

= 1.36, p = .26, ω = .09. There was a significant effect of the manipulation on both fine-grain and coarse-grain volunteering at Phase II, $F(2, 89) = 4.95$, p = .01, ω = .28, with an effect size approaching moderate. A choice between fine and coarse-grain answers was forced in Phase II, meaning that an increase in volunteering for one type of answer necessitated a decrease for the other. Planned contrasts showed that there was a significant difference between the confirming and disconfirming groups for volunteering fine- and coarse-grain answers at Phase II, $t(89) = 2.02$, p = .05, and a significant difference between the control and confirming and disconfirming groups for this variable, $t(89) = 2.45$, p = .02. Participants in the disconfirming feedback group volunteered more coarse-grain and fewer fine-grain answers (coarse-grain M = 11.6, SD = 2.7; fine-grain M = 10.3, SD = 2.7) than participants in the confirming feedback group (coarse-grain M = 10.3, SD = 2.6; fine-grain M = 11.7. SD = 2.6). Furthermore, participants in both the confirming and disconfirming feedback groups volunteered more coarse-grain and fewer fine-grain answers than participants in the control group (coarse-grain M = 9.5, SD = 2.8; fine-grain M = 12.5, SD = 2.8). There was no overall significant difference between groups for response withholding at Phase III, $F(2, 89) = 2.28$, p = .11, ω = .26. There were no other significant differences between groups, or effect sizes of note, including for accuracy. Table 3.2 shows the results of the ANOVAs for all dependent variables.

Table 3.2 Experiment 3: Inferential Statistics of the ANOVAs for all Dependent Variables.

Dependent variable	$F(2, 89)$	p	ω
Phase I CG confidence	3.32	.04	.30
Phase I FG confidence	1.36	.26	.09
Phase II CG volunteering	4.95	.01	.28
Phase II FG volunteering	4.95	.01	.28
Phase III withholding	2.28	.11	.26
Phase I CG accuracy	1.09	.34	.04
Phase I FG accuracy	.368	.69	.02

Note. CG = coarse-grain; FG = fine-grain.

Discussion

In line with Hypothesis 2, we found that participants in the disconfirming condition reported significantly fewer fine-grain details than participants in the confirming or control conditions. Contrary to our prediction in Hypothesis 1, this decrease in fine-grain responding did not correspond with a decrease in participants' expressed confidence in the accuracy of their fine-grain answers at Phase I. This is

surprising, as previous research shows that fine-grain confidence at Phase I is the primary determinant of whether a fine-grain option is volunteered at Phase II (Ackerman & Goldsmith, 2008; Goldsmith, et al., 2002; Weber & Brewer, 2008). We also expected that having the confederate challenge the participant on fine-grain details would make the participants less confident in the accuracy of those details. It appears from the results that this was not necessarily the case. The significant decrease in fine-grain volunteering in the absence of a decrease in confidence shown by participants in the disconfirming group could be due to the influence of the social feedback manipulation on these participants' meta-cognitive monitoring decisions.

Participants' answers to the cued recall task were private, so it is unlikely that they altered their reporting strategy over concerns that their answers would conflict with those of their co-witness, as might occur in a situation where normative influences are in effect (Cialdini & Goldstein, 2004; Deutsch & Gerard, 1955). However, it is possible that disagreement with the co-witness (confederate) over the majority of answers on the practice task affected participants' memory self-efficacy. Feedback from others can affect one's memory self-efficacy (Berry, 1999); and memory self-efficacy impacts memory performance (Beaudoin & Desrichard, 2011). Decreased memory self-efficacy may have led participants in the disconfirming group to take a more cautious approach to reporting, if only because coarse-grain responses are more likely to be accurate than fine-grain responses (Yaniv & Foster, 1995, 1997). Lower memory self-efficacy may also have led participants to withhold more responses that they were uncertain about.

Despite the lack of a significant effect of feedback on fine-grain confidence, coarse-grain confidence was significantly affected, partially supporting Hypothesis 3. Participants in the confirming feedback condition expressed higher confidence in the accuracy of their coarse-grain responses at Phase I than participants in the disconfirming feedback condition. Why coarse-grain confidence was affected by feedback but fine-grain confidence was not is unclear, which necessitates further investigation in Experiment 4. Finally, in comparison to the control group, participants in both of the experimental groups volunteered fewer fine-grain responses. One possible explanation for this is that publicly reporting results and engaging in comparison with the confederate placed an emphasis on accuracy. Previous research has shown that public (as opposed to private) reporting can influence meta-cognitive monitoring and control decisions, such as the precision with which rememberers report details from memory, as well as the level of confidence participants express in the accuracy of their recall (McCallum et al., 2016; Shaw et al., 2007). The results of Experiment 3 suggest that the effects of public reporting may extend beyond the immediate reporting of details, to subsequent memory reports.

Experiment 4

To further investigate the findings of Experiment 3, we attempted to replicate them in a second experiment. Moreover, in Experiment 4, we aimed for a more ecologically valid design. In real life, witnesses do not engage in 'practice' conversations—they just start talking about the to-be-remembered event. We therefore eliminated the practice task in Experiment 4. Furthermore, witnesses may discuss many of the details they will later be questioned about (by investigators) with each other. In Experiment 3, the practice task questions for which participants had received feedback did not appear on the cued recall task. In Experiment 4, we had participants engage in a naturalistic conversation with another participant who had seen a slightly altered version of the same event. We expected that the differences in the versions of the film would be points of disagreement, and lead to the exchange of misinformation between participants, as found in previous research using this memory conformity paradigm (e.g., Gabbert et al., 2003). Our aim was to examine the effects of co-witness discussion of a mock crime event on participants' confidence in their recall, grain-size selection, answers withheld, and accuracy on a subsequent memory task.

In Experiment 3, participants in the disconfirming feedback condition adapted a more conservative reporting strategy than participants in the confirming and no feedback conditions, reporting significantly fewer fine-grain details. Similarly, we expected that in Experiment 4, disagreement over the critical items in the videos would lead participants in the co-witness discussion condition to report fewer fine-grain answers to critical item questions on the cued recall task than participants in the no discussion condition (Hypothesis1). We did not expect that disagreement between co-witnesses over the critical items would lead to a decrease in their confidence for their memory of these items (as that was not the case in Experiment 3). Instead, we reasoned that disagreement would lead participants to be more conservative in their reports because the instructions for the recall test stressed accuracy, and coarse-grain responses present a low-risk response option. Coarse-grain responses are more likely to be accurate than fine-grain responses, and might not necessarily contrast with the co-witnesses' recall for some critical items (Yaniv & Foster 1995, 1997; Koriat & Goldsmith, 1996). For example, a participant who recalled the male perpetrator's top as 'grey' might instead choose to report that it was 'light' after hearing a co-witness report that it was 'white'. Another possibility is that participants might perceive the co-witness as confident and therefore assume that they are likely to be accurate (especially if the co-witness mentions the critical items first) (Wright & Carlucci, 2011). Participants might therefore report information given by co-witnesses in response to critical item questions on the recall test, but choose to volunteer coarse-grain responses to these questions in

their final report, as they themselves do not recall the item as such. For example, after hearing a co-witness mention that the mobile phone was 'white' a participant might choose to report that the phone was 'light', because although the co-witness seemed very confident and likely to be accurate, the participant could not confirm this detail from his or her own memory.

In light of findings from the eyewitness literature (e.g., Wright et al., 2009), and the classic literature on the misinformation effect (e.g., see review by Frenda et al., 2011), we expected that participants in the co-witness discussion condition would be more likely to volunteer inaccurate responses (reported by their co-witness) to critical item questions than participants in the no discussion condition (Hypothesis 2). As in Experiment 3, we did not expect accuracy for non-critical item questions to be affected by the manipulation. Finally, research on the strategic regulation of memory reporting shows that individuals can improve the accuracy of their reports if they are given the option to withhold responses (Koriat & Goldsmith, 1996). We therefore predicted that participants in the discussion condition would be more likely to withhold answers to critical item questions when given the opportunity to do so (in Phase III), due to disagreement with the co-witness regarding the answers to these questions (Hypothesis 3), than participants in the no discussion condition. Hypothesis 3 is also derived from the results of Experiment 3, in which participants in the disconfirming feedback condition withheld more responses at Phase III than those who received confirming feedback. We made no predictions regarding effects on confidence, as results from Experiment 3 were inconsistent for fine- and coarse-grain responses.

Method

Design

In a between subjects design, we manipulated co-witness discussion across two conditions: no discussion (n = 32) and discussion (n = 34) and examined its potential effects on confidence, grain size, accuracy, and response withholding in participants' recall reports.

Participants

Sixty-six undergraduate students participated in the study in exchange for course credit (43 females, 23 males, M_{age} = 21 years; SD = 7.3). Participants were recruited primarily through the Psychology department's student participant pool, though

some were recruited in person from various locations on the university campus. Inclusion criteria were the same as for Experiment 3.

Materials

Stimulus event. Each participant viewed one of two versions of a video depicting a distraction theft. In the video, a female perpetrator distracts a male victim while her male accomplice steals the victim's belongings. Similar to stimuli used in several studies of witness conformity (Gabbert et al., 2003;Wright et al., 2008), the two versions differed with respect to two critical items: the colour of the male perpetrator's top, and the colour of the mobile phone that was stolen. Aside from these two differences, the event depicted in the videos was otherwise the same. Each version of the video was 149s long.

Recall questions. Participants in the discussion condition were asked to discuss the event depicted in the video with a co-witness (another participant recruited in the same manner). Following previous co-witness methodology (e.g., Gabbert et al., 2003), they were given the impression that they had seen the same video as their co-witness. Co-witness pairs were each given a copy of a discussion prompt, which contained a list of talking points intended to guide the conversation between the pair through the key aspects of the event, including the (differing) critical items (see Appendix H). An example of a prompt from the list is: "What did the perpetrators look like? Consider gender, skin colour, hair colour, height, age, and the colour and type of clothing worn". To control for the length of the interaction, discussions were limited to five minutes. Questions on the discussion prompt and the cued recall task referred to details from the video. Participants in the no discussion condition did not discuss the event with a co-witness. Instead, they were given a contemplation prompt with the same points on it as the experimental group's discussion prompt, and were instructed to read over it and think about the points (see Appendix I). Participants in the no discussion condition were given five minutes to consider the points in the contemplation prompt, so that their rehearsal of the information, and the delay between encoding and recall was similar to that of participants in the discussion condition.

The phased format of the cued recall task was the same as that used in Experiment 3, except that it contained twenty-five questions relevant to the stimulus video used in this experiment (see Appendix G). Additionally, after completing the task, participants answered a series of open-ended questions serving as a manipulation check (e.g., What do you think the purpose of this study is? If you discussed the video with a co-witness, did the two of you disagree on any aspects?).

Procedure

Participants were randomly allocated to one of the two conditions. They then viewed a version of the video either in the same room as another participant (co-witness), or individually (control). Participants in the co-witness discussion condition were seated at opposite ends of a table, with their laptop screens facing away from each other. Sound was played through headphones, so that participants would not be aware that they were viewing a different version of the video from their co-witness. This procedure is similar to that used in previous studies on witness conformity (Gabbert et al., 2003;Wright et al., 2008). After viewing the video, participants completed a ten-minute filler task comprising unrelated questionnaires. This created a time interval between encoding and recall. Participants in the discussion condition were then given the discussion prompt and asked to follow the instructions on it while discussing the video with each other. At this stage, participants in the no discussion condition were given the contemplation prompt, and asked to think quietly about the points listed for five minutes. All participants then completed the cued recall task independently on a computer. Finally, participants were thanked and debriefed about the purpose of the study.

Coding

The PI and an independent rater coded the accuracy of participants' responses to questions on the cued recall task following the same procedure used in Experiment 1. Inter-rater agreement was high, with an ICC value of .93.

Results

Data for all variables was roughly normally distributed. Three cases were excluded from analyses due to procedural errors and one participant's lack of adherence to instructions. Data from the remaining 63 participants (n = 32 no discussion, n = 31 discussion[1]) were analyzed. Members of a dyad share a common experience that may mean their scores (on the dependent variables measured) are more similar to each other than those of other participants. We therefore used the syntax provided in Alferes and Kenney (2009), to run Pearson product-moment correlations to

[1] One participant in a dyad was excluded because he failed to comply with instructions and exited the cued recall task. The problem occurred after the discussion, and so did not affect results from the other dyad member. Data from the latter was retained, which is why the experimental group n is odd.

assess the independence of data within dyads. None of the resultant *r* values exceeded the conventional cutoff for a small correlation (Cohen, 1988). Moreover, all *r* values were non-significant, with confidence intervals that crossed zero. We therefore treated data from participants in the co-witness discussion pairs as independent. Table 3.3 displays *r* values, their 95% confidence intervals, *t* values, degrees of freedom and associated *p* values for the dyadic data analysis. We ran an independent samples *t*-test comparing the no discussion and co-witness discussion groups on confidence in fine- and coarse-grain responses at Phase I, volunteering of fine- and coarse-grain responses at Phase II, withholding ('I don't know') responses at Phase III, and accuracy of fine-grain responses at Phase I for all items on the cued recall task. Each of these variables, as well as the total number of accurate fine-grain responses participants provided to critical item questions at Phase I, was entered into a separate analysis for critical item questions. We examined fine-grain accuracy for the critical item questions because we expected that it would be decreased by the misinformation exchanged between participants in the co-witness discussion condition. Table 3.4 displays group means and standard deviations for all dependent variables. I will discuss results for all items first, followed by results for critical item questions.

Analyses for all Cued Recall Questions

There were no significant differences between groups for confidence in coarse-grain responses at Phase I, $t(61) = 0.36$, $p = .72$, $d = 0.09$. Similarly, there were no significant differences between groups for confidence in fine-grain responses at Phase I, $t(61) = 1.41$, $p = .17$, $d = 0.38$; volunteering of coarse-grain responses, $t(61) = -1.40$, $p = .17$, $d = 0.33$, and fine-grain responses, $t(61) = 1.40$, $p = .17$, $d = 0.33$, at Phase II; withholding responses at Phase III, $t(61) = -0.06$, $p = .95$, $d = 0.02$; or accuracy of fine-grain responses at Phase I, $t(61) = 0.40$, $p = .69$, $d = 0.10$.

Table 3.3 Experiment 4: Inferential Statistics of the Dyadic Data Analysis.

Dependent variable	*r*	95% CI	*t*(df)	*p*
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 3.4 Experiment 4: Descriptive Statistics for all Dependent Variables by Condition.

	No discussion n = 32		Discussion n = 31	
Dependent variable	*M (SD)*	95% CI	*M (SD)*	95% CI
Phase I CG confidence	81.5 (8.5)	[78.7; 84.6]	70.6 (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)	[1.5; 1.8]	1.2 (.60)	[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.

Analyses for Critical Item Questions

To explore the possibility that any effects of the manipulation may have been limited to critical item questions, further t-tests were run to assess group differences for dependent variables related to these items. Results showed that for critical item questions, there was no significant difference between groups for Phase I confidence in coarse-grain responses, $t(61) = 1.62$, $p = .11$, $d = 0.47$; Phase I confidence in fine-grain responses, $t(61) = 1.34$, $p = .19$, $d = 0.37$; and Phase III response withholding, $t(61) = -0.96$, $p = .34$, $d = 0.32$. There was also no significant group difference in Phase II volunteering of coarse-grain responses, $t(61) = -1.91$, $p = .06$, $d = 0.51$; and fine-grain responses, $t(61) = 1.90$, $p = .06$ $d = 0.49$. However, the associated effect sizes were moderate (Cohen, 1988, 1992), and p-values approached significance. The descriptive data in Table 3.4 show that participants in the co-witness discussion condition volunteered more coarse- ($M = .90$, SD = .75) and fewer fine-grain ($M = 1.1$, SD = .75) answers to critical item questions at Phase II than participants in the no discussion condition (coarse $M = .56$, SD = .67; fine $M = 1.4$, SD = .67). Participants in the discussion condition gave fewer accurate answers to critical item questions than those in the no discussion condition, $t(61) = 3.75$, $p = .001$, $d = 0.98$. The results of the t tests, along with associated p values and effect sizes for all dependent variables are displayed in Table 3.5.

Finally, the results of a chi square analysis showed a significant association between reporting PEI and experimental condition, $\chi^2(1, 63) = 4.59$; $p = .03$, $V = .27$. Participants in the co-witness discussion condition were significantly more

likely to incorporate at least one unseen detail pertaining to a critical item (mentioned by the co-witness) than participants in the no discussion condition. Approximately 35% of participants in the co-witness discussion condition conformed to at least one critical item detail reported by their co-witness.

Table 3.5 Experiment 4: Inferential Statistics of the *t* tests for all Dependent Variables.

Dependent variable	*t*(61)	*p*	*d'*
Phase I CG confidence	0.36	.72	0.09
Phase I FG confidence	1.41	.17	0.38
Phase II CG volunteering	-1.40	.17	0.33
Phase II FG volunteering	1.40	.17	0.33
Phase III withholding	-0.06	.95	0.00
Phase I FG accuracy	0.40	.69	0.14
Phase I CG confidence critical	1.62	.11	0.47
Phase I FG confidence critical	1.34	.19	0.36
Phase II CG volunteering critical	-1.91	.06	0.51
Phase II FG volunteering critical	1.91	.06	0.45
Phase III withholding critical	-0.96	.34	0.32
Phase II FG accuracy critical	3.38	.001	1.04

Note. CG = coarse-grain; FG = fine-grain.

Discussion

In Experiment 4, we found no significant differences between groups for confidence, grain-size volunteering, response withholding, and accuracy when all cued recall questions were examined. However, when analyses were focused on participants' responses to critical item questions we found that participants in the discussion group tended to volunteer fewer fine-grain details at Phase II than participants in the control group. Despite having a moderate effect size, this difference between groups was not statistically significant. Thus, our prediction that disagreements arising between co-witnesses in the discussion condition would result in their reporting fewer fine-grain details (Hypothesis 1) was not supported. While co-witnesses in Experiment 4 presented contradictory information pertaining to the critical items, their confidence in the accuracy of their responses was not overtly stated, reflecting the conventions of more naturalistic conversation. By contrast, in Experiment 3, confederates directly expressed high degrees of confidence in the accuracy of their contradictory responses. Research has shown that PEI expressed with high confidence elicits stronger conformity effects than PEI expressed with low confidence (Allan & Gabbert, 2008). Given this, it may be that the effect on fine-grain responding found in Experiment 3 was driven by the confederate's high

confidence in the accuracy of her answers. In Experiment 4, the lack of overt expressions of confidence during co-witness discussions may have weakened the manipulation (cf. the manipulation in Experiment 3), resulting in an effect on fine-grain responding that only approached significance.

Another possibility is that, in Experiment 4, there were fewer items upon which the social interaction could have exerted an effect (just two critical items) – although it is worth noting that previous similar research has typically only used a small number of critical items (e.g., Gabbert et al., 2007; Oeberst & Seidmann, 2014). Another potential factor underpinning these results is the extent of disagreement and agreement between participants in the co-witness dyads. In the course of their discussions, participants in the discussion condition agreed (had their report confirmed by their co-witness) more often than they disagreed, which may have weakened the effect of the social interaction on meta-memorial monitoring and control. It could also be that the expected reduction in reporting of fine-grain details for critical items was offset by an increase in participants' reporting of fine-grain details mentioned by the co-witness. Previous research has shown that individuals strive to be informative, even at the cost of accuracy, and are reluctant to answer 'I don't know' too often (Ackerman & Goldsmith, 2008). Participants in the co-witness discussion condition may have preferred to volunteer the fine-grain answers reported by their co-witness rather than offer less informative coarse-grain answers when the accuracy of their own fine-grain answers to the critical item questions was challenged.

In support of Hypothesis 2, participants in the co-witness discussion condition reported significantly more inaccurate answers to critical item questions than participants in the no discussion condition. The results showed a misinformation effect with respect to the critical items, which likely underlies the decreased accuracy of participants in the discussion condition. An examination of conformity per item showed that participants in the discussion condition reported incorrect PEI mentioned by their co-witness in 23% of reports pertaining to the mobile phone and 16% of reports pertaining to the colour of the male perpetrator's top. The lower degree of conformity to PEI regarding the male perpetrator's top may have been due to the high memorability of this item. In the stimulus video, participants viewed the male perpetrator's top for a longer period of time than the mobile phone. It is possible that this increased viewing time bolstered their encoding of details related to the male perpetrator's top. It is possible that the higher degree of conformity to PEI about the mobile phone was due to a *low confidence outsourcing effect,* in which individuals rely on external sources for information when their internal evidence is low (Jaeger et al., 2012). It may be that the colour of the mobile phone was not a distinctive detail, and participants could not recall it with confidence.

We cannot verify that there was a difference in participants' confidence in their original memory for the two critical items, as we do not have a baseline assessment of their memory for the event (including expressed confidence) prior to introducing the manipulation. In any case, bolstering retrieval via an initial test before introducing the PEI manipulation may well strengthen memory (e.g., 'testing effect'; Roediger & Butler, 2011; Rowland, 2014). Previous research suggests that having a 'strong' original memory for an event increases the likelihood that an individual will detect discrepancies between their original memories for the event and PEI and therefore be in a better position to reject mistaken PEI (Hall, Loftus, & Tousignant, 1984; Loftus, 2005; Loftus, Levidow, & Duensing, 1992; Tousignant, Hall, & Loftus, 1986). Recently, Putnam, Sungkhasettee, and Roediger (2017) found that misinformation actually improved participants' recognition when they were able to identify and remember discrepancies between the original stimulus and PEI. Vredeveldt and colleagues (2015, 2016) reported that, under certain circumstances, collaborative recall among co-witnesses could actually benefit individual recall for an event. In two experiments, participants who had witnessed a mock crime were interviewed individually before either engaging in collaborative recall with a co-witness, or undertaking a second individual interview. Results from both experiments showed that collaborative pairs made significantly fewer errors than individual interviewees in the second interview. Additionally, in one of the experiments, participants who engaged in collaborative recall provided more new information in a third interview then participants who had not (Vredeveldt, Groen, Ampt, & van Koppen, 2016a). Future research should investigate whether interviewing witnesses individually before they engage in co-witness discussion can decrease witness conformity. Another potential improvement on the present design would be to include a co-witness discussion group in which participants watched the same version of the report. Such a group would more accurately approximate real-life co-witness discussion situations. Moreover, it would be valuable to compare participants exposed to naturally occurring PEI with those exposed to artificially introduced PEI (such as the co-witness discussion group in the present study).

Finally, Hypothesis 3 was not supported, as there was no significant difference between groups for response withholding at Phase III.

Experiment 5

In Experiment 4, the observed decrease in fine-grain responding for participants in the co-witness discussion condition only approached significance. This failure to replicate the results of Experiment 3 may have been due to the fact that there was

little disagreement between co-witness dyads compared to the amount of details they agreed upon. Dyads experienced agreement over many of the details of the mock crime event, partly because there were only two critical items that differed across versions of the event. This agreement may have attenuated the effects of disagreement over the critical items, and weakened the experimental manipulation. In Experiment 5, which was an online study, we attempted to remedy these issues in two ways. First, we sought to increase the number and variety of critical items participants were exposed to in an attempt to create a greater discrepancy between the participants' and a co-witness' memory for the event. Second, in Experiment 5 there was more control over the communication of accurate post-event details. The co-witness report included only five correct fine-grain details in the co-witness report (out of 25 details that were queried in the cued recall task). In addition to these changes, we offered a monetary incentive for accuracy and informativeness, to investigate whether or not this would attenuate the misinformation effect. Specifically, participants were told that they would be entered into a prize draw for a £15 gift voucher if they were among the most accurate and informative participants (top 10%).

In Experiment 5, we introduced misinformation pertaining to critical items in a crime video via the written statement of a co-witness. The relative power of both directly communicated (face-to-face) and written misinformation on subsequent eyewitness testimony has yet to be satisfactorily resolved; however, research has shown that both methods of communicating misinformation can result in a misinformation effect (Blank et al., 2013; Gabbert, Memon, Allan, & Wright, 2004). Two versions of a bogus co-witness statement were prepared by the experimenter, allowing for control over the presentation of both misinformation and accurate details. Each version contained misinformation pertaining to three different details from the video. PEI was introduced for different items in each version to allow for the identification of potentially item-specific effects. As found in previous research, memory conformity can occur more frequently for PEI relating to details that are not highly memorable, or are not recalled with confidence (Bless et al., 2000; Jaeger et al., 2012; Wright & Villalba, 2012). Exposing two groups of participants to different sets of critical items would allow us to determine whether observed effects were consistent, or specific to a set of critical items. The "'co-witness" reports also included accurate information, which was purposely kept to a minimum (8 details in total, 5 fine-grain and 3 coarse-grain). This was done so as not to bolster participants' confidence in the accuracy of their memory (through corroboration) to a degree that would preclude any effect of the manipulation. The aim of Experiment 5 was to investigate whether receiving contradictory post-event information in the form of a written co-witness report would affect participants'

confidence in the accuracy of their memory, grain-size selection, response withholding, and accuracy of reported details.

Our hypotheses were the same as those for Experiment 4, but adapted to the present design. We expected that, for critical item questions, participants would report more coarse- and fewer fine-grain responses (Hypothesis 1), more inaccurate answers (conforming to the misinformation read in the co-witness report) (Hypothesis 2), and withhold more responses (cf. questions about items for which no misinformation was provided in the co-witness report) (Hypothesis 3).

Method

Design

In a within subjects design, we counterbalanced participants' exposure to misinformation using two versions of a bogus 'co-witness' report. Three different 'critical items' of misinformation about details from the mock crime event used in Experiment 4 were presented in each report. In Report 1 participants were misled about the colour of the i) female perpetrator's boots; ii) male victim's hair; and iii) male perpetrator's top. In Report 2 participants were misled about the colour of the i) stolen laptop; ii) male victim's top; and iii) female perpetrator's hair. To distinguish between participants who viewed different versions of the report in this counter-balancing, we will refer to them using the name of one of the items for which misinformation was presented. Thus participants who read Report 1 are hereafter referred to as the 'boots' group (n = 30), and those who read Report 2 are referred to as the 'laptop' group (n = 30).

Participants

Sixty individuals participated in the study (41 females, 19 males, $M_{age} = 30.2; SD = 9.9$). The sample included students, staff, and members of the general public recruited through advertisements placed on social media and the university intranet bulletin. Inclusion criteria were the same as for Experiments 3 and 4.

Materials

Stimulus event and recall questions. Experiment 5 was conducted online, using Qualtrics survey software. Participants watched Version 1 of the mock crime event used in Experiment 4. The cued recall task was the same as the one used in Experiment 4, with a few exceptions. First, participants were given a monetary incentive

for accuracy and informativeness. Second, in Phase II of the cued recall task, participants were given the option of either selecting one of the two answers they gave in Phase I, or withholding their response (i.e., selecting 'I don't know' from a list of response options). The addition of the 'don't know' response to Phase II removed the need for Phase III in the present experiment. At the conclusion of the cued recall task, participants were asked i) what they thought the purpose of the study was, ii) if they had noticed any discrepancies between their memory for the event and the details reported by the co-witness, and iii) whether they felt that reading the co-witness' report had influenced their answers on the cued recall task, and if so, how?

"Co-witness" report. Two versions of a bogus co-witness report were prepared by the experimenter; each contained misinformation about three different critical items (see Appendices J & K). The critical items were selected based on the frequency of their mention in free recalls written by members of a pilot focus group (N = 5), and Experiment 4 participants' accuracy scores for questions pertaining to these items (to avoid selecting items with floor or ceiling effects). The reports included 5 accurate fine-grain details (the victim was wearing blue jeans; the female had a white coat on, all three perpetrators had white skin), and three accurate coarse-grain details (the male perpetrator had light hair and was wearing dark jeans, the female was wearing dark trousers). These accurate details were the same across versions. Table 3.6 displays items for which misinformation was presented for each version of the report (six critical items in total; three per version), as well as items for which accurate and no information was presented.

Procedure

Participants accessed the experiment through a personal link emailed to them by the principal investigator. After providing informed consent, they received instructions about the format of the questions they would later be answering, and were shown examples of fine- and coarse-grain responses. The video of the mock crime event (2 minutes and 30 seconds) then played automatically, and when it ended the program advanced to the next screen. To ensure that participants had watched the video all of the way through, they were then asked to answer two questions (What did the victim say when he realised his things had been stolen?; What did the perpetrators do at the end of the video?). Afterwards, participants saw a set of instructions explaining that they would see the report of the building security guard who had witnessed the crime on closed-circuit television (CCTV), and had logged the victim's complaint.

After seeing one of the two version of the bogus "co-witness" report, participants completed 25 cued recall questions about the video. Instructions regarding

the monetary incentive for accuracy and informativeness appeared on screen prior to the start of the cued recall task. Participants were informed that those who provided the most accurate and detailed responses to the cued recall task questions would be eligible to win one of three additional £15 gift vouchers. Following a set of questions about their perception of the experiment (e.g., what they thought the purpose was, and if they noticed/were influenced by the manipulation), participants saw a debriefing detailing the purpose of the study.

The final screen displayed a thank you message and instructed participants to enter their email address should they wish to be emailed a £5.00 amazon.co.uk gift voucher code as a thank-you for taking part in the experiment, and to be considered in the prize draw for the three additional £15 vouchers. The entire procedure took approximately 25 minutes.

Table 3.6 Experiment 5: Correct Answers and Misinformation Provided in the "Co-witness" Report (Misinformation in Bold).

Question	Correct FG response	Correct CG response	Report I	Report II
1. How long (seconds) did the theft take?	149s, +/- 10s	In range +/- 10s		
2. Approx. how many items did the perpetrators steal?	4 or 5	In range	--	--
3. What colour was the laptop that was stolen?	Black	Dark	--	**Grey**
4. What colour was the mobile phone that was stolen?	White	Light	--	--
5. What colour was the bicycle that was stolen?	Purple and pink	Dark, warm	--	--
6. What colour is the male victim's hair?	Blonde	Light	**Brown**	--
7. What is his skin colour/ethnicity?	White/Caucasian	Light	White	White
8. How old is he?	18 +/- 1 yr.	In range +/- 1yr.	Late teens	Late teens
9. What is his height?	6'2; 188cm +/- 1 in.	In range +/- 1 in.	--	--
10. What colour was his top?	Red, burgundy	Dark, warm	--	**Purple**
11. What colour were his trousers?	Blue	Light, cool	Blue	Blue
12. What colour was the female perpetrator's hair?	Brown	Dark	--	**Blonde**
13. What was her skin colour/ethnicity?	White/Caucasian	Light	White	White
14. How old is she?	21 +/- 1 yr.	In range +/- 1yr.	Early 20s	Early 20s
15. What is her height?	5'8; 173cm +/- 1 in.	In range +/- 1 in.	--	--
16. What colour was her coat?	White	Light	White	White
17. What colour were her trousers?	Black	Dark	Dark	Dark
18. What colour were her boots?	Black	Dark	**Grey**	--
19. What was the male perpetrator's hair colour?	Blonde, brown	Light	Light	Light
20. What was his skin colour/ethnicity?	White/Caucasian	Light	White	White
21. How old is he?	24 +/- 1 yr.	In range +/- 1yr.	Early-mid 20s	Early-mid 20s
22. What is his height?	6'4; 193cm +/- 1 yr.	In range +/- 1 in.	--	--
23. What colour was his top?	Grey	Dark	**White**	--
24.What colour were his trousers?	Blue, black	Dark	Dark	Dark
25. What colour was his rucksack?	Black	Dark	--	--

Note. '--' indicates no information given. CG = coarse-grain; FG = fine-grain.

Coding

The cued recall task in this experiment was the same as in Experiment 4. Therefore, the PI coded for accuracy of participants' responses to questions in the same manner as for Experiment 4.

Results

Prior to conducting preliminary analyses and data cleaning, we checked that participants had answered the two questions that followed the mock crime video correctly. These questions were included to ensure that participants had watched the video in its entirety. All participants answered both questions correctly. Data from two participants were later removed from analyses because they were outliers (more than 3 standard deviations away from the mean) with respect to two or more of the dependent variables. Data from the remaining 58 participants (29 in each of the 'boots' and 'laptop' groups) were entered into analyses. A series of paired samples *t*-tests were conducted comparing participants' (i) confidence in coarse and fine-grain responses at Phase I, (ii) number of coarse and fine-grain details volunteered at Phase II, (iii) number of responses withheld at Phase II, and (iv) accuracy at Phases I and II for non-critical item (no misinformation given) and critical item questions on the cued recall task. The means and standard deviations for dependent variables for all non-critical item and critical item questions on the cued recall task are presented in Table 3.7. Means for accuracy and volunteering were converted to proportions, for comparison. There were 3 critical items per version of the "co-witness" report, making a total of 6 critical items. All other items (including the items for which accurate information was provided in the reports) were considered non-critical.

T-test statistics (separated by report version) can be found in Table 3.8. Analyses were separated by report version (as opposed to collapsing across versions) so that potential effects specific to the critical items in each version could be detected. I will first present significant results for participants who read Version 1 of the 'co-witness' report ('boots' group), followed by significant results for participants who read Version 2 ('laptop' group). Descriptive and inferential statistics for non-significant results can be found in Tables 3.7 and 3.8.

Table 3.7 Experiment 5: Descriptive Statistics for all Dependent Variables for each Version of the Co-witness Report.

	Version 1: 'boots' *n* = 29		Version 2: 'laptop' *n* = 29	
Dependent variable	*M (SD)*	95% CI	*M (SD)*	95% CI
FG confidence	75.18 (10.20)	[71.70; 78.82]	74.77 (14.28)	[69.56; 79.40]
FG confidence critical	68.16 (16.10)	[62.76; 74.14]	78.97 (14.75)	[73.79; 83.68]
CG confidence	81.89 (8.10)	[79.01; 84.68]	81.63 (12.48)	[76.80; 85.82]
CG confidence critical	75.29 (16.12)	[69.66; 81.15]	83.56 (12.31)	[79.00; 87.59]
Phase II confidence	78.50 (10.60)	[74.68; 82.14]	76.44 (15.75)	[70.73; 81.86]
Phase II confidence critical	69.54 (23.28)	[61.33; 76.95]	78.85 (19.50)	[71.95; 85.03]
FG volunteering	0.55 (0.13)	[0.50; 0.60]	0.55 (0.18)	[0.48; 0.62]
FG volunteering critical	0.52 (0.30)	[0.41; 0.62]	0.67 (0.31)	[0.56; 0.77]
CG volunteering	0.37 (0.13)	[0.33; 0.42]	0.33 (0.13)	[0.28; 0.38]
CG volunteering critical	0.32 (0.33)	[0.20; 0.44]	0.24 (0.25)	[0.15; 0.34]
Phase II withheld	0.08 (0.10)	[0.05; 0.12]	0.12 (0.14)	[0.07; 0.17]
Phase II withheld critical	0.16 (0.23)	[0.09; 0.25]	0.09 (0.20)	[0.03; 0.16]
FG accuracy	0.63 (0.08)	[0.59; 0.66]	0.62 (0.07)	[0.60; 0.65]
FG accuracy critical	0.44 (0.30)	[0.33; 0.55]	0.43 (0.28)	[0.34; 0.52]
CG accuracy	0.77 (0.08)	[0.74; 0.80]	0.79 (0.08)	[0.76; 0.82]
CG accuracy critical	0.67 (0.28)	[0.56; 0.77]	0.76 (0.22)	[0.68; 0.83]
Phase II accuracy	0.69 (0.11)	[0.65; 0.73]	0.65 (0.12)	[0.60; 0.69]
Phase II accuracy critical	0.47 (0.33)	[0.34; 0.61]	0.51 (0.30)	[0.40; 0.61]

Note. CG = coarse-grain; FG = fine-grain.

Table 3.8 Experiment 5: Inferential Statistics of the *t* tests Comparing Participants' Performance for Non-Critical Items and Critical Items on the Cued Recall Task for all Dependent Variables.

Version	Dependent variable	*M (SD)*	95% CI	*t*(28)	*p*	*r*
1: 'boots'	FG confidence	7.03 (8.90)	[3.64; 10.41]	4.25	.000*	.56
	CG confidence	6.60 (11.48)	[2.23; 10.97]	3.10	.004*	.31
	Phase II confidence	8.96 (19.04)	[1.71; 16.20]	2.53	.02*	.21
	FG volunteering	0.03 (0.24)	[-0.06; 0.12]	0.70	.49	.02
	CG volunteering	0.05 (0.28)	[-0.06; 0.16]	0.97	.34	.03
	Phase II withheld	-0.08 (0.20)	[-0.16; -0.01]	-2.19	.04*	.19
	FG accuracy	0.19 (0.25)	[0.09; 0.29]	4.04	.000*	.51
	CG accuracy	0.10 (0.25)	[0.01; 0.20]	2.18	.04*	.16
	Phase II accuracy	0.22 (0.28)	[0.11; 0.33]	4.27	.000*	.56
2: 'laptop'	FG confidence	-4.19 (5.90)	[-6.44; -1.95]	-3.82	.001*	.60
	CG confidence	-1.94 (6.21)	[-4.30; 0.43]	-1.68	.10	.11
	Phase II confidence	-2.41 (10.86)	[-6.54; 1.72]	-1.20	.24	.05
	FG volunteering	-0.11 (0.25)	[-0.21; -0.02]	-2.42	.02*	.23
	CG volunteering	0.09 (0.25)	[-0.01; 0.18]	1.88	.07	.12
	Phase II withheld	0.03 (0.12)	[-0.02; 0.07]	1.16	.26	.05
	FG accuracy	0.20 (0.28)	[0.09; 0.31]	3.78	.001*	.45
	CG accuracy	0.03 (0.21)	[-0.05; 0.11]	0.72	.48	.02
	Phase II accuracy	0.14 (0.29)	[0.03; 0.25]	2.59	.02*	.22

Note. *Denotes a significant p value. CG = coarse-grain; FG = fine-grain.

Version 1: 'Boots'

Participants who read the 'boots' version of the co-witness report expressed higher confidence in the accuracy of their fine-grain answers to non-critical item questions (M = 75.18; SD = 10.20) than critical item questions (M = 68.16; SD = 16.10); this difference, 7.03, 95% CI [3.64; 10.41], was significant, $t(28) = 4.25$, $p < .001$, with a large effect size, $r = .56$. Participants also expressed higher confidence in the accuracy of their coarse-grain answers to non-critical item questions (M = 81.89; SD = 8.10) than to critical item questions (M = 75.29; SD = 16.12); this difference, 6.60, 95% CI [2.23; 10.97], was significant, $t(28) = 3.10$, $p = .004$, and represented a medium-sized effect, $r = .31$. Participants displayed the same pattern for confidence in the accuracy of their volunteered responses at Phase II, expressing higher confidence in the accuracy of their answers for non-critical item questions (M = 78.50; SD = 10.60), than for critical item questions (M = 69.54; SD = 23.28); this difference, 8.96, 95% CI [1.71; 16.20], was significant, $t(28) = 2.53$, $p = .02$, with a small effect size, $r = .21$.

Participants also withheld a higher proportion of responses to critical item questions (M = 0.16; SD = 0.23) than non-critical item questions (M = 0.08; SD = 0.10) at Phase II; this difference, -0.08, 95% CI [-0.16; -0.01], was significant, $t(28) = -2.19$, $p = .04$, with a small effect size, $r = .19$. Contrary to our predictions in (H1), there were no significant differences in participants' volunteering of fine- or coarse-grain responses for non-critical and critical item questions at Phase II.

On average, participants gave a higher proportion of accurate fine-grain responses to non-critical item questions (M = 0.63; SD = 0.08), than critical item questions (M = 0.44; SD = 0.30); this difference, 0.19, 95% CI [0.09; 0.29], was significant, $t(28) = 4.04$, $p < .001$, with a large effect size, $r = .51$. Participants also gave a higher proportion of accurate coarse-grain responses to non-critical item questions (M = 0.77; SD = 0.08), than critical item questions (M = 0.67; SD = 0.28); this difference, 0.10, 95% CI [0.01; 0.20], was significant, $t(28) = 2.18$, $p = .04$, with a small effect size, $r = .16$.

Finally, participants gave a higher average proportion of accurate answers to non-critical item questions (M = 0.69; SD = 0.11), than critical item questions (M = 0.47; SD = 0.33) at Phase II; this difference, 0.22, 95% CI [0.11;0.33], was significant, $t(28) = 4.27$, $p < .001$, with a large effect size, $r = .56$.

Version 2: 'Laptop'

Participants in the 'laptop' group expressed higher confidence in the accuracy of their fine-grain answers to critical item questions (M = 78.97; SD = 14.75) than non-critical item questions (M = 74.77; SD = 14.28); this difference, -4.19, 95% CI

[-6.44; -1.95], was significant, $t(28) = -3.82$, $p = .001$, with a large effect size, $r = .60$. Participants also volunteered a higher average proportion of fine-grain responses for critical item questions ($M = 0.67$; $SD = 0.31$), than for non-critical item questions ($M = 0.55$; $SD = 0.18$); this difference, -0.11, 95% CI [-0.21; -0.02], was significant, $t(28) = -2.42$, $p = .02$, with a small effect size, $r = .23$. This finding is contrary to our prediction in Hypothesis 1**.** On average, participants gave a higher proportion of accurate fine-grain responses to non-critical item questions ($M = 0.62$; $SD = 0.07$), than critical item questions ($M = 0.43$; $SD = 0.28$) at Phase I; this difference, 0.20, 95% CI [0.09; 0.31], was significant, $t(28) = 3.78$, $p = .001$, and represented a medium-sized effect, $r = .45$. Finally, participants volunteered a higher average proportion of correct answers to non-critical item questions ($M = 0.65$; $SD = 0.12$) at Phase II, than critical item questions ($M = 0.51$; $SD = 0.30$); this difference, 0.14, 95% CI [0.03; 0.25], was significant, $t(28) = 2.59$, $p = .02$, with a small effect size, $r = .22$.

In line with Hypothesis 2, participants in both groups reported lower average proportions of correct a) fine-grain answers at Phase I and b) volunteered answers at Phase II for critical item questions (cf. non-critical item questions). These significant results for accuracy are likely due to participants' conforming to inaccurate details in the co-witness reports. A chi square analysis showed that participants in the 'boots' condition were significantly more likely to volunteer misinformation for the critical items in version 1 of the written account than were participants in the 'laptop' condition (who had received no information related to the critical items in version 1), χ^2 (1, 58) = 9.95; $p = .002$, $V = .41$. Over 50% of participants in the 'boots' condition reported at least one piece of misinformation from version 1 of the co-witness report. The results of a second chi square analysis showed that participants in the 'laptop' condition' were significantly more likely to volunteer misinformation for the critical items in version 2 of the written account than were participants in the 'boots' condition (who had received no information related to the critical items in version 2), χ^2 (1, 58) = 6.65; $p = .01$, $V = .33$. Over 40% of participants in the 'laptop' condition reported at least one piece of misinformation from version 2 of the co-witness report. Overall, these findings demonstrate a robust witness conformity effect. Conformity was higher for some items than others; Table 3.9 details conformity by item for each version of the co-witness report. For participants who read the 'boots' version of the co-witness report, conformity to misinformation about the colour of the male perpetrator's top was very low (3%). As in Experiment 4, low conformity to PEI regarding this detail may have been due to the fact that participants had ample time to encode and reinforce details about the male perpetrator, who was central to the event. Conformity to misinformation for other critical items ranged from 16%-31%.

The questions at the end of the cued recall task revealed that 11 participants had suspicions about the accuracy of the co-witness report, and a few of them recalled discrepancies between their answers and those of the co-witness for critical items. We re-ran the analyses with data from participants who had expressed suspicion about the manipulation removed, and this did not alter the direction or magnitude of the results.

Table 3.9 Experiment 5: Percentage of Participants who Reported PEI per Critical Item for Each Version of the Co-witness Report.

		Critical Item		
Version 1: Boots		Female's boots	Victim's hair	Male perp's top
	% PEI	24%	31%	3%
Version 2: Laptop		Laptop	Victim's top	Female's hair
	% PEI	30%	20%	13%

Note. PEI = Post-event information

Discussion

In Experiment 5, we predicted that including misinformation about critical items in a bogus co-witness report would lead participants to volunteer more coarse-grain and less fine- grain information about these items on a recall task. We also expected that participants would withhold more responses to critical item questions. The results varied depending on which items misinformation was presented for, and did not consistently support our hypotheses. However, a number of consistent findings emerged. The next section details the findings by group, followed by results that were consistent across items/groups.

Participants in the 'boots' group expressed lower confidence in their recall of critical item details (cf. non-critical item details), but the opposite was true of participants in the 'laptop' group. According to the revised dual-criterion model, confidence in the accuracy of a candidate response is one of two main criteria rememberers use to determine whether or not to volunteer that response (Ackerman & Goldsmith, 2008). Thus, the difference in participants' confidence for critical items across the two versions of the co-witness report could underlie some of the results for response volunteering and withholding. For instance, the 'boots' group's increased response withholding for critical item questions at Phase II could be due to the lower confidence in both coarse-grain and fine-grain responses to critical item questions (cf. non-critical item questions) expressed by these participants. We therefore cannot conclude that Hypothesis 3 was supported. Moreover, the lower confidence for critical item questions expressed by 'boots' group participants was

not reflected in their grain-size volunteering, as would be predicted by the revised dual-criterion model. Participants in the 'boots' group did not show any significant differences in coarse-grain or fine-grain volunteering at Phase II for critical and non-critical item questions. This may be because when participants' confidence in the accuracy of their memory for critical items was low, they volunteered the fine-grain misinformation from the 'co-witness' report, instead of volunteering coarse-grain information or withholding a response. Such behaviour is in line with the *low confidence outsourcing* strategy, in which participants rely on the judgments of an external source when their confidence in their internal evidence is weak (Jaeger et al., 2012; Zawadzka et al., 2015).

Results for the 'laptop' group participants showed a different pattern. In direct contrast to Hypothesis 1, the 'laptop' group volunteered more fine-grain details for critical item questions than non-critical item questions at Phase II. This is likely due to the higher level of confidence these participants expressed in the accuracy of their answers to critical item questions (cf. non-critical item questions). The difference in average confidence for critical items in the 'boots' and 'laptop' versions of the co-witness report may have been due to participants' perceived memorability of the items. Despite careful selection of the misinformation items based on pilot testing and previous performance (to avoid ceiling and floor effects), the critical items in the 'laptop' version may have seemed distinctive to participants relevant to the other details they were questioned about on the recall task. The critical items in the 'boots' version may simply have been less memorable despite our attempts to match critical items.

Notwithstanding differences in expressed confidence for participants in the 'boots' and 'laptop' groups, the results demonstrated robust witness conformity effects for critical items from both versions of the report. Participants reported significantly more inaccurate answers to questions about critical items for which they read misinformation in the co-witness report than items for which they did not receive any information in the report, a classic misinformation effect (Frenda et al., 2011; Loftus, 2005). While some research has found that low item memorability predisposes individuals to conform to judgments from external sources (Bless et al., 2001; Jaeger et al., 2012), other research has shown that memory conformity can also occur for confidently recalled stimuli, as seems to be the case for critical items in the 'laptop' version (Horry et al., 2012).

Results for accuracy were fairly consistent across report versions, and supported Hypothesis 2. Participants in the 'boots' group reported fewer accurate coarse and fine-grain responses to critical item questions (cf. non-critical items). Accuracy results were nearly identical for participants in the 'laptop' condition, except with respect to coarse-grain responses. There was no significant difference in the accuracy of 'laptop' group participants' coarse-grain responses to critical and non-

critical item questions. Participants' volunteering misinformation presented in the bogus co-witness report likely underlies the observed significant difference in accuracy of responses to critical and non-critical item questions. In sum, we found a misinformation effect for items in both versions of the co-witness report, and results showed that participants volunteered fewer accurate responses to critical item questions than non-critical item questions. These findings suggest that the lack of significant differences in participants' meta-cognitive monitoring and control (confidence, grain size selection, response withholding) for critical and non-critical item details was not due to an unsuccessful manipulation.

Participants may have decided to report the co-witness' answers because they believed them to be more accurate than their own, a case of informational influence (Deutsch & Gerard, 1955; Oeberst & Seidmann, 2014). In the instructions for the experiment, we wrote that the co-witness report was that of the building security guard, who had witnessed the event on CCTV, and logged the victim's account. It is possible that participants may have assumed that the "security guard" may have had more exposure to the video, or more knowledge of the details of the crime as described to him by the victim. Such assumptions may have led participants to think that the quality of the security guard's memory for the event was better than their own, thus setting the stage for informational influence. Previous research has shown that perceiving the quality of a co-witness' memory as better than one's own can lead to increased witness conformity (Gabbert et al., 2007).

In this experiment, participants' conformity to misinformation provided by an external source did not affect their meta-cognitive monitoring and control in a consistent way. While we cannot determine precisely why no clear overall pattern emerged, it may be that memory conformity occurs after individuals have made monitoring and control decisions about their own memory for details. After deciding against volunteering a candidate response, rememberers may turn to external sources for information. This strategy is supported by research on low confidence outsourcing, as well as social comparison theory, which both predict that individuals will seek information from external sources when their internal evidence is weak (Festinger, 1954; Jaeger et al., 2012). A response from an external source may not be subjected to the same monitoring and control as a response based on internal evidence, and may be volunteered based on the source's perceived credibility and the rememberer's desire to be informative—an end which is not achieved by providing vague, coarse-grain information or withholding a response (Ackerman & Goldsmith, 2008; Gabbert et al., 2007; Horry et al., 2012). Conversely, rememberers may think they recall a detail accurately, but upon hearing/reading it described differently by someone else, refrain from volunteering their internally generated candidate response. In the latter situation, the rememberer's meta-cognitive judgements are not based on internal evidence, but are modified by social factors.

Such social influences on memory reporting are in line with Blank (2009)'s social cognitive model of memory; in which he asserts that social factors have a large role to play in what, previously, were considered to be largely internal decision-making processes.

Further research is needed to determine how and why reporting of misinformation is not reflected in the meta-cognitive monitoring and control that determines memory output. The methodology used in Experiments 4 and 5 might be refined to include a source-monitoring test, which also queries participants' reasons for knowingly volunteering misinformation (when they accurately identify the source of this information as the co-witness). Such an addition to the present design might clarify why conformity occurs.

General Discussion

The aim of Experiments 3, 4, and 5 was to examine social influence effects on the meta-cognitive strategies that regulate memory reporting. Specifically, these three experiments examined the effects of i) receiving confirming or disconfirming feedback about the accuracy of one's memory, and ii) receiving post-event misinformation on participants' reported confidence, grain size volunteering, and response withholding on a subsequent recall task. In Experiment 3, we found that participants who received disconfirming feedback from a confederate about their answers on a practice recall task reported fewer precise (fine-grain) details on a subsequent recall task. Unexpectedly, this decrease in fine-grain reporting was not accompanied by a decrease in participants' confidence in the accuracy of their fine-grain responses. The results of Experiment 3 indicate that receiving social comparative feedback about one's memory performance can affect subsequent reporting of details. One possible explanation for our findings is that memory self-efficacy was lowered by disconfirming feedback. In light of this, participants in the disconfirming condition may have volunteered fewer fine-grain details in an attempt to increase the likelihood of their responses being correct.

In Experiment 4, participants who discussed a stimulus event with a co-witness later reported more incorrect details about the event (mentioned by the co-witness) in their individual responses than participants who did not discuss the event. Contrary to our predictions, participants in the discussion group did not report lower confidence in the accuracy of their memory for fine-grain details, volunteer fewer fine-grain details, or withhold more information than participants in the no discussion group. In Experiment 5, we sought to extend Experiment 4 by increasing the amount of misinformation and decreasing the amount of correct fine-grain information participants received from a co-witness. Participants in Experiment 5

viewed a mock crime event and read one of two versions of a co-witness report containing misinformation about three critical items from the event. Results showed that participants reported significantly more incorrect details about these critical items than non-critical items (for which no misinformation was provided) in a recall task (i.e., showed a classic misinformation effect). Reporting of misinformation had different effects on confidence, grain size volunteering and response withholding for the different critical items in each version of the co-witness report (see Thesis General Discussion for further consideration of this methodological issue).

The results of Experiments 4 and 5 support the extensive findings from the literatures on the misinformation (see Frenda et al., 2011; and Loftus, 2005 for reviews) and witness conformity effects (Gabbert et al., 2003; Wright et al., 2000). Despite conforming to misinformation communicated by a co-witness, participants in the two experiments did not show an associated pattern of effects on the metacognitive monitoring and control strategies that regulate memory reporting. It is possible that many participants did not read the co-witness report carefully enough to detect discrepancies between their memory for the event, and the co-witness'. Tousignant, Hall, and Loftus (1986) found that individuals who read a report containing misinformation more slowly were more likely to detect discrepancies, and were less likely to conform to misinformation than those who read the report more quickly. Participants who did not detect the inaccurate details in the report may have assumed they were correct and reported them with the same confidence and level of precision as accurate details. It is also possible that, after monitoring, participants decided that their candidate responses to critical item questions were either unlikely to be accurate, or were not informative enough. Driven to be as informative as possible, these participants may have reported the misinformation provided by a seemingly confident co-witness (Experiment 4) or a seemingly reliable implied co-witness (Experiment 5). Misinformation may have been volunteered without undergoing the usual monitoring, which may explain the lack of consistent effects on monitoring and control in Experiments 4 and 5. However, the results of these studies do not confirm this explanation, but they certainly represent an interesting avenue for future research. In order to test this suggestion an experimental design with conditions that motivate both informational and normative conformity is needed. If participants are reporting misinformation from a co-witness because they believe it to be accurate, then their confidence in the accuracy of this information likely will not differ from their confidence in correct details they volunteer from their own memory. However, in cases of normative conformity to misinformation, the rememberer, not being privately convinced of the veracity of discrepant information from the co-witness, should report lower confidence in its accura-

cy, and perhaps be less likely to volunteer fine-grain details about items for which they have conformed to misinformation.

Chapter 4

Thesis General Discussion

The aim of this thesis was to examine the effects of social influence on the meta-cognitive monitoring and control decisions that dictate the contents of individual memory reports. Research has demonstrated that participants acting as mock eye-witnesses select which details to report, and the precision of those details, in accordance with the revised dual-criterion model of the strategic regulation of memory reports (Ackerman & Goldsmith, 2008; Evans & Fisher, 2011, McCallum et al., 2016; Weber & Brewer, 2008). Research has also shown that post-event discussion between eyewitnesses may cause their individual accounts to converge (i.e., lead to memory conformity (e.g., Gabbert et al., 2003; Wright et al., 2000); and that providing post-event feedback regarding the quality of eyewitness' memory can affect their confidence in the accuracy of their subsequent recall performance (Dixon & Memon, 2005; Leippe et al, 2006; Roper & Shewan, 2002). The five experiments that comprise this thesis are the first programme of research to examine whether receiving feedback about the quality of one's memory, or receiving misinformation about an event from a co-witness, affect aspects of meta-memory (e.g., confidence ratings, precision of volunteered details, response withholding). In this final chapter, I will i) highlight the key findings from each experiment; ii) discuss these findings in relation to existing research; and iii) reflect on the potential theoretical implications of the present findings. I will also note some of the limitations associated with the experiments conducted, and conclude with an exploration of potentially interesting lines of inquiry for future research on meta-memory and social influence.

Key Findings

In Experiment 1, participants were exposed to a co-witness' score on a recall task for a jointly witnessed stimulus video; this score was either high or low. In Experiment 2, participants were shown either a high or low bogus score for their own performance on a practice recall task of six questions about a character from a stimulus video. Participants in both experiments then completed a cued recall task of questions about the video. In Experiment 1, participants who were exposed to social comparative information regarding the performance of a co-witness (experimental groups) volunteered significantly more fine-grain responses on the cued recall task than participants who did not see a co-witness score (control group). The increase in volunteering of fine-grain responses for participants in the experimental groups occurred irrespective of whether these participants saw a high or low co-witness score. This increase in fine-grain responding was not accompanied by a significant difference between the experimental and control groups' expressed confidence, which represents a departure from the relationship between confi-

dence and volunteering of fine-grain details predicted by the revised dual-criterion model.

In Experiment 2, participants who were given feedback regarding the accuracy and informativeness of their recall on the practice task did not differ significantly from a no feedback control group with respect to their performance on a subsequent recall task. There were no significant differences between the means of the experimental groups (high and low scores) and the control group (no score) with respect to expressed confidence, grain size volunteering, response withholding, and accuracy.

In Experiment 3, participants in the two experimental groups took turns reporting their answers to a practice recall task with a confederate who either confidently agreed (confirming condition) or disagreed (disconfirming condition) with the majority of their answers. Participants in the disconfirming condition volunteered significantly fewer fine-grain details than participants in the control condition (who did not verbally report their responses to the recall task), and the confirming condition. The disconfirming group's volunteering of fewer fine-grain details was not reflected in lower mean confidence in these details (cf. fine-grain confidence reported by the control and confirming groups). As in Experiment 1, the results of Experiment 3 highlight a mismatch between monitoring assessments and control decisions that is not predicted by the revised dual-criterion model.

In Experiment 4, participants either discussed (in dyads; discussion condition) or did not discuss (control condition) two versions of a stimulus video that included two discrepant critical items. Each participant in a discussion dyad had viewed a different version of the video, and disagreement arose over critical item details. However, the results did not show any significant differences between discussion and control group means for expressed confidence, grain size volunteering, response withholding, and accuracy. The group means for fine-grain volunteering only approached significance, with participants in the discussion condition volunteering fewer fine-grain details than those in the no discussion condition.

In Experiment 5, participants watched a video of a mock crime event and then read a bogus "co-witness" report containing misinformation about details from the event. There were two versions of the report, and each contained misinformation pertaining to three different critical items. Participants then completed a cued recall task. Results showed that participants conformed to misinformation about critical items in both versions of the report. However, the results for confidence, volunteering of fine- and coarse-grain details, and response withholding varied for the two sets of critical items. Confidence for critical items in the 'boots' version of the report was lower than for non-critical items, while confidence for critical items in the 'laptop' version of the report was higher than for non-critical items.

The results of the experiments in this thesis suggest that under certain social conditions, meta-cognitive regulation of memory diverges from the framework proposed in the revised dual-criterion model (Ackerman & Goldsmith, 2008). This finding is not entirely surprising, as the model was originally developed based on responses to general knowledge questions given by participants acting in isolation. Witnesses to a crime likely have very different motivations when giving evidence to the police, as the consequences of the information they provide are certainly greater than for individuals answering trivia questions. This is the first work to attempt to systematically explore social influence effects on meta-cognitive monitoring and control of memory reports, and therefore represents an innovation in the literature (and can contribute to the literature as such). However, this programme of research has also highlighted a number of interesting and challenging methodological issues that will be discussed throughout this chapter. Table 4.1 displays a summary of the manipulations employed and key findings from the Experiments in this thesis.

Social comparative information and meta-memory. In Experiment 1, the increase in fine-grain volunteering by participants who were incidentally exposed to the score of a co-witness suggests that social comparative information may affect meta-memorial monitoring. It is unlikely that this effect is due to an assessment of the difficulty of the upcoming cued recall task based on the bogus co-witness score. If that were the case, the performance of participants in the high and low score conditions would have been affected differently (e.g., participants who saw a high score may have assumed that the task was easy, and reported more precise details, while participants who saw a low score may have assumed the task was difficult, and adopted a more conservative reporting strategy). It is possible that upon seeing the co-witness score as they sat down to begin the cued recall task, participants in the experimental groups may have come to expect that their performance on the task would be similarly assessed. In fact, several participants did ask the experimenter why they did not see their own score at the conclusion of the cued recall task. This expectation of feedback may have motivated participants to be more informative, resulting in their providing more fine-grain responses (irrespective of the nature of the comparative information).

The question remains, however, as to why participants might relate superior performance to informativeness and not accuracy, when the instructions for the experiment placed emphasis on both. Findings from previous research have shown that participants prefer to volunteer fine-grain responses more often than coarse-grain responses (McCallum et al., 2016), despite the fact that the latter are more likely to be correct (Yaniv & Foster, 1995), thereby choosing to sacrifice accuracy for informativeness (Ackerman & Goldmsith, 2008; Sauer & Hope, 2016). It may be that people perceive informative but potentially inaccurate responses as more

useful to a receiver than imprecise but accurate ones, and therefore consider them indicative of superior recall performance. Future research should query participants' perceptions of what constitutes an 'accurate' and 'informative' response, and which of these they would emphasize in different contexts.

Table 4.1 Summary of Key Findings

Experiment and manipulation	Effects of Feedback	Effects of CW disagreement	Effects of misinformation
1: Exposure to high, low, or no score feedback (bogus) re: a CW's performance on a recall task.	Ps who saw feedback volunteered sig. more FG details on the cued recall task than Ps who did not see a score. There was no related increase in FG confidence.		
2: High, low, or no electronic feedback re: Ps performance on a practice recall task.	No sig. effects of feedback on subsequent cued recall task performance.		
3: Social comparative feedback (confirming, disconfirming, none) from a confederate posing as a CW for answers to a practice recall task.		Ps who received disconfirming feedback volunteered sig. fewer FG details than Ps who received confirming or no feedback. There was no related decrease in FG confidence.	
4: Discussion vs. no discussion of a mock crime video with a CW who has seen a version differing with respect to two CIs.		Ps in the discussion condition tended to volunteer fewer FG details in response to CI Qs than those in the no discussion condition. This difference only approached sig.	A misinformation effect was observed. Ps in the discussion group reported more inaccurate FG responses to CI Qs (as mentioned by their CWs) than Ps in the no-discussion group.
5: Exposure to one of two versions of a bogus co-witness report, each containing 3 different items of misinformation.		Results for confidence, volunteering of FG and CG details, and response withholding varied for the two sets of CIs.	Ps conformed to misinformation about CIs in both versions of the report.

Note. Ps = participants; FG = fine-grain; CG = coarse-grain; CI = critical item(s); Qs = questions; sig. = significan(t/ce); CW = co-witness

Contrary to our hypotheses for Experiment 2, participants who received feedback about their performance on a practice recall task did not differ significantly from participants who received no feedback with respect to meta-cognitive monitoring and control on a subsequent recall task. The feedback manipulation may have been

ineffective because participants were clearly told in the instructions that they would receive feedback for the practice test only, and not for their performance on the cued recall task. Although this instruction was included to control for feedback expectancy effects, it may have affected participants' motivation to improve/maintain their level of performance. Research on the effects of feedback has shown that feedback can influence performance if participants are given the opportunity to improve their performance on a subsequent task (Kluger & DeNisi, 1996). Additionally, research in educational psychology has found that the expectation of immediate feedback and consequences associated with outcomes can increase motivation and enhance task performance (Kettle & Haubl, 2010; Wolf & Smith, 1995). Having been told that their performance on the cued recall task would not be assessed meant that participants had no way of gauging potential improvement, which may have decreased their motivation to alter their reporting strategy in accordance with the feedback they received for the practice task. These results contribute to our understanding of the complexity of social comparison effects – they also suggest that expecting comparative feedback (although this was not directly manipulated) may exert an influence on rememberers' meta-cognitive regulation of their memory reports.

The results of Experiments 1 and 2 do not support findings from other feedback studies in the eyewitness literature (Dixon & Memon, 2005; Leippe et. al, 2006; Roper & Shewan, 2002). These differences may be due to the type of feedback, and the different manner in which it was communicated. For example, participants in Roper and Shewan (2002) and Dixon and Memon (2005) were classed into one of two categories and told that they were either 'good' or 'bad' eyewitnesses. In Leippe et al., (2006), social comparative information was conveyed face to face by an experimenter, and reflected the disagreement between the participant and a co-witness over details of a witnessed event. Both of these forms of feedback are distinct from that provided in Experiments 1 and 2, which was presented electronically, along a continuum as opposed to categorically, and compared the participant's performance to that of all previous 'co-witnesses' by means of a percentile rank (as opposed to highlighting disagreement with the account of one other individual). There are clear differences between being placed in a category of 'good' or 'bad' witnesses by an experimenter (e.g., Roper & Shewan, 2002; Dixon & Memon, 2005), and being ranked electronically (as was done in the Experiments 1 and 2 of this thesis). Different presentations and varied content of feedback may result in important differences in (a) perceived credibility of the source, (b) realism of the situation, and (c) participants' motivation to 'please' the experimenter, all of which can impact participants' memory performance. In addition to these factors, comparison to a specific individual may elicit different responses and reporting strategies than comparison to an aggregated 'group'.

Disagreement between co-witnesses. The results of Experiment 3 and 4 indicate that disagreement between co-witnesses can affect participants' volunteering of fine-grain information. Similar to participants in the disconfirming feedback group in Experiment 3, discussion group participants in Experiment 4 tended to volunteer fewer fine-grain answers than participants in the no discussion group (but this descriptive difference was not statistically significant). There were more instances of pronounced disagreement between participants and confederates in Experiment 3 than there were between co-witness dyad members in Experiment 4, which may explain why there was a significant effect in Experiment 3 but not Experiment 4.

In Experiment 3, the confederates' high degree of confidence in the accuracy of their discrepant responses may have led participants in the disconfirming condition to adopt a more conservative reporting strategy. Previous research has found that witnesses who express high levels of confidence in their memory are perceived as credible (Luus & Wells, 1994), and that witnesses are more likely to conform to answers provided by a confident co-witness (Allan & Gabbert, 2008; Wright et al., 2000). Public expressions of confidence may therefore be one factor that can alter witness susceptibility to social influence effects on memory reporting.

The significant decrease in the 'disconfirming' group's volunteering of fine-grain responses in Experiment 3 was not accompanied by a decrease in confidence. This discrepancy between confidence and grain-size volunteering does not align with the predictions of the revised dual-criterion model of meta-memorial monitoring and control. According to the model, confidence in the accuracy of fine-grain candidate responses is an important determinant of whether or not those responses will be volunteered (Ackerman & Goldsmith, 2008). It may be that participants were not less confident about their memory for particular details, but decided to adopt a more conservative reporting strategy nonetheless. Participants who encountered disagreement from a confederate or co-witness may therefore have volunteered more coarse-grain answers, which are more likely to be accurate (Yaniv & Foster, 1995). These findings suggest that the revised dual-criterion model may not accurately predict rememberers' reporting across different social conditions.

Misinformation and meta-memory. A misinformation effect was found in both Experiments 4 and 5. Unsurprisingly, conformity to misinformation by participants in both of these experiments led to a reduction in the accuracy of their answers to critical item questions on the cued recall task. Blank (2009) notes that people turn to their social environment for external sources of validation for their memory beliefs, as well as guidance, and that doing so can result in social influences on memory. Moreover, both social comparison theory and the low confidence outsourcing hypothesis suggest that people seek information from external

sources when they are uncertain about, or have low confidence in, the accuracy of their memory (Festinger, 1954; Jaeger et al., 2012). Though it is a possible explanation, we cannot conclude from the results of these experiments that conformity to misinformation occurred as a result of low confidence outsourcing. Participants' reported confidence in the accuracy of their responses to critical item questions was not consistently lower than that for non-critical item questions. Still, misinformation from a co-witness may have led participants to doubt their memory for critical items, making them more susceptible to the memory conformity effect. The confidence participants reported for misinformation may represent how accurate they feel that information is, and may reflect their perception of the co-witness' credibility and confidence; it is therefore not telling of their confidence in their own (original) memory for the critical items. The inclusion of a source-monitoring test with additional questions about why participants chose to report information conveyed by a co-witness (when they indicate they have done so knowingly) might clarify the factors that motivate memory conformity.

Unexpectedly, conformity to misinformation was not accompanied by consistent effects on confidence, grain-size volunteering, or response withholding. While more research is needed to investigate these results, there are several potential explanations for this lack of evidence for social influence effects on metamemory in situations of memory conformity. In an attempt to be maximally informative, participants may have knowingly reported post-event misinformation for critical item questions when their confidence in their own memory for critical items was low (Ackerman & Goldsmith, 2008; Yaniv & Foster, 1995). This might explain why participants did not withhold more responses to critical item questions than non-critical item questions. It is also possible that participants misattributed the source of the misinformation, and mistakenly thought that they recalled it from the mock crime video instead of having heard it from another participant (Experiment 4) or having read it in a co-witness' report (Experiment 5). Hence, metacognitive assessments of post-event misinformation were similar to those for details encoded during the event, because participants did not distinguish between sources of the information. Again, future research could investigate this possibility by building in a source monitoring test at the end of an experiment (e.g., asking participants to identify which piece of information came from which source).

Externally sourced information may circumvent meta-cognitive screening, which might explain why memory conformity was not evinced by changes in metamemorial monitoring and control. People may weigh the potential accuracy and informativeness of internal evidence, but may accept external information based on the perceived confidence and credibility of the source. Research shows that witnesses are more likely to conform to information from a source that is perceived as highly credible (Horry et al., 2012; Wright et al., 2009). Moreover, partici-

pants' confidence can mirror that expressed by a confederate (Goodwin, Kukucka, & Hawks, 2012; Ost et al., 2008). To illustrate, an eyewitness (X) may judge that she cannot recall the colour of a getaway car in a bank robbery. After discussing the event with a co-witness (Y), who asserts that she had an unobstructed view and confidently claims that the car was blue, X offers this response to a police interviewer. In the absence of internal evidence for the accuracy of this detail, X's confidence mirrors that of Y. The results of Experiment 4 and 5 do not verify this explanation—but it is an interesting possibility to explore in future research. For example, researchers can examine whether conforming to a source perceived as credible or highly confident affects meta-cognitive monitoring and control differently than conforming to a source perceived as less credible, or less confident.

Finally, in Experiments 4 and 5, participants may have accepted misinformation conveyed by a co-witness as a result of social loafing. Social loafing refers to the tendency for individuals to exert less effort when working on a collective task as opposed to an individual one (Karau & Williams, 1993; Latane, Williams, & Harkins, 1979). It is possible that participants in these experiments wanted to be informative without expending much effort, and so reported answers given by a co-witness without much consideration when those answers contradicted their own memory for the event. If this were the case, then the rates of conformity obtained in these lab studies overestimate the real-life occurrence of this phenomenon. It is not likely that participants would employ such a strategy in a real-life police interview, when the consequences for providing incorrect information are high. However, future research should examine the influence of number of witnesses present on meta-memory. It may be that, in the presence of one or more co-witnesses, people are motivated by social facilitation to provide more fine-grain responses. To increase fine-grain responding, remembers may engage in social loafing—that is, they may employ a low effort strategy of conformity to the fine-grain responses of other witnesses when their own memory for certain details is weak (this is also in line with the low confidence outsourcing hypothesis). Rememberers may not perceive this strategy as risky, as when multiple witnesses are present, investigators have the advantage of comparing different witnesses' reports to determine accuracy. On the other hand, if an individual is aware that she is the only witness to an event, she may feel that the consequences of her testimony are greater, and therefore adopt a more conservative, less precise, reporting strategy (choosing to volunteer more coarse-grain responses; withholding when confidence in the accuracy of a response is not very high). Such an investigation would add greatly to the eyewitness memory literature.

Limitations of the Present Research

As is often the case with research, there are a number of limitations associated with each of the experiments reported here. Due to the novelty of the present work, a number of methodological decisions had to be made in the absence of prior frameworks to rely on. However, our exploration of these new designs has shed light on avenues for future research, which will be discussed in further depth at the end of this chapter. In this section, I note the limitations for each experiment, and how these might have impacted our findings and associated interpretation of the results.

In Experiment 1, the experimental manipulation (social comparative information) was not purposely brought to the attention of participants. Instead, participants entered a room and were told to sit in front of a computer screen on which a bogus "co-witness" score was displayed. Most of the participants in the experimental groups noticed the score (according to what they reported in a manipulation check); however, a sizeable subset of participants did not, which indicates that the salience of the manipulation was low. Low salience of the manipulation may be one reason for the limited effects found. Data from participants who reported not noticing the co-witness' score were excluded from analyses, which decreased the sample size and may have potentially limited statistical power. Another potential limitation is that participants in the control group watched the stimulus video individually, while participants in the experimental groups watched the video in pairs. The observed effect on fine-grain volunteering may therefore have been the result of social facilitation (Monfardini et al., 2015; Zajonc, 1965). The social facilitation effect refers to situations in which the presence of others causes arousal, and influences individual task performance by facilitating a dominant response (a preferred or habitually strengthened response; Zajonc, 1965). In the current experiment, this may have led participants to volunteer more informative (fine-grain) answers, as research shows that rememberers tend to prefer these types of answers (Ackerman & Goldsmith, 2008; McCallum et al., 2016; Yaniv & Foster, 1995). If presence is likely to affect performance in important ways, this would represent a serious problem for much of cognitive psychology where group testing is quite common.

Social comparative feedback in Experiment 2 was deliberately brought to the attention of participants. After completing a cued recall practice task, participants in the experimental groups saw bogus ratings of their performance such as the number of correct answers they had volunteered and their percentile rank in relation to other participants who had completed the task. Post-experiment questions revealed that a subset of participants guessed the experimental manipulation. It is therefore possible that the manipulation may not have been convincing enough to influence meta-memorial decision making--even for participants who did not

overtly express doubt or suspicion about its authenticity. Moreover, when data from participants who guessed the manipulation were excluded from analyses, it decreased the sample size, which may have negatively affected statistical power.

In Experiment 3, social comparative information was delivered face-to-face, by a trained confederate posing as a co-witness. The experimenter directed the order in which the participant and confederate reported their answers to questions on the practice task (the real participant always went first). Moreover, both participants and confederates were instructed to report their confidence in the accuracy of their answers. The methodological decision to have participants convey their answers first, and to have participants and confederates report confidence ratings, were based on similar designs in the memory conformity literature (Carol et al., 2013; Gabbert et al., 2006; Ost et al., 2008; Wright & Carlucci, 2011). As noted earlier, research has identified perceived confidence of the speaker (Allan & Gabbert, 2008) and speaking order (Gabbert et al., 2006, experiment 1; Oeberst & Seidmann, 2014; Wright & Carlucci, 2011) as factors that can affect susceptibility to memory conformity. Forced turn taking and reporting of subjective confidence in this experiment was done to motivate memory conformity for the purpose of examining its effects on meta-memory; however, it is unlikely to occur in real life conversations, which limits the generalizability of the results.

Participants in the experimental condition in Experiment 4 engaged in a more naturalistic discussion of the stimulus event. While agreement, disagreement, and confidence may have been expressed too overtly in Experiment 3 (e.g., the confederate verbally reported their subjective confidence on a scale of 0-100% following each response), their expression in Experiment 4 was markedly subdued (often, participants politely listened to each other recall the stimulus event, and did not linger over discrepancies when they arose). Each of the two critical items was mentioned at least once by nearly all of the dyads, but often they were mentioned by only one of the two members, and no disagreement arose over their description. It is possible that participants were trying to avoid being perceived as disagreeable by their co-witness, or that their silence was evidence of normative social influence (Cialdini & Goldstein, 2004; Deutsch & Gerard, 1955). In addition to this, the manipulation may have had a stronger effect on performance had there been more than two critical items. However, the number of critical items in this experiment was limited to two so as not to arouse participants' suspicion about the manipulation. Similar studies on memory conformity also do not include more than a few items of misinformation (e.g., Gabbert et al., 2007; Oeberst & Seidmann, 2014), yet still find strong conformity effects resulting from post-event discussion between witnesses.

In Experiment 5, the three items that comprised each of the two critical item clusters were selected based on the frequency of their mention in free recall reports

by pilot test participants, and based on the confidence participants expressed in relation to the accuracy of their memory for these items in Experiment 4. However, in both groups, means for confidence and fine-grain volunteering were consistently higher for critical items in Version 2 of the co-witness report than critical items in Version 1. We included three different critical items in each of the two versions of the report as a means for detecting item specific effects, and despite careful pre-testing to select for the items, item specific differences did emerge. Moreover, we were able to detect item specific effects because we analyzed results separately for participants who had read each version of the report. Had we collapsed the data for the 'boots' and 'laptop' groups, these item specific effects may have gone undetected, and our results would have misrepresented the effect of the misinformation manipulation on participants' monitoring and control of their memory reports.

It is important to note that the participants in all 5 Experiments reported here were mainly young, highly educated individuals. Moreover, given that most of the participants were students, they were generally used to receiving social comparative performance feedback. These specific features of the participant sample may have made social comparison effects on memory output difficult to obtain, and it is possible that the results of the present research underestimate the effects of such social influences on metacognitive monitoring and control in the population. Research has shown mixed results pertaining to age and suggestibility to misinformation in young and elderly samples, with some studies reporting that the elderly are more susceptible to the misinformation effect than young people, and others reporting no significant difference (Wilcock, 2010). In order to ascertain generalizability of the results reported here, future research should include samples more diverse in age and level of education.

Finally, certain aspects common to all lab-based experiments may limit the generalizability of the results of this research to real-life settings. Motivation to provide accurate and informative memory reports may be much higher in real-life eyewitness situations than in a lab-based setting, given the different consequences in consideration. Furthermore, the conditions in which real eyewitnesses observe live events (e.g., sudden onset and duration of events, obstructed view, lighting) are likely to be very different than what participants observed in the mock crime videos used here. In the present Experiments, participants viewed videos of mock crimes of short duration in optimal visual and auditory conditions. Such encoding conditions may have increased participants' confidence in the accuracy of their recall, thus making them less susceptible to the effects of feedback and misinformation than real-life eyewitnesses might be.

Potential Applications

The results of this thesis highlight the need for further empirical investigations of the meta-cognitive monitoring and control strategies that govern memory reporting. Furthering our theoretical understanding of how rememberers determine the details to be included in their memory reports can inform the refinement and application of widely used investigative interviewing and information gathering techniques. For example, the Cognitive Interview (CI; Fisher & Geiselman, 1984, 1992) is an interviewer-administered information-gathering approach that has been found to increase correct recall compared to standard approaches (e.g., standard untrained interview, free recall, or structured interviews; Memon, Meissner, & Fraser, 2010). However, the CI also increases incorrect recall in comparison to these interviews (Memon et al., 2010). Memon et al. (2010) noted that this increase in reporting of incorrect details may be the result of increased output and decreased monitoring, and can be remedied by reminding witnesses not to guess, or in other terms, encouraging rememberers to withhold responses for which their confidence in the accuracy of their recall is low. These suggestions pertain to the meta-memorial regulation of memory reporting, which is still poorly understood within the varied social contexts in which memory reporting often occurs. Moreover, the difference (if any) between interviewer-administered and self-administered information-gathering techniques on meta-memory merits investigation. The Self-Administered Interview (SAI; Gabbert, Hope, & Fisher, 2009), a self-administered (paper booklet) form of the CI that witnesses/victims can complete at the scene of the crime, has been found to increase reporting of accurate details in comparison to free recall, with no accompanying increase in inaccurate details (Hope, Gabbert, & Fisher, 2011; but see Krix, Sauerland, Gabbert, & Hope, 2014). It is therefore possible that the presence of an interviewer during the administration of the CI exerts subtle social influences that lead interviewees to lower their accuracy criterion and report more details (leading to an overall increase in reporting of inaccurate details), perhaps in an attempt to increase informativeness for the purposes of positive self presentation. An empirical investigation of meta-memorial regulation of memory reporting in the CI and SAI may shed light on the potential effects of interviewer presence, and how to potentially control for these effects when there is no other option but to use an interviewer administered information-gathering technique.

The results of this thesis can also be used to inform research aimed at improving other procedural aspects of the information gathering process (whether in the course of eyewitness interviews or suspect interrogations). Recent work by Henkel (2016) shows that indirect, supportive negative feedback given by an interviewer can increase witnesses' suggestibility, and lead them to change some of the details

they initially reported. Increased suggestibility was not related to decreased confidence in the accuracy of the initial reports; and changes in responses may therefore be attributable to alterations in metacognitive control strategies. It would therefore be interesting to explore what role metacognitive factors play in eyewitness suggestibility, and how interviewers can be trained to give supportive feedback that is neutral (for the purposes of maintaining rapport) and does not bias the consistency of interviewees' memory reports. Building on the results of the present thesis, future research should investigate the adaptation of interview instructions and procedures to maximize the accuracy and informativenss of memory reports based on rememberers' monitoring assessments, while minimizing the effects of social influences on meta-memorial monitoring. The suggestions made here are just a few of many possibilities for real world applications of the results of this thesis, and the future experiments to address the questions that have arisen from them.

Conclusion and Future Directions

The results presented here demonstrate that under certain conditions, social comparative information can affect the precision with which individuals report information from memory. Many new questions have been raised with regard to the extent of these effects, and the precise conditions in which they may be observed. Two surprising findings were that a) when fine-grain responding was altered following exposure to social comparative information, a change in the same direction was not observed for confidence, and b) there was a lack of evidence to support meta-memorial underpinnings for the misinformation effect. These two observations are important, and make a contribution to the literature because they highlight that existing models may not accurately predict the meta-cognitive monitoring and control decisions that regulate memory reporting in contexts of social influence.

More research is needed to explore the conditions in which social influence factors effect a change in individuals' reporting strategies. A first step would be to explore social facilitation (mere presence) effects on meta-memory. In Experiment 1, the results for participants in the high and low score conditions may have been due to the presence of a co-witness during encoding of the stimulus event. This may have increased participants' drive to be informative, causing them to report more fine-grain details on the cued recall task. Running an experiment with a design similar to that of Experiment 1, but in which all participants view the stimulus event individually, can control for social facilitation and isolate the potential effects of receiving social comparative information. Second, the effects of expecting and receiving feedback on meta-cognitive decision making in memory reporting should also be explored in further depth, by conducting experiments in which the influence of timing (e.g., immediate and delayed) and type (e.g., comparative or non

comparative, computer mediated or face-to face) of feedback on meta-memory are tested. In Experiment 2, participants were given feedback on a practice task but told that their performance on a subsequent task would not be assessed. The effect observed in Experiment 1 may not have replicated in Experiment 2 due to participants' lack of feedback expectancy. In other words, after being informed that their performance on the cued recall task would not be scored, participants may have been less motivated to be informative. Third, the boundary conditions for the effects of co-witness interaction on reporting strategies should be tested. In Experiment 3, face-to-face disconfirming feedback expressed with confidence caused participants to volunteer fewer fine-grain details. Future research should investigate whether factors such as more or less disagreement or the use of a confederate perceived as highly credible might increase the observed effect.

Finally, the lack of clear evidence for meta-cognitive underpinnings of the misinformation and witness conformity effects raises interesting questions. Does information reported as result of informational influence (i.e., information for which participants can recall the source as post-event, and are convinced is accurate) circumvent the meta-cognitive monitoring and control processes that regulate memory reporting? One way to find out would be to design an experiment in which there are conditions for normative, informational, and no influence to examine the potentially different effects the former two have on meta-memory. It may be that conformity resulting from normative influence is reflected in decreased confidence and volunteering of detailed responses, whereas conformity resulting from informational influence may not be evidenced by changes in meta-memorial monitoring and control.

In five experiments, this thesis examined social influence effects on the meta-cognitions that control memory reporting. The results indicate that, under certain conditions, factors such as receiving social comparative information about the quality of one's memory can influence individual reporting strategies. Due to the exploratory nature of the research, the results have raised many questions that merit further investigation. Researchers are still a long way from determining the meta-cognitive underpinnings of social influence effects on memory; therefore, future research should attempt to further our understanding of these mechanisms.

Valorization Addendum

This chapter addresses the application of scientific knowledge in practice, or valorization. The topic and results of this thesis are primarily of theoretical importance, and their practical applications are not overt. However, here I will demonstrate how they are relevant and innovative. I will also discuss the implementation of plans for future research related to this topic, and the dissemination of the results to target groups.

Relevance

Misconceptions about human memory abound. The results of a survey of the U.S. population showed that 63% of respondents believe that memory works like a video camera, 48% believe that memory is permanent, and 37% supported the notion that the testimony of one confident eyewitness should be enough to convict a criminal defendant (Simons & Chabris, 2011). Eyewitness testimony can exert a great deal of influence on the outcome of a trial. In criminal courts, confident eyewitnesses who provide detailed accounts can sway the opinion of judge and jury, forever altering the fate of the individual on trial (O'Neill Shermer, Rose, & Hoffman, 2011). Eliciting accurate, detailed accounts from eyewitnesses is therefore of utmost importance for investigators. Research on eyewitness memory has contributed to our understanding of human memory, and to the development of investigative tools and methods. Despite this, miscarriages of justice still occur. The Innocence Project is an organization dedicated to justice reform and exonerating the wrongly convicted through DNA evidence. According to the organization's statistics, over 70% of cases of wrongful conviction involved either erroneous eyewitness identification or testimony. Clearly, there is still much that research can do to increase the general public and legal practitioners' understanding of the limitations of human memory, and establish best practice guidelines for eliciting accurate and detailed information from eyewitnesses. The present thesis adds to the large body of research on eyewitness memory, which spans well over fifty years and is still as relevant today as it ever was.

Target Groups

One of the primary aims of this thesis was to test the validity of a theoretical model of metacognitive monitoring and control of memory reporting under varied social conditions. As such, academic researchers are the primary target group for dissemination of results. The results reported here raise many new questions that should be addressed by future research. Findings from further work in this area

may later aid in the development of investigative interviewing tools and techniques. At present however, replication and further investigation of the results of this thesis by researchers is needed to clarify how the social context in which memories are reported influences the content of reports.

A second target group for the results of this research is the general public. As noted above, many people still have a poor understanding of how memory functions. Such misunderstandings can prove highly problematic. Non-specialists can become witnesses or serve as jury members. It is therefore important that research findings be communicated to the public in an accessible manner. A proper understanding of the limitations of human memory, and the influence of the social context in which memories are communicated can make for more reliable witnesses and more qualified jurors and judges.

Activities/Products

The results of this thesis have been presented at three international conferences. Two manuscripts of the findings have been submitted to memory and cognition journals. A third article aimed at furthering non-specialists' understanding of socially reported memories was published in an online peer-reviewed journal. In addition to the five experiments that comprise this thesis, I have also been involved in two additional experiments during my doctoral training. The first investigated the effects of question order on metacognitive monitoring and control, and the second investigated the efficacy of three different interview techniques in conditions of divided and full attention. I hope to continue using the knowledge and training gained from my doctoral studies to contribute to research and public outreach.

Innovation

The eyewitness memory literature has addressed the accuracy and quantity of details in memory reports in varied conditions. A handful of previous studies have examined meta-memory in eyewitnesses through the lens of Ackerman & Goldsmith's (2008) model. There is also a well-developed literature on how feedback and witness conformity affect eyewitnesses' memory reports. However, to my knowledge, this thesis represents the first set of experiments designed to assess the effects of social comparative feedback and misinformation on metacognitive monitoring and control of eyewitnesses' memory reports. The experiments reported here were designed based on findings from two distinct literatures (research on

social influences on eyewitness memory reporting, and meta-memory), and represent an innovation in that they combine the two. Memory reporting often occurs in a social setting, or with the potential for some level of social influence (Paterson & Kemp, 2006; Hirst & Echterhoff, 2012). It is therefore an important contribution of this thesis that the validity of the prevailing model of meta-memorial monitoring and control was assessed in similar conditions.

Implementation

As mentioned above, I have already taken steps to disseminate the results of this thesis to other academics through conference presentations and journal articles. One of the manuscripts resulting from the present work was submitted to an open-source journal, so that other academics may have unpaid access to it. I have also authored a peer-reviewed article in an online journal aimed at a non-specialist audience. I am active on several social media outlets, and post information that is relevant to my research. Recently, I contributed my specialist knowledge of meta-memory in a research collaboration with colleagues at the University of Portsmouth. I hope to continue to conduct research on eyewitness memory, teach, and communicate findings to the public throughout my academic career.

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Appendix A

Experiment 1: Recall Task

You will now be asked to answer some questions about the video you have just seen. You will be prompted to provide two answers per question: a fine-grained answer (specific), and a coarse-grained (less specific) one. You will be asked to rate your confidence in the accuracy of each answer on a scale of 0-100% (in 10% intervals) with a greater number indicating a higher level of confidence in the accuracy of your response. The following two examples are sample questions, and are unrelated to the video:

Example 1: What is the colour of your eyes?
Coarse (the overall tone): dark
Confidence: 100%
Fine (a specific colour): brown
Confidence: 100%

Example 2: How many people attended your last birthday party?
Coarse-grained (range): 10-15
*For questions with numerical answers, please provide a range when prompted for a coarse-grained answer.
Confidence: 70%
Fine-grained (precise): 12
*Please type a whole number into the box when prompted to give a fine-grained answer.
Confidence: 60%

Phase I START:

1. How long (in seconds) did the robbery take to occur from the time you got your first glimpse of the robbers in the forest until they left the house?
   Coarse-grained (range): Confidence:……
   Fine-grained (precise): Confidence:……
2. What colour/shade was the hoodie of the perpetrator who threw an object through the property window?

Coarse-grained (shade): Confidence:……
Fine-grained (colour): Confidence:……

3. What colour/shade were his pants?
   Coarse-grained (shade): Confidence:……
   Fine-grained (colour): Confidence:……
4. What colour were his shoes?
   Coarse-grained (shade): Confidence:……
   Fine-grained (colour): Confidence:……
5. What was his skin colour?
   Coarse-grained (shade): Confidence:……
   Fine-grained (colour/ethnic group): Confidence:……
6. What colour are his eyes?
   Coarse-grained (shade): Confidence:……
   Fine-grained (colour): Confidence:……
7. What was the colour of the object he threw through the window?
   Coarse-grained (shade): Confidence:……
   Fine-grained (colour): Confidence:……
8. How tall was he?
   Coarse-grained (range): Confidence:……
   Fine-grained (precise): Confidence:……
9. What was the number emblazoned on his arm?
   Coarse-grained (range): Confidence:……
   Fine-grained (precise): Confidence:……
10. What was the colour of the number emblazoned on his arm?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
11. What was the main colour/shade of the jacket worn by the other perpetrator?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
12. What colour/shade were his pants?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
13. What colour were his gloves?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
14. What colour were his shoes?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……

15. What was the colour of the backpack he was carrying?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
16. What was his skin colour?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour/ethnic group): Confidence:……
17. How tall was he?
    Coarse-grained (range): Confidence:……
    Fine-grained (precise): Confidence:……
18. What was the age of the perpetrator who broke into the house?
    Coarse-grained (range): Confidence:……
    Fine-grained (precise): Confidence:……
19. What was the age of the perpetrator with the backpack?
    Coarse-grained (range): Confidence:……
    Fine-grained (precise): Confidence:……
20. What colour/shade were the walls inside the house?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
21. How many drawers were opened?
    Coarse-grained (range): Confidence:……
    Fine-grained (precise): Confidence:……
22. What was the colour of the laptop the perpetrators stole?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
23. What colour/shade was the bicycle?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……
24. What was the colour of the fence the perpetrators jumped?
    Coarse-grained (shade): Confidence:……
    Fine-grained (colour): Confidence:……

Phase II START:

Now I would like you to imagine that you are a real eyewitness to the crime you have just seen in the video. The police officer interviewing you requests that you choose ONE of the two answers that you provided to each of the questions above. Choose the answer you feel is best. You also have the option of withholding, should you decide that neither of the responses is suitable.

Phase III START:

Did you notice the score of the previous participant on the screen before you started the questionnaire?
Yes No
-If you answered Yes: What was their accuracy rate?
Fine (specific percentage):
Coarse (range; or high/low):

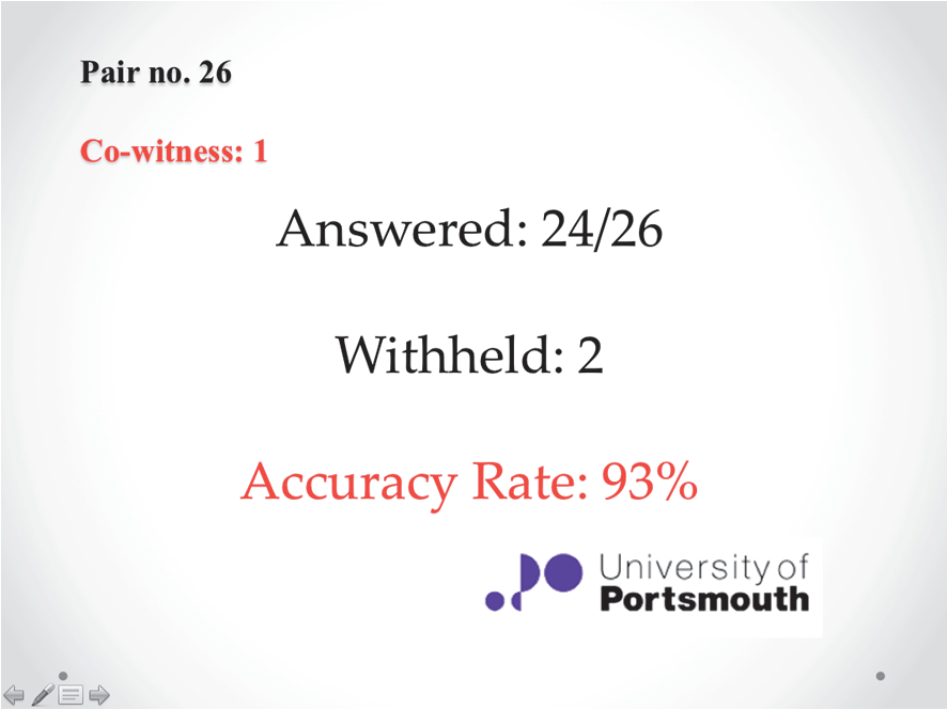
Did seeing the previous participants score affect your answers to the questionnaire?
Yes No
-If you answered Yes, please explain how so:

Final Screen:

Thank you for participating in this study. We kindly ask that you refrain from sharing your suspicions/beliefs about the purpose of the study with other potential participants. Please respect the scientific process! Information abut the purpose/aims of the study will be divulged in a debrief email, which will be sent to you once data collection has been completed.

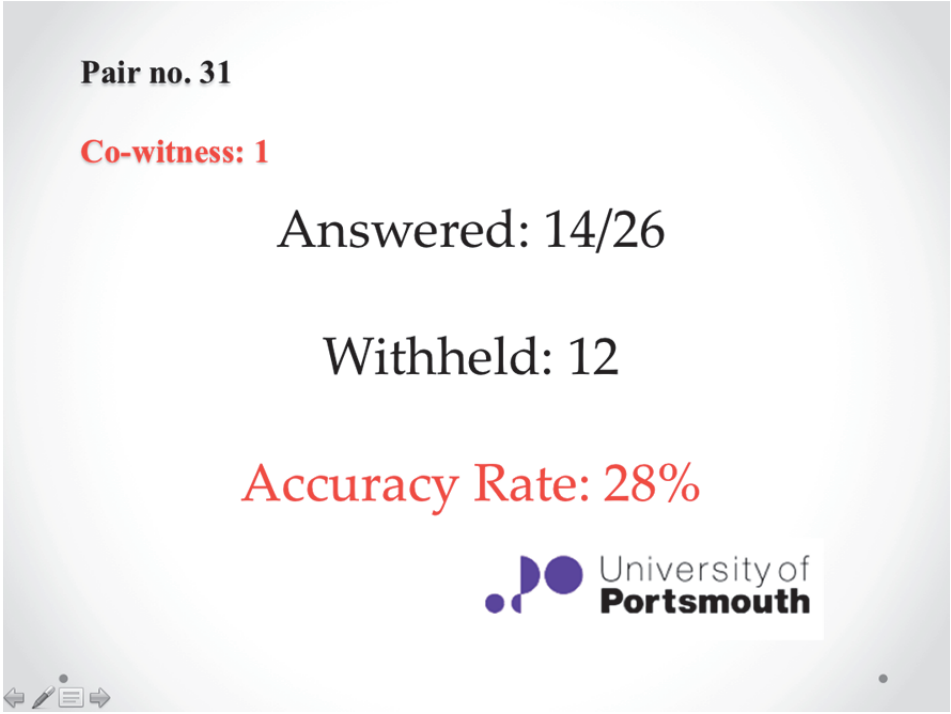
Appendix B

Experiment 1: Screen displaying co-witness' score (high)



Appendix C

Experiment 1: Screen displaying co-witness' score (low)



Appendix D

Experiments 2 and 3: Recall Task

Questions 1-6 comprised the practice task in Experiment 2 and 3. In Experiment 2, both the practice and recall tasks were presented on a computer. In Experiment 3, practice task questions were presented in a booklet, answers were written out manually, and then shared verbally in the two experimental conditions; whereas the recall task was computerized.

Practice Task:

The following questions refer to: The male victim.

1. What was the colour of the male victim's vest?
   Coarse-grained answer (shade): Confidence:……
   Fine-grained answer (colour): Confidence:……
2. **What colour was his shirt?**
   Coarse-grained answer (shade): Confidence:……
   Fine-grained answer (colour): Confidence:……
3. What colour were his trousers?
   Coarse-grained answer (shade): Confidence:……
   Fine-grained answer (colour): Confidence:……
4. What is his eye colour?
   Coarse-grained answer (shade): Confidence:……
   Fine-grained answer (colour): Confidence:……
5. How old is he?
   Coarse-grained answer (range): Confidence:……
   Fine-grained answer (precise): Confidence:……
6. What is his height?
   Coarse-grained answer (range): Confidence:……
   Fine-grained answer (precise): Confidence:……

Recall Task:

Phase I

You will now be asked to answer additional questions about the video you have seen. The questions will be in the same format as the practice task. Please try to be as accurate as possible.

Questions:

7. **How long (in seconds) did the theft take to occur from the time the first thief entered the house until he left? [1 min = 60 sec]**
   Coarse-grained answer (range): Confidence:……
   Fine-grained answer (precise): Confidence:……
8. What colour was the front door of the house?
   Coarse-grained answer (shade): Confidence:……
   Fine-grained answer (colour): Confidence:……
9. Approximately how many items did you see the perpetrators steal from the home?
   Coarse-grained answer (range): Confidence:……
   Fine-grained answer (precise): Confidence:……
10. What colour was the getaway car?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
11. How many **other** cars were parked along the side of the street?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……

Questions 6-11 refer to: The perpetrator who entered the home first, distracting the victims.

12. What colour was the first thief's hair?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
13. **What colour were his eyes?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
14. **What was his skin colour/ethnicity?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour/ethnic group): Confidence:……

15. **What colour was his shirt?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
16. **What colour was his jacket?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
17. **What colour were his gloves?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

Questions 12-14 refer to: The female victim.

18. What colour was the female victim's hair?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
19. **What colour was her top?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
20. What colour was her sweater?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

Questions 15-22 refer to: The second perpetrator, who entered the house while the victims were distracted.

21. **What was the second perpetrator's hair colour?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……....
22. **What was his skin colour/ethnicity?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour/ethnic group): Confidence:……....
23. What colour was his shirt?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
24. **What colour was his jacket?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
25. **What colour were his trousers?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

26. What colour were his gloves?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……....
27. **What colour was his cap (hat)?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……....
28. **How many drawers did he open in the bedroom?**
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer: Confidence:……

Phase II:

Now I would like you to imagine that you are a real eyewitness to the crime you have just seen in the video. The police officer interviewing you requests that you choose ONE of the two answers that you provided to each of the questions above. Choose the answer you feel is best. **Please try to be accurate, and try not to guess.**

Phase III:

You will now have a chance to review the final answers you have chosen. In this section, you have the option of choosing to refrain from responding to questions (choosing "I don't know") should you decide that the response you provided earlier is not suitable.

Phase IV [Questions 2-4 appeared for participants in the experimental conditions ONLY]:

1. What do you think the purpose of this study is?
2. What did hearing the co-witness's answers to the practice Task (at the beginning of the study) make you think/feel?
3. Did hearing the co-witness's answers to the sample Task (at the beginning of the study) affect your responses to the main Questionnaire?
   YES NO
4. If so, please explain how.

Final Screen:

Thank you for participating in this study. The experimenter will be with you shortly to debrief you about the purpose of the study. We kindly ask that you refrain from sharing this information with other potential participants. Please respect the scientific process!

Appendix E

Experiment 2: Screen displaying participant's score (high)

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Participant #: 36

Co-witnesses: 35

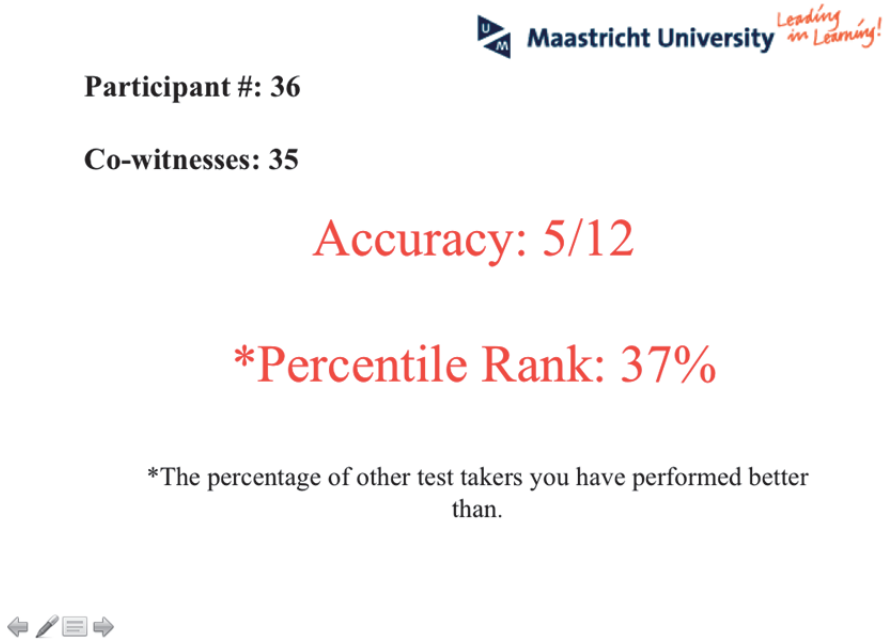
Accuracy: 9/12

*Percentile Rank: 93%

*The percentage of other test takers you have performed better than.

Appendix F

Experiment 2: Screen displaying participant's score (low)



Appendix G

Experiments 4 and 5: Recall Task

Thank you for participating in this study. You will now be asked to answer some questions about the video you have seen. Please try to be as accurate as possible.

For each question, you will be asked to provide a coarse-grain (range, less detailed) and a fine-grain (precise, detailed) answer. You will also be asked to rate your level of confidence in the accuracy of your answers (0-100%), with higher values indicating increased confidence.

Below are two examples of fine and coarse-grain responses:

Example 1: What is the colour of the experimenter's eyes?
Coarse: Dark (the overall tone)
Confidence: 70%
Fine: Brown (a specific colour)
Confidence: 90%

Example 2: How old is the experimenter?
Coarse-grained answer: 20-30 years
*For questions with numerical answers, please provide a range when prompted for a coarse-grained answer.
Confidence: 60%
Fine-grained answer: 27
*Please type a whole number into the box when prompted to give a fine-grained answer.
Confidence: 40%

If you have any questions, please ask the experimenter. When you are ready, click 'Next' to begin.

Phase I:

General Questions

29. **How long (in seconds) did the theft take to occur from the time the perpetrators spotted the victim locking up his bike to when they stole it? [1 min = 60 sec]**
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
30. Approximately how many items did the perpetrators steal from the victim?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
31. What colour was the laptop that was stolen?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
32. What colour was the mobile phone that was stolen?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
33. **What colour was the bicycle that was stolen?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

The next set of questions refers to: The male victim.

34. What colour is the male victim's hair?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
35. **What is his skin colour/ethnicity?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour/ethnic group): Confidence:……
36. How old is he?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
37. What is his height?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……

38. What colour was his top?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
39. What colour were his trousers?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

The next set of questions refers to: The female perpetrator who entered the room first, distracting the victim.

40. What colour was the female perpetrator's hair?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
41. **What was her skin colour/ethnicity?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour/ethnic group): Confidence:……
42. How old is she?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
43. What is her height?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
44. **What colour was her coat?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
45. **What colour were her trousers?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
46. **What colour were her boots?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

The next set of questions refers to: The second perpetrator, the man who entered the room while the victim was distracted.

47. **What was the male perpetrator's hair colour?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……....

48. **What was his skin colour/ethnicity?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour/ethnic group): Confidence:……....
49. How old is he?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
50. What is his height?
    Coarse-grained answer (range): Confidence:……
    Fine-grained answer (precise): Confidence:……
51. What colour was his top?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
52. **What colour were his trousers?**
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……
53. What colour was his rucksack?
    Coarse-grained answer (shade): Confidence:……
    Fine-grained answer (colour): Confidence:……

Phase II:

Now I would like you to imagine that you are a real eyewitness to the crime you have just seen in the video. The police officer interviewing you requests that you choose ONE of the two answers that you provided to each of the questions above. Choose the answer you feel is best. **Please try to be accurate, and try not to guess.**

Phase III:

You will now have a chance to review the final answers you have chosen. In this section, you have the option of choosing to refrain from responding to questions (choosing "I don't know") should you decide that the response you provided earlier is not suitable.

Phase IV [Questions 2-6 will appear for Ps in the Experimental Conditions ONLY]:

5. What do you think the purpose of this study is?
6. If you discussed the event with a co-witness, did the two of you disagree on any aspects?

YES **NO**

7. If so, do you feel this disagreement influenced your later responses to items on the questionnaire?

YES **NO**

8. If so, please explain how:

For Questions 5 and 6, please tick one answer:

9. I think the co-witness had a better/worse/same memory as me.
10. I think the co-witness had more/less/same confidence in their recall as me.

Final Screen:

Thank you for participating in this study. The experimenter will be with you shortly to debrief you about the purpose of the study. We kindly ask that you refrain from sharing this information with other potential participants. Please respect the scientific process!

Appendix H

Experiment 4: Discussion Prompt

Please take a few minutes to reflect on the events, characters, and objects in the video you watched. You may want to visualize the events in the order they happened, and place people and objects spatially.

When you are ready, please discuss what you have seen in the video with your co-witness.

Consider the following points:

- What happened? Start from the beginning and go through events and sequential order.
- What was the setting like? If there was more than one location, describe each.
- What did the victim look like? Consider gender, skin colour, hair colour, height, age, and the colour and type of clothing worn.
- What did the perpetrators look like? Consider gender, skin colour, hair colour, height, age, and the colour and type of clothing worn.
- Think about the objects that were stolen. How many were there? What were they? Describe them (colour, etc…)

Appendix I

Experiment 4: Contemplation prompt

Please take a few minutes to reflect on the events, characters, and objects in the video you watched. You may want to visualize the events in the order they happened, and place people and objects spatially.

Consider the following points:

- What happened? Start from the beginning and go through events and sequential order.
- What was the setting like? If there was more than one location, describe each.
- What did the victim look like? Consider gender, skin colour, hair colour, height, age, and the colour and type of clothing worn.
- What did the perpetrators look like? Consider gender, skin colour, hair colour, height, age, and the colour and type of clothing worn.
- Think about the objects that were stolen. How many were there? What were they? Describe them (colour, etc…)

Appendix J

Experiment 5: Bogus co-witness statement (*boots* version)

On the next screen you will see an incident report filed by C.W. Jones, the building security guard, after he witnessed the theft on CCTV and logged the victim's complaint. Afterwards, you will be asked to answer some questions about the video. Please read the report carefully, it may help you remember some additional information. If you are among the top 10% of participants in terms of the accuracy and detail of your answers, you will be entered into a prize draw to win one of three £15 Amazon gift vouchers (in addition to the £5 voucher you will receive for participating).

***

The victim was a white male with brown hair, in his late teens. He was wearing a zip up top and blue jeans. He cycled up and chained his bike to a rack outside of a building. The perpetrators were standing near the entrance to the building. The female perpetrator was in her early twenties; she had white skin and long hair, and was wearing a white coat with dark trousers and grey boots. The male perpetrator was in his early to mid twenties, with white skin and light hair. He was wearing a white top and dark jeans. The victim entered the building through a secure door. The male perpetrator stopped the door from shutting and the two perpetrators followed the victim inside.

The victim entered a kitchen and sat at a table. He took out a small laptop, some keys, and a mobile phone and placed them on the table. A short while later, there was a knock at the door and the female perpetrator asked if she could enter the room. The victim let her in, and she directed his attention to a map, causing him to face away from the table where his things were. While the victim was giving the female perpetrator directions, the male perpetrator entered the room quietly. He slowly collected the victim's things and put them in his backpack before leaving the kitchen.

When the victim finished giving the female perpetrator directions, she thanked him and left. While still facing away from the table the victim poured himself a glass of water. He then turned toward the table and realized that his things were missing. He ran out of the door, presumably in pursuit of the perpetrators.

The perpetrators stopped outside of the building, and the female perpetrator pointed out the victim's bicycle. The male perpetrator used the stolen keys to unlock it. The perpetrators then rushed out of view with the stolen goods.

Appendix K

Experiment 5: Bogus co-witness statement (*laptop* version)

On the next screen you will see an incident report filed by C.W. Jones, the building security guard, after he witnessed the theft on CCTV and logged the victim's complaint. Afterwards, you will be asked to answer some questions about the video. Please read the report carefully, it may help you remember some additional information. If you are among the top 10% of participants in terms of the accuracy and detail of your answers, you will be entered into a prize draw to win one of three £15 Amazon gift vouchers (in addition to the £5 voucher you will receive for participating).

***

The victim was a white male with short hair, in his late teens. He was wearing a purple zip up top and blue jeans. He cycled up and chained his bike to a rack outside of a building. The perpetrators were standing near the entrance to the building. The female perpetrator was in her early twenties; she had white skin and long blonde hair, and was wearing a white coat with dark trousers and boots. The male perpetrator was in his early to mid twenties, with white skin and light hair. He was wearing a zip-up top and dark trousers. The victim entered the building through a secure door. The male perpetrator stopped the door from shutting and the two perpetrators followed the victim inside.

The victim entered a kitchen and sat at a table. He took out a grey laptop, some keys, and a mobile phone and placed them on the table. A short while later, there was a knock at the door and the female perpetrator asked if she could enter the room. The victim let her in, and she directed his attention to a map, causing him to face away from the table where his things were. While the victim was giving the female perpetrator directions, the male perpetrator entered the room quietly. He slowly collected the victim's things and put them in his backpack before leaving the kitchen.

When the victim finished giving the female perpetrator directions, she thanked him and left. While still facing away from the table the victim poured himself a glass of water. He then turned toward the table and realized that his things were missing. He ran out of the door, presumably in pursuit of the perpetrators.

The perpetrators stopped outside of the building, and the female perpetrator pointed out the victim's bicycle. The male perpetrator used the stolen keys to unlock it. The perpetrators then rushed out of view with the stolen goods.

Acknowledgements

My deepest gratitude goes out to my family, supervisors, colleagues, friends, and partner for their support. Many thanks to the administrative staff that handles the paperwork and logistics required to keep the Erasmus Mundus Joint Doctorate in Legal Psychology (EMJD-LP) programme running, and to all of the academics involved in the programme at the Universities of Portsmouth, Maastricht, and Gothenburg.

I am also very grateful to the European Union for funding the EMJD-LP programme, and for giving researchers from diverse backgrounds excellent educational opportunities like this one.

I have avoided mentioning people by name for fear that I might unintentionally leave someone out, or turn this section into a chapter. I will however, shine a few sentences' worth of spotlight on my amazing mother. Emerald, you're an absolute gem who has always supported my sisters and I in all of our ambitions. Thank you for the many sacrifices you have made for our family. I could fill a volume the size of this thesis with praise for you, but it wouldn't be enough. Suffice it to say that I love you and I feel incredibly lucky to be your daughter.

Finally, I would like to dedicate this humble work to the memory of my late friend Raja Oueis (1987-2015), who would have completed a doctoral thesis of his own this year. I am constantly retrieving, re-constructing and reinforcing my memories of our shared experiences. While some of the fine-grain details may fade and change with time, the gist remains: you were wonderful, and I was privileged to be your friend.

Dissemination

Conference Presentations

Rechdan, J., Sauer, J.D., Hope, L., Sauerland, M., & Ost, J. (2015, June). The effects of social comparative feedback on grain size and confidence in eyewitness reports. Paper presented at the eleventh conference of the Society for Applied Research in Memory and Cognition, Victoria, BC.

Rechdan, J., Hope, L., Sauerland, M., Ost, J., Sauer, J.D., & Merckelbach, H. (2016, July). The effects of social comparative feedback on grain-size and confidence in eyewitness reports. Paper presented at the annual conference of the European Association of Psychology and Law (EAPL), Toulouse, France.

Rechdan, J., Hope, L., Sauerland, M., Ost, J., Sauer, J.D., & Merckelbach, H. (2016, July). Was that how it happened? Exploring the effects of co-witness discussion on meta-memory. In J. Gawrylowicz (Chair), Memory in the 'Real World': Factors Influencing Memory in Forensic Settings. Symposium conducted at the sixth International Conference on Memory (ICOM), Budapest, Hungary.

Publications

Rechdan, J., Sauerland, M., Hope, L., & Ost, J. (2016). Was that how it happened?: Shaping our memory for personal experiences in conversation with others. *The Inquisitive Mind, 7(31)*. Retrieved from: http://www.in-mind.org/article/was-that-how-it-happened-shaping-our-memory-for-personal-experiences-in-conversation-with

Rechdan, J., Sauer, J.D., Hope, L., Sauerland, M., Ost, J., & Merckelbach, H. (2017). The effects of social comparative feedback on confidence and precision in eyewitness memory reports. Manuscript submitted for publication.

Rechdan, J., Hope, L., Sauerland, M., Ost, J., Sauer, J.D., & Merckelbach, H. (2017). The effects of co-witness discussion and misinformation on confidence and precision in eyewitness memory reports. Manuscript submitted for publication.

Illustrations by: Nina Tupper

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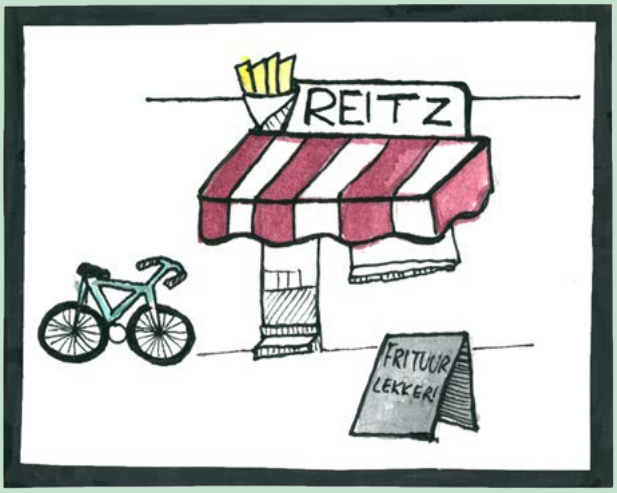
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