THE EFFECT OF PERCEPTUAL ELABORATION AND RE-STUDY ON FALSE MEMORY IN THE SOCIAL CONTAGION OF MEMORY PARADIGM

by

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ABSTRACT

The social contagion paradigm has demonstrated false memories occur for items when they are suggested to the participant during a collaborative recall phase. The current experiment examined the effect of perceptual elaboration (generation of sensory and elaborative details) and re-study (repeated encoding) on false memories in the social contagion paradigm. Participants either performed a perceptual elaboration task or completed a math filler task after viewing six slides and collaborating with the confederate. Half of the participants in each condition were given an opportunity to re-study the original slides. Perceptual elaboration increased false recall, but decreased false recognition. Re-study decreased false recall and only decreased false recognition if in conjunction with perceptual elaboration.

INTRODUCTION

False memories are defined as remembering an event that never actually happened or remembering an event differently than it happened. False memories have been studied in a multitude of ways and have been demonstrated to occur when schematically consistent information is presented (Meade & Roediger, 2002; Allan, Midjord, Martain & Gabbert, 2012), when misinformation is given after encoding (Loftus & Palmer, 1974; Wright, Self & Justice, 2000; Roediger, Meade & Bergman, 2001; Allan et al., 2012), and through the social exchange of information about an event (Gabbert, Memon, & Wright, 2006; Reysen, 2003; French, Garry & Mori, 2011; Reysen & Adair, 2008; Wright, Memon, Skagerberg & Gabbert, 2009). When false memories occur in a social manner people tend to incorporate others' ideas, even false ideas, into their own memory reports (Roediger et al., 2001). Of interest to the current study is whether or not individuals can correct erroneous information that is received within a social situation.

Much research has established factors that influence social false memories, but relatively little research has focused on how and if we may correct erroneous information after it has been encoded. The purpose of the current study is to examine the effects of perceptual elaboration and re-study on participants' ability to correct socially introduced false memories. Perceptual elaboration occurs when someone elaborates or generates perceptual or sensory details of an object or event (Drivdahl & Zaragoza, 2001). Past research has established that perceptual elaboration typically increases false memory for that event (Lane & Zaragoza, 2011), however, research has not yet examined the effect of perceptual elaboration in conjunction with re-study. Re-study is the chance to encode

the same information twice. If participants are able to re-study the original event, will they correct their false memories, especially when the details generated on the perceptual elaboration test direct their attention to memory errors?

Perceptual elaboration and re-study have been studied individually in individual false memory paradigms, but no existing study has looked at the combination of perceptual elaboration and re-study in the context of social memory. Social memory is defined as the study of how social influences can alter the memory of an individual. People are naturally social and often recall events with friends, family, co-workers, teachers, acquaintances, etc. This type of social interaction can improve one's memory but can also cause false memories (see Rajaram, 2011, for a review). The creation of false memories through social interactions is an area of growing interest for both theoretical research on memory and applied research on eyewitness testimony and collaboration in educational and occupational settings.

Two paradigms that analyze social influence on memory are the memory conformity paradigm and the social contagion paradigm. The memory conformity and social contagion paradigms are similar in describing how people may be influenced by others when discussing an event. Participants in both these paradigms work together in recalling details of an event or information they each encoded. After participants are done recalling the event together, individual memory tests are given asking details of the participant's memory for that event. Memory conformity is the extent one person's memory conforms to another person's memory. Memory conformity can is operationalized as how accurate or inaccurate participants' individual recall test is in

regards to what information they discussed with the other person (Wright et al., 2000). The two paradigms differ in how stringently they differentiate memory change from social bias, or public conformity (Asch, 1956). In the social contagion paradigm, rather than participants interacting freely about their memories for an event, a research assistant (confederate) is used. The confederate follows a script outlining the specific false items to introduce to the participant. This structured design allows for control of false information and assessment of the specific items in later testing. Another advantage in using the social contagion paradigm is the physical separation of the participant and confederate for all memory testing. This separation relieves the participant of any social pressure of feeling the need to comply with the answers of the other person. Lastly, an important benefit the social contagion paradigm offers, relative to the memory conformity paradigm, is the inclusion of a source monitoring test (recognition test). The source monitoring test includes veridical, false and filler items from the scenes and asks participants to self monitor (check a box) where they remember the specific items: in the scene, said by the other participant, or never presented. Participants on the source monitoring test are given the option to demonstrate they do not have an actual memory change for a false item (by checking the never presented box and/or by checking that the confederate said the item, but they do not remember it from the scene) but they typically still misattribute falsely suggested items to having appeared in the scenes. This test provides support for the notion that an individual memory change is actually occurring for the participants and at relatively high levels. Overall, the social contagion paradigm allows for a clearer analysis on what false memories are being incorporated into a

participant's memory and to what extent a participant demonstrates an actual memory change. For this reason, we chose the social contagion paradigm for this particular study.

Research has identified factors that either increase ore reduce memory conformity. Manipulating credibility of the post-event information (PEI) as well as manipulating participant's perceived confidence in their own memory (e.g., through instructions or shortened presentation rates) can contribute to an increase in false memories (Allan et al., 2012; Jaeger, Lauris & Selmeczy, 2012; Meade & Roedgier, 2002; Horry, Palmer, Sexton & Brewer, 2012). For example, Allan et al. (2012) manipulated participants' confidence by showing participants three scenes for 30 s, 60 s or 120 s while telling them that their partner was shown the same scene for either half as long or twice as long as they saw it themselves. Memory conformity increased when participants were in the 30 second condition as well as when they were led to believe they saw the scene for half as long as their partner. Similarly, French et al. (2011) manipulated credibility by leading participants to believe their partner had better visual acuity for an event than they did. Two participants were led to believe they had watched the same movie at the same time as their partner. One person in the dyad was given glasses to wear while watching the movie that they were led to believe degraded their visual acuity in comparison with their partner. In reality, the two participants were actually seeing two different versions of the movie with the use of the MORI Technique (Mori, 2007). Susceptibility to the false information was dependent upon participant's perceived credibility of themselves in comparison to their partners. The more

participants believed their partner had higher credibility than themselves, the more likely they were to incorporate false memories given by their partners.

Similarly, not only does credibility influence the amount of false memories but an increase in conformity can occur when another person is perceived as having high confidence rather than low confidence (Ozuro & Hirst, 2006). Wright et al. (2000) demonstrated that participants were more likely to conform to misinformation when they rated their partner as having high confidence. Confidence in another person's answers can be perceived in different ways, but one way that has been experimentally tested is the response order. Thus, when someone speaks first in answering a question they are generally seen as having more confidence about the answer (Wright & Carlucci, 2011). Gabbert et al. (2006) demonstrated support that response order can influence another person's memory. In the collaborative memory task that was given to participants, the partner who answered a question first had more influence over the other person's memory for an event. Conformity to the false information can be explained by the perceived confidence of their partners' memory. Credibility, as well as confidence in their own memory in comparison to their partner's memory, can largely influence the susceptibility of incorporating false memories. In sum, the less confident people feel about their own memories the more they rely on others, thus leading in an increase in false memories.

Factors that can help decrease the likelihood incorporating false memories are pre and post-warnings (Hirst & Echterhoff, 2012) as well as encouraging source monitoring (Bodner, Musch & Azad, 2009). For example, Meade and Roediger (2002), told half of

the participants in their social contagion study that the confederate may have suggested incorrect information and so participants should write down only items that they were certain had appeared in the scenes. The other half of the participants were told nothing about the confederate being inaccurate (the no warning condition). On the subsequent recall and recognition tests, participants who received the warning demonstrated reduced levels of social contagion. This finding is consistent with the wider literature demonstrating that warnings and caution in responding reduce false memories but they do not eliminate them (see Hirst & Echterhoff, 2012 for a review).

Memory conformity can also be reduced when participants are directed to attend to source information. Bodner et al. (2009) had participants watch a clip of a crime scene and either work with another person (who saw a different version), read another participant's report (who saw a different version), or watch the other version of the same clip. After they completed this task, they reported all they could remember on a free recall test and a source-judgment task. Results showed that although participants initially reported a large amount of false memories on the free recall test, they could correctly attribute where the information was obtained on the source judgment task. These results are not entirely consistent with the social contagion paradigm. In the social contagion paradigm, the final source test slightly reduces the contagion effect, but the levels of false information are still relatively high. One reason for this discrepancy may be that in the Bodner et al. (2009) study, the information from the sources were distinct and did not create source confusion. This is supported by their data reported in the video-video condition, in which individual participants had a harder time attributing what information

came from which video. In the social contagion paradigm there may be an increase in source confusion because all of the items are semantically accurate (toaster is schematically consistent with items found in a kitchen) and the collaborative recall phase may not be distinct enough to later discriminate where the item was presented. Overall, these factors have been identified as influencing or reducing someone's memory for false information and demonstrate that the magnitude of the memory conformity and social contagion effects are malleable. Critically, however, no factors have eliminated the effect entirely. The current study extends previous research on moderators of social contagion by exploring the role of perceptual elaboration and re-study on the effect. Inclusion of these two parameters is motivated by research from individual memory paradigms and source monitoring theory.

Perceptual elaboration is the process of focusing on perceptual characteristics of an object such as its location, physical appearance or any additional information that includes perceptual characteristics (Drivdahl & Zaragoza, 2001). Participants may imagine the objects, but participants are not explicitly told to imagine anything; rather they are told to write down the characteristics that come to mind. The process of perceptual elaboration has a significant influence in creating false memories for participants. For example, Drivdahl and Zaragoza (2001) had participants watch a video about a burglary and then come back to the lab one week later to read a narrative about the video. This narrative was plausible and exposed all participants to eight misleading suggestions. Participants in the perceptual elaboration group answered follow-up questions about the location, appearance or physical features of the misleading

suggestions. Participants in the no elaboration group completed a rhyming, unscrambling or grammatical task. Results indicated that participants who generated perceptual details of the misleading suggestions were more likely to later claim they remembered witnessing the misleading event that did not actually occur (Drivdahl & Zaragoza, 2001). Similarly, Thomas, Bulevich and Loftus (2003) asked participants to perform or imagine using objects in front of them to complete a series of tasks. They were asked to perform simple imagining (no perceptual details) or elaborate imagining (give three sensory details). An example of the simple imagining was, imagine kissing the frog. An example of the elaborate imaging was, imagine kissing the frog, imagine the color of the frog, and imagine the feel of the frog against your lips. Two weeks later, participants completed a memory test. The main finding was that false memories increased when participants imagined an event, but false memories increased to an even greater extent when participants focused on the sensory details while they were imagining. Lane & Zaragoza (2007) investigated perceptual elaboration and false memory, specifically, whether perceptual elaboration increased false memory based on the act of generating perceptual details or just through exposure of perceptual details. They presented participants with a series of seventy-nine slides which showed a person stealing $20 and a calculator. Two days later, participants read paragraphs describing the event that included nine misleading items that were never presented in the slides. In the generate-elaborate condition, participants were asked to generate two perceptual details about each misleading item. In the read- elaborate condition, participants read two perceptual details about each misleading item, and were asked to elaborate on presented, veridical items. Lastly, in the

read-item only condition, participants simply read each misleading item without any perceptual details. Results reflected that generating perceptual details for an event increased false memories more than just being exposed to perceptual details through reading. Lane & Zaragoza explained that generating perceptual details is a stronger contributor to false memory because participants are creating highly detailed and plausible representations of their own knowledge of the event. In sum, perceptual elaboration experiments provide evidence that the act of perceptually elaborating can increase false memories for an object or event in individual memory paradigms. Of interest to the current study, is whether perceptual elaboration also increases false memory in a social memory paradigm.

Source monitoring theory can explain the increase in false memories when someone perceptually elaborates. Source monitoring framework proposed by Johnson, Hashtroudi & Lindsay (1993) explains a process through which one can remember not only the memory item, but the context of that item. When someone is asked to remember an event or specific memory, they rely on two processes for their decision: the decision criterion and the matching process. The decision criterion is set by the amount of accuracy required in a memory judgment. If the question a person is asked about a memory for an event is simple and does not require details about the source, it is referred to as heuristic judgment. A heuristic judgment is automatic and does not require a lot of reflecting on the source or details of the memory itself. If the question asked about a memory for an event is specific and important, such as, details about a victim or criminal that was witnessed, a more strict judgment process that requires careful reflection will be

activated. A careful reflection of thinking back to an event for details is referred to as a systematic judgment.

The second process involved in judging a memory is a matching process based on memory characteristics. Each memory when encoded involves several characteristics (cues) that contribute to memory. These cues include perceptual information (sound/color), contextual information (spatial and temporal), semantic detail, affective information and cognitive operations (e.g., what you were thinking about as you were encoding). These cues are activated and stored within memory at encoding. For example, in the social contagion paradigm participants are not only encoding the scenes but later they are encoding details about the confederate's responses, such as their voice, age or any judgments about the confederate's memory. At retrieval, these encoded characteristics serve as cues to the origins of the memory; if the memory characteristics encoded match the typical characteristics of a particular source, then the item will likely be attributed to that source. For example, if someone remembers a lot of perceptual details about an event, he/she will attribute it to having seen it in the real world. This is because typically items seen in the world have many perceptual characteristics.

Perceptual elaboration tasks encourage participants to generate specific perceptual characteristics for an item. Later, when participants are reflecting on whether the item they perceptually elaborated on was actually presented or not, they may confuse the perceptual characteristics they created with the perceptual details typically associated with real events and so may misattribute the item as having occurred in the real world. This confusion can lead to an increase in false memories.

The ability to re-study may reduce false memories within the social contagion paradigm. In this experiment re-study is used in conjunction with perceptual elaboration to examine if false memories can be reduced or even eliminated. Participants are not explicitly warned against being exposed to any false items, so if they corrected against these false items, this would be a self-initiated process (cf. Watson, McDermott, & Balota, 2004). Past studies that use explicit warnings (Meade & Roediger, 2002) suggest that explicit warnings result in an overall criterion shift in which all information suggested by the confederate (veridical or false) is discounted and social contagion overall is reduced. In contrast to experimenter instructed warnings, re-study may encourage self-initiated correction of false items due to the discrepancies encountered when encoding the slides for a second time (cf. Tousignant, Hall, & Loftus, 1986). These discrepancies may become more obvious if a participant completes a perceptual elaboration task beforehand because the perceptual elaboration will make perceptual characteristics more salient. According to source monitoring theory, re-study could influence participants' response criterion through awareness of possible mistakes or through realization of a discrepancy between their memory and the re-presented item. Re-study could also influence participants' matching process. Re-study would allow for the opportunity to encode more characteristics for an item that could later be used at retrieval to judge if a memory was real or false. Previous studies on perceptual elaboration have not included re-study, so it is not known whether the same perceptual details used to inflate false memory might also direct attention during re-study and so

reduce false memory. In other words, participants may use the perceptual details generated during perceptual elaboration to focus attention during re-study.

Re-study, the ability to re-encode an entire event, is not common in memory studies (although many studies have examined the role of single item repetitions within a list (e.g., Tussing & Greene, 1999)). One of the most relevant studies to the current experiment is from Watson, McDermott & Balota (2004). In this experiment, participants were given a memory task on word lists that could induce false memories. Participants were either given a warning that false memories can occur through these lists and then they proceeded to five different study-test phases or were not given a warning. Most important to the current study was the finding that even without warning, young adults could use the re-study phase and self-initiated source monitoring to decrease false memories. They concluded that re-study may encourage participants to direct attention to perceptual dimensions of studied items in order to discriminate between true and false memories and even without an explicit warning young adults use re-study opportunities to spontaneously verify veridical items and correct false items. In recognition tests after repeated exposure of word items completed by Benjamin (2001), it was found the young adults could use repetition to begin increasing their decision criterion and decreasing false recognition. Re-study without warning is ecologically valid in the real world. Many times people are given the opportunity to re-encode information (after taking a test) but they are not always given warnings that specify what information they are encoding could be incorrect (see Rajaram & Pereira-Pasarin, 2010, for a review). If

participants are drawn to these perceptual details through elaboration, could they use a re-study phase to direct themselves in correcting their false memories?

Experiment

The experiment reported here examined the effects of perceptual elaboration in conjunction with re-study in the social contagion paradigm. Half of the participants, completed a collaborative recall with the confederate, and then performed a perceptual elaboration task for both veridical and false items. In the perceptual elaboration task, participants were asked to write down two details about all of items listed on the page (veridical and false) to the best of their ability. Participants were reminded to write something about the items' location or physical appearance. Half of participants did not complete the perceptual elaboration task but rather completed a five minute math filler task. Based on previous research demonstrating that perceptual elaboration increases individual false memory (e.g. Drivdahl & Zaragoza, 2001), perceptual elaboration was expected to increase false memory in the social contagion paradigm. Re-study was the other between-subjects manipulation. Participants who re-studied are told they have a second opportunity to look at the original slides and the ability to increase their accuracy before being tested further. Re-study may have allowed for spontaneous, self-initiated correction of false recall (cf. Watson et al., 2004), and was predicted to decrease false memories in the social contagion paradigm. A significant interaction was expected for the perceptual elaboration and re-study conditions in which re-study may be more beneficial in reducing false memories when a person first perceptually elaborates. This reduction in false memory was hypothesized to occur based on the perceptual elaboration

task generating characteristics that may be used during re-study to actually help reduce false memories.

Method

Participants

Participants were 81 Montana State University Psychology 100 undergraduates who participated for partial course credit. Three participants reported suspicion about the confederate, two participants were non-native English speakers and four subjects were run in the wrong condition, so their data were excluded from analyses. As a result, our final analysis included the remaining 72 participants, with 18 participants comprising each of the four conditions. All 72 were native English speakers with normal or corrected-to-normal vision.

Design

This experiment consisted of a 2 X 2 X 2 mixed model design. Exposure to contagion items (contagion items versus no control items) was manipulated within-subjects. Contagion items are the twelve specific false items given to the participant by the confederate in the collaborative recall phase while the control items are the other twelve false items that the participants were not exposed to by the confederate in the collaborative recall phase. Perceptual elaboration (elaboration or math filler) and re-study (slides viewed twice versus slides viewed once) were both manipulated between-subjects. The primary dependent variables were false recall and false recognition of the contagion items relative to the control

items. Veridical recall and recognition were analyzed as well, along with phenomenological judgments of memory (confidence ratings and Remember/Know/New judgments).

Materials

Six slides of household scenes (toolbox, a bathroom, a kitchen, a bedroom, a closet and a desk) created by Roediger et al. (2001) were used. Each scene contains an average of 23.8 items. These items contain a mixture of both high expectancy (likely in the scene) and low expectancy items (not as likely in the scene). Two high-expectancy and two low-expectancy items were excluded from the slides so that they could later be used as the misleading (contagion) items. The four contagion items excluded from each scene are presented in Appendix A.

Additional materials included a mathematical filler task, a perceptual elaboration task, and a final source monitoring (recognition) test. The perceptual elaboration test listed all twelve contagion items (four per three scenes) that were given by the confederate and twenty four veridical items that were in the scenes (4 contagion items + 2 real items for three scenes + 6 real items for three scenes). On the perceptual elaboration task the item was listed with a place for participants to circle an R/K or an N (remember, know or new item) as well as two blank lines next to the word (see Appendix B). The final source monitoring test that was given contained a total of 60 items (12 contagion items, 12 control items, 30 veridical items, and 6 filler items, presented in Appendix C).

Procedure

Participants were tested individually and they completed all tasks in the same order. First, participants received a study phase of all six scenes presented on a computer screen. Each scene was presented for 15 seconds. Participants were then given a filler math task for four minutes. Next, participants engaged in a collaborative recall task with a confederate of the same age group (18-25 years old) as them. Both the participant and confederate took turns recalling six items each from all of the six scenes. The confederate recalled a total of four contagion items for three of the six scenes. These contagion items included a mixture of both high and low expectancy items that are semantically appropriate to each scene. The contagion items were counterbalanced across the six conditions. After the collaborative recall was completed, half the participants performed a perceptual elaboration task and the other half completed a math filler task for five minutes.

In the perceptual elaboration task, participants were asked to circle an R for "remember", K for "know", or N for "new" for each item on the test (cf. Tulving, 1985; Rajaram, 1993). Participants circled an (R) if they recollected specific details about the item, they circled a (K) if they did not necessarily recollect details of the item but they knew it was shown, or an (N) for new item that they did not believe had been presented in the scenes. Participants completed this for all 36 items. Once completed they had completed the R/K/N judgment task, participants were asked to go back through their responses and for all (R) responses, write down at least two descriptions (e.g., location, physical appearance). Once completed with (R) descriptions they were asked to do the

same for the (K) judgments. Participants were told although they did not have specific details of the particular item they gave a (K), they should indicate what they believed the item could have looked like, where it could have been located, or any details they may have. Participants that participated in the math filler task were not exposed to any contagion items for a second time and were simply instructed to complete a series of multiplication problems.

Half of the participants in each condition (perceptual elaboration or math filler) were presented with either a math filler task or they were given the opportunity to re-study the slides for a second time. Participants in the re-study phase were given a subtle warning before the slides were presented stating "I will show you the slides again so you can improve your accuracy for the upcoming tests. Please focus your attention on the slides before completing further memory tasks." A subtle warning was used to encourage self-initiated error correction (cf. Watson et al., 2004) rather than an experimenter induced general criterion shift (cf. Meade & Roediger, 2002). The slides were presented in the same order, same presentation rate of 15 seconds as they were originally.

Once completed with re-study, the participant and confederate were separated to complete further individual memory tasks. The first individual task was an individual recall task. Participants were instructed to write down all the items they could remember from each scene in the allotted time of two minutes per scene. Next to each item they indicated remembering, participants indicated their confidence of seeing that item in the scenes on a scale from 1-4: (1) very sure the item was not there (2) somewhat sure the item was not there (3) somewhat sure the item was there (4) very sure the item was there.

Confidence ratings were used on the individual recall test rather than the standard R/K judgment used in previous studies because the perceptual elaboration condition included R/K judgments. Finally, the final source monitoring (recognition) test was given which contained contagion items, control items (false but not given), veridical items and filler items. On the source monitoring task participants were instructed for each item to check a box indicating the source of where they remembered the specific items: in the scene, said by the other participant, or never presented. Participants could check multiple boxes for an item such as in the scene and said by the other participant but only one box if it they chose neither. There was no time limit on the recognition test

RESULTS

Recall

Veridical Recall

A 2 (perceptual elaboration or no perceptual elaboration) X 2 (re-study or no restudy) between subjects analysis of variance (ANOVA) was preformed analyzing overall veridical recall across all six scenes. The mean proportions of veridical recall can be seen in Table 1. There was a significant main effect of re-study for the veridical items ($F(1,68) = 37.14$, $MS_e = .01$, $p<.001$) indicating that veridical recall was lower for participants that did not re-study the slides ($M = .28$) than for participants that did get the opportunity to re-study the slides ($M = .38$). Participants recalled more veridical items after they had the chance to re-study the slides which was to be expected because of two separate opportunities to encode the information The main effect of perceptual elaboration was not significant ($F(1,68) = .61$, $MS_e = .01$, $p=.44$), nor was the interaction between perceptual elaboration and re-study ($F(1,68) = 1.49$, $MS_e = .01$, $p=.23$).

Table 1. Mean proportion of veridical recall as a function of perceptual elaboration and re-study. Standard deviations are reported in parentheses.

	No Perceptual Elaboration	Perceptual Elaboration
Condition	*M (SD)*	*M (SD)*
No Re-Study	.29(.07)	.28(.07)
Re-Study	.37(.07)	.40(.06)

False Recall

The false recall results are displayed in Table 2 for contagion and control items for each of the four conditions: participants who received perceptual elaboration and for those who did not, as well as for those who re-studied and those who did not. The means in the table are represented in terms of the proportions of contagion or control items recalled out of a total of twelve possible responses for each. The standard deviations for each mean are given as well as a total overall contagion effect (contagion mean minus the control mean).

A 2 (contagion or control) X 2 (perceptual elaboration or no perceptual elaboration) x 2 (re-study or no re-study) mixed model ANOVA revealed a significant main effect of the contagion manipulation ($F(1,68) = 152.52$, $MS_e = .02$, $p<.001$). Participants recalled more contagion items (false items that had been suggested to them by the confederate) ($M = .33$) than control items (false items but not suggested to them) ($M = .08$). This main effect for the contagion items indicates that participants were incorporating the confederate's suggestions into their own memories. This finding replicates past research in the social contagion paradigm (Roediger et al., 2001; Meade & Roediger, 2002).

There was also a significant main effect of the perceptual elaboration manipulation ($F(1,68) = 8.36$, $MS_e = .01$, $p<.01$). Participants recalled more false items if they had engaged in a perceptual elaboration task ($M = .24$) than if they did not perceptually elaborate ($M = .18$). This main effect of perceptual elaboration demonstrates that when participants elaborate on false items, they will have higher recall for those

items. There was a significant interaction between perceptual elaboration and the contagion manipulation ($F(1,68) = 10.47$, $MS_e = .02$, $p<.01$). Follow up t-tests on this interaction indicate that perceptual elaboration selectively boosted false recall of the contagion items, but had no effect on the baseline false recall of control items. Participants in the perceptual elaboration condition were more likely to recall contagion items ($M = .39$) than participants in the no perceptual elaboration condition ($M = .27$), ($t(70) = -2.75$, $SEM = .04$, $p<.01$). False recall of control items did not differ between perceptual elaboration and no perceptual elaboration conditions, ($t(70) = .492$, $SEM = .02$, $p=.62$). This increase in false recall after a perceptual elaboration task is consistent with the literature on perceptual elaboration in individual memory paradigms (Drivdahl & Zaragoza, 2001).

A significant main effect of the re-study manipulation ($F(1,68) = 48.09$, $MS_e = .01$, $p<.001$) was found. Participants recalled fewer false items if they had engaged in a re-study task ($M = .14$) than if they did not get the opportunity to re-study ($M = .28$). This main effect of re-study demonstrates that when participants had the chance to re-encode the slides, their overall recall for false items decreased. There was a significant interaction of the re-study and the contagion manipulation ($F(1,68) = 18.95$, $MS_e = .02$, $p<.001$). Upon further analysis of this interaction, t-tests indicated that re-study decreased false recall for both the contagion and control items. Although this decrease was significant for both control and contagion items, the difference was higher for the contagion items [($M = .45$) with no re-study; ($M = .22$) with re-study; ($t(70) = 5.83$, $SEM = .04$, $p<.001$)] as compared to the control items [($M = .10$) with no re=study; ($M = .06$)

with re-study; ($t(70) = 2.67$, $SEM = .05$, $p<.01$)]. A decrease in false recall after a re-study phase was expected and replicates past research, specifically, Watson et al. (2004). The interaction between re-study and perceptual elaboration was not significant ($F(1,68) = .62$, $MS_e = .01$, $p=.44$), nor was the three way interaction ($F(1,68) = 2.11$, $MS_e = .01$, $p=.15$).

Table 2. Mean proportion of false recall, for contagion and control items as a function of perceptual elaboration and re-study. Standard deviations are reported in parentheses.

Condition	No Perceptual Elaboration *M (SE)*	Perceptual Elaboration *M (SE)*
No Re-Study		
Contagion	.36(.16)	.53(.19)
Control	.12(.10)	.09(.07)
Contagion Effect	*0.24*	*0.44*
Re-Study		
Contagion	.18(.10)	.26(.15)
Control	.05(.06)	.06(.07)
Contagion Effect	*0.13*	*0.20*

3 & 4 Confidence Ratings

For each item the participant recalled they were to indicate on a scale of 1-4 their confidence they had seen that item from 1) very sure not there to (4) very sure was there. For analysis purposes, ratings of 3 & 4 (both indicating confidence that the item was old) were analyzed together and separately from the 1 & 2 ratings (both indicating that confidence was new). The overall proportions of 3 & 4 ratings for falsely recalled contagion and control items are displayed in Table 3.

First, examining the 3 and 4 ratings, a 2 (contagion or control) x 2 (perceptual elaboration or no perceptual elaboration) x 2 (re-study or no re-study) mixed model ANOVA was performed. A significant main effect of contagion was revealed ($F(1,68) = 83.02$, $MS_e = .01$, $p<.001$). Participants were more confident they saw the contagion items ($M = .25$) than the control items ($M = .06$) which was to be expected because the participant was exposed to the contagion items (by the confederate) but not to the control items.

There was a significant main effect of perceptual elaboration ($F(1,68) = 5.68$, $MS_e = .02$, $p<.05$). Participants were more confident about falsely recalled items if they had engaged in a perceptual elaboration task ($M = .18$) than if they did not perceptually elaborate ($M = .13$). There was also a significant interaction between perceptual elaboration and contagion ($F(1,68) = 7.64$, $MS_e = .01$, $p<.001$). Follow up t-tests on the interaction indicate that participants were more confident about the contagion items in the perceptual elaboration condition, ($M = .30$) than in the no perceptual elaboration condition, ($M = .19$); ($t(70) = -2.69$, $SEM = .04$, $p<.01$). However, perceptual elaboration did not influence participants' confidence in control items ($M = .06$) in the perceptual elaboration condition; ($M = .06$) in the no perceptual elaboration condition; ($t(70) = -.03$, $SEM = .02$, $p=.98$). Consistent with the overall proportions of false recall, the effect of perceptual elaboration on confidence judgments was driven selectively by the contagion items. This increase in confidence was expected for contagion items relative to control because participants were not exposed to the control items nor did they elaborate on them.

There was a significant main effect of the re-study manipulation ($F(1,68) = 10.85$, $MS_e = .02$, $p<.05$). Participants were more confident about the items falsely recalled if they did not have the chance to re-study ($M = .19$) than if they did re-study ($M = .12$). This may occur because during the re-study phase, participants are made aware of their memory weaknesses, therefore leading them to be less confident in their responses.

There was a significant interaction of the re-study and the contagion manipulation ($F(1,68) = 4.93$, $MS_e = .01$, $p<.05$). Follow up t-tests on the interaction indicate that participants were more confident about the contagion items when they did not get a re-study phase, ($M = .31$) than in the re-study condition, ($M = .18$); ($t(70) = 2.97$, $SEM = .04$, $p<.01$). However, re-study did not influence participants' confidence about control items [($M = .08$) in the no re-study condition; ($M = .05$) in the re-study condition; ($t(70) = 1.62$, $SEM = .02$, $p=.11$)]. This demonstrates that a re-study phase may allow participants to find errors leading them to be less confident in their response.

A three way interaction of contagion items, perceptual elaboration and re-study was significant ($F(1,68) = 4.06$, $MS_e = .01$, $p<.05$). Follow up t-tests showed that, with no re-study, perceptual elaboration ($M = .39$) increased participants' confidence in contagion items relative to no perceptual elaboration condition ($M = .22$); ($t(34) = -2.67$, $SEM = .07$, $p<.05$), but had no effect on control items, ($t(34) = .39$, $SEM = .04$, $p=.70$). In contrast, when participants did have the opportunity for re-study, perceptual elaboration had no impact on confidence ratings for contagion items ($t(34) = .-1.16$, $SEM = .04$, $p=.25$) or control items ($t(34) = -.75$, $SEM = .02$, $p=.46$). In other words, increased

confidence occurs only when a participant perceptually elaborates on contagion items but does not have a re-study phase.

Table 3. Mean proportion of 3 and 4 ratings, for contagion and control items as a function of perceptual elaboration and re-study. Standard deviations are reported in parentheses.

Condition	No Perceptual Elaboration *M (SD)*	Perceptual Elaboration *M (SD)*
No Re-Study		
Contagion	.22(.19)	.39(.21)
Control	.09(.09)	.07(.12)
Contagion Effect	*0.13*	*0.32*
Re-Study		
Contagion	.16(.09)	.21(.14)
Control	.04(.04)	.06(.08)
Contagion Effect	*0.12*	*0.15*

Recognition

Veridical Recognition

The mean proportions of veridical recognition are displayed in Table 4. Veridical recognition was operationalized as the proportion of presented items participants correctly attributed to having occurred in the scene ("scene only" plus "scene and other" responses on the source recognition test; see Meade & Roediger, 2002, for an identical scoring measure).

A 2 (perceptual elaboration or no perceptual elaboration) X 2 (re-study or no restudy) between subjects ANOVA was performed analyzing overall veridical recognition across all six scenes. Results revealed that there was a significant main effect of the perceptual elaboration manipulation ($F(1,68) = 11.46$, $MS_e = .03$, $p<.001$).

Participants recognized significantly more veridical items if they had not engaged in a perceptual elaboration task (M = .79) than if they did perceptually elaborate (M = .66). This pattern was not predicted, and the decrease in veridical recognition may occur because participants begin to change their decision criterion (more stringent) for both veridical and false recognition of items after performing a perceptual elaboration task, most likely because the recognition test required use of the details generated on the perceptual elaboration test. There was a significant main effect of re-study for the veridical items recognized ($F(1,68) = 18.43$, $MS_e = .03$, $p<.001$). Participants recognized more veridical items after they had the chance to re-study the slides (M =.81) as compared to no chance for re-study (M =.64). This demonstrates an overall improvement in memory after a second encoding phase. The interaction between perceptual elaboration and re-study was not significant, ($F(1,68) = .03$, $MS_e = .03$, $p=.86$).

Table 4. Mean proportion of veridical recognition as a function of perceptual elaboration and re-study. Standard deviations are reported in parentheses.

	No Perceptual Elaboration	Perceptual Elaboration
Condition	*M (SD)*	*M (SD)*
No Re-Study	.71(.19)	.58(.17)
Re-Study	.87(.15)	.75(.12)

False Recognition

The false recognition results are displayed in Table 5 for both contagion and control items in each of the four conditions. The means in the table are represented in terms of the proportions of contagion or control items recognized out of a total of twelve

possible responses for each. The standard deviations for each mean are given as well as a total overall contagion effect (contagion mean minus the control mean). False recognition was operationalized as the proportion of non-presented items falsely attributed to the scenes ("scene only" plus "scene and other" responses on the source recognition test).

A 2 (contagion or control) X 2 (perceptual elaboration or no perceptual elaboration) x 2 (re-study or no re-study) mixed model ANOVA revealed that there was a significant main effect of the contagion manipulation ($F(1,68) = 81.73$, $MS_e = .03$, $p<.001$). Participants recognized contagion items ($M = .68$) significantly more than the control items ($M = .41$). Recognizing contagion items indicates that participants were incorporating the items given to them by the confederate into their own memories more than just schematically consistent control items. This is again consistent with previous research demonstrating false recognition in the social contagion paradigm (e.g. Meade & Roediger, 2002).

There was a significant main effect of the perceptual elaboration manipulation ($F(1,68) = 8.93$, $MS_e = .09$, $p<.01$). Participants who had completed a perceptual elaboration task ($M = .47$) had lower levels of false recognition than those who did not engage in a perceptual elaborate task ($M = .62$). This decrease in false recognition following perceptual elaboration may be due to participants using the characteristics they generated originally on the perceptual elaboration as a guide to later reduce false recognition.

The main effect of re-study was not significant ($F(1,68) = 1.60$, $MS_e = .09$, $p=.21$), but a three-way interaction between contagion items, perceptual elaboration and re-study was significant ($F(1,68) = 7.15$, $MS_e = .03$, $p<.01$). Follow up t –tests demonstrate that when participants engage in re-study, perceptually elaborating helps to reduce false recognition of contagion items ($M = .55$) relative to the no perceptual elaboration condition ($M = .76$); ($t(34) = 2.26$, $SEM = .09$, $p<.05$), while leaving the control items unaffected ($t(34) = .40$, $SEM = .05$, $p=.70$). However, without re-study, the pattern is opposite. With no re-study, perceptually elaborating helps to reduce false recognition of control items ($M = .33$) relative to the no perceptual elaboration condition ($M = .57$); ($t(34) = 3.12$, $SEM = .07$, $p>.01$), while leaving the contagion items unaffected ($t(34) = 1.25$, $SEM = .09$, $p=.22$). The reduced recognition in control items without a re-study phase suggests that the perceptual elaboration task may cause participants to be more cautious during recognition. This novel finding suggests that perceptual elaboration may influence baseline guessing rates on recognition, but details generated during perceptual elaboration can be utilized during re-study to selectively reduce false recognition of suggested contagion items.

Table 5. Mean proportion of false recognition for contagion and control items as a function of proportion of incorrect items. Standard deviations are reported in parentheses.

Condition	No Perceptual Elaboration *M (SD)*	Perceptual Elaboration *M (SD)*
No Re-Study		
Contagion	.76(.26)	.64(.30)
Control	.38(.15)	.33(.22)
Contagion Effect	*0.38*	*0.31*
Re-Study		
Contagion	.75(.25)	.55(.31)
Control	.57(.24)	.36(.18)
Contagion Effect	*0.18*	*0.19*

Perceptual Elaboration Task

Responses during the perceptual elaboration task itself were analyzed to determine participants' initial judgments and also to determine any lasting effect of their initial judgments on the subsequent recognition test. Keep in mind that only half of the subjects completed the perceptual elaboration task. Table 6 displays the mean proportion of contagion and control items that were given remember, know or new judgments on the perceptual elaboration test. A paired samples t-test was conducted to check if there was a significant difference in memory judgments based on item type (contagion or control) for the remember, know or new responses. Results indicated that contagion items were awarded more know responses ($t(35) = 7.68$, $SEM = .03$, $p<.001$) than the control items. Control items were awarded more remember responses ($t(35) = -3.80$, $SEM = .04$, $p<.001$) than contagion items. There was no significant difference between new judgments ($t(35) = -1.89$, $SEM = .03$, $p=.07$). Consistent with previous research, participants are most likely to report know responses for contagion items (e.g. Roediger

et al., 2001). Know responses may be at higher proportions because participants were exposed to the items from the confederate who they believe is reliable, and the items themselves are schematically accurate for the scene. Although they may not remember specific details, participants believe the item was there.

Table 6. Mean proportion of remember, know, new judgments in the perceptual elaboration task for contagion and control items. Standard deviations are reported in parentheses.

Condition	Contagion	Control
Remember	.38(.23)	.53(.14)
Know	.44(.16)	.23(.11)
New	.18(.19)	.24(.13)

Conditional Analysis on R/K/N Judgments

Conditional analyses were performed to determine if initial remember, know, and new responses on the perceptual elaboration test predicted subsequent false recognition (cf. Roediger, Jacoby, & McDermott, 1996). Responses on the recognition test were classified as attributing an item to the scene ("scene only" responses or "scene and other" responses) or not attributing an item to the scene ("other" responses or "neither" responses). Of particular interest were items originally awarded remember or know judgments on the perceptual elaboration test that were later correctly recognized as having not been studied in the scenes. Such items would provide evidence that participants were self-initiating error correction, especially if such correction were more likely with re-study. The proportion of items given remember responses on the

perceptual elaboration test that were corrected on the final source test were compared across the re-study and no-study conditions. Independent sample t-tests on the number of corrected responses indicate that participants in the re-study condition were marginally more likely to correct previous false remember judgments on the final source test (*M* = .14) than were participants in the no re-study condition (*M* = .06), (*t*(35) = -1.87, *SEM*=.04, *p*=.07). The t-test results for the know responses were not significant but the same numerical pattern of results emerged. When participants did not re-study, the proportion of items later corrected (*M* = .18) was less than in the re-study condition (*M* = .22). Overall, these t-tests completed indicate when participants did re-study, they were numerically more likely to self-correct their remember and know responses and correctly attribute the false items to having not occurred in the scenes. Although only conditional, these analyses support the interpretation that participants who perceptually elaborate on items, especially ones they indicate remembering, may actually use those generated details to self-correct their errors during re-study.

GENERAL DISCUSSION

The results of the current experiment replicate previous social contagion research (Roediger et al., 2001; Meade & Roediger, 2002) by showing that participants incorporate erroneous confederate suggestions into their own individual recall and recognition reports. The current experiment also unravels novel findings regarding the influence of perceptual elaboration and re-study on the social contagion effect. Primarily, perceptual elaboration increases false recall such that individual recall for contagion items increases after participants generate perceptual details about the contagion items. However, perceptual elaboration reduces false recognition. On the final source monitoring recognition test, a prior perceptual elaboration task decreases false recognitions of the contagion items. Perceptual elaboration did not affect veridical recall but it did affect veridical recognition. Interestingly, a perceptual elaboration task not only reduces false recognition but reduces overall veridical recognition as well.

The current experiment reveals novel and interesting findings involving the re-study manipulation. On the recall task, re-study reduces false memory presumably because the re-study phase allows participants to re-encode the same stimuli and engage in a self-initiated correction against their false memories (cf. Watson et al., 2004). On the final recognition test, re-study decreases false recognition of the contagion items only if used in conjunction with a perceptual elaboration task. This reduction on recognition may be due to participants utilizing the characteristics they generate on the perceptual elaboration task to search for errors during restudy. A re-study phase affected veridical items. Participants were better able to recall and recognize veridical items that were

presented in the scenes after a re-study phase. An increase in both veridical recall and recognition is suggestive of a better overall memory of the scenes.

Interpretation of Results and Relation to Other Paradigms

The false and veridical recall results are consistent with previous findings in both individual and social paradigms (Roediger et al., 2001). Participants incorporated the contagion items (suggested to them by the confederate) more than control items into their individual recall. This suggests that the act of another person recalling an item can be spread to another person's memory for that item (Roediger et al., 2001; Meade & Roediger, 2002).

The results of the current experiment replicate and extend individual perceptual elaboration research (Drivdahl & Zaragoza 2001; Lane & Zaragoza, 2007) into the social contagion paradigm. When participants perceptually elaborate on items, especially the contagion items, their false recall for those items is much higher relative to recall in the no perceptual elaboration condition. Consistent with past research, perceptually elaborating on items, regardless of actual presentation, can cause source confusion and lead to an increase in false recall (Bodner et al., 2009). Furthermore, the effect of perceptual elaboration is driven selectively by a change in recall of the contagion items. Perceptual elaboration increases false recall for the contagion items presumably because not only do participants generate their own idiosyncratic characteristics about the items in which they believe to be located in the scenes, but because these items are both suggested by the confederate and are schematically consistent for the scenes (Drivdahl & Zaragoza,

2001; Johnson et al., 1993; Wright et al, 2000). These findings are consistent with previous studies demonstrating that perceptual elaboration increases false recall in individual memory paradigms (Drivdahl & Zaragoza, 2001; Lane & Zaragoza, 2007) and extend findings to a social setting.

When participants were given a re-study phase, false recall is reduced. Participants are given a second opportunity to re-encode the slides, and a re-study phase in fact does reduce false recall. This reduction in recall is in accord with previous research in individual false memory paradigms (Watson et al., 2004) and supports our prediction of false memory reduction in the social paradigm. When participants are given a re-study phase and do not perceptually elaborate on any items the least false recall is observed. If participants first perceptually elaborate, re-study improves their accuracy overall by reducing false recall. Although perceptually elaborating in conjunction with re-study does improve accuracy it still does not reduce false recall rates to the same level as in the no perceptual elaboration condition. Perceptually elaborating may increase false recall to such a great extent that even with a re-study phase, participants cannot correct against all the activated information they commit to and generate details about.

Mainly, the focus in false memory research has been analyzing how and when false memories occur (Roediger & McDermott, 1995; Loftus Miller, & Burns, 1978) and to what strength they exist (Watson, Bunting, Poole & Conway, 2005; Roediger, McDermott, Pisoni & Gallo, 2004). Very little research has focused on how people may self-correct to reduce a false memory, especially if they are not made aware they could have created one. The re-study manipulation used in the current experiment contrasts

with other techniques in the literature to reduce false memories. The most typical manipulation used is an explicit warning. An example of an explicit warning commonly used in individual memory paradigms is telling participants to be cautious because the study materials have been shown to create false memories. This explicit warning typically does promote improved accuracy from participants although false memories are not entirely eliminated (Gallo, Roberts, & Seamon, 1997). Similar effects of explicit warnings have been obtained in social false memory paradigms (e.g. Meade & Roediger, 2002). The explicit warnings used in social memory paradigms involve telling participants that the person they were working with was completely inaccurate in their recall. Results from explicit warnings in both individual and social false memory paradigms typically show an overall criterion shift in which both true and false items generated by the confederate are rejected. In the current study, a subtle warning and self-initiated correction is tested (cf. Watson et al., 2004). The observed decrease in false recall after a re-study phase without an explicit warning lends credence to the presumption that participants engage in self- correction of socially suggested false memories, a novel finding.

The false and veridical recognition results are consistent with the social contagion paradigm. Again, participants incorporate the contagion items (suggested to them by the confederate) more than control items into their individual recognition which indicates that the confederates' responses are influential overall to a person's memory. When participants perceptually elaborated on items, especially contagion items, their false recognition for those items actually decreased. This is the opposite pattern that is

obtained for the recall data, in which perceptual elaboration was shown to increase false memory. Perceptually elaborating may affect recall and recognition performance differently due to the task demands and requirements in each task. Specifically, the recall task instructs participants to recall every item they can that is in the scene without regard to the item's source, whereas the source monitoring recognition task direct participants attention to the source. Due to the nature of the source monitoring (recognition) task, participants may be more likely to use the details they generate during the perceptual elaboration task to correctly attribute contagion items to the appropriate source, in this case "stated by the other person."

The reduction of false recognition after participants complete a perceptual elaboration task is consistent within the literature pertaining to perceptual elaboration in individual memory paradigms. Drivdahl and Zaragoza (2001) report that perceptual elaboration has the paradoxical effect of increasing false memory while overall improving one's memory for the elaborated items' true source. Further, Chan & McDermott (2006) demonstrated that initial testing of studied items may enhance overall source memory for the items, due to an increase in the recollective details which can selectively be used on a recognition test. The perceptual elaboration task may be viewed as an initial test in which participants commit to items and make judgments on their overall memory for the items, which can enhance their recollective details and be used to guide their responses on a recognition task.

Interestingly, re-study in the recognition task is only beneficial to reduce false memories if a participant perceptually elaborates first. Again these results differ from the

recall results in which re-study reduces false recall both with and without perceptual elaboration. The recognition results suggest a re-study phase may initiate self-correction against false memories for a recognition task only after engaging in a task that directs attention to specific details of items. Evidence that participants are using the details they generate during the perceptual elaboration task to reduce false recognition comes from our reported conditional analyses. Specifically, the finding that participants after a re-study phase are more likely to change their initial remember response to indicate the item is new lends support for the notion that perceptual elaboration when in conjunction with re-study may initiate self-correction of false memories.

Theoretical Framework

The source-monitoring framework (Johnson et al., 1993) can explain the social contagion effects when in conjunction with a perceptual elaboration and re-study phase. According to this theory, when someone is asked to remember an event or specific memory they rely on two processes for their decision: a decision criterion and matching process. The decision criterion is set by the amount of accuracy required in a memory judgment. In the free recall task, participants list everything they may have seen, heard and perceptually elaborated on (typical of heuristic judgments). Recall encourages participants to report all "old" items without regard for source. Items that are perceptually elaborated on can boost false recall because the items in the scenes have many perceptual characteristics even without any type of elaboration. The overlap of actual perceptual characteristics of the item and self-generated perceptual characteristics

increase source confusion and boosts false recall (because the recall test does not explicitly require source discrimination). When participants are later asked to complete the source monitoring recognition task, there is an increase in the need of source accuracy on the participant's memory judgment. Participants need to carefully reflect back to the details of an item as to the true origin of that memory (typical of systematic judgment). Now, initially generating characteristics in the perceptual elaboration task may allow participants an advantage on the source monitoring task. The details generated on the task may increase the ability for participants to reflect more accurately on the true source of that item, leading to an overall reduction of false recognition.

Re-study reduces false recall possibly due to the participant employing a more stringent decision criterion (cf. Benjamin, 2001). Re-study allows participants to realize their errors or possible lack of memory for items that were in the scenes. The awareness of one's mistakes, and/or a realization that one's initial memory was poor, will encourage an increase in systematic judgments when recalling items (cf. Tousignant, Hall, & Loftus, 1986). Support for this idea comes from our analysis of confidence ratings in which a re-study phase actually decreased participant's overall confidence about their memories. When participants are later asked to complete the source monitoring recognition task and carefully reflect back to the true origin of that memory, a re-study phase is only beneficial if they engaged in a perceptual elaboration task first. Re-study alone may make a participant more stringent overall but does not lead to enhanced memory of the source information unless perceptual elaboration task is first completed.

The effects of re-study may also affect the matching process on recall and recognition. The matching process is based on memory characteristics. These characteristics are activated and stored within memory at encoding. At retrieval, these encoded characteristics serve as cues to the origins of the memory; if the memory characteristics encoded match the typical characteristics of a particular source, then the item will likely be attributed to that source. When participants engage in a recall or recognition task, they may have source confusion on the item they perceptually elaborated on (generated details about). Source confusion of the item may be due to confusion of the perceptual characteristics they created with the perceptual details typically associated with real events. Re-study reduces false recall. With regards to the matching process, this may occur because when an item is recalled in the collaborative recall phase, perceptual characteristics for the items are automatically generated (regardless of engaging in a perceptual elaboration task or not). When participants get a chance to re-study the slides, they may use these automatic characteristics that are activated to match against what was actually presented. The mismatch of the automatically generated characteristics to the actual characteristics studied may reduce overall false recall. Further, re-study may influence the matching process because re-study elicits additional memory characteristics that can be used to decrease false recall. Re-study helped to reduce false recognition for only participants that perceptually elaborated first. Reduction in false recognition after perceptual elaboration and a re-study phase may be due to participants using the characteristics they generated on the perceptual elaboration task as a guide for a more directed form of study. If participants

did not generate characteristics, re-study may not be beneficial because discrepancies between their automatic generation of characteristics and the actual characteristics are not as explicit, therefore not beneficial.

Practical Implications

Generation of false memories is fascinating and has been studied extensively with research using individual memory paradigms. Throughout years of research, investigators have tried to pinpoint the parameters of when false memories occur and what factors could increase them. The social contagion paradigm is a reliable, unique, and efficient way to observe and analyze how false memories can occur within a social setting. The social exchange of information is ecologically valid and relevant to real world situations in which conversations and interactions of all types (media, internet, etc.) influence a person's individual memory for an event. This experiment in particular aimed to study two novel concepts that can moderate social memory: perceptual elaboration and re-study. Ultimately, the underlying goal was to see if re-study, could eliminate false memories especially after perceptual elaboration

Perceptual elaboration occurs at relatively high rates throughout one's daily life. When someone is recalling a story or thinking about what they learned, they often generate accurate and inaccurate details. The more details generated about an item or event that overlaps with what was actually encoded, the more challenging it becomes to delineate real versus imagined events. This experiment demonstrates that perceptual elaboration does increase false recall within a social situation. The ironic side of

perceptual elaboration is that although it increases false recall, it reduces false recognition. When someone has to explicitly and carefully indicate the source of information the more details they initially generate about an object or event, the better able they are to use the details to attribute the false information to the correct source.

Re-study is not a typical component to most memory studies, but has important practical implications. In everyday life people have the ability to re-watch, re-read, and essentially re-study information. If false memories can be created effortlessly and without complete awareness, can people use a re-study phase to update and eliminate the erroneous information? The current experiment demonstrates that a re-study lead to a reduction in false recall but re-study alone is not strong enough to eliminate false memories entirely. For false recognition, re-study was only beneficial to a participant if he or she had engaged in a perceptual elaboration task initially and may actually be harmful without perceptual elaboration. This finding supports the idea that a re-study phase is only helpful if a participant has generated or utilized details to compare against the actual event.

In this experiment a subtle warning of improving one's accuracy was used. The subtle warning that was used is more reflective of everyday interactions because they require more self-initiated corrections. In both our experiment and in real life situations the overall goal would be to improve one's accuracy. For example, in an educational setting, if a student hears incorrect information from another student and later realizes that other student was incorrect: can that student correct the false memory with re-study of the information? The results of the current experiment support that a self -correction

occurs spontaneously on recall tests, but occurs on recognition tests only if participants focus on specific details during re-study. These results suggest that a re-study in which details are used may be necessary to correct against false memories.

The results obtained demonstrate that participants may actually be able to correct their own mistakes during re-study. Remember judgments, in theory, are the least malleable judgment due to the specific recollective details a participant has when awarding a remember response. With a remember response they admit to "actually remembering seeing the item." The conditional analyses provide evidence that participants actually change their initial remember responses after one re-study phase to later admit that the item was not located in the scene. The evidence in this experiment that people in fact correct their own remember responses is motivating for further research on the malleability of false memories.

Future Directions & Conclusions

In conclusion, the present study revealed several interesting findings on the malleability of false memories as a result of the impact of perceptual elaboration and re-study on the social contagion. In all, it seems that perceptual elaboration increased the magnitude of the social contagion effect in recall because participants were generating details of commonly seen items in everyday life that are schematically appropriate to the scenes, resulting in source confusion. These same details generated are used to later reduce false recognition. Re-study overall reduces false recall, but again only reduces false recognition if used following a perceptual elaboration task. These results

complement our initial predictions and illustrate how false memories can not only be increased, but can be reduced to moderately low levels. This experiment replicates the social contagion effect by demonstrating its robust nature while also simultaneously extending the social contagion effect to other parameters. The present experimental method establishes an ecologically valid approach to how an individual may experience and correct false information.

Future research can explore and extend upon on the malleability of false memories through self-correction. A goal for a follow-up experiment is to narrow the contributing factors to false memory creation for the perceptual elaboration task. Are the details generated on the perceptual elaboration task leading to an increase in false recall and a decrease in false recognition or is the perceptual elaboration task acting as an initial test in which just commitment to a remember, know, or new response later influences false recall and recognition (cf. Chan & McDermott, 1996)? Another question for possible follow up is can false memories be eliminated altogether? In this experiment we demonstrate a strong reduction in false recall after a re-study phase, but would an even longer re-study allow for an elimination of false memories altogether? With more time allotted in a re-study phase than the initial encoding phase we are curious is false memories could occur at all. We are anxious to begin the next round of experiments to follow-up on the malleability of false memories.

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APPENDICES

APPENDIX A

CONFEDERATE SCRIPTS

	Condition 1	
Desk	**Toolbox**	**Bathroom**
Plant(Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Tape Dispenser(Pen)	**Chisel (Duct Tape)**	**Hairspray (Floss)**
Planner (Dictionary)	Extension cord (table)	Razor (Mirror)
Filing Cabinet (Chair)	**Screws (Pliers)**	**Toothbrush (Shower)**
Keyboard(Lamp)	**Tape Measure (Bolts)**	**Soap (Bath Rug)**
Mouse (Photos)	**Ruler (Pencil)**	**Hair Brush (Contact Solution)**
Kitchen	Bedroom	Closet
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Blender (Spatula)	Fan (video)	Tie (Hat)
Cutting Board (Metal Spoons)	Pillow (window)	Flashlight (helmet)
Toaster (Cups)	Bed (Picture)	Cooler (Soup)
Knives (Pots)	Vacuum (Comforter)	Umbrella (Hangers)
Oven Mitts (Napkins)	Laundry bag (Dresser)	Frisbee (shirts)

	Condition 2	
Desk	**Toolbox**	**Bathroom**
Plant (Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Briefcase (glue)	**Chisel (Duct Tape)**	**Hairspray (Floss)**
Planner(dictionary)	Extension cord (table)	Razor (Mirror)
Printer (Paper Clips)	**Screws (Pliers)**	**Toothbrush (Shower)**
Calendar(phone)	**Tape Measure (Bolts)**	**Soap (Bath Rug)**
Radio (Rolodex)	**Ruler (Pencil)**	**Hair Brush (Contact Solution)**
Kitchen	Bedroom	Closet
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Phone (Books)	Fan (video)	Tie (Hat)
Cutting Board (Metal spoons)	Pillow (window)	Flashlight (helmet)
Magnets (Spices)	Bed (Picture)	Cooler (Soup)
Paper towel (stove)	Vacuum (Comforter)	Umbrella (Hangers)
Tea Kettle (Spice rack)	Laundry bag (Dresser)	Frisbee (shirts)

	Condition 3	
Desk	**Toolbox**	Bathroom
Plant (Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Briefcase (glue)	**Chisel (Duct Tape)**	Toothpaste (sink)
Planner(dictionary)	Extension cord (table)	Razor (Mirror)
Printer (Paper Clips)	**Screws (Pliers)**	Magazine (Cup)
Calendar(phone)	**Tape Measure (Bolts)**	Deodorant (Medicine Cabinet)
Radio (Rolodex)	**Ruler (Pencil)**	Shaving Gel (Scissors)
Kitchen	Bedroom	**Closet**
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Phone (Books)	Fan (video)	**Slippers (Boots)**
Cutting Board (Metal spoons)	Pillow (window)	Flashlight (helmet)
Magnets (Spices)	Bed (Picture)	**Shoes (Boxes)**
Paper towel (stove)	Vacuum (Comforter)	**Belt (Bags)**
Tea Kettle (Spice rack)	Laundry bag (Dresser)	**Ball (Gym Shorts)**

	Condition 4	
Desk	Toolbox	Bathroom
Plant (Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Briefcase (glue)	Bungee cord (tool box)	Toothpaste (sink)
Planner(dictionary)	Extension cord (table)	Razor (Mirror)
Printer (Paper Clips)	Wrench (Hammer)	Magazine (Cup)
Calendar(phone)	Washers (Saw)	Deodorant (Medicine Cabinet)
Radio (Rolodex)	Hair clip (Banana)	Shaving Gel (Scissors)
Kitchen	**Bedroom**	**Closet**
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Phone (Books)	**Water Glass (Rug)**	**Slippers (Boots)**
Cutting Board (Metal spoons)	Pillow (window)	Flashlight (helmet)
Magnets (Spices)	**Clock (Mirror)**	**Shoes (Boxes)**
Paper towel (stove)	**TV (Lamp)**	**Belt (Bags)**
Tea Kettle (Spice rack)	**Cologne (Quilt)**	**Ball (Gym Shorts)**

	Condition 5	
Desk	Toolbox	Bathroom
Plant(Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Tape Dispenser(Pen)	Bungee cord (tool box)	Toothpaste (sink)
Planner (Dictionary)	Extension cord (table)	Razor (Mirror)
Filing Cabinet (Chair)	Wrench (Hammer)	Magazine (Cup)
Keyboard(Lamp)	Washers (Saw)	Deodorant (Medicine Cabinet)
Mouse (Photos)	Hair clip (Banana)	Shaving Gel (Scissors)
Kitchen	**Bedroom**	**Closet**
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Blender (Spatula)	**Water Glass (Rug)**	**Slippers (Boots)**
Cutting Board (Metal Spoons)	Pillow (window)	Flashlight (helmet)
Toaster (Cups)	**Clock (Mirror)**	**Shoes (Boxes)**
Knives (Pots)	**TV (Lamp)**	**Belt (Bags)**
Oven Mitts (Napkins)	**Cologne (Quilt)**	**Ball (Gym Shorts)**

	Condition 6	
Desk	Toolbox	**Bathroom**
Plant(Monitor)	Knife (metal supports)	Shampoo (Tissue Box)
Tape Dispenser(Pen)	Bungee cord (tool box)	**Hairspray (Dental Floss)**
Planner (Dictionary)	Extension cord (table)	Razor (Mirror)
Filing Cabinet (Chair)	Wrench (Hammer)	**Toothbrush (Shower)**
Keyboard(Lamp)	Washers (Saw)	**Soap (Bath Rug)**
Mouse (Photos)	Hair clip (Banana)	**Hair Brush (Contact Solution)**
Kitchen	**Bedroom**	Closet
Coffee maker (Wire whisk)	Candle (wine glass)	Suitcase (Gloves)
Blender (Spatula)	**Water Glass (Rug)**	Tie (Hat)
Cutting Board (Metal Spoons)	Pillow (window)	Flashlight (helmet)
Toaster (Cups)	**Clock (Mirror)**	Cooler (Soup)
Knives (Pots)	**TV (Lamp)**	Umbrella (Hangers)
Oven Mitts (Napkins)	**Cologne (Quilt)**	Frisbee (shirts)

APPENDIX B

PERCEPTUAL ELABORATION TASK

Desk Scene			
Pen	R K N		
Dictionary	R K N		
Photos	R K N		
Lamp	R K N		
Chair	R K N		
Monitor	R K N		
ToolBox Scene			
Screws	R K N		
Metal Supports	R K N		
Ruler	R K N		
Chisel	R K N		
Tape Measure	R K N		
Table	R K N		
Bathroom Scene			
Tissue Box	R K N		
Hairbrush	R K N		
Soap	R K N		
Toothbrush	R K N		
Mirror	R K N		
Hairspray	R K N		
Kitchen Scene			
Blender	R K N		
Oven Mitts	R K N		
Knives	R K N		
Toaster	R K N		
Metal Spoons	R K N		
Wire Whisk	R K N		
Bedroom Scene			
Vacuum	R K N		
Picture	R K N		
Comforter	R K N		
Wine Glass	R K N		
Window	R K N		
Video	R K N		
Closet Scene			
Gloves	R K N		
Hat	R K N		
Shirts	R K N		
Soup	R K N		
Hangers	R K N		
Helmet	R K N		

APPENDIX C

SOURCE MONITORING TASK

Please indicate whether you recognize these items. Use the following scale:
Scene = the item was in the household scenes from the computer
Other subject = the other subject recalled the item
Neither = the item was not in the scenes, and the other subject did not recall it

	Scene	Other Subject	Neither
belt			
knives			
oven mitts			
frisbee			
tea kettle			
water glass			
video			
ink jar			
extension cord			
candle			
magazine			
tie			
blender			
hairbrush			
boat			
plant			
ring			
planner			
tape measure			
ruler			
washers			
ALL			
radio			
chisel			
soap			
dog			
mug			
shoes			
printer			

hairspray			
deodorant			
cologne			
razor			
ball			
shampoo			
hamper			
clock			
paper towels			
hairclip			
toaster			
tissue box			
screws			
cutting board			
suitcase			
vacuum			
toothbrush			
monitor			
tree			
briefcase			
hammer			
TV			
keyboard			
key			
pillow			
calendar			
cooler			
coffee maker			
sofa			
wrench			
slippers			