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Social Anxiety and Memory Conformity in Eyewitnesses

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Social Anxiety and Memory Conformity in Eyewitnesses

An Honors Thesis

Presented to

The Faculty of the Department of Psychology

Bates College

in partial fulfillment of the requirements for the

Degree of Bachelor of Arts

by

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Lewiston, Maine

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Abstract

Two experiments examined memory conformity in an eyewitness context where it can have devastating effects. The aim of these experiments was to determine whether state anxiety (Experiment 1) and trait anxiety (Experiment 2) affect memory conformity. Experiment 1 revealed that state anxiety was resistant to influence from a one-way mirror in the context of an identification decision, precluding a test of state anxiety's effect on memory conformity in this context. Experiment 2 examined anxiety as a dispositional variable by testing the differential effects of social avoidance on memory conformity. In the first phase, participants completed a measure of social anxiety and viewed 60 photographs of faces. Later that week, participants were paired and asked to look through 120 photos and indicate whether the photos were old (previously seen) or new (previously unseen). Participants were randomly assigned to one of three conditions: *no motivation*, *monetary incentive*, or *forced unanimity*. In the *no motivation* condition, participants were not given any instructions beyond the basic task instructions. Participants in the *monetary incentive* condition were told that the most accurate participant would receive a cash reward, and participants in the *forced unanimity* condition were told that they would have to engage in a face-to-face discussion to resolve discrepant answers, should any occur. Overall, socially avoidant participants conformed significantly less than non-socially avoidant participants, and conformity rates were significantly higher in the *forced unanimity* condition than in the *no-motivation* and *monetary incentive* conditions.

Social Anxiety and Memory Conformity in Eyewitnesses

Eyewitness misidentification is the leading cause of wrongful convictions in the United States (The Innocence Project, 2012). Of the 297 wrongfully convicted people who have been exonerated by DNA evidence, over 75% were convicted using incorrect eyewitness identifications (Garrett, 2011). In his book, *Convicting the Innocent* Brandon Garrett evaluated the first 250 cases of people who have been exonerated by DNA evidence. In his chapter on eyewitness misidentification, Garrett states that suggestive identification procedures and unreliable identifications emerge as recurring themes in misidentification cases. For example, in an evaluation of the 161 cases for which he was able to obtain trial information, Garrett found evidence that police were responsible for contaminating eyewitness identification in 78% of the cases. Within these cases, police used biased procedures such as single person showups, constructed biased lineups, or made suggestive comments to eyewitnesses after identification procedures. In each instance, eyewitness memory was contaminated and a witness's original recollection of the perpetrator was damaged.

Conformity to an errant co-witness can have profound deleterious effects on witnesses, victims, suspects, and on the integrity of our justice system; therefore, researchers must examine the social variables and individual differences that foster memory conformity among eyewitnesses. A growing body of evidence demonstrates that numerous variables give rise to memory conformity and that the effect of a given variable differs as a function of circumstance and individual differences. Consequently, it is important to continue to work to 1) identify the variables that

give rise to memory conformity and 2) to explore how nuanced situational factors and individual differences affect an individual's susceptibility to memory conformity.

The purpose of this present study is to examine memory malleability as a function of conformity to others and as a function of individual differences in social anxiety. I will begin by discussing the social variables that effect memory conformity among eyewitnesses and then move to a discussion of the effects of anxiety on eyewitnesses. Discussion will subsequently narrow on social avoidance and the factors that could potentially increase, decrease, or eliminate the tendency of socially avoidant individuals to (unwittingly) succumb to memory conformity.

Developing False Memories

Memory is malleable and can be manipulated in a variety of ways. For over two decades, researchers have successfully manipulated participants' memories such that participants have come to report details for events that never occurred (Loftus & Pickrell, 1995; Lindsay et al., 2004). In an earlier study, Loftus and Pickrell found that 29% of participants reported partial or full memories for a childhood event that never occurred. In their study, researchers interviewed participant's family members to obtain information about events from the participant's childhood, and subsequently put together a booklet describing four childhood events: three events that had occurred, and one event that did not occur. Each participant then read the story booklet that had been designed for him or her, and were asked to write what he or she remembered about each event, with the option of reporting, "I do not remember" (p. 722). Researchers found that

participants not only reported having “memories” for the false event, but also reported an increase in the “clarity” of the false memories at a follow up session, two-weeks later. Loftus and Pickrell suggest that when an individual thinks about a false memory, the false memory may become linked to other aspects of or experiences from true events and thus, errantly integrated into their memory. The findings and relative explanation that Loftus and Pickrell put forth in their study demonstrate that entire false memories can be implanted using misinformation and suggest that once a false memory has been introduced, it may be difficult to discern the false memory from true memories.

Since Loftus and Pickrell conducted their study in 1995, additional research has demonstrated various ways that false-memories can be implanted. Using a slightly different research paradigm than Loftus and Pickrell, Lindsay et al. (2004) conducted a study to determine what effect the provision of real childhood class photographs would have on the development of false memories. In Lindsay et al.’s study, researchers met with individual participants and read each participant three narratives of childhood events: two of the narratives were true and one narrative described a pseudo-event that did not occur. The two true narratives referred to events that occurred between Grades 3-5 and between Grades 5 and six; the pseudo-event narrative described the participant’s ploy to put Slime a “brightly colored gelatinous compound” in his or her teacher’s desk when the participant was in Grade 1 or 2 (p. 150). The critical manipulation in this study was that half of the participants received their real childhood class photos to look at while listening to the narratives, and half did not. After listening to each narrative, participants

provided three ratings: 1) the extent to which the participant felt he or she was “reliving” and 2) “remembering” the event, and 3) how confident he or she was that “the event occurred as described in the narrative” (p. 150).

Subsequent to rating their memory experiences, participants were asked to spend the following week remembering as much as possible about the oldest event (the pseudo-event) and when participants returned a week later, they were asked to recall the pseudo-event and again, rate their memory experience (Lindsay et al., 2004). Based on their recollection of the pseudo-event, participants were rated as having either 1) “no images or memories”, 2) “images but not memories” (*partial false memory*), or 3) “memories of putting Slime in the teacher’s desk.” (*complete false memory*) (p. 151). In Lindsay et al.’s study, partial false memories refer to instances when a participant speculates about the pseudo-event or “accepts” that the event has occurred, whereas a participant who demonstrates evidence and a “genuine” belief that he or she has a memory for the pseudo-event would be classified as having a complete false memory (p. 149). Two judges, who were blind to manipulations, were responsible for determining whether or not participants had: no images or memories, a partial false memory, or a complete false memory for the pseudo-event.

Three key findings emerged from this study (Lindsay et al., 2004). The first key finding is that, after the second session, 45.5% of participants who were *not* given a class photograph to look at when trying to recall the pseudo-event reported having either images but no memories (31.8%), or memories (22.7%) for the pseudo-event. The second key finding is that 78.2% of participants who were given

photographs reported having either images but no memories (13%) or memories (65.2%) for the pseudo-event. These data demonstrate that the mere narration of the pseudo-event is enough to implant false memories in participants and further, that when a photograph was provided to help “jog” participant’s memories, the number of partial and complete false memories that were reported *doubled*. Lindsay et al. posit that the increase in false memories among participants in the photo condition could be due to the fact that the “perceptual details from the photo...may have been subsequently been blended with products of imagination... thereby contributing to subjectively compelling false-memories.” (p 154). Lindsay et al.’s (2004) contention echoes Loftus and Pickrel’s (1995) notion that false memories are created by a link between imagined events to true experiences.

Last, the third noteworthy finding to emerge from Lindsay et al.’s (2004) study was that participants’ ratings of clarity for the pseudo-event, as well as their confidence that the pseudo-event had occurred, were comparable to their ratings of clarity for and confidence in true events. This data demonstrate that participant’s false memories are comparable in clarity and believability to true memories; one participant even stated “If you didn’t tell me it was a false event, I would have left here thinking I did this” (p. 153). In a legal context, no authority figure is present both during and after a crime to be able to inform a witness which of his or her memories are true, and which are false. Indeed, the similarities between memory experiences for true and false memories are alarming, and in an eyewitness context, the potential ramifications are disconcerting.

Other researchers have developed alternate research paradigms – different from the type of paradigm that Loftus and Pickrell (1995) and Lindsay et al. (2004) used – to demonstrate the additional and nuanced ways in which an individual’s memory can change. For example, Wright, Self, and Justice (2000) conducted a study to determine the effect that misinformation has on memory when the misinformation is presented by another participant. In Wright et al.’s study, pairs of participants viewed a storybook that consisted of 21 photos that showed two men entering a snooker hall, playing snooker, and in the midst of the two men’s game, the storybook showed a woman stealing one man’s wallet. The critical manipulation was that there were two versions of the slide that depicted the two men playing snooker: one version showed the woman standing alone, and one version showed the woman standing with an accomplice. One half of the participants viewed the storybook the depicted the thief standing with an accomplice, and the other half viewed the storybook the depicted the thief standing alone. Subsequent to seeing the storybook, each participant individually filled out a questionnaire that asked “true” or “false” questions about the event, including a question that asked participants to report whether or not there was an accomplice present. Participants were then paired, one participant from the accomplice condition and the other from the no-accomplice condition, and were asked to describe the event as if they were reporting the theft to a police officer. In their report, participants discussed whether or not the woman who was standing at the entrance of the bar was alone. Last, each participant individually filled out the same questionnaire that he or she filled out prior to discussion.

The results from this study indicate that 39 out of 40 participants correctly reported whether or not an accomplice was present *before* discussing the event with their partner, meaning that 19 out of 20 pairs were originally accurate in their reports (Wright, Self, and Justice, 2000). However, subsequent to discussion, 15 out of 19 pairs (79%) ultimately came to an agreement about whether or not there was an accomplice present. Notably, the partner who was less confident in his or her recollection was more likely to conform to the partner who was more confident in his or her assertion regarding the presence of an accomplice. Wright et al.'s study demonstrates not only that false memories can be implanted using misinformation, but also how subtle manipulations and well-intentioned discussion can lead to an incorrect memory that, in a legal context, can have profound implications.

Wright et al.'s (2000) study is one among many studies that demonstrate how post-event information can contaminate eyewitness memory. Post-event information (PEI) refers to information that is provided about an event *after* the event occurs. According to Wright and Davies (1999, as cited by Patterson & Kemp, 2006a) there are three primary ways in which an eyewitness can encounter PEI: (1) media reports (2) "being asked questions about the event by police officers, lawyers, friends or others," (p. 1083) and (3) co-witness information.

PEI can play a significant role in manipulating eyewitness memory and researchers have also found that even brief exposure to misinformation can have lasting, long-term effects on eyewitness memory (Zhu et al., 2011). In a study designed to examine the longevity of false-memories, Zhu et al. found that false memories were still evident a year and half after exposure to misinformation and

the initial formation of false memories. In their study, Zhu et al. showed participants a series of slides depicting two separate crimes, presented a narrative containing misinformation, and administered a memory test in which participants reported true and false memories. A year and a half later, researchers administered the memory test again. The results from this longitudinal design were profound: researchers found that although only briefly exposed to pieces of misinformation, participants retained half of the false memories reported at time 1, which was the same rate of retention for true memories. Thus, participants were equally as likely to retain and subsequently report false memories as they were to retain and report true memories, even a year and a half after the exposure to misinformation. Evidently, the effects of misinformation on eyewitness memory can persist long after the eyewitness' initial exposure to misinformation.

Memory Conformity

Memory conformity, also referred to as the social contagion of memory, refers to instances when what one person says about an event influences another person's memory and subsequent report of that event (Wright, Mathews, & Skagerberg, 2005). Memory conformity contaminates eyewitness memory by impairing, if not altogether removing, an eyewitness' ability to recall his or her original memory of an event (Douglass & Bustamante, 2012).

The legal implications of memory conformity are profound. When multiple eyewitnesses report similar accounts of an event, the accounts are increasingly corroborative in the eyes of lawyers, judges, and other law enforcement officers (Hope, Ost, Gabbert, Healey, & Lenton, 2008). After all, how could two or more

people come to report the same version of an event that didn't occur? Garrett (2011) asserts that prosecutors mobilize this form of "logic" when cases involve multiple eyewitnesses, and that similarities between eyewitness accounts have been used as evidence to "strengthen" cases that have ultimately led to wrongful convictions. For example, Cody Davis was wrongfully convicted of armed robbery after being identified by two witnesses (The Innocence Project, 2012; Garrett, 2011). At trial, the prosecutor for Davis' case argued, "...in this case you have two witnesses, again, that made the identification of Cody Davis, the defendant, on their own, in separate locations, at separate times" (Garrett, 2011, p. 50). Research indicates that a variety of social influences can cause people to develop shared memories for events that did not occur; still, members of the legal community fall prey to the assumption that matching co-witness identifications corroborate guilt (Douglass & Bustamante, 2012). In his assessment of exoneration cases, Garrett (2011) reports that 36% of wrongfully convicted people were identified by multiple eyewitnesses.

Researchers have examined the incidence of co-witness discussion in attempt to explore how frequently eyewitnesses are at risk for memory conformity. Co-witness discussion is one of three primary sources of PEI that can contaminate an eyewitness' memory (Wright & Davies, 1999 as cited by Patterson & Kemp, 2006a). For example, Patterson and Kemp (2006b) surveyed 773 undergraduate students and found that 75% of participants reported that they had witnessed at least one serious crime in their lifetime. Of the 75% of participants who witnessed a serious crime, 86% reported that there was at least one co-witness present at the

event. The majority (86%) of participants who reported that there was one or more co-witness present at the time of the event also reported that they had discussed the event with a co-witness.

Though Paterson and Kemp (2006b) provide compelling data about the incidence of co-witness discussion, they relied on retrospective recall, which must be noted as a methodological weakness. Skagerberg and Wright (2008b) conducted a study that was similar to Paterson and Kemp's study, but that used a smaller sample and most importantly, recruited participants directly from a group of eyewitnesses who were attempting to identify criminals in an ongoing, real life case. The latter design component indicates that Skagerberg and Wright's (2008b) study has two particular strengths that were absent from Patterson and Kemp's (2006b) study of co-witness discussion. First, Skagerberg and Wright recruited eyewitnesses who were attempting to identify criminals in real crimes; second, researchers were able to question participants about experiences that they, as eyewitnesses, were having in the present moment. Together these two design components suggest that the results from Skagerberg and Wright's study – which will be subsequently discussed – are particularly informative, reliable, and ecologically valid.

Skagerberg and Wright (2008a) found that 88% of the eyewitnesses in their sample reported that there was at least one co-witness present at the event they had witnessed, and that the average number of co-witnesses to an event was four people. Researchers found that of the 88% of participants who reported being one of multiple witnesses to an event, 56% reported that they had discussed the event

with at least one other co-witness. The two most common topics of co-witness discussion were “general crime details” (52%) and “suspect details” (39%) (p. 517). Evidently, co-witness discussion is common in real-life cases and, due to the link between co-witness discussion and memory conformity, is also a cause for concern (Skagerberg & Wright, 2008a).

Yet, it is important to indicate that co-witness interaction is not always bad; in fact, co-witness interaction can have unique benefits. For example, co-witnesses who discuss an event may do so to provide emotional support for one another after enduring a traumatic event (Skagerberg & Wright, 2008a). Instead, the problem with co-witness interaction occurs when one co-witness’ report contains inaccurate information, or when one co-witness’ report affects his or her co-witness’ confidence (Luus & Wells, 1994). For example, Luus and Wells (1994) found that co-witness discussion poses the risk of artificially inflating co-witness confidence. In Luus and Wells’ (1994) study, pairs of participants viewed a staged theft; were separated and asked to individually identify the “thief” from a target absent photospread; and were subsequently provided one type of feedback (out of nine possible types). Researchers found that participants who were told that they had identified the same suspect as their co-witness were significantly more confident in their identifications than were participants who were not given any feedback about their identification. Conversely, participants who were told that they made a different identification than their co-witness were significantly less confident than participants who were not given any feedback about their identification. The data from Luus and Wells’ (1994) study demonstrates that co-eyewitness confidence in

malleable in both directions, regardless of accuracy. Manipulating eyewitness confidence is problematic due to the fact that, at trial, jurors tend to perceive confident eyewitnesses as more credible (Whitley & Greenburg, 1986), despite a weak relationship between eyewitness confidence and accuracy (Luus & Wells, 1994). Indeed, co-witness interaction has both detrimental and beneficial effects; yet, the profound consequences that can stem from the harmful effects of co-witness interaction requires an investigation of the ways in which co-witnesses come to share inaccurate memories.

Evidence of Co-Witness Memory Conformity

The current body of research on memory conformity demonstrates that a variety of factors influence susceptibility to memory conformity. Some factors include: response order (Wright, Mathews, & Skagerberg, 2005; Skagerberg & Wright, 2009); perceived encoding duration (Gabbert, Memon, & Wright, 2007); power differentials between co-witnesses (Skagerberg & Wright, 2008b), perceptions of co-witness confidence (Wright et al., 2000; Skagerberg & Wright, 2009; Wright & Villabla, 2012), and co-witness relationship type (e.g., romantic couples, platonic friendships, strangers) (French, Garry, & Mori, 2008; Hope et al., 2008). These factors and their implications will be subsequently discussed.

In 2005, Wright et al. conducted a series of studies designed to test the effects of response order on participants' recollections of previously seen and previously unseen items. In this set of studies, participants viewed a set of stimuli (either faces, words, or cars) and then were given a recognition memory test that contained both previously seen and unseen stimuli. Participants were paired with a

confederate and asked to verbally indicate whether or not they had seen each stimulus before. The pairs were instructed to take turns responding, though the conditions were manipulated such that the confederate responded first.

Confederates provided wrong answers for a third of the stimuli. The results from each study demonstrate that participants conformed to the confederate's incorrect responses for previously seen and unseen stimuli. However, participants were *more* likely to conform to a confederate's bogus response for items that the participant had not seen, than they were to conform to incorrect responses for items that they had seen. This finding appears to have two implications.

First, the findings suggests that people are more likely to develop a false memory for a non-existing event than they are to not report a memory for an actual event (Wright et al., 2005); however, there is also evidence to the contrary. In an earlier study Wright et al. (2000) found that participants were equally as likely to develop a false memory that an accomplice was present when in fact there was none, as they were to develop a false memory that an accomplice was not present when in fact she was. Thus, the existing data on whether or not people are more likely to develop a false memory for a non-existing event than they are to not report a memory for an actual event leaves this topic open for debate. Memory conformity is a complex social phenomenon and it is possible that moderating variables exist and affect this relationship in ways that are currently unclear.

Second, the results from Wright et al.'s (2005) study provides evidence for the argument that people trust other people's memories more when they lack their own memory for a particular item or event. Gabbert et al. (2007) posited a similar

argument after conducting a study to determine the effects of perceived encoding duration differentials on memory conformity in co-witnesses. In Gabbert et al.'s (2007) study, previously unacquainted pairs of participants were told that they would be viewing a series of photos, and that one participant would be viewing photos for half as long as the other, while the other participant would be viewing the photos for twice as long as the other; though participants actually viewed the photos for the same amount of time. Participants were then shown four photos of complex scenes containing various objects, and although they were led to believe that they would be viewing the same photos, they were shown two different versions of the complex scenes. Overall, there were 8 "critical items" that differed between versions (e.g., version (a) "woman holding a cigarette," version (b) "woman holding a glass of red wine") (Gabbert et al., 2007, p. 322). After looking at the photos, participants were asked to work together to recall the details of the photos and were not required to take turns speaking. Subsequently, participants individually completed a free-recall task that required participants to *only* report seen items.

Results from this study demonstrate that overall, 359 critical items were mentioned in co-witnesses' discussion and that 102 of the critical items were later incorrectly reported in the free-recall task (Gabbert et al., 2007). Therefore, memory conformity occurred in both conditions: those who were led to believe that they saw photos for twice as long as their partner conformed, as did those who were led to believe that they saw photos for half as long as their partner. Further evaluation of the data demonstrates that on average, the participants who believed that they viewed photos for half as long reported more errant critical items when compared

to their partners, who believed that they had viewed photos for twice as long. Therefore, the mere *perception* of differences in encoding duration makes an individual more susceptible to memory conformity: eyewitnesses who perceive their memory to be inferior are more likely to rely on their co-witness's memory, even when their co-witness's memories are invalid or differ from their own.

It is also important to note that data from Gabbert et al.'s (2007) study revealed a response order effect: the partner who *did not* initially mention a critical item during co-witness discussions was 12 times more likely to be influenced in the free recall task. This finding is consistent with those from other studies in which researchers have found an effect of response order on memory conformity (Wright et al., 2000; Wright et al., 2005; Skagerberg & Wright, 2009). For example, in their study of memory conformity among mock co-witnesses, Wright et al., (2000) found that 11 out of the 15 pairs who conformed in their reports of event details (i.e., the presence or absence of an accomplice) conformed "in the direction of the person with higher confidence." (p. 197). The emerging pattern of results that shows that co-witnesses tend to conform to the more confident witness is concerning due to evidence that eyewitness confidence is not a reliable measure of accuracy (Wells, Olson, & Charman, 2002).

In addition to co-witness confidence, researchers have also found that power differentials among co-witnesses have an effect on memory conformity (Skagerberg & Wright, 2008b). In Skagerberg & Wright's (2008b) study, pairs of participants viewed 50 faces and then completed a "power task" that was designed to set up a power differential between the members of each pair. This task required one

participant to design a restaurant in 5 minutes (low power), and the other participant to assess the design as the “judge” (high power). After manipulating the power differential, participants were shown a set of 100 faces and asked to rate whether or not they had seen the face before. Low-power participants were more likely than high-power participants to be influenced by their partner’s memory report. Skagerberg and Wright suggest that the tendency for people to seek social approval may lead low-power individuals to accept a response as correct simply because they perceive their partner as being more powerful. In cases that involve multiple witnesses, it is possible for the witness who is perceived as most powerful to influence his or her co-witness’ memory.

In a subsequent study, Skagerberg and Wright (2009) built on their previous findings to determine how power differentials among pairs of siblings would influence memory conformity. Researchers hypothesized that older siblings would influence younger siblings’ memory reports during a facial recognition task; however, their results did not support this hypothesis. Instead, researchers found that response order affected memory conformity: what the first person reported affected how the second person answered. Interestingly, researchers also found that rates of memory conformity were higher when participants perceived their sibling as being highly confident (Skagerberg & Wright, 2009). Skagerberg and Wright suggest that that the variance in the quality of sibling relationships – something that was unaccounted for in their study – may have affected the hypothesized relationship between power and memory conformity in their sample. Future studies that control for various components of a sibling relationship (e.g., closeness,

agreeableness, age gap, etc.) may provide better insight into the effect of sibling power differentials on memory conformity.

Other researchers have used pairs of strangers and romantic couples to study the effects of relationship type on memory conformity (French, Garry, & Mori, 2008). In French et al.'s (2008) study, pairs of strangers and romantic couples watched a movie of a crime and were led to believe that they were viewing the exact same event; however, they actually saw two different versions of the event. After, participants completed two tasks: first, participants were asked to engage in discussion about the "event" and to answer a set of questions. Second, participants completed independent recognition tasks that were designed to test memory accuracy for their respective movie version. Researchers found that during discussion, couples and pairs of strangers were equally as likely to expose each other to misinformation, and, that they were equally likely to dispute the validity of the misinformation. However, results from the independent memory tests indicate that romantic partners were more likely than pairs of strangers to incorporate misinformation into their memories (French et al., 2008). When compared to pairs of strangers, romantic couples were also more confident in both their correct and incorrect memory reports. This finding suggests that members of a romantic couple perceive each other as being accurate and reliable. It is also likely that couples are used to relying on each other's memories in day-to-day life, where the consequences of memory conformity may go unnoticed or be misattributed.

In an experiment with a similar purpose to French et al.'s (2008) study, but that had a slightly different design, Hope et al. (2008) evaluated the effect of co-

witness relationship type (strangers, friends, or romantic partners) on memory conformity. In Hope et al.'s study, co-witnesses watched an event from different perspectives but were led to believe that they had viewed the event from the same perspective. Pairs subsequently discussed the events with their co-witness and then engaged in an individual cued-recall task. Results revealed that *all* dyads incorporated co-witness misinformation into their individual recollections, but that the effect was stronger for friends and couples. Co-witnesses who were previously acquainted (friends and couples) incorporated significantly more misinformation into their individual recollections when compared to strangers who had not been previously acquainted. Another interesting finding to emerge from this study is that among pairs of strangers, the individuals who incorporated the most misinformation rated their co-witness as being more likeable than those who incorporated less misinformation. Together these findings indicate that an individual's relationship with, and perception of, their co-witness can profoundly impact witness's individual memory reports.

Evidently, there are a variety of social factors that can lead to memory conformity and that can cause an inaccurate eyewitness to feel more confident in his or her memory performance. It is likely that individual differences further complicate the relationship between memory conformity and the social factors discussed thus far. Due to the fact that a myriad of dispositional variables influence decision-making, it is disquieting that researchers have paid such little attention to the effects that individual differences have on memory conformity. In the following

section, I will focus on eyewitness anxiety through an evaluation of the scant existing literature on eyewitness anxiety and eyewitness memory performance.

Eyewitness Anxiety

An eyewitness may find his or herself experiencing anxiety for a host of different reasons. It is not difficult to imagine the numerous ways in which criminal events, police procedures, and legal situations can provoke anxiety. Yet, this factor has received little attention in the context of eyewitness memory performance. However, within the existing literature, there are emerging relationships between eyewitness performance and anxiety that suggest that this is an area of research worth exploring.

In a clever study conducted by Valentine and Mesout (2009), researchers investigated whether or not state anxiety would impact participants' abilities to describe and identify someone who they had encountered in the "Horror Labyrinth". The Horror Labyrinth, which is the first exhibit in the tour of the London Dungeon, is a maze comprised of mirrored walls that is designed to "disorient" its visitors (Valentine & Mesout, 2009, p. 154). In the maze there is also a "scary person" whose job is to jump out at visitors. In this study, participants walked through the Labyrinth for 7 minutes where they at some point encountered the "scary person". 45 minutes after leaving the maze, participants completed a state-anxiety questionnaire, provided a written description of the "scary person," and answered questions about the "scary person" in a cued-recall memory task. Last, participants were asked to identify the 'scary person' from a target present lineup and then rate their level of confidence in their identification accuracy.

The data from this study reveal 4 key findings. When compared to participants who reported low state anxiety, participants who reported higher state anxiety: (1) recalled fewer correct details about the “scary person”, (2) reported more incorrect details about the “scary person”, and (3) were less likely to make a correct identification in the photospread task. The fourth key finding from this study is particularly alarming: among the participants who fell above the median score on the state anxiety scale (high anxiety), only 17% made a correct identification. This finding stands in stark contrast to the 75% of correct identifications made by participants who scored below the median score on the state anxiety scale (low anxiety) (Valentine & Mesout, 2009). Together these findings demonstrate that within a short amount of time after the event, a witness’ identification accuracy may be severely diminished by state anxiety that is high during the event.

Another noteworthy finding from this study is that a gendered pattern of results emerged: overall, women reported higher levels of state anxiety when compared to men (Valentine & Mesout, 2009). Women also made significantly fewer correct identifications from the target-present lineup than men did. These findings suggest that female witnesses may be more susceptible to the effect of state anxiety on identification accuracy than male witnesses.

In addition to experiencing anxiety during and soon after an event, a witness may find his or herself experiencing anxiety during the identification procedure itself. Test anxiety, according to Nolan and Markham (1998) refers to an individual’s tendency to reflect “a lack of confidence in her/his abilities” and to experience “a heightened awareness of possible negative outcomes” (p. 45). Not surprisingly,

those who score high in test anxiety also report having less confidence in performance situations. It is therefore reasonable to expect a witness to experience test anxiety due to the fact that the level of task importance is elevated and that the task is likely unfamiliar; in a 1998 study, Nolan and Markham investigated this notion.

Nolan and Markham (1998) sought to determine if test anxiety moderated the relationship between accuracy and confidence. Participants in this study viewed a crime and a week later, were asked to answer a set of questions about the event and to rate their confidence in each answer. Additionally, participants completed a questionnaire designed to measure test anxiety that, based on their scores, researchers used to split participants into low and high anxiety groups. Researchers found that participants who were highly anxious expressed significantly less confidence in the accuracy of their answers overall, than did participants who were less anxious. Further analysis demonstrated that highly anxious participants were significantly less confident in answers that were correct, than were participants who were less anxious. However, participants in the high and low anxiety groups expressed comparable levels of confidence in the answers that were incorrect. Although more evidence is needed, results from this study do provide some support for the notion that test anxiety may moderate the accuracy-confidence relationship among eyewitnesses.

One additional and noteworthy piece of information from this study is that during their experiment, Nolan and Markham (1998) sat participants so that they were faced with a screen that projected a live video feed of the session. This design

component was intended to increase participants' feelings of anxiety and self-awareness and is noteworthy because it suggests that self-awareness can be operationalized through visual feedback of the self (Nolan & Markham, 1998).

Similarly, other researchers have found that in addition to a live video feed, mirrors can also be used to operationalize self-focused attention (Carver & Scheier, 1997). In a series of four studies, Carver and Scheier examined the effects of self-focused attention on an individual's transient affective state in order to determine if the effects of self-focused attention would vary as a function of valence (Carver & Scheier, 1997). In Carver and Scheier's studies, participants were either faced with a mirror or not faced with a mirror while either a positive (e.g., attraction) or negative (e.g., depression) emotion was made salient. Researchers found that when a mirror was present, participants provided higher intensity ratings of the manipulated emotion in question, regardless of whether the emotion was positive or negative. Carver and Scheier (1997) suggest that when faced with a mirror, participants were cued to shift their attention towards themselves and consequently, to become more cognizant of their "transient affective state" (p. 625). Thus, Carver and Scheier conclude that the presence or absence of a mirror can be used to manipulate self focus, thereby providing additional evidence to validate mirrors as a successful way to induce self-focus (Feningstein, Scheier, & Buss, 1975; Scheier, 1976; Carver & Scheier, 1978).

At this point it is apt to state that many police procedure rooms contain one-way mirrors. Based on the findings explored in this section, it seems plausible that under the assumption that an eyewitness is experiencing anxiety during an

identification procedure, a one-way mirror may increase anxiety and inhibit eyewitness performance. Experiments 1A and 1B determined if participants who make an identification from a photospread will report higher levels of state-anxiety when faced with a one-way mirror when compared to those who make an identification in the absence of a mirror. Experiment 2 built upon the results from experiments 1A and 1B.

EXPERIMENT 1A

Method

Participants

Participants in Experiment 1A were 31 undergraduate psychology students (21 women, 7 men, 2 no reported gender) who ranged in age from 17 to 21 ($M = 18.41$, $SD = 0.88$) years old. Participants were recruited from an introductory psychology class at a small liberal arts college and received extra credit for their participation. No restrictions were placed upon participant eligibility, and informed consent was obtained prior to beginning the experiment.

Materials

Crime Video and Photospread

In the first portion of the experiment, participants viewed a 43 second video of a staged encounter. In the video, an individual returns to his office where he sees a man building a bomb on the roof outside of his window (Bradfield, Wells, & Olson, 2002). Once the “bomber” sees the man looking out his window, the bomber runs into the building and then away down the stairs. In this video, the culprit looks directly at the camera when he initially sees the man looking out his window and

also while he running away; therefore, participants are able to see his entire face for a total of 3 seconds.

The target-absent photospread used in this study was created by Bradfield et al. (2002) to be used in conjunction with the crime video described above. The photospread contains two rows of three colored photographs; any identification that participants make is incorrect (false positive).

One-way Mirror

Half of the participants in this experiment completed their identification task and their questionnaires in front of a one-way mirror, and the other half completed their task and measures when the mirror was fully covered by a non-transparent shade. The mirror used in this experiment is located in one of the college's psychology research labs and is believed to be comparable to the one-way mirrors that are found in police stations.

Confidence and Task Engagement Questionnaire, Profile of Mood States, State-Trait Anxiety Inventory

Immediately after making their identification, participants were asked to report on a scale of 0 (*not at all*) to 6 (*extremely*) how confident they were that they "correctly identified the perpetrator." Participants were also asked to answer questions about their level of engagement in the study (e.g., "*How much did you care about giving a correct response in this study?*") (Baron et al., 1996) (see Appendix A).

Participants subsequently completed the Profile of Mood States Short Form (POMS-SF), a 37 item self-report questionnaire that is designed to assess six dimensions of an individual's mood state (see Appendix B) (Shacham, 1983). This

measure contains six subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, confusion-bewilderment. This measure was designed to be a manipulation check to ensure that the one-way mirror is a manipulation of anxiety only, and not of any other mood state.

Last, participants completed the State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1983) a 40-item questionnaire designed to assess an individual's state anxiety and trait anxiety (see Appendix C). The STAI has adequate discriminant validity for state and trait anxiety, and has also been successfully administered in a general, subclinical population (Metzger, 1976; Ray, 1984).

Procedure

Upon arrival at the research lab and after obtaining informed consent, participants were seated at a desk and instructed to watch the crime video on a 13-inch MacBook Pro. Participants were told to start the video once the experimenter left the room and then to join the experimenter in the hall when the video ended. Thereafter, the participants and the experimenter moved to the adjacent laboratory room that contained the one-way mirror.

Once inside the mirror room, participants were seated at a desk directly in front of the one-way mirror. In the high-anxiety condition the mirror was exposed, and in the low-anxiety condition, the mirror was covered by a closed shade. The examiner then provided participants with the photospread and an identification sheet, recited unbiased instructions that the culprit "may or may not be present in the lineup," and informed participant that she would step outside while participants made his or her identification. After one minute, the examiner returned to the room

to collect the participant's identification materials and to give the packet of questionnaires that contained the confidence rating, POMS-SF, and the STAI. Subsequent to completing the questionnaires, participants were thanked for their participation and debriefed (see Appendix D).

Results

Table 1 lists the frequency of misidentification per lineup member, as well as the frequency of correctly opting to not make an identification, as the true culprit was not present in the lineup. One participant's identification was eliminated due to the fact that he made two identifications.

After making their identifications, using a scale of 0 (*not at all*) to 6 (*extremely*) participants reported how hard they tried on the task, how much they cared about giving a correct response, and how strong of a desire they had to be above average on the task. A series of one-sample t-tests comparing participant's responses to the midpoint of the scale demonstrated that participants reported trying significantly harder on this task ($M = 4.60$, $SD = 0.93$), $t(29) = 9.40$, $p < .001$, and cared significantly more than the midpoint about giving a correct response ($M = 4.6$, $SD = 1.33$), $t(29) = 6.78$, $p < .001$. Furthermore, a series of two-sample independent groups t-tests demonstrates that participants in the no-mirror condition tried equally as hard on the task as those in the mirror condition, and that participants in the no-mirror condition cared equally as much about giving a correct response when compared to those in the mirror condition (Table 2).

A series of independent-sample t-tests revealed that when compared to the no-mirror condition, participants in the mirror condition did not have significantly

different scores of: vigor-activity, depression-dejection, confusion-bewilderment, tension-anxiety, anger-hostility, or fatigue-inertia (Table 3).

Scores from the STAI (Speilberger et al., 1983) indicate that the average state anxiety score was 39.03 ($SD = 9.31$) and the average trait anxiety score was 41.00 ($SD = 8.20$). Contrary to expectations, women's trait anxiety scores ($M = 40.95$, $SD = 8.81$) were not significantly higher than men's ($M = 38.29$, $SD = 6.23$), $t(26) = -1.15$, $p = .33$), nor were women's reported levels of state anxiety ($M = 40.95$, $SD = 10.32$) significantly higher than men's ($M = 34.43$, $SD = 4.237$) $t(26) = -1.16$, $p = .11$. There were also no significant differences between state anxiety scores in the mirror condition when compared to the no-mirror condition (Table 4).

Last, an evaluation of confidence scores demonstrates that on a scale of 0 (*not at all*) to 6 (*extremely*) participants were moderately confident that they had made a correct choice in the identification task ($M = 2.97$, $SD = 1.45$). A one-sample t-test comparing participant's confidence scores to the midpoint of the scale indicate that participant's confidence scores were not significantly different ($M = 2.97$, $SD = 1.45$), $t(29) = -0.12$, $p = .90$. A two-sample independent group t-test revealed that although the difference in confidence scores among participants who made an identification ($M = 2.68$, $SD = 1.24$) was not significantly lower than the confidence scores of those who opted not to make an identification ($M = 3.71$, $SD = 1.89$), $t(27) = 1.67$, $p = .10$, the results suggest that there is a trend. Last, a two-sample independent groups t-test demonstrates that there was no significant difference in confidence scores of those in the no-mirror condition ($M = 3.20$, $SD = 1.65$) and those in the mirror condition ($M = 2.73$, $SD = 1.22$), $t(27) = 0.87$, $p = .38$.

Discussion

The results from Experiment 1A did not support the hypothesis that participants who made an identification would report higher levels of state-anxiety when faced with a one-way mirror when compared to those who made an identification in the absence of a one-way mirror. However there were two primary flaws in Experiment 1A that likely contributed to these results. First, participants completed their identification task immediately after viewing the video which did not leave adequate time for participants to recognize and, potentially, to be affected by the presence of the mirror. In addition, some participants appeared to be confused by the unbiased directions and were unclear as to whether or not they were being asked to make an identification. Therefore, Experiment 1B was designed to remedy these shortcomings and determine if the improvements would produce the predicted results.

EXPERIMENT 1B

Method

The procedures, materials, and analytic approach used in Experiment 1B were the same as Experiment 1A with three exceptions. First, subsequent to watching the crime video and prior to the identification task, participants were left alone in the mirror room for 2.5 minutes. The experimenter told participants in the mirror condition that she “just needs to gather some materials on the other side of the mirror, and will be back shortly,” whereas participants in the no-mirror condition were told that the examiner “just needs to gather some materials and will be back shortly.” This change was intended to explicitly direct participant’s attention towards the mirror and to expose them to the mirror for a short amount of

time *before* administering the identification task. It seems plausible that in Experiment 1A, participants immediately focused their attention on the identification task and were therefore not recognizing or being affected by the presence of the mirror.

Second, when tasked with making an identification, participants were provided with written instructions rather than verbal instructions in attempt to eliminate vocal bias and to provide clear directions. The directions were written as follows:

Please identify the culprit from the video using the photospread provided. Record your identification by marking the box on the identification sheet that corresponds with the chosen suspect. When you are finished, please remain seated; the examiner will return shortly.

The third difference in Experiment 1B is that unbiased instructions were omitted due to the confusion that some participants experienced in Experiment 1A as to whether or not they were expected to make an identification. The unbiased instructions were also eliminated in order to determine if perhaps, the forced choice would have an effect on confidence or anxiety. Thus, with the exception of the three changes noted above, Experiment 1B was carried out in the same way and using the same materials as in Experiment 1A.

Results

Twenty-four undergraduate psychology students (16 women, 8 men) aged 17 to 21 years old ($M = 18.46$, $SD = 0.97$) participated in Experiment 1B. All but one participant made an identification from the target-absent lineup. Table 5 lists the frequency of misidentifications per lineup member and demonstrates that lineup member 3 was misidentified most frequently (41.7% of misidentifications).

Subsequent to making an identification, participants rated on a scale of 0 (*not at all*) to 6 (*extremely*) how hard they tried on the task, how much they cared about giving a correct response, and how strong a desire they had to perform above average on this task. A series of one-sample t-tests were used to compare participant's ratings to the midpoint of the scale and reveal that participants scores were significantly higher than the midpoint and that participants: reported trying significantly hard on the task ($M = 4.22, SD = 1.31$), $t(23)=4.57, p < .001$; caring significantly about giving a correct response ($M = 4.54, SD = 1.02$), $t(23)=7.40, p < .001$; and having a significant desire to perform above average on this task ($M = 4.43, SD = 1.29$), $t(23)=5.43, p < .001$. Although participants overall scores suggest that participants were motivated to engage in this study, a series of two-sample independent groups t-test indicate that this differed as a function of condition (mirror versus no-mirror). Although participants tried equally as hard in the no-mirror condition as they did in the mirror condition (*try*), participants in the mirror condition cared significantly less about giving a correct response (*care*) and had a significantly lower desire to perform above average (*desire*) (Table 6).

A series of two-sample independent groups t-tests were conducted to determine if there were any significant differences in POMS-SF (Shacham, 1983) scores between participants in the no-mirror condition and participants in the mirror condition. Results demonstrate that there were no significant differences between participants in the mirror condition and participants in the no-mirror condition's reported feelings of: vigor-activity, depression-dejection, confusion-bewilderment, tension-anxiety, anger-hostility, or fatigue-inertia (Table 7).

Subsequently, a series of tests were used to evaluate STAI scores (Spielberger et al., 1983). The average state anxiety score was 40.06 ($SD = 8.21$) and the average trait anxiety score was 41.25 ($SD = 7.60$). As expected, women reported significantly higher levels of trait anxiety ($M = 43.31, SD = 7.35$) when compared to men ($M = 37.13, SD = 6.71$), $t(22) = -1.99, p = .05$; however, contrary to expectations, women's reported levels of state anxiety ($M = 41.71, SD = 8.38$) did not differ from men's reported levels of state anxiety ($M = 36.75, SD = 7.22$), $t(22) = -1.42, p = 1.67$. Additionally, participants levels of state anxiety in the mirror condition ($M = 40.07, SD = 8.63$) were not significantly different than participant's levels of state anxiety in the no-mirror condition ($M = 40.04, SD = 8.10$), $t(22) = -0.00, p = .99$.

Confidence scores reported on a scale of 0 (*not at all*) to 6 (*extremely*) demonstrate that overall, participant's confidence scores ($M = 2.83, SD = 1.52$) did not differ significantly from the scale's midpoint $t(23) = -0.53, p = .59$. There were no significant differences between confidence reports in the mirror condition ($M = 2.69, SD = 1.25$) when compared to the no-mirror condition ($M = 3.00, SD = 1.84$), $t(22) = 0.48, p = .63$.

Discussion

Experiment 1B was designed to manipulate eyewitness anxiety; however, results demonstrate that the one-way mirror did not increase participants state anxiety levels. Participants who made an identification in front of a one-way mirror did not report higher levels of state-anxiety when compared to participants who made an identification in the absence of a one-way mirror. Though there is evidence for the relationship between self-focused attention and anxiety, Mor and Winquist

(2002) report that the evidence has been mixed. Mor and Winquist conducted a meta-analysis of 149 studies and synthesized 226 effect sizes in order to evaluate the relationship between self-focused attention and negative affect (i.e. depression, anxiety, and negative mood). What Mor and Winquist found was that of the three forms of negative affect included in their meta-analysis, depression was more strongly associated with self-focus than was anxiety. In addition, although mirrors are the most commonly used manipulation of self-focus, studies using mirrors as a manipulation of self-focus had generally small effect sizes.

Mor and Winquist's (2002) finding that depression is more strongly associated with self-focus than anxiety is particularly illuminating for the purpose of understanding the results for Experiment 1B. For, not only does it help explain why the one-way mirror did not increase participants state anxiety levels, but it also helps to understand the unforeseen effects that the mirror had on eyewitness performance. The results from Experiment 1B revealed that when compared to participants in the no-mirror condition, the participants in the mirror condition reported caring significantly less about giving a correct response in the study and had a significantly lower desire to perform above average on the task. Given Mor and Winquist's findings, it is likely that the mirror evoked depressive symptoms, such as self-doubt, that caused participants in the mirror condition to not care about the task, or about performing above average on the task.

Due to the fact that the mirror had no effect on participants state anxiety levels in Experiment 1A and Experiment 1B, the research in Experiment 2 shifts

direction to expand upon a paradigm wherein dispositional anxiety is known to interact with memory conformity (Wright, Busnello, Buratto, & Stein, 2012).

EXPERIMENT 2

Previous research has focused on causal explanations for the conformity effects on eyewitnesses, including effects of eyewitness confidence (Wright et al., 2000; Skagerberg & Wright, 2009; Wright & Villabla, 2012), co-witness relationship type (French, Garry, & Mori, 2008; Hope et al., 2008), physical characteristics of suspects (Zajac & Henderson, 2009), and response order (Wright, Mathews, & Skagerberg, 2005; Skagerberg & Wright, 2009). Yet, little attention has been paid to the ways in which individual differences influence memory conformity. In order to achieve a deeper understanding of the effect of co-witness interactions on memory conformity, it is necessary to evaluate how attuned co-witnesses are to socially transmitted information (Wright, London, & Waechter, 2010). For, in spite of the justice system's tendency to ignore recommendations for procedures to evaluate eyewitness evidence (Wells & Olson, 2001), understanding the effect of individual differences on memory conformity could potentially effect meaningful change in eyewitness procedures.

Wells (1978) draws an important distinction between *system variables* and *estimator variables*, and the respective utility of eyewitness research that focuses on either category of variables. System variables refer to variables that are under the direct control of the justice system (e.g., lineup presentation, lineup content, police interrogation methods; Wells & Olson, 2003), whereas estimator variables cannot be controlled in criminal cases (e.g., race of the culprit, personality type of the

victim, the presence of a weapon during a crime; Wells & Olson, 2003). Although the effect of estimator variables can only be estimated in real life cases, estimator variables are important for two reasons. First, estimator variables can help researchers develop an understanding of the variance in eyewitness memory performance. Second, once researchers have developed an understanding of the relationship between a given estimator variable and eyewitness performance, researchers can endeavor to find system variables that can help mitigate the detriments of the estimator variable in question (Wells & Olson, 2001). The later strategy has been applied in the context of a well-known and important estimator variable: race (Wells & Olson, 2001).

Eyewitnesses are less likely to misidentify a suspect of their own race than they are to misidentify a suspect of another race (Wells & Olson, 2001). Known as “the other-race effect,” the estimator variable of an eyewitness’s race is, according to Wells and Olson, perhaps the most extensively researched variable in the context of eyewitness identification performance (Wells & Olson, p. 230). A recent meta-analysis of 39 studies (91 effect sizes) that tested participants’ memories for other-race and same-race faces demonstrates that mistaken identifications are 1.56 times more likely to occur in cross-racial identifications than they are to occur in within-race identifications (Meissner & Brigham, 2001). Yet, Wells and Olson argue that establishing an understanding of the other-race effect does not mean that it must be accepted as unchangeable fact. Rather, researchers argue that system variables can be used to mitigate the other-race effect. For example, Wells and Olson suggest that increasing the number of fillers (i.e., lineup members who are known to be

innocent) in a lineup can decrease the magnitude of the other race effect and help minimize the chances that a witness will choose an unknown innocent suspect. Importantly, such a recommendation for decreasing cross-racial misidentifications would not have been possible without first researching race as an estimator variable. It is with this logic in mind that I argue for the importance of expanding research on an estimator variable that has only recently attracted empirical attention in the context of memory conformity: social anxiety (Wright, London, & Waechter, 2010; Wright et al., 2012).

Social Anxiety and Memory Conformity

Wright, London, and Waechter (2010) posit that some individuals are more attuned to socially transmitted information than others. The degree to which an individual is receptive of socially transmitted information will influence the likelihood that he or she will combine his or her beliefs with the beliefs of a co-witness, thereby engaging in memory conformity (Wright, London, & Waechter).

There are two primary components of social anxiety: social avoidance and fear of negative evaluation (Wright, London, & Waechter, 2010). Wright et al. contends that although social avoidance and fear of negative evaluation are positively correlated (La Greca et al., 1988), the two constructs will have opposite effects on memory conformity. In social situations, socially anxious individuals feel that they are constantly at risk for behaving in a way that will cause others to view them negatively (e.g., awkward, unintelligent, incompetent, flawed, Clark & Wells, 1995; Schultz & Heimberg, 2008). Therefore, Wright, London, and Waechter contend that socially anxious individuals who score high on fear of negative

evaluation will be *more* likely to conform because the cost of disagreeing with their co-witness is high. This notion is supported by evidence from Baron, Vandello, and Brunzman (1996) who report that people are more likely to conform to others when the cost of disagreeing is high (e.g., identification accuracy will be used to inform the State's eyewitness identification procedures) and the cost of making an error is low. Conversely, Wright, London and Waechter predict that socially anxious people who score high on socially avoidance will be *less* likely to engage in memory conformity because socially avoidant individuals pay less attention to socially transmitted information and therefore will be less influenced by others. Therefore, those who are socially avoidant are less likely to absorb and incorporate co-witness information into their memory reports (Wright, London, & Waechter; Wright et al., 2012).

Indeed, Wright, London, and Waechter (2010) found evidence to support their theory regarding the differential effects of social anxiety on memory conformity. In their study, 98 adolescents completed an individual measure of social anxiety, the Social Anxiety Scale for Adolescents (SAS-A) (La Greca & Lopez, 1998) which contains three subscales: 1) Fear of Negative Evaluation (FNE) general social avoidance and distress (SAD-General), and social avoidance and distress in new situations (SAD-New). Next, participants completed a facial recognition task in pairs; the first part of the task required each pair to sit together and view 50 photos of faces (for 2 seconds each with no time interval between photos). Participants were then informed that they would complete a memory task, and that they would be shown 100 photos that were a mix of old (previously seen) or new (not

previously seen) photos of faces. Researchers instructed participants to mark on their shared answer sheet whether a given photo was old or new. In this study, participants were randomly assigned to answer first (control group) or second (PEI group) for the entire experiment. The control group provided data regarding baseline recognition accuracy, and those who answered second provided conformity data. When the second respondent provided the same answer as the first respondent, memory conformity occurred.

As predicted participants' fear of negative evaluation scores were positively correlated with memory conformity (Wright, London, & Waechter, 2010).

Researchers also found that social avoidance was negatively correlated with memory conformity, but only after controlling for fear of negative evaluation and only using participants' scores of social avoidance and distress in new situations. This study was the first to demonstrate a relationship between memory conformity and social avoidance. Further, Wright, London, and Waechter's study validates the need for researchers to continue to explore how personality variables influence memory suggestibility.

In a subsequent study, Wright et al. (2012) sought to replicate and expand upon Wright, London, and Waechter's (2010) findings by assessing the relationship between memory conformity and social avoidance within a sample of college students. In this study, researchers modified their design and used a slightly different memory task, as well as a different measure of social anxiety, the Liebowitz Social Anxiety Scale (LSAS) (Liebowitz, 1987). The modified recognition task was completed in two parts over the course of 2 days. During the first part of the

experiment, participants individually viewed 60 photographs (of faces, buildings, animals, objects, and scenes) that varied in valence (positive, negative, neutral), and that were each shown for 1 second, with 1-second intervals between photos.

Participants then completed the LSAS, and were asked to return in two days to complete the second part of the experiment. In the second part of the experiment, participants were randomly assigned into pairs with a fellow student of the same gender. Participants were given a response sheet with an 'old' and 'new' column for each participant, and 126 rows for each photo (22 new photos of each valence, and 20 old photos for each valence). In this study, participants alternated answering first so that each participant answered first for half of the trials and second for the other half of the trials. Social avoidance was negatively associated with memory conformity. Notably, the relationship between social avoidance and memory conformity existed without having to control for fear of negative evaluation. Once again, Wright et al. argue that because socially avoidant individuals are "less likely to process and act upon the behavior of others," they are less likely than non-avoidant individuals to conform (p. 83). Thus, Wright, London, and Waechter (2010) and Wright et al. (2012) found individual differences in levels of social avoidance affects how susceptible people are to memory conformity. The relationship existed among adolescents (Wright, London, & Waechter, 2010) and college students (Wright et al., 2012), as well as after immediate recognition testing (Wright, London, & Waechter, 2010) and recognition after a two day delay (Wright et al., 2012).

The Present Research

It seems plausible, however, that there are conditions under which socially avoidant individuals are more, or even equally as likely as non-socially avoidant individuals to engage in memory conformity. A marked characteristic of social anxiety is the tendency to direct attention toward the self (Schultz & Heimberg, 2008). Most researchers agree that self-focused attention is the “critical attentional process” among socially anxious individuals, who typically focus on negative internal thoughts during social interactions (Schultz & Heimberg, 2008, p. 1207). There is a discrepancy, however, regarding how vigilant socially anxious people are to sources of external threat (Clark & Wells, 1995; Rapee & Heimberg, 1997; Schultz & Heimberg, 2008). Some researchers (Mogg, Phillipot, & Bradley, 2004) have provided evidence that socially anxious individuals demonstrate an attentional bias to external sources of threat, whereas other researchers (Mansell, Clark, & Ehlers, 2003; Pineles & Mineka, 2005; Schultz & Heimberg, 2008) have found that socially anxious individuals demonstrate an attentional bias toward internal threat cues (i.e., physiological cues, negative thoughts) that detracts attentional focus from external sources of information. In attempt to reconcile this empirical discrepancy, Schultz and Heimberg (2008) posit that throughout the course of a social interaction, individuals with social anxiety engage both internal and external attentional processes; however, it remains unclear what motivates the shifts between internal and external attentional focus. Another explanation, perhaps, is that the context of the social interaction influences whether or not the socially anxious individual attends to internal or external sources of information. Such a shift in attentional

focus would, according to Wright, London, and Waechter (2010) influence susceptibility to memory conformity.

Only two previous studies have demonstrated a relationship between social avoidance and memory conformity, and neither of the two studies manipulated social context. Experiment 2 sought to fill this empirical void by replicating and expanding upon Wright et al.'s (2012) experimental paradigm to determine if manipulating the social context – and therefore, attentional focus – will have an effect on memory conformity rates. Experiment 2 determined if manipulating task instructions prior to a memory recognition task can cause socially avoidant individuals to be more, equally, or less likely than non-socially avoidant individuals to engage in memory conformity.

Previous research demonstrates that without manipulating the social context, socially avoidant individuals will be less likely than non-socially avoidant individuals to engage in memory conformity (Wright, London, & Waechter, 2010; Wright et al., 2012). In Experiment 2, the *no-motivation* condition is designed to replicate previous findings; therefore, participants in the no-motivation condition will only receive basic task instructions. Without manipulating the social context, individual differences in social avoidance should, by itself, show that socially avoidant participants conform less than non-socially avoidant participants.

Research involving socially avoidant college students reveals that individuals who are self-focused and doubt their competency to perform adequately in social situations are less concerned about how well they actually perform and instead, are focused on escaping the social situation (Burgio, Merluzzi, & Pryor, 1986). In

Experiment 2, a *forced unanimity* condition was designed by drawing on this notion to predict that socially avoidant participants – who by definition, are not confident in their social abilities and are motivated to avoid social situations – will be *more* likely to conform to their partner when the threat of a prolonged, confrontational social encounter exists. Under this condition, the threat of confrontation (or even conversation) should heighten the socially-avoidant participant's motivation to escape the social situation and thereby increase their conformity.

Last, in attempt to eliminate the differences in conformity rates among socially avoidant and non-socially avoidant participants' tendencies to conform, a third group of participants will be informed that there is a cash reward for the most accurate participant (*monetary incentive*). Though Baron et al. (1996) demonstrate that the social context profoundly shapes conformity, Baron et al. also contend that when there are financial incentives for accuracy, people are more likely to resist the pressure to conform. In this condition, the appeal of a monetary reward should overshadow any personality differences in likelihood to conform, ensuring that conformity rates are equal between the socially avoidant and non-socially avoidant participants.

Thus, in Experiment 2 it is predicted that in the *no-motivation* condition, socially avoidant participants will be less likely to conform than non-socially avoidant participants; in the *forced unanimity* condition, socially avoidant participants will be more likely than non-socially avoidant participants to conform; and in the *monetary incentive* condition, socially avoidant participants will be

equally as likely as non-socially avoidant participants to engage in memory conformity [see Figure 1 for predicted results].

Method

Participants

One hundred and twenty participants (90 women, 30 men) completed Experiment 2. Participants ranged in age from 18 to 24 ($M = 19.7$, $SD = 1.35$) years. The majority (65%) of participants identified as White, 13.6% as Asian, 10% as African American, 4.8% as Hispanic, 3.3% as Mixed Race, 0.8% as Middle Eastern, and 1.6% opted not to report their race.

Participants were recruited from a small liberal arts college. Participants were recruited through e-mail advertisements to the general student population and also from introductory neuroscience and psychology courses. The only restriction placed upon participation was that students not sign up to participate with a friend in the second portion of the experiment. Students received either \$10 or partial course credit for their participation in this experiment. Informed consent was obtained prior to beginning the experiment.

Materials

Social Anxiety Scale and Empathy Quotient

Subsequent to providing informed consent, participants were asked to fill out an online questionnaire that was comprised of: (1) questions regarding basic demographic information (e.g., age, gender, race), (2) a measure of social anxiety, and (3) a measure of empathy. To control for order effects, participants were randomly assigned to either complete the measure of social anxiety, The Liebowitz

Social Anxiety Scale (LSAS), before the measure of empathy, the Empathy Quotient (EQ-40), or to complete the EQ before the LSAS (Liebowitz, 1987; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004).

The Liebowitz Social Anxiety Scale (LSAS) (Liebowitz, 1987) is a 24 item questionnaire that requires participants to rate their feelings of anxiety within a variety of situations, as well as their tendency to avoid those situations. The questionnaire is comprised of 13 items to address performance situations (e.g., “participating in small groups,” p. 152) and 11 items to address social interactions (e.g., “talking to people in authority,” p. 152). For each item, participants rate how anxious or fearful they feel in each situation (using a scale of 0 (*none*) to 3 (*severe*)), and also how often they avoid each situation (using a scale of 0 (*never*) to 3 (*usually*)) (p. 152) (see appendix E). The LSAS thus provides an overall score of social anxiety, as well as six additional scores: total avoidance, avoidance of social interaction, avoidance of performance, total anxiety, performance anxiety, and anxiety during social interactions (Heimberg & Holaway, 2006).

Heimberg and Holaway (2006) contend that the LSAS is the most widely used measure of social anxiety. Heimberg et al. (1999) have determined that the LSAS has “excellent internal consistency” and that the LSAS is a reliable and valid measure of social anxiety. Furthermore, Heimberg and Holaway (2006) found that, with a high degree of accuracy, the LSAS can differentiate between: (1) patients with social anxiety disorder and non-anxious controls, (2) patients with social anxiety and patients with generalized anxiety disorder (GAD), and (3) different subtypes of social anxiety disorder (Heimberg & Holaway, 2006).

The Empathy Quotient (EQ-40) is a 40 item questionnaire that requires participants to rate the extent to which they strongly agree, slightly agree, slightly disagree, or strongly disagree with statements that are designed to assess empathy (Baron-Cohen & Wheelwright, 2004) (see appendix F). Empathy is a complex construct that is difficult to define; consequently, psychologists have contested how to best define and measure empathy. The EQ-40 was created to measure empathy as defined by Baron-Cohen and Wheelwright as "... the drive or ability to attribute mental states to another person/animal, and entails an appropriate affective response in the observer to the other person's mental state." (p. 168). Baron-Cohen and Wheelwright posited their definition of empathy to a panel of six judges along with 60 items (40 items to measure empathy and 20 filler items) to determine if each item fit with Baron-Cohen and Wheelwright's notion of empathy. Indeed, researchers found that five out of six judges rated each of the 40 items used in the EQ as consistent with Baron-Cohen and Wheelwright's definition of empathy.

Further, researchers have found that the EQ-40 can discriminate between adults with Asperger's Syndrome (AS) or High-Functioning Autism (HFA) who demonstrate clinical difficulty with empathy, and aged-matched controls (Cohen & Wheelwright, 2004). Further, Cohen and Wheelwright found that within the normal control group, women score significantly higher than men, a finding that is consistent with previous research on individual differences in empathy. Thus, the EQ-40 can adequately discriminate between those with AS/HFA and age-matched controls, and is also sensitive to reported gender differences within a normal control sample.

Video and Slideshow of Faces

In the first part of the experiment, participants viewed a 2-minute long video of 60 color photographs of Black men who were photographed from the shoulders up, and wearing maroon sweatshirts. Each photo was shown for 1 second, with 1-second intervals between photos. There were two versions of the video: *video A* and *video B*. The difference between *videos A* and *B* was that each video contained an entirely different set of faces. The first group of 26 participants all viewed *video A*, but all subsequent participants were randomly assigned to watch either *video A* or *video B*.

The slideshow of faces that was used for the old-new task in the second part of experiment consisted of all the photos from both *video A* and *video B*. All 120 photos in the slideshow were randomized and presented using PowerPoint.

Partner Relationship, Confidence Rating, and Task Engagement Questionnaire

After completing the old-new task, all participants were asked to fill out a questionnaire designed to determine if participants knew each other and if participants felt comfortable interacting with their partner (see appendix G). Participants were also asked how confident they were in the accuracy of their identifications, and how engaged they were in the experiment (e.g., “How much did you care about giving a correct response in this study?”).

Procedure

Scheduling

The first 26 participants who participated in this experiment signed up to complete part 2 upon their arrival to complete part 1. However, this scheduling

method was time consuming and posed the risk that participants might establish rapport prior to completing the old/new task. Therefore, the experimenter contacted all subsequent participants via e-mail to schedule part 2.

Part 1: Video Exposure, Completion of LSAS and EQ

Participants completed part 1 in groups that ranged in size from two to twelve participants. Eight participants completed part 1 on their own due to scheduling conflicts or missed sessions; of the participants who completed part 1 on their own, seven completed part 1 in the presence of the experimenter and one participant completed part 1 on her own (after receiving the same detailed instructions that other participants received).

The participants who completed part 1 in groups, did so in a campus computer lab. After obtaining informed consent, participants were instructed to complete the online questionnaire that was pre-loaded on their screen (consisting of the LSAS, EQ, and demographic questions), and then to watch the video of faces one time. Participants were then thanked for their participation in part 1, and reminded of the time that they were scheduled to complete part 2.

Part 2: Photo Recognition Task

Participants completed part 2 within 1 to 4 days of completing part 1. The average number of days between testing sessions was 2.48 (SD = 0.71) days. The majority (87.5%) of participants completed part 2 either two or three days after completing part 1, 3 participants (2.5%) completed part 2 the day after completing part 1, and 12 participants (10%) completed part 2 four days after completing part 1.

Although participants provided informed consent for both parts of the experiment at time 1, participants signed an additional informed consent form at time 2 to signify that they consented to continue their participation. The experimenter then read participants the following task instructions:

You will be shown a set of photos, some of which you saw during the study session and some of which are new and that you did not see in the study session. You will be instructed to mark on your answer sheet whether the photo was old (meaning you saw it in the study phase) or new (meaning you didn't). So, when a photo is shown, participant A (*use randomly selected partner name*) will mark whether or not the photo is old or new, and pass the sheet to participant B (*use partner name*) who will mark whether or not the photo is old or new. Then, participant B (*use name*) will hit enter, a new photo will appear, and he/she will mark whether or not the photo is old or new, and pass the sheet to participant A (*use name*). This back-and-forth will continue until all photos have been shown.

Prior to their arrival, each pair of participants was randomly assigned to one of three conditions: *no motivation*, *forced unanimity*, or *monetary incentive*. All participants received the basic task instructions; participants in the *no motivation* condition did not receive any instructions beyond the basic task instructions.

Participant who were in the *forced unanimity* condition received the following directions in addition to the basic task instructions:

After the recognition task, we will have you go back through all the items on which you disagreed with your partner and see if you can come to an agreement. Sometimes a face-to-face conversation can resolve disagreements. While you make your initial judgment though, it is important to remain focused on the screen. If there is limited or no disagreement during this initial rating task, you will move on to another portion of the experiment.

Participants in the *monetary incentive* condition received the following instructions in addition to the basic task instructions:

After the recognition task, we will go through your answers to determine the accuracy of your answers. The most accurate participant will be awarded \$10. (After the old/new task, participants were informed that the most

accurate participant would be contacted by the end of the week to receive his or her reward money).

Last, all participants, regardless of condition, were reminded that participant A answers first on all of the odd numbered photos and participant B answers first on all of the even numbered photos. The experimenter provided this reminder to ensure that participants did not lose track of who was supposed to answer first as they completed the task.

After completing the old-new task, participants filled out the *Partner Relationship, Confidence Rating, and Task Engagement Questionnaire*. Upon completion of the questionnaire, participants were thanked for their participation and debriefed (see Appendix H).

Results

Conformity Scores

During the photo recognition task, participants viewed 120 photos: 60 that they had previously seen in part 1 of the experiment (old photos) and 60 that they had not seen (new photos). Participants alternated answering first during the recognition task; only participants who answered second on a given trial were eligible to conform. Conformity occurred when the first respondent provided an incorrect answer (i.e. reported that a photo was old when in fact, it was new, or reported that a photo was new, when in fact it was old) and the second respondent provided the same incorrect answer. Three conformity scores were calculated, all of which are proportions reflecting the number of trials on which participants conformed as a function of the total number of trials on which they *could have* conformed. These scores yielded three dependent variables: *total conformity*,

conformed on old, conformed on new. For ease of description, these proportions are represented as percentages throughout the results section.

Avoidance Grouping

Participants provided an avoidance rating for each of the 24 items on the LSAS: 12 items addressed performance situations and 12 items addressed social interactions. *Social interaction avoidance* was calculated by summing the avoidance rating for the items that addressed social interactions (e.g., looking at people you don't know very well in the eyes, Liebowitz, 1987), and *performance avoidance* was calculated by summing the avoidance rating for the items that addressed performance situations (e.g., participating in small groups, Liebowitz, 1987). Participants' *total avoidance* scores were calculated by adding their social interaction avoidance and performance avoidance scores.

The average social interaction avoidance score and the average performance avoidance score in Experiment 2 was 12.37 ($SD = 5.14$) and 13.23 ($SD = .64$), respectively. The mean social interaction avoidance, mean performance avoidance, and mean total avoidance scores were compared to the scores from a sample of 34 non-anxious adult controls and a sample of 46 adults with Social Anxiety Disorder (Heimberg & Holaway, 2007). The mean social interaction avoidance score in Experiment 2 was significantly higher than the mean social interaction avoidance score ($M = 3.24$) from the sample of non-anxious controls, $t(118) = 19.38, p < .001$, and significantly lower than the mean social interaction avoidance score ($M = 18.20$) from the sample with Social Anxiety Disorder, $t(118) = 12.37, p < .001$. The mean performance avoidance score in Experiment 2 was significantly higher than the

mean social interaction avoidance score ($M = 3.41$) from the sample of non-anxious controls, $t(118) = 19.01, p < .001$, and significantly lower than the mean social interaction avoidance score ($M = 16.70$) from the sample with Social Anxiety Disorder, $t(118) = -6.71, p < .001$. Last, the mean total avoidance score from Experiment 2 ($M = 25.61, SD = 9.89$) was significantly higher than the mean total avoidance score ($M = 6.65$) from a sample of 34 non-anxious adult controls, $t(118) = 10.90, p < .001$, and significantly lower than the mean total avoidance score ($M = 34$) from the sample with Social Anxiety Disorder $t(118) = -10.24, p < .001$ (Heimberg & Holaway,).

Participants total avoidance scores ranged from 3 to 55 and were normally distributed with an approximately symmetric skew of 0.295 ($SE = 0.22$). Therefore, participants from Experiment 2 were divided into two groups using a median split ($Mdn = 25.00$). Participants who had avoidance scores of 25 or below (53.8% of participants) were classified as *non-socially avoidant*, and participants who had avoidance scores of 26 or higher (46.2% of participants) were classified as *socially avoidant*.

Conformity and Social Avoidance as a function of Instructions

A 2 (Social Avoidance Grouping: Socially Avoidant vs. Non-Socially Avoidant) X 3 (Instructions: No Motivation vs. Forced Unanimity vs. Monetary Incentive) Analysis of Variance (ANOVA) was conducted to determine the effects of social avoidance grouping and instruction on participants total conformity scores. The analysis revealed that there was no main effect of social avoidance grouping, $F(1,113) = 2.20, p = .14, \eta^2 = .019$, on conformity, but that there was a significant main effect of

instructions, $F(2,113) = 4.89$, $p < .01$, $\eta^2 = .080$, on conformity. Tukey HSD *post hoc* comparisons revealed that participants in the forced unanimity condition conformed on a significantly higher percentage of trials ($M = 75.79\%$) than did participants in either the monetary incentive ($M = 67.47\%$) or the no motivation ($M = 66.90\%$) conditions, $p = .025$ and $p = .016$, respectively. The difference between conformity rates in the monetary incentive and no motivation conditions was not significant, $p = .98$.

The interaction between social avoidance grouping and instruction approached significance, $F(2,113) = 2.894$, $p = .059$, $\eta^2 = .049$, see Figure 2. A series of simple effects tests were conducted to determine the effect of social avoidance on conformity within each of the three instructions conditions. In the no motivation condition, socially avoidant participants ($M = .6$, $SD = .10$) were significantly less likely than non-socially avoidant participants ($M = .73$, $SD = .13$) to conform, $t(37) = 3.25$, $p = .002$. There was no significant difference between socially avoidant ($M = .76$, $SD = .11$) and non-socially avoidant ($M = .75$, $SD = .11$) participants conformity scores in the forced unanimity condition, $t(38) = -0.17$, $p = .86$, nor was there a significant difference between socially avoidant ($M = .68$, $SD = .15$) and non-socially avoidant ($M = .68$, $SD = .19$) participants conformity scores in the monetary incentive condition $t(38) = -0.095$, $p = .93$.

Additional testing included three variables as covariates in the ANOVA analysis. First, number of days between testing session and initial photo exposure was used to determine if participants' conformity rates were affected by the amount of time between sessions. This variable was not significant, $F(1,109) = 0.52$, $p = .47$,

$\eta^2 = .005$. None of the effects reported above changed as a function of adding days as a covariate.

Second, friend status (*friends with partner, not friends with partner*) was entered as a covariate to determine if conformity levels were affected by whether or not participants completed the photo recognition task with a friend, or with a stranger. This variable was significant, $F(1,109) = 18.50, p < .001, \eta^2 = .145$, and revealed that when including friend status as a covariate, the main effect of avoidance grouping ($F(1,109) = 3.67, p = .058, \eta^2 = .032$) approached significance, such that socially avoidant participants ($M = .67, SE = .018$) conformed significantly less than non-socially avoidant participants ($M = .71, SE = .016$). The interaction pattern was unaffected when friend status was entered into the model as a covariate.

Last, empathy was entered as a covariate to determine if conformity was influenced by individual differences in empathy. This variable was not significant, $F(1,112) = 0.14, p = .71, \eta^2 = .001$, and none of the effects reported above changed when empathy was added as a covariate.

Conformity to Old and New Photos

A 2 (*Photo Type: Old v. New*) X 2 (*Social Avoidance Grouping: Socially Avoidant vs. Non-Socially Avoidant*) X 3 (*Instructions: No Motivation vs. Forced Unanimity vs. Monetary Incentive*) mixed model ANOVA was conducted with the photo type variable manipulated within subjects on participants' total conformity scores. The analysis revealed a significant main effect of photo type on conformity rates, $F(1, 113) = 64.99, p < .001, \eta^2 = .37$. Participants were significantly more likely to

conform and report that a photo was old ($M = .73, SE = .014$) when it was actually new, than they were to conform and report that a photo was new ($M = .53, SE = .021$) when it was actually old. There was no significant interaction between photo type and condition ($F(2,113) = 2.00, p = .14, \eta^2 = .034$), between photo type and avoidance grouping ($F(1,113) = .037, p = .99, \eta^2 = .009$), or between photo type, condition, and avoidance grouping ($F(2, 113) = 1.29, p = .27, \eta^2 = .022$).

Discussion

Experiment 2 was the first study to manipulate the social context in order to evaluate the differential effects of social avoidance on memory conformity. Socially avoidant participants conformed less than non-socially avoidant participants; however, this main effect was qualified by a significant interaction in which it was apparent that this difference emerged only in the *no motivation* condition. The relationship between conformity and social avoidance changed, as predicted, when participants were incentivized with a cash reward for memory accuracy. In the *monetary incentive* condition, socially avoidant participants conformed as much as non-avoidant participants. The results from Experiment 2 did not support the hypothesis that in the *forced unanimity* condition, conformity rates would be higher for socially avoidant participants than for non-socially avoidant participants. Instead, non-socially avoidant participants conformed equally as much as socially avoidant participants.

Overall, participants in the forced unanimity condition conformed more than participants in the no-motivation and monetary instruction condition. The forced unanimity condition was designed to only be aversive to socially avoidant

participants by posing the threat of a prolonged social encounter as a consequence for discrepant memory reports. The instructions were intended to draw on certain components of social interactions that socially avoidant people tend to avoid: face-to-face discussions, talking with and among strangers, working in a group, and expressing disagreement to strangers (Liebowitz, 1987). It is certainly possible that the instructions did successfully motivate socially avoidant participants to conform more, as the conformity rates were significantly higher among socially avoidant participants in the forced unanimity condition than in the no-motivation and monetary incentive condition. However, non-socially avoidant participants' conformity rates were highest in the forced unanimity condition. It is likely that for non-socially avoidant participants, the prospect of prolonging their participation in the experiment for longer than they had initially anticipated was as undesirable as it was for non-socially avoidant participants. Therefore, it is possible that non-socially avoidant participants conformed more in the forced unanimity condition in an effort to shorten the length of the experiment.

In order to increase conformity rates only among socially-avoidant participants, future studies should make two changes to the forced unanimity condition. First, it would be beneficial to lead participants to believe that the experiment will take longer than it actually does, so that the prospect of a prolonged conversation will not be interpreted as an additional punishment, but rather an included portion of the study. Second, the instructions should be modified such that participants are informed that they will have a discussion to determine why they disagreed in general, rather than why they disagreed on each item. Even for non-

avoidant participants, the prospect of discussing discrepancies for up to 120 items is likely undesirable and may have contributed to higher conformity rates in Experiment 2.

Though the conformity rates in the forced unanimity condition differed from what was expected, the pattern of results that emerged from Experiment 2 was striking. Looking at socially avoidant and non-socially avoidant participants' conformity rates across all three instructions conditions, it is evident that the social context shaped conformity rates. For, when the context was not manipulated, individual differences in social avoidance directly influenced conformity rates; however, when the social context provided an incentive for accuracy, or an undesirable outcome for discrepant memory reports, individual differences in social avoidance were overshadowed. In the context of co-witness performance, the latter finding is concerning – especially when considering that conformity rates were highest in the forced unanimity condition. For example, it's not difficult to imagine a situation wherein a co-witness, after witnessing a crime and faced with the prospect of a long police investigation, might conform to his or her co-witness's memory report in an effort to avoid having to explain, defend, and discuss a discrepant memory report with an authority figure (e.g., police, lawyer). Disagreeing in such a context would carry a high cost and could influence conformity (Baron et al., 1996). When multiple people witness a crime, an eyewitness's report can be contradicted by other witnesses' reports (Shaw et al., 2007). Shaw et al. argue that when there is a chance for contradiction, a witness will decrease his or her public display of confidence in an effort to avoid the social cost of being highly confident and wrong

(Shaw et al.). Even though Shaw et al. found that people's private confidence ratings were higher than their public confidence ratings, Baron et al. have demonstrated that when the difficulty of a task is high, and the importance of providing a correct response is also high, people are more likely to conform to group members, even if the group member is incorrect. Consequently, in a context wherein the task (e.g., eyewitness identification) is difficult, and the importance of providing a correct response is also high (e.g., avoiding the social costs contradiction) it is reasonable to expect conformity rates to increase, regardless of individual differences in social avoidance.

Future research should expand upon the present research by exploring how other manipulations of the social context – such as the presence of an authority figure, or requiring participants to provide public confidence ratings – would influence conformity rates. It would be beneficial to continue building upon the findings from Experiment 2 by drawing on the characteristics that shape the social context during eyewitness identification procedures. Such an endeavor would foster a deeper understanding of how the social context influences conformity rates in an applied setting.

Conformity to Old and New Photos

In an effort to contribute evidence to help resolve an empirical discrepancy, Experiment 2 sought to determine whether people are 1) more likely to conform by reporting a previously unseen item as previously seen, than they are to conform by report a previously seen item as previously unseen (Wright, Matthews, & Skagerberg, 2005; Wright et al., 2012) or 2) equally as likely to conform in either

direction (Wright, Self, & Justice, 2000). However, results from Experiment 2 demonstrate that participants were more likely to conform and report that a photo was old (previously seen), when it was actually new (previously unseen). Given that Experiment 2 actually expanded the discrepancy, it is worth comparing the studies in attempt to determine the potential source of the discrepancy.

There are two notable differences between Experiment 2 and the studies that found different patterns of conformity for previously seen and previously unseen items (Wright, Self, & Justice, 2000; Wright, Matthews, & Skagerberg, 2005; Wright et al., 2012) First, Wright, Self, and Justice (2000) used a storybook method that required participants to view a series of photos that depicted a theft in a bar, and subsequently recall various aspects of the scene. The critical item was an accomplice, who was present in one pair member's storybook, and absent in the other. Participants were equally as likely to conform and report that there was no accomplice, as they were to report that there was an accomplice. In Wright, Self, and Justice's study, the direction of conformity was determined using a single critical item, as opposed to 60, which is the number of chances that each participant had to conform in Experiment 2. Moreover, the number of participant pairs that Wright, Self, and Justice based their assertion on (15) was relatively small compared to the number of participant pairs used in Experiment 2 (59). Therefore the different patterns of conformity for old and new items in Experiment 2 and Wright, Self, and Justice's study could be due to the different number of critical items or participants. The discrepancy could also reflect a different effect of conformity based on whether or not participants view complex scenes or faces.

Perhaps the most illuminating difference between the stimuli in Experiment 2 and the stimuli in Wright, Matthews, and Skagerberg's (2005) study and Wright et al.'s (2012) study is that the faces in Experiment 2 were of Black men, whereas the other studies used photos of White faces. It is possible that the difference in conformity pattern for previously seen and previously unseen photos involves cross-racial identifications and the other-race effect (Wells & Olson, 2001). The other-race effect has been widely documented across numerous studies using a variety of methodologies (Wells & Olson, 2001). Experiment 2 required the majority (90%) of participants to make cross-racial identifications. Meissner and Brigham (2001) report that a White eyewitness is 56% more likely to misidentify a Black suspect who is innocent, than they are to misidentify a White suspect who is innocent. Thus, when making a cross racial identification, White eyewitnesses are more likely to report that a Black suspect had been seen (i.e., was "old") when in fact the witness had never seen the Black suspect before (i.e., was "new"). Indeed, the pattern of results in Experiment 2 reflects the same tendency: participants, 90% of whom were making a cross racial identification, were more likely to conform and report that a photo was old, when it was actually new. Future research should explore the differential effects of conformity on old and new photos by developing a paradigm that requires participants to make both same-race and cross-race identifications.

General Discussion

The experiments reported here showed that the social context plays an important role in shaping eyewitness performance. Although Experiments 1A and

1B did not produce the expected results, the finding that the one-way mirror did not increase participants' state anxiety does not reflect a failure of the social context; rather, the results from Experiment 1B simply suggest that the context shaped participants' experiences in an unforeseen way. In Experiment 1B, when compared to participants in the no-mirror condition, participants in the mirror-condition reported caring less about providing a correct response and caring less about performing above average. Though the mirror did not produce anxiety as expected, Mor and Winquist's (2002) meta-analysis revealed that across 226 studies, depression was more strongly associated with self-focus – which is commonly induced with mirrors – than anxiety. Thus, the social context in Experiment 1B did produce a meaningful effect: it evoked depressive symptoms.

Certainly, it is possible that if the social context in Experiments 1A and 1B had been manipulated in a different way, participants might have experienced anxiety. One limitation of Experiments 1A and 1B was that participants viewed a crime video and were thus aware that they were not witnessing a true crime and that there was no consequence for making an inaccurate identification. In retrospect, it would have made sense to incorporate a design component that bolstered the study's ecological validity and led participants to feel more emotionally involved as eyewitnesses. For example, what if participants witnessed a staged crime and were led to believe that their involvement would produce a consequence for a fellow student? What if participants witnessed the "crime" with a co-witness and could therefore be contradicted? Shaw et al. (2007) found that when there is a chance of being contradicted by a co-witness, eyewitnesses will use

confidence as an impression management tool and either increase or decrease their public confidence reports, depending on the social context. Might the possibility of being contradicted influence anxiety and identification performance? Would the effects differ if the co-witness was a friend or someone with whom the participant had previously argued? Perhaps in such a context, the mirror would have had a different effect on anxiety. Of course, there are limitations inherent to studying eyewitness performance, as it is simply not ethical to try and establish in a lab the type of environment that one might find in a real case. Still, Experiments 1A and 1B would have benefitted from additional changes to produce a stronger effect.

The effect of the social context on eyewitness performance was more pronounced in Experiment 2, which demonstrates that the social context can overshadow the effect of social avoidance on memory conformity. Therefore, it is important to continue exploring how conformity may differ in other social contexts. Experiment 2 revealed that participants' friend status (i.e. friends with partner, not friends with partner) accounted for variance in participants' conformity scores. Upon further analysis it was evident that both socially avoidant and non-socially avoidant participants were more likely to conform when they completed the recognition task with a friend, than they were to conform when they completed the recognition task with someone who they did not consider to be a friend. Previously, researchers have reported that memory conformity is greater among friends (Hope et al., 2008) and romantic partners (French et al., 2008) than among strangers. In Experiment 2, effort was made to ensure that partners were not friends; however, due to recruitment restraints and the fact that the sample was drawn from a small

residential college, many students had previously interacted with their partner, and some considered themselves to be friends with each other. Future research should either manipulate relationship status or ensure that all participants have the same relationship with their partner (i.e., all friends, or all strangers), as relationship status has a clear effect on memory conformity.

One potential direction for future research involving relationship status and memory conformity is to evaluate the role of empathy. Although Experiment 2 did not find empathy to be related to conformity, previous research has found empathy to be positively correlated with conformity, but only when participants were unacquainted (D. Wright, personal communication, December 6, 2012). Seldom studied in the context of witness performance, empathy is an intriguing variable to consider. Might friends be more empathetic toward each other and thus more susceptible to conformity than strangers, or more susceptible than a dyad that has been primed for competition? Might the effect of friend status on memory conformity change as a function of empathy? Certainly, future research should continue to explore the nuanced ways in which the social context and individual differences interact and influence conformity.

Limitations

A primary limitation of the present research is that the sample was drawn from a relatively homogenous college sample, which prohibits generalization beyond the sample characteristics. Notably, there are two particular distinctions to affirm in order to deter unfounded generalization. First, the sample from Experiment 2 was not drawn from a population of people with Social Anxiety

Disorder. Though it is certainly possible that some participants have or had been diagnosed with Social Anxiety Disorder due to the fact that its lifetime prevalence is high, the findings from Experiment 2 should not be generalized to a clinical sample (Heimberg et al., 2000). However, it is intriguing that the mean social avoidance scores in Experiment 2 were significantly higher than a sample of non-anxious controls, but significantly lower than a sample of people with Social Anxiety Disorder (Heimberg & Holaway, 2007). Wright et al. (2012) used the Liebowitz Social Anxiety Scale to assess social avoidance within their college sample; however, Wright et al. did not report their avoidance scores for comparison. Though the source of the discrepancy between the avoidance scores from Experiment 2 and the avoidance scores from Heimberg & Holaway's study is unclear, Heimberg et al. (2000) reports that when compared to older adults, the incidence of social anxiety appears to be increasing among young adults. Though purely speculative, it may be that there is a particular cohort effect that caused participants in Experiment 2 to have higher social avoidance scores than older adults, but not high enough to be comparable to a clinical sample.

Second, it is important to be cautious about generalizing the rates of conformity since Experiment 2 required the majority of participants (90%) to make cross-racial identifications. As previously discussed, cross-racial identifications are known to reduce identification accuracy (Olson & Wells, 2001). One potential avenue for future research would be to determine if conformity rates are different for cross-race and same-race identifications. Researchers might also explore how

manipulating the racial composition of the dyad might influence conformity, and whether the effects of social avoidance and the social context would be the same.

Conclusion

The conformity effects observed in the laboratory in the current research have real and profound implications for actual criminal cases. In his discussion of the wrongful convictions that have stemmed from co-witness misidentifications, Garrett (2011) posits: “One wonders how separate individuals could have all made the same mistake” (p. 50). Richard Alexander was misidentified by multiple eyewitnesses and wrongfully convicted on 10 charges – including rape, robbery, and burglary – and sentenced to 70 years in prison (The Innocence Project, 2012). Prior to making their identifications, the witnesses in Alexander’s case all spent time in the same room, looking at the photo-array together (Garret). In light of the evidence from Experiment 2, it seems clear and hardly surprising that the witnesses made the same error. Yet, the witnesses in the Alexander case are not to blame, as memory conformity reflects an adaptive process (Schacter, Guerin, & St. Jacques, 2011). Schacter et al. report that errant memories are likely the result of an adaptive memory system that “flexibly incorporates relevant new information in order to update memory” (p. 470). In daily social exchanges, the ability to incorporate new information and update memory is undeniably advantageous and a desirable capability that likely produces few consequences, regardless of whether or not one’s memory updates are accurate. However, in a legal context where the consequence of an adaptive memory system leads to memory conformity and the wrongful conviction of an innocent person, the effects are devastating. Therefore, it is

imperative to continue to identify and mitigate the factors that give rise to memory conformity. As Wright et al. (2012) aptly notes, it is important for the courts to be able to determine how co-witnesses come to identify the same suspect. Did each co-witness identify the same suspect on his or her own, without knowledge of his or her co-witnesses report? Or, was one person's memory "incorporated into others' memories" (Wright et al., p. 83)? These questions are not ones that can be readily answered, but by continuing to build our knowledge of the variables that give rise to memory conformity, we can continue to work toward strengthening our justice system and reducing the incidence of wrongful convictions.

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Table 1: *Lineup Member Identification Frequency – Experiment 1A*

| Lineup member | Frequency | Percent |
|--------------------------|-----------|---------------|
| <i>no identification</i> | 7 | 23.3 |
| 1 | 7 | 23.3 |
| 2 | 0 | 0 |
| 3 | 5 | 16.7 |
| 4 | 2 | 6.7 |
| 5 | 3 | 10 |
| 6 | 5 | 16.7 |
| Total | 29 | 96.7 |
| Missing | 1 | 3.3 |
| Total | 30 | 100.00 |

Table 2: Mean "Try" and "Care" Scores for Mirror and No-Mirror Conditions – Experiment 1A

| | Anxiety Condition | | <i>t</i> | <i>df</i> | <i>p</i> |
|------|-------------------|--------|----------|-----------|----------|
| | No-mirror | Mirror | | | |
| Try | 4.60 | 4.60 | 0.00 | 28 | 1.00 |
| Care | 4.73 | 4.53 | 0.40 | 28 | .68 |

Table 3: Mean POMS-SF Scores for Mirror and No-Mirror Conditions – Experiment 1A

| | Anxiety Condition | | <i>t</i> | <i>p</i> |
|------------------------|-------------------|--------|----------|----------|
| | No-mirror | Mirror | | |
| Vigor-Activity | 1.7 | 1.73 | -0.08 | .92 |
| Depression-Dejection | 0.70 | 0.70 | 0.00 | 1.00 |
| Confusion-Bewilderment | 1.03 | 1.28 | -0.95 | .48 |
| Tension-Anxiety | 1.34 | 1.45 | -0.31 | .75 |
| Anger-Hostility | 0.49 | 0.68 | -0.84 | .40 |
| Fatigue-Inertia | 1.61 | 1.65 | -0.11 | .90 |

note. df = 28

Table 4: *Mean State Anxiety Scores for Mirror and No-Mirror Conditions – Experiment 1A*

| | Anxiety Condition | | <i>t</i> | <i>df</i> | <i>p</i> |
|---------------|-------------------|--------|----------|-----------|----------|
| | No-mirror | Mirror | | | |
| State Anxiety | 38.33 | 39.73 | -0.40 | 26 | .68 |

Table 5: *Lineup Member Identification Frequency – Experiment 1B*

| Lineup member | Frequency | Percent |
|---------------|-----------|---------|
| 1 | 6 | 25.0 |
| 2 | 0 | 0 |
| 3 | 10 | 41.7 |
| 4 | 2 | 8.3 |
| 5 | 0 | 0 |
| 6 | 5 | 20.8 |
| Total | 23 | 95.8 |
| Missing | 1 | 4.2 |
| Total | 24 | 100.00 |

Table 6: Mean Task Engagement Scores for Mirror v. No-Mirror Conditions – Experiment 1A

| | Anxiety Condition | | <i>t</i> | <i>df</i> | <i>p</i> |
|--------|-------------------|--------|----------|-----------|----------|
| | No-mirror | Mirror | | | |
| Try | 4.5 | 4.5 | 0.92 | 22 | .36 |
| Care | 5.09 | 4.08 | 2.74 | 22 | .01* |
| Desire | 5.04 | 3.92 | 2.30 | 22 | .03* |

note. * $p < .05$

Table 7: Mean POMS-SF Scores for Mirror and No-Mirror Conditions – Experiment 1B

| | Anxiety Condition | | <i>t</i> | <i>p</i> |
|------------------------|-------------------|--------|----------|----------|
| | No-mirror | Mirror | | |
| vigor-activity | 1.63 | 1.94 | -0.92 | .36 |
| depression-dejection | 0.52 | 0.82 | -1.33 | .19 |
| confusion-bewilderment | 1.30 | 1.36 | -0.24 | .81 |
| tension-anxiety | 1.36 | 1.64 | -0.72 | .47 |
| anger-hostility | 0.77 | 0.74 | 0.10 | .91 |
| fatigue-inertia | 1.72 | 1.80 | -0.19 | .85 |

note. df = 22

Figure 1: Predicted Results – Experiment 2

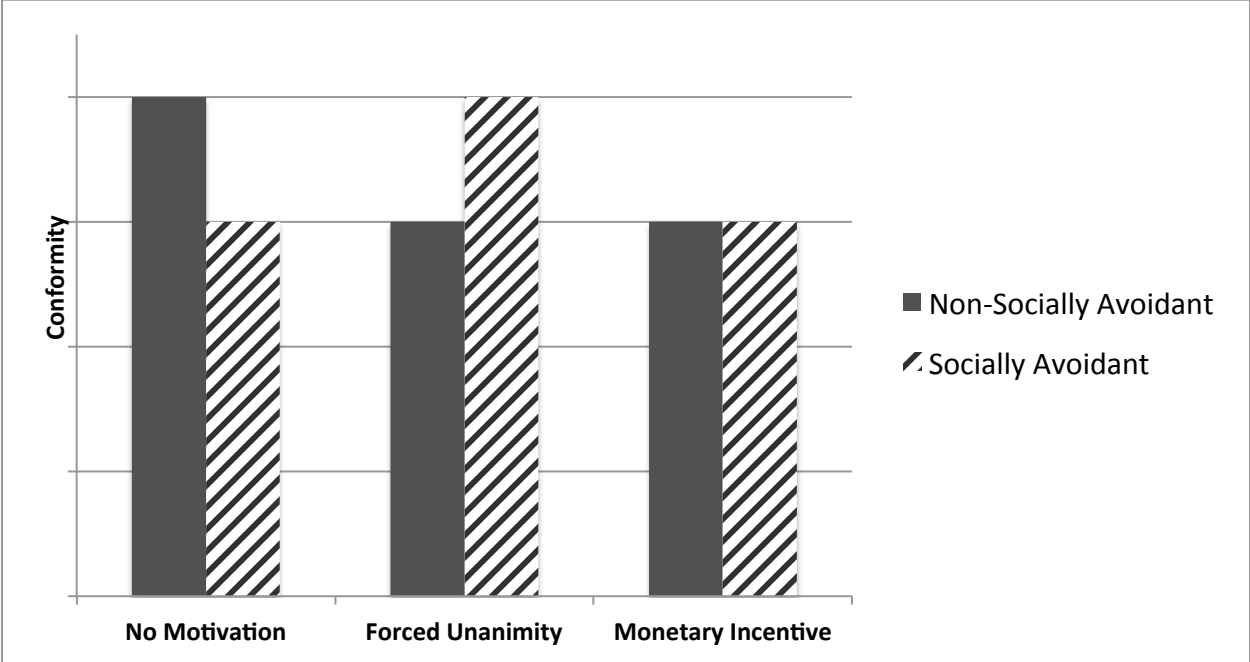
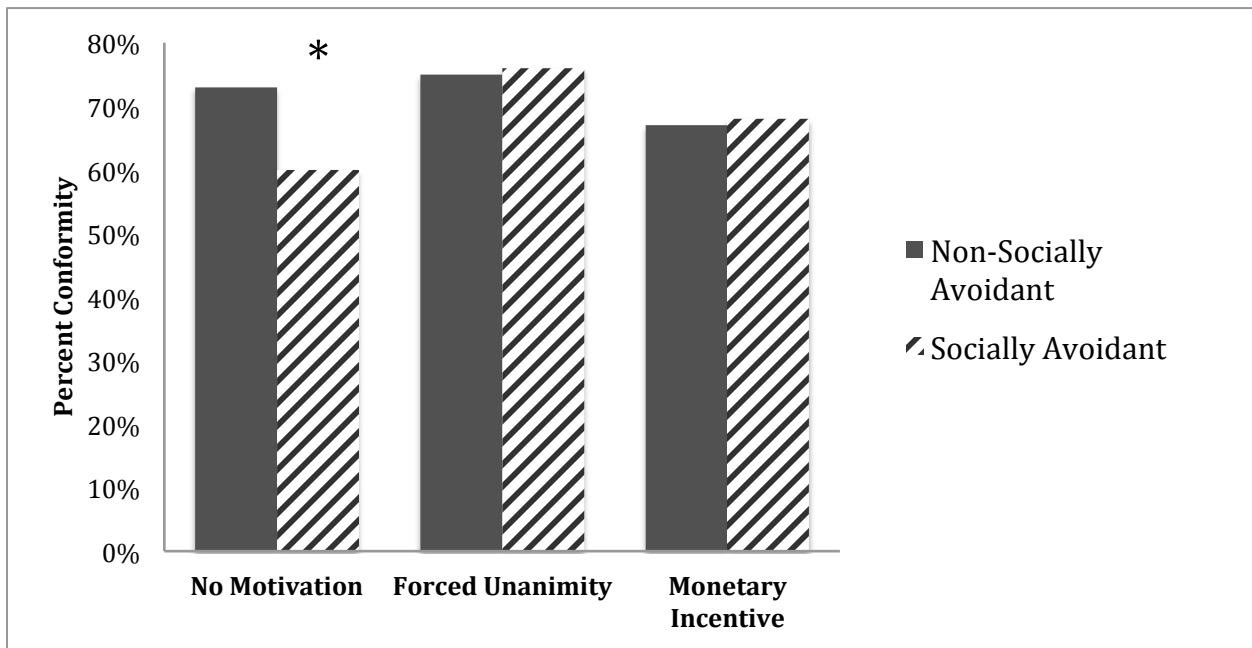


Figure 2: *Significant Interaction Between Social Avoidance Grouping and Instructions – Experiment 2*



note. * $p < .01$

Appendix A: Confidence and Task Engagement Questionnaire – Experiment 1

AGE _____

Gender (*circle*): M F

Please read each statement carefully and indicate on a scale of 0 (*not at all*) to 6 (*extremely*) how much each statement applies to you.

1. How confident are you that you correctly identified the perpetrator?

0 1 2 3 4 5 6

*(not at all)**(extremely)*

2. To what extent were you guessing on this task?

0 1 2 3 4 5 6

*(not at all)**(extremely)*

3. How hard did you try on this task?

0 1 2 3 4 5 6

*(not at all)**(extremely)*

4. How much did you care about giving a correct response in this study?

0 1 2 3 4 5 6

*(not at all)**(extremely)*

5. How much desire did you have to be above average on this task?

0 1 2 3 4 5 6

*(not at all)**(extremely)*

Appendix B: Profile of Mood States Short Form (POMS-SF)

“Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE circle under the answer of the right which best describes HOW YOU HAVE BEEN FEELING DURING THE PAST WEEK INCLUDING TODAY.” (Schacham, 1983).

- 0 = Not at all
- 1 = A little
- 2 = Moderately
- 3 = Quite a bit
- 4 = Extremely

| | | NOT AT ALL | A LITTLE | MODERATELY | QUITE A BIT | EXTREMELY |
|-----|-----------------|------------|----------|------------|-------------|-----------|
| 1. | Tense | ① | ② | ③ | ④ | ⑤ |
| 2. | Angry | ① | ② | ③ | ④ | ⑤ |
| 3. | Worn out | ① | ② | ③ | ④ | ⑤ |
| 4. | Unhappy | ① | ② | ③ | ④ | ⑤ |
| 5. | Lively | ① | ② | ③ | ④ | ⑤ |
| 6. | Confused | ① | ② | ③ | ④ | ⑤ |
| 7. | Peeved | ① | ② | ③ | ④ | ⑤ |
| 8. | Sad | ① | ② | ③ | ④ | ⑤ |
| 9. | Active | ① | ② | ③ | ④ | ⑤ |
| 10. | On edge | ① | ② | ③ | ④ | ⑤ |
| 11. | Grouchy | ① | ② | ③ | ④ | ⑤ |
| 12. | Blue | ① | ② | ③ | ④ | ⑤ |
| 13. | Energetic | ① | ② | ③ | ④ | ⑤ |
| 14. | Hopeless | ① | ② | ③ | ④ | ⑤ |

| | | | | | | |
|-----|------------------------------|---|---|---|---|---|
| 15. | Uneasy | ① | ① | ② | ③ | ④ |
| 16. | Restless | ① | ① | ② | ③ | ④ |
| 17. | Unable to concentrate | ① | ① | ② | ③ | ④ |
| 18. | Fatigued | ① | ① | ② | ③ | ④ |
| 19. | Annoyed | ① | ① | ② | ③ | ④ |
| 20. | Discouraged | ① | ① | ② | ③ | ④ |
| 21. | Resentful | ① | ① | ② | ③ | ④ |
| 22. | Nervous | ① | ① | ② | ③ | ④ |
| 23. | Miserable | ① | ① | ② | ③ | ④ |
| 24. | Cheerful | ① | ① | ② | ③ | ④ |
| 25. | Bitter | ① | ① | ② | ③ | ④ |
| 26. | Exhausted | ① | ① | ② | ③ | ④ |
| 27. | Anxious | ① | ① | ② | ③ | ④ |
| 28. | Helpless | ① | ① | ② | ③ | ④ |
| 29. | Weary | ① | ① | ② | ③ | ④ |
| 30. | Bewildered | ① | ① | ② | ③ | ④ |
| 31. | Furious | ① | ① | ② | ③ | ④ |
| 32. | Full of pep | ① | ① | ② | ③ | ④ |
| 33. | Worthless | ① | ① | ② | ③ | ④ |
| 34. | Forgetful | ① | ① | ② | ③ | ④ |
| 35. | Vigorous | ① | ① | ② | ③ | ④ |
| 36. | Uncertain about things | ① | ① | ② | ③ | ④ |
| 37. | Bushed | ① | ① | ② | ③ | ④ |

Appendix C: State-Trait Anxiety Inventory (STAI)

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1. I feel calm.....1 2 3 4
2. I feel secure.....1 2 3 4
3. I am tense.....1 2 3 4
4. I feel strained.....1 2 3 4
5. I feel at ease.....1 2 3 4
6. I feel upset.....1 2 3 4
7. I am presently worrying over possible misfortunes.....1 2 3 4
8. I feel satisfied.....1 2 3 4
9. I feel frightened.....1 2 3 4
10. I feel comfortable.....1 2 3 4
11. I feel self-confident.....1 2 3 4
12. I feel nervous.....1 2 3 4
13. I am jittery.....1 2 3 4
14. I feel indecisive.....1 2 3 4
15. I am relaxed.....1 2 3 4
16. I feel content.....1 2 3 4
17. I am worried.....1 2 3 4
18. I feel confused.....1 2 3 4
19. I feel steady.....1 2 3 4

20. I feel pleasant.....1 2 3 4

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel using the following scale:

- 1 = Almost Never
- 2 = Sometimes
- 3 = Often
- 4 = Almost Always

21. I feel pleasant.....1 2 3 4

22. I feel nervous and restless.....1 2 3 4

23. I feel satisfied with myself.....1 2 3 4

24. I wish I could be as happy as others seem to be.....1 2 3 4

25. I feel like a failure1 2 3 4

26. I feel rested.....1 2 3 4

27. I am “calm, cool, and collected”1 2 3 4

28. I feel that difficulties are piling up so that I cannot overcome them...1 2 3 4

29. I worry too much over something that really doesn’t matter 1 2 3 4

30. I am happy.....1 2 3 4

31. I have disturbing thoughts1 2 3 4

32. I lack self confidence.....1 2 3 4

33. I feel secure.....1 2 3 4

34. I make decisions easily.....1 2 3 4

35. I feel inadequate.....1 2 3 4

36. I am content.....1 2 3 4

37. Some unimportant thought runs through my mind and bothers me..1 2 3 4

38. I take disappointments so keenly that I can't put them out of my mind.....

..... **1 2 3 4**

39. I am a steady person.....**1 2 3 4**

40. I get in a state of tension or turmoil as I think over my recent concerns and

interests.....**1 2 3 4**

Appendix D: Debrief (Experiment 1)

You have just participated in a study designed to determine if the presence of a one-way mirror will induce anxiety during an eyewitness identification task. Previous research suggests that mirrors can cause people to experience heightened levels of self-focus which has been linked to social anxiety (Carver & Scheier, 1978; Gaydukevych, Kocovski, 2012). Therefore, if you were randomly selected to participate in the condition of this study that exposed you to the one-way mirror, it is normal to feel anxious.

Due to the fact that it is common for police interrogation rooms to contain one-way mirrors, we are interested in determining if the presence of mirrors impacts anxiety, and if so, what effects it may have on confidence and decision making. By participating in this research, you are helping to build evidence that can be used to improve eyewitness identification procedures and accuracy.

Moreover, all participants who made an identification in this study made a mistaken identification due to the fact that the actual culprit was not included in the photospread. This study was designed to make it easy to make a misidentification and selecting the wrong culprit is not indicative of memory malfunction. In fact, eyewitness misidentifications are common in the general population (Garret, 2011). This study is intended to add to the existing body of literature that memory is malleably and can be subtly manipulated in the right circumstances.

If you have any questions about this study please contact Alexandra Abry at aabry@bates.edu or Professor Douglass at adouglass@bates.edu.

Please help protect the integrity of this study and do not discuss its purpose with other students.

Appendix E: The Liebowitz Social Anxiety Scale (LSAS)

Directions: Read each situation carefully and answer two questions about that situation. The first question asks how ***anxious or fearful*** you feel in the situation. The second question asks ***how often you avoid the situation***.

If you come across a situation that you ordinarily do not experience, we ask that you imagine "what if you were faced with that situation," and then rate the degree to which you would fear this hypothetical situation and how often you would tend to avoid it. Please base your ratings on the way that the situations have affected you in the last week.

| | | 0 = <i>None</i> 1 = <i>Mild</i> 2 = <i>Moderate</i> 3 = <i>Severe</i> | 0 = <i>Never</i> 1 = <i>Occasionally</i> 2 = <i>Often</i> 3 = <i>Usually</i> |
|-----|---|--|---|
| | | Fear/Anxiety | Avoid |
| 1. | Telephoning in public | | |
| 2. | Participating in small groups | | |
| 3. | Eating in public places | | |
| 4. | Drinking with others in public places | | |
| 5. | Talking to people in authority | | |
| 6. | Acting, performing or giving a talk in front of an audience | | |
| 7. | Going to a party | | |
| 8. | Working while being observed | | |
| 9. | Writing while being observed | | |
| 10. | Calling someone you don't know very well | | |
| 11. | Talking with people you don't know very well | | |
| 12. | Meeting strangers | | |

| | | 0 = <i>None</i> 1 = <i>Mild</i> 2 = <i>Moderate</i> 3 = <i>Severe</i> | 0 = <i>Never</i> 1 = <i>Occasionally</i> 2 = <i>Often</i> 3 = <i>Usually</i> |
|------------------------------|---|--|---|
| | | Fear/Anxiety | Avoid |
| 13. | Urinating in a public bathroom | | |
| 14. | Entering a room when others are already seated | | |
| 15. | Being the center of attention | | |
| 16. | Speaking up at a meeting | | |
| 17. | Taking a test | | |
| 18. | Expressing a disagreement or disapproval to people you don't know very well | | |
| 19. | Looking at people you don't know very well in the eyes | | |
| 20. | Giving a report to a group | | |
| 21. | Trying to pick up someone | | |
| 22. | Returning goods to a store | | |
| 23. | Giving a party | | |
| 24. | Resisting a high pressure salesperson | | |
| Total (P) Performance | | | |
| Total (S) Social Interaction | | | |
| Total Score | | | |

Appendix F: The Empathy Quotient (EQ-40)

Directions: *Below are a list of statements. Please read each statement very carefully and rate how strongly you agree or disagree with it. There are no right or wrong answers, or trick questions.*

| | | | | |
|--|----------------|----------------|-------------------|-------------------|
| 1. I can easily tell if someone else wants to enter a conversation. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 2. I find it difficult to explain to others things that I understand easily, when they don't understand it first time. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 3. I really enjoy caring for other people. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 4. I find it hard to know what to do in a social situation. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 5. People often tell me that I went too far in driving my point home in a discussion. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 6. It doesn't bother me too much if I am late meeting a friend. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 7. Friendships and relationships are just too difficult, so I tend not to bother with them. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 8. I often find it difficult to judge if something is rude or polite. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 9. In a conversation, I tend to focus on my own thoughts rather than on what my listener might be thinking. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 10. When I was a child, I enjoyed cutting up worms to see what would happen. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 11. I can pick up quickly if someone says one thing but means another. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 12. It is hard for me to see why some things upset people so much. | strongly agree | slightly agree | slightly disagree | strongly disagree |

| | | | | |
|---|----------------|----------------|-------------------|-------------------|
| 13. I find it easy to put myself in somebody else's shoes. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 14. I am good at predicting how someone will feel. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 15. I am quick to spot when someone in a group is feeling awkward or uncomfortable. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 16. If I say something that someone else is offended by, I think that that's their problem, not mine. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 17. If anyone asked me if I liked their haircut, I would reply truthfully, even if I didn't like it. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 18. I can't always see why someone should have felt offended by a remark. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 19. Seeing people cry doesn't really upset me. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 20. I am very blunt, which some people take to be rudeness, even though this is unintentional. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 21. I don't tend to find social situations confusing. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 22. Other people tell me I am good at understanding how they are feeling and what they are thinking. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 23. When I talk to people, I tend to talk about their experiences rather than my own. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 24. It upsets me to see an animal in pain. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 25. I am able to make decisions without being influenced by people's feelings. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 26. I can easily tell if someone else is interested or bored with what I am saying. | strongly agree | slightly agree | slightly disagree | strongly disagree |

| | | | | |
|---|----------------|----------------|-------------------|-------------------|
| 27. I get upset if I see people suffering on news programs. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 28. Friends usually talk to me about their problems as they say that I am very understanding. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 29. I can sense if I am intruding, even if the other person doesn't tell me. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 30. People sometimes tell me that I have gone too far with teasing. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 31. Other people often say that I am insensitive, though I don't always see why. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 32. If I see a stranger in a group, I think that it is up to them to make an effort to join in. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 33. I usually stay emotionally detached when watching a film. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 34. I can tune into how someone else feels rapidly and intuitively. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 35. I can easily work out what another person might want to talk about. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 36. I can tell if someone is masking their true emotion. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 37. I don't consciously work out the rules of social situations. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 38. I am good at predicting what someone will do. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 39. I tend to get emotionally involved with a friend's problems. | strongly agree | slightly agree | slightly disagree | strongly disagree |
| 40. I can usually appreciate the other person's viewpoint, even if I don't agree with it. | strongly agree | slightly agree | slightly disagree | strongly disagree |

Appendix G: Partner Relationship, Confidence Rating, and Task Engagement
Questionnaire– Experiment 2

CODENAME:

How many days ago did you complete part 1 of this study? _____

Have you met your partner before? **Yes** **No**

If so, do you frequently spend time with your partner? **Yes** **No**

If so, are you friends with your partner? **Yes** **No**

Please read each statement carefully and indicate on a scale of 0 (*not at all*) to 6 (*extremely*) how much each statement applies to you.

1. How comfortable did you feel interacting with your partner during this task?

0 1 2 3 4 5 6

(not at all)

(extremely)

2. How confident are you in your accuracy on this task?

0 1 2 3 4 5 6

(not at all)

(extremely)

3. To what extent were you guessing on this task?

0 1 2 3 4 5 6

(not at all)

(extremely)

4. How hard did you try on this task?

0 1 2 3 4 5 6

(not at all)

(extremely)

5. How much did you care about giving a correct response in this study?

0 1 2 3 4 5 6

(not at all)

(extremely)

6. How much desire did you have to be above average on this task?

0 1 2 3 4 5 6

(not at all)

(extremely)

Appendix H: Debrief – Experiment 2

You have just participated in a study designed to explore the conditions under which individuals with a tendency to avoid social situations are more, equally, or less likely to report inaccurate memories as a function of a partner's response. Previous research suggests that socially avoidant individuals are less susceptible to memory conformity than are non-socially avoidant individuals (Wright, Busnello, Buratto, & Stein, 2012). This present study seeks to replicate Wright et al.'s (2012) finding and to identify two additional conditions under which the relationship may change.

Participation in this study does not signify that you are socially avoidant. It is common to experience anxiety in certain social situations; however, some individuals who experience heightened levels of fear and discomfort amidst a wide range of social interactions may benefit from guidance to help mitigate social discomfort. Confidential and free counseling is available at the Bates College Health Center for Bates students. The health center can be reached at (207)-786-6199.

Furthermore, the provision of inaccurate responses as to whether or not items were "old" or "new" does not indicate memory malfunction or weakness. Rather, there is evidence that memory conformity is in part, the result of adaptive neurological mechanisms that are designed to aid memory, but that sometimes lead to the integration of both true *and* false information that individuals are unable to distinguish between (Schacter, Guerin, & Jacques, 2011). Moreover, various social influences can both increase and decrease the likelihood that an individual will integrate false information into his or her memory and later report it as being "true."

The goal of this present study was to deepen our understanding of the relationship between individual differences and the conditions under which memory is most malleable. Such an understanding is important in a legal context in which inaccurate memory reports may have profound and detrimental consequences. By participating in this research, you are helping to build evidence that can be used to improve eyewitness identification procedures and accuracy.

If you have any questions about this study please contact Alexandra Abry at aabry@bates.edu or Professor Douglass at adouglas@bates.edu. Please help protect the integrity of this study and do not discuss its purpose with other students.