

**THANKS FOR THE MEMORY FAILURES: PRIMING MEMORY FALLIBILITY AND INTERPRETATIONS OF
PROSPECTIVE AND RETROSPECTIVE MEMORY FAILURES**

by

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Abstract

Retrospective memory is the cognitive function associated with recalling details from the past, (e.g., someone's name) whereas prospective memory is the cognitive function associated with recalling an intention or plan in the future (e.g., attending a meeting). There is an interesting hypothesis that states prospective memory failures (e.g., forgetting about a meeting) tend to be interpreted as personality flaws while retrospective memory failures (e.g., forgetting someone's name) tend to be interpreted as simply memory breakdowns. Recent research has supported this hypothesis, however little is known about the properties of the memory failures that might influence the biases in interpretations or the underlying cognitive processes of the effect.

Three experiments were designed to address these important issues. The first experiment examined sociality and importance of the memory failures as potential properties influencing interpretations. Participants were presented with memory failure vignettes that varied on these dimensions, and the bias towards personality flaw interpretations of prospective memory failures only occurred memory failures were social in nature. Furthermore, the effect was slightly weakened by the perspective from which the vignettes were written (the participant's perspective). The second experiment developed a priming procedure that successfully induced a sense of self-perceived memory fallibility by requiring participants to generate examples of prospective and retrospective memory failures they had committed. In the third experiment this priming procedure was implemented prior to vignette interpretations with the objective of manipulating the interpretations bias. The results of Experiment 3 indicated that the priming manipulation reduced differences in the interpretations participants offered for prospective versus retrospective memory failures, particularly in terms of the seriousness, personality flaw, and poor memory interpretations of prospective failures. These results suggest that the priming procedure facilitated empathy the protagonist, and in this way reduced this interpretation bias.

Preface

The research presented in this thesis was approved by the University of British Columbia's Behavioural Research Ethics Board, under Ethics Certificates H03-80566 (Experiment 1) and H04-80316 (Experiments 2 and 3).

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*"All things are subject to interpretation;
whichever interpretation prevails at a given time
is a function of power and not truth."*

Friedrich Nietzsche

1 Interpretations of Prospective and Retrospective Memory Failures

One recent morning when I boarded the bus, I was thinking, "that lady is frowning; she's probably unfriendly and so I won't sit next to her", and when I was a little rude to the cashier at Starbucks, it occurred to me that "I must be in a bad mood because I didn't sleep well last night". As human beings, in social interactions and even when alone, we constantly interpret our own and others' behaviour. In interpreting these behaviours, we are searching for potential causes and more often than not, we cannot be sure about these causes. Perhaps the woman on the bus was truly a lovely person, and she might have been frowning because the sun was in her eyes, and maybe I was rude to the Starbucks cashier because I am the unfriendly one!

As scientists in the field of psychology, the interpretations we make are not just critical to our daily lives, but also to our research. We regularly interpret the effect of our experimental manipulations on a given behaviour, whether or not the effect supports our hypotheses, and what the effect might mean to our understanding of the behaviour. However, as Nietzsche suggests in the quote above, our interpretations -- as human beings and as scientists -- are vulnerable to factors other than the evidence. Thus, as scientists, and as human beings, it is crucial to understand the factors that influence our interpretations.

The main objective of the research reported in this document is to gain a deeper understanding of the manner in which our interpretations of our own and others' behaviour can be biased. There is a vast literature of many forms of interpretation biases. For example, we often misinterpret other people's beliefs (e.g., the fundamental attribution error; Jones & Harris, 1967), we generally have different interpretations for our successes and our failures (e.g., the self-serving

bias; Zuckerman, 1979), and we generally consider different interpretations for our own failures versus those experienced by others (e.g., the actor-observer bias; Jones & Nisbett, 1971).

Furthermore, interpretation biases can occur for both small scale behaviours or situations (e.g., a student's speech, performance on an anagram task) and large scale behaviours or situations (e.g., the outcome of an Olympic competition).

To better understand the manner in which these biases occur in our interpretations, in this dissertation I will focus on one specific type of interpretation bias that is associated with memory failures. A number of researchers have hypothesized that prospective and retrospective memory failures might be interpreted differently, speculating that prospective memory failures are interpreted as the mark of poor character (i.e., personality flaws) while retrospective memory failures are the result of a faulty memory (i.e., poor cognitive abilities) (Bennett, 1910; Freud, 1957; Munsat, 1967). This bias in interpretation focused on memory failures, dubbed the 'Munsat hypothesis', is of particular interest, given that these two types of failures are likely to stem from nearly identical underlying cognitive processes (Roediger, 1996), and can frequently have identical consequences.

1.1 Retrospective and Prospective Memory

In order to best understand the biases in interpretations of prospective and retrospective memory failures, it is critical to first have a solid understanding of the two forms of memory, their similarities and differences, the tasks associated with them, what neuroscience can tell us about them, what factors influence memory success and failure, as well as theoretical accounts of retrospective and prospective memory.

1.1.1 Descriptions of retrospective and prospective memory. Retrospective memory is what we classically consider memory; the cognitive function required to encode, retain and retrieve

information about past events, details, facts and experiences. Retrospective memory has a great number of components, one of which will be the focus of the present research. A distinction first introduced by Tulving (1972) separated semantic and episodic retrospective memory. Semantic memory refers to memory for facts or general knowledge (e.g., the capital of France, $2 + 2$). On the other hand, episodic memory can refer to memory for personal events or experiences or information associated with a specific time (e.g., the author of a paper I read yesterday, where I travelled during my trip to Australia) (Tulving, 1972). In Munsat's (1967) original hypothesis, he referred specifically to long-term (i.e., lasting more than a few seconds) and episodic retrospective memory failures. As such, throughout this document, further references to retrospective memory will serve as a shorthand for episodic memory and episodic retrospective memory tasks.

Prospective memory is the cognitive function required for encoding a plan or intention, retaining that plan, and retrieving it at the appropriate time or upon the occurrence of an appropriate cue. Like retrospective memory, prospective memory also has several components. For example, prospective memory tasks can be one-time episodic tasks (e.g., delivering a message) or habitual tasks (e.g., taking medication daily) (Einstein, McDaniel, Smith, & Shaw, 1998). Prospective memory tasks can also be event-based -- carrying out an intention when something specific occurs (e.g., stopping at the grocery store you see it on the way home) or time-based -- carrying out an intention in a specific amount of time (e.g., attending a meeting in 30 minutes) (Einstein & McDaniel, 1990). In terms of the Munsat hypothesis, the prospective memory failures to which he referred were episodic, event-based and long-term (lasting more than a few seconds). The research reported in this dissertation is also concerned only with this type of prospective memory.

1.1.2 Retrospective and prospective memory tasks: Encoding, retention and retrieval. Both prospective and retrospective memory tasks can be described as having three distinct phases:

encoding, retention, and retrieval, particularly in the context of laboratory studies. Prospective and retrospective memory tasks are quite similar in terms of the first two of these phases. Both types of memory tasks require initial encoding. The encoding phase is labelled differently for retrospective memory and prospective memory, the former being called 'studying' or 'learning', and the latter labelled 'planning', but the same thing is occurring for both types of memory; a memory code is formed (Tulving & Thompson, 1973). For retrospective memory, we encode events and details, and for prospective memory we encode intentions and promises.

Retrospective and prospective memories are encoded in both lab tasks and in daily life. In lab tasks, a retrospective memory might be formed for a list of words, and a prospective memory might be formed for the instructions to press a designated computer keyboard key every time a specific word is displayed on the computer. In the context of our daily life, we might form a memory of learning our co-worker's name (retrospective) or our intention to stop and buy groceries after work later in the day (prospective).

Once formed, both prospective and retrospective memories must be retained for some interval of time, thus introducing phase two, often called the retention interval. During this retention interval, the memory is outside of conscious awareness (i.e., we do not have the event or intention currently in mind). Furthermore, a number of importance processes can occur during the retention interval, and these processes might influence whether or not a memory can subsequently be successfully retrieved. Consolidation can occur during the retention interval, which is the process by which the memories are converted into a durable (i.e., lasting) representations in long-term memory (Lechner, Squire, & Byrne, 1999). Should this consolidation process fail, the memory for an event, experience, intention or promise is lost. This type of forgetting occurs outside of our conscious control. It is also possible, that during the retention interval, we might make the conscious choice to

no longer hang on to the information or intention. Perhaps we decide that it is no longer necessary to remember our co-worker's name, or we decide that going grocery shopping is not a crucial plan to carry out. It is possible that, while the opportunity to consciously decide to let go of a certain memory is available for both retrospective and prospective memories, we tend to associate this conscious choice more frequently with prospective memory failures. Previous research on memory failure interpretations has indicated that we do in fact tend to more frequently endorse motivational factors as causes of prospective memory failures compared to retrospective memory failures (Graf, 2012). The present research aimed to replicate this finding. Furthermore, the present research looked to establish whether or not the relationship between prospective memory these motivational factors is related to personality flaw interpretations of prospective memory failures.

If successful consolidation or conscious choice to remember allows the memory to be maintained during the retention interval, the information must be retrieved at some point. The retrieval phase in any memory task is when the memory (event, intention, etc.) is brought back to conscious awareness, frequently when some form of cue is provided. It is during this retrieval phase that the two forms of memory differ significantly.

For retrospective memory tasks, we are always alerted to the cue, and also alerted to the fact that it is relevant to the information we previously studied (Graf & Uttl, 2001). In a retrospective memory lab-task, this might occur during a recognition task, when a new or old word is presented (the cue) and participants are explicitly asked if they studied that word during the encoding phase (the to-be-remembered information). In the context of daily life, the need for retrospective memory retrieval might be illustrated when we must introduce a co-worker to someone. In this scenario, the required introduction is the cue, and it is explicitly related with the name (the to-be-remembered information).

There are two fundamental differences between prospective and retrospective memory during the retrieval phase. First, during a prospective memory task we are presented with a cue, but we are not alerted to the cue's relevance to the target intention (Graf & Uttl, 2001). In a prospective memory lab task, a participant is performing an ongoing task such as categorizing words as living or non-living, and the prospective task might be to press a designated key when a furniture word appears. When the furniture word appears (the cue) the participant is aware of the word's relevance to the ongoing task, but is not explicitly alerted to the link between the furniture word and the intention to press a key (the to-be-remembered intention). In the context of daily life, as we are driving past the grocery store, we are not alerted to the intention we had formed to go grocery shopping.

The second fundamental difference in the retrieval phase is that prospective memory tasks are exclusively performed in a dual-task situation (e.g., Einstein & McDaniel, 1990; Marsh, Hicks & Cook, 2005). We are always performing some other ongoing task (e.g., categorizing words or driving home) when we are presented with the cue (e.g., a specific word or the grocery store). We must then switch away from the ongoing task in order to perform the prospective memory target task (Graf & Uttl, 2001). This task-switching requirement is rarely necessary for retrospective memory tasks. Furthermore, very little is known about the influence of this kind of dual-task situation on retrospective memory. I will describe this work later in the chapter.

These differences in the retrieval phase (the cue-target association and the dual-task situation) can perhaps shed some light on the different interpretations we make regarding retrospective and prospective memory failures. As Lewin (1951) described, we form intentions to satisfy some form of motivation. These intentions are most likely to return to conscious awareness when the cue appears if we are more motivated to carry out the intention (Lewin, 1951). Using

Lewin's theory, I can speculate that being accountable for the process of linking the cue with the intention and bringing the intention back into conscious awareness during an ongoing task (both exclusively prospective memory concerns) shifts some of the blame internally, and this internal blame for prospective memory failures is directed towards personality flaws.

1.1.3 Personality and memory. In view of the possibility raised by the Munsat hypothesis that personality characteristics are implicated in prospective memory failure interpretations, it is surprising that so little research has explored the strength of the relationship between personality and memory performance, and whether the same personality constructs are associated with prospective and retrospective memory. There is, however, some research conducted using older adult subjects that found extraversion was weakly positively correlated and neuroticism was weakly negatively correlated with episodic retrospective memory performance on both free recall and recognition tests (Meier, Perrig-Chiello, & Perrig, 2002). Research on a wider range of adults indicated that trait conscientiousness and neuroticism were predictive of some pass-fail prospective memory tasks (Cuttler & Graf, 2007). Neuroticism appears to be a common personality trait related to both prospective and retrospective memory, but it is the relationship between conscientiousness and prospective memory that can perhaps speak to the Munsat hypothesis.

One potential explanation of the relationship between prospective memory performance and conscientiousness is that people who are conscientious are genuinely better at prospective memory tasks (Cuttler & Graf, 2007), and therefore our interpretation bias associating unreliability with prospective memory failures might be accurate. A second possibility is that those who are conscientious are more likely to follow instructions closely (Le Pine, Colquitt, & Erez, 2000), and this aptitude for following instructions mediates prospective memory task performance, particularly within the laboratory context. Given the plausibility of both of these explanations, even research

focusing specifically on the relationship between memory and personality cannot necessarily explain bias towards personality flaw interpretations of prospective memory failures.

1.1.4 Neuroanatomy of retrospective and prospective memory. We know a great deal about the neuroanatomy associated with episodic retrospective memory. For example, the hippocampus and prefrontal cortex are generally accepted to be critical for episodic retrospective memory retrieval, and the medial temporal lobe is implicated in encoding and retention processes of episodic retrospective memory (see Ferbinteanu, Kennedy, & Shapiro, 2006). In a review article, Tulving (2002) pointed to the importance of the right prefrontal cortex in the retrieval of episodic memory, particularly in contrast to the retrieval of semantic memory which is more localized to the left prefrontal cortex.

However, much less is known about the brain areas associated with prospective memory, and as such it is difficult to make comparisons between the neuroanatomy of retrospective and prospective memory. One reason for the paucity of research into the neuroanatomical regions associated with prospective memory performance stems from the methodological constraints imposed by prospective memory tasks. As discussed earlier in this chapter, the critical difference between prospective and retrospective memory occurs during the retrieval phase, when in the presence of a cue a previously made plan needs to be brought back into conscious awareness and then carried out. If cues occur too frequently during the retrieval phase (e.g., every 10 seconds), a participant is likely to maintain the intention in conscious awareness, and by doing so he/she transforms the prospective memory task into a vigilance task (Uttl, McDouall, & Leonard, 2011). Therefore, in a typical prospective memory task, the ongoing task might last for 45 minutes to an hour, with only three or four prospective memory cues throughout (e.g., Einstein & McDaniel, 1990). This number of cues will likely not provide enough opportunities for collecting data and as such not enough

events across which averages can be computed. Furthermore, we would want to have scans that help us identify the brain structures involved in the connecting of cues with previously formed intentions, thus limiting the amount of data collected even further to situations in which the cue and intention were successfully linked.

A small number of studies have attempted to compare retrospective tasks with tasks that successfully measure prospective memory (and not vigilance). Some animal research suggests that performance on tasks requiring retrospective and prospective memory both involve the hippocampus (Ferbinteanu & Shapiro, 2003). One event-related potential (ERP) study attempted to compare a prospective memory task with a matched retrospective memory task. For the prospective memory task, the cues appeared once every experimental block, which was once every 20 trials. The researchers found similar slow wave activity across frontal, central and parietal regions of the scalp for both the prospective and retrospective memory tasks (West & Krompinger, 2005). Together, these results provide some support that there is a similar neural underpinning associated with performance for these two types of memory.

The neuroscience literature does not currently provide any solid evidence of a critical difference between the neuroanatomy of prospective and retrospective memory that can offer an explanation into the different interpretations we make about these types of memory failures.

1.1.5 Retrospective and prospective memory performance. Research on the variables known to influence performance on episodic prospective and retrospective memory tasks also provides minimal or no insights into the different interpretations given for the two forms of memory failures. One reason for this claim is the fact that there is very little research on factors that have a differential or dissociative influence on prospective and retrospective memory performance.

A great deal of the research on retrospective memory performance has focused on the encoding phase of the memory task. For example, the production effect suggests that saying a word out loud at encoding results in better performance at test than silently reading it (MacLeod, Gopie, Hourihan, Neary, & Ozubko 2010). In terms of prospective memory, the research focus is often directed at the attentional resources available at the time of retrieval, and as such properties of the ongoing task are frequently examined in the context of manipulating these available resources. For example, if the ongoing task is more difficult (Marsh & Hicks, 1998) or is described as being more important (Marsh, Hicks & Cook, 2005), it will monopolize more attentional resources, and therefore prospective memory performance will suffer. Much less research on retrospective memory has focused on retrieval under dual-task conditions. In general, findings suggest that for retrospective memory, divided attention only disrupts performance if attention is diverted at encoding (Craig, Govoni, Naveh-Benjamin, & Anderson, 1996; Logie, Della Salla, MacPherson, & Cooper, 2007). Therefore, the existing research on dual-task situations in prospective and retrospective memory can identify factors that influence performance, but cannot provide insight into the different interpretations we make when these two forms of memory fail.

A number of recent prospective memory studies have focused on different kinds of cues during the retrieval phase. This research might point to one factor that is implicated in the different interpretations people offer for prospective and retrospective memory failures. Prospective memory research into cue focality is focused on the differential effects of nonfocal and focal cues on prospective memory performance. A focal cue is one that is consistent with the processing required for the ongoing task. For example, in one study, participants were required to name famous faces as the ongoing-task (Rendell, McDaniel, Forbes, & Einstein, 2007). Rendell and colleagues (2007) varied the focality of the prospective memory cue by requiring that participants

make a prospective response by circling the picture number either when the name “John” appeared (the focal cue), or when the person in the picture was wearing glasses (the non-focal cue). Prospective memory performance decreased when the cue was non-focal (Rendell et al., 2007). The factor in question here is the difficulty in making a conscious connection between a cue and a previously formed intention, and the fact that this connection is dependent on a subject-initiated process (Craik, 1986). It is possible that when a prospective memory failure occurs, we blame the character of the subject because of his/her failure to marshal the resources required to make this connection. Unfortunately, focality of the memory cue is not an area of research that has received much attention in the context of retrospective memory. It is therefore difficult to make comparisons between the two types of memory tasks, and in turn difficult to say whether or not the subject-initiated connection between the prospective memory cue and the intention is a potential source of the interpretation bias against prospective memory failures.

1.1.6 Theories of prospective and retrospective memory. A vast number of theories have been proposed for different aspects of retrospective memory, and many fewer theories about prospective memory. One theoretical framework, Transfer-Appropriate Processing (TAP), has been used to inform our understanding of both retrospective and prospective memory, but it does not seem to explain why different interpretations might be given for retrospective and prospective memory failures interpret failures.

TAP is a framework that posits memory performance is determined by the amount of overlap in the cognitive operations required for both study and test (Morris, Bransford, & Franks, 1977). There is a wealth of research supporting the TAP framework in the context of retrospective memory performance, such that matching processing at encoding and retrieval, for example by both studying and testing on physical properties of a word, improves performance (e.g., Blaxton,

1989). Recent research has indicated that prospective memory performance is also improved under the TAP framework. If similar processing is required for the ongoing and prospective tasks (e.g., semantic processing of the words), the prospective response is more likely to be made (Abney, McBride, & Petrella, 2013; Meier & Graf, 2000).

TAP can be applied to performance on both prospective and retrospective memory tasks, but it cannot account for differences in interpretations of prospective and retrospective memory. It is possible that theories focusing exclusively on prospective memory may shed more light on the bias towards personality flaw interpretations of these types of memory failures. The Preparatory Attention and Memory processes theory (PAM) explains that attentional resources must be allocated to constant monitoring for cues in order for prospective memory performance to be successful (Smith, 2003). Should attentional resources be available, prospective memory performance is successful. In contrast to the PAM theory, McDaniel and Einstein (2000) describe a multiprocess theory of prospective memory. In this theory, prospective memory task completion can at times involve attention-demanding monitoring (e.g., when the cue is not focal), but can also be automatic, requiring no extra attentional resources for monitoring when there is a highly salient cue (e.g., a focal cue). Both of these theories of prospective memory focus on cognitive processes (e.g., attention), and do not mention personality factors as having any influence in prospective memory performance. As such, we are left without theoretical insight into why we might interpret prospective memory failures as resulting from personality flaws.

I can speculate that there may be a motivational component to the willingness to monitor for prospective memory cues. Low motivation to monitor might result in failure, which might in turn result in personality flaw interpretations of these prospective memory failures. However, to the

best of my knowledge, there is no theory that explains memory failure interpretations specifically or what might influence them.

1.2 Cognitive and Memory Failures

There is a substantial amount of research on failures of all sorts, such as failures in performance and failures in cognition, as well as a smaller amount of research on various kinds of memory failures. Understanding cognitive and memory failures themselves is an important step towards understanding the interpretations of these failures. However, the majority of researchers are interested in learning about the circumstances under which failures occur and not on the interpretations of made regarding these failures. This section briefly summarizes research on failures, and serves to highlight the factors considered as the primary causes of these cognitive and memory failures.

1.2.1 *The influence of attention.* Much of the research on cognitive failures is heavily focused on lapses in attention. The phenomenon of inattention blindness describes a situation where we do not see something obvious because our attention is directed elsewhere (Mack, 2003). This phenomenon often occurs in lab-based tasks when an individual's attention is deliberately directed to a highly demanding task (Mack, 2003). For example, having participants count the number of times a group of people passed a ball around was attention-demanding enough such that participants often did not notice a person in a gorilla suit walking through the middle of the scene (Simons & Chabris, 1999). Inattention blindness is closely related to prospective memory failures that occur when in a non-focal cue situation – the non-focal cue is missed generally because it is not receiving adequate attention (Rendell et al., 2007).

Similarly, Cheyne, Carriere and Smilek (2006) have found that lapses in attention can have serious consequences for performance on the Sustained Attention to Response Task (SART). The

SART requires participants to withhold a response when an infrequent target appears and is thought to measure vigilance and inhibition of automatic responses (Cheyne et al., 2006). Certainly, the finding that the SART is negatively impacted by lapses in attention should not be surprising; however Cheyne et al.'s (2006) research indicated that these attentional lapses need only be milliseconds in duration to have profound effects on the number of errors in this cognitive task. This finding is particularly relevant when considering the PAM theory of prospective memory, which also posits that diverting attentional resources from cue detection results in prospective memory failures (Smith, 2003).

While much of the research on attention and cognitive task failures is associated with attention shifting away from the task at hand, there is also research to suggest that task performance can suffer as a result of too much attentional focus. DeCaro, Thomas, Albert, and Beilock (2011) discovered that attending too closely to the performance of a skill can disrupt performance, especially if the skill is reliant upon information integration. Consider, for example, the context of athletes choking under pressure during an important competition. Consistent with DeCaro et al.'s (2011) research, an explanation of this choking phenomenon is that athletes focusing too much attention on the individual elements of a task (e.g., tracking and catching a baseball) might be unable to integrate those elements as they normally would and thus perform the task poorly. For prospective memory, we know that too much focus on the ongoing task disrupts performance on the prospective task (e.g., Marsh & Hicks, 1998). This disruption in performance could be interpreted as a problem integrating the requirements of the ongoing and prospective memory tasks, and it is possible that blame for the inability to properly integrate both tasks is placed internally on personality characteristics, similar to when an athlete chokes during an important competition, and his character often shoulders all the blame.

1.2.2 The influence of mind-wandering. A relatively new and interesting area of research revolves around mind-wandering and its influence on cognitive tasks. Kam and colleagues (2012) have indicated that mind-wandering is a failure in executive control, and is detrimental to visuomotor tracking tasks. The researchers posit that mind-wandering negatively affects behavioural control and adjustment. Other recent research has suggested that mind-wandering is not always detrimental to task performance, as responses to unexpected or surprising stimuli are not affected by mind-wandering (Kam, Dao, Stanciulescu, Tildesley, & Handy, 2013). The findings can be linked to the multiprocess theory of prospective memory, which states that a cue can be automatically detected if it is salient enough (McDaniel & Einstein, 2000). Mind-wandering research is a new and interesting avenue of research in the area of cognitive performance, and might be applied to prospective memory performance as well, however as yet cannot account for interpretation biases about memory failures.

1.2.3 The influence of mindfulness. In research that may be related to the personality bias in prospective memory failure interpretations, Herndon (2006) focused on the influence of trait mindfulness, or the ability to attend to the 'here and now' on cognitive failures. High trait mindfulness was predictive of low cognitive errors as measured by the Cognitive Failures Questionnaire (CFQ), which is a self-report measure of the frequency of various cognitive blunders. This finding is particularly interesting in the context of prospective memory failure interpretations, considering monitoring for prospective memory cues is certainly dependent upon attending to the 'here and now' (Smith, 2003). In contrast, retrospective memory focuses more on reflecting back into the past (Tulving, 1972). It is conceivable that being low on mindfulness (i.e., not attending to the here and now) is an undesirable personality trait, and might be related to irresponsibility or unreliability. Taking this possibility into account, and the fact that low mindfulness is related to high

cognitive failures, I can speculate that perhaps trait mindfulness mediates the relationship between prospective memory failures and personality flaw interpretations.

While the research on the connection between mindfulness and cognitive failures is a promising start, unfortunately there is little research that focuses on personality trait interpretations of cognitive failures.

1.2.4 Factors influencing memory failures. Several researchers have supported the idea that memory failures result when a number of cognitive processes fail. In a study examining self-reports of cognitive and memory failures occurring in the context of daily life, Carriere, Cheyne and Smilek (2008) found that self-reported lapses of attention were significantly predictive of self-reported memory failures. Using a diary study method where participants were asked to track their daily cognitive failures, Unsworth, Brewer and Spillers (2012) were also able to relate every day cognitive failures, including prospective memory failures, to a variety of cognitive abilities. For example, time-based prospective memory failures were significantly related to working memory capacity. Efklides and Touroutoglou (2010) further support the importance of working memory in prospective memory task performance, as high working memory load had detrimental effects on prospective memory task accuracy and errors of omission.

The aforementioned research suggests that various cognitive processes play a huge role in cognitive and memory failures. The Munsat hypothesis suggests we interpret only retrospective memory failures as poor cognitive ability, and prospective memory failures as resulting from character or personality flaws. However, very little of the theory or research suggests any influence of personality for either type of memory failure specifically. Why, then, would we interpret prospective memory failures as the mark of a poor personality and only retrospective memory failures as resulting from poor cognitive or memory abilities? Furthermore, given all we know about

the similarities in prospective and retrospective memory, why would we interpret these memory failures differently at all?

As mentioned in earlier sections of this chapter, the critical difference between prospective and retrospective memory comes at the time of retrieval. For retrospective memory, we might automatically associate the need to think back in response to a cue with cognitive processes, and so not being able to retrieve the target information is more obviously the result of a failure in these cognitive processes. By contrast, for prospective memory, the critical issue is connecting the cue with an intention, which (to the lay-person) may not be as easily related to cognitive processes but rather is more easily related to motivational or personality issues. If we are not motivated to make the link between a cue and an intention, we will not do so, and as such we cannot be counted on to do so in the future (i.e., we are unreliable). At present, this explanation remains speculation. However, there is a large body of social cognition research that suggests there are a number of situations when unwarranted interpretations occur. These types of interpretation biases might add some insight into the Munsat hypothesis.

1.3 Interpretation Biases

Consistent with the quotation from Nietzsche, our interpretations of external and internal events are subject to a number of well known biases. A bias is said to occur when we make different interpretations of an event, according to the context in which it occurred. This section provides a brief overview of different kinds of interpretation biases, and serves to highlight the factors which tend to colour our interpretations.

Research in the field of social cognition has demonstrated that various interpretations we make are flexible, and can be influenced by any number of factors. For example, speaking with a certain accent can have a negative or positive influence on attributions of competence (Edwards,

1977), integrity (Birch & McPhail, 2010) and credibility of the speaker (Lev-Ari & Keysar, 2010).

Levin, Giles and Garrett (1994) demonstrated that a speaker using more formal language is seen as more intelligent and ambitious, but less sincere and trustworthy.

This type of research demonstrates how the same information can be interpreted very differently, simply by varying the context. As the aforementioned research demonstrates, the difference in context might be the same information given with or without an accent, or (in the context of the present research) the different context might be a retrospective compared to a prospective memory failure. While there is virtually no research that focuses on the different interpretations of prospective and retrospective memory failures, there is a wealth of research focused more on attributions of belief and/or blame in regards to many other contexts, successes or failures. The research is not associated with memory failures directly; however the findings can be connected to the Munsat hypothesis.

1.3.1 The fundamental attribution error. The fundamental attribution error demonstrates the tendency to attribute blame or belief internally (i.e., to the individual) rather than to the situation. In their initial research paradigm, Jones and Harris (1967) presented subjects with opinion-based speeches, and subjects were told these speeches were written by other students. These speeches were either in favour of or in opposition to the communist leader in Cuba, Fidel Castro. Participants were told either that the student had a choice of which position they were to argue in the speech, or that the student was forced to argue one position or the other. Participants attributed the student's position in the speech as representative of their true internal belief rather than situational constraints regardless of whether or not the student chose to argue from that position (Jones & Harris, 1967). An interesting area of study within the fundamental attribution error framework revolves around the influence of participant age. One study found that middle-

aged adults were less likely than their younger and older counterparts to engage in the fundamental attribution error (Follett & Hess, 2002). This result has implications for the present research, given our subject pool is made up of almost exclusively younger adults.

Jellisen and Green (1981) suggested that the tendency to attribute blame or belief of others internally (rather than to the situation) is a normative behaviour, and therefore has positive effects on our perception of ourselves as well as how we are perceived by others, which perhaps explains why this interpretation bias is so persistent. Based on the findings of Jellisen and Green (1981), I can speculate that biases in memory failures interpretations are also normative behaviours, and thus the bias persists due to the positive effects of behaving normatively. However, this explanation does not account for why prospective memory and retrospective memory failures would have different normative interpretations.

1.3.2 The self-serving bias. The self-serving bias is relevant to the present research because it is focused on interpretations of failures. This bias states that we tend to attribute our failures to chance, but our successes to skill (Zuckerman, 1979). There are two ways in which the self-serving bias is directly related to the present research. First, as mentioned my research focused on participants' interpretations of failures (specifically memory failures). Second, in the present research participants were asked to place themselves in the position of the protagonist in various memory failure vignettes. Essentially then, they were being asked to interpret their own failures.

There is interesting research on the interaction between gender and the self-serving bias that is also relevant to the present research. Levine et al. (1976) demonstrated that males were more likely to attribute success on an in-lab anagram task to ability or skill and but failure on this task to luck, whereas females did not show differences in interpretations for the positive and negative outcomes. Another study examined the attributions of blame made by male and female

Olympic athletes in newspaper articles following the athletes' successes or failures. Aldridge and Islam (2012) hypothesized that the self-serving bias would not be present in a collectivist culture like Japan, and so coded attributions made by both Australian and Japanese athletes. Results indicated that, regardless of culture, the male athletes attributed blame for failures more externally and the source of success to internal controllable factors, but female athletes did not differ in their attributions of blame for failures and credit for successes (Aldridge & Islam, 2012).

These findings are critical to the present research. First, it is possible that the vignettes, which are written from the participants' perspective, will encourage less internal and more external blame for the memory failures should the participants genuinely see themselves as the actor of the failure. Furthermore, it is very common for female participants to substantially outnumber male participants in the subject pool used in the present research, thus if the self-serving does influence interpretations of memory failures, it is important to remember that the effect might be somewhat diminished. Finally, together the two aforementioned studies demonstrate that the self-serving bias occurs regardless of task importance. This information is critical, as the present research varies the importance of the memory failures being interpreted in the vignettes. If the interpretations biases associated with the Munsat hypothesis are robust, they should occur regardless of the importance of the memory failure consequences.

1.3.3 The actor-observer bias. Another interpretation bias dealing with failures was proposed by Jones and Nisbett (1971). The actor-observer bias states that when we are the actor of a failure, blame is more likely to be attributed to the situation; however, when we are the observer of another person committing a failure, even when we are provided with identical information, blame is more likely to be attributed to the individual (Jones & Nisbett, 1971). The researchers posit that one reason this bias occurs is different information processing that occurs between actors and

observers (Nisbett, Caputo, Legant, & Marecek, 1976). Actors have access to more information about their own disposition whereas observers are forced to make assumptions. Support for this finding comes from a meta-analytic study that found asymmetrical bias for successes and failures. This summary of 173 studies suggested that even when successes occur, observers are also more likely to make dispositional attributions compared to actors (Malle, 2006) The actor-observer bias is particularly relevant to the current research on the Munsat hypothesis, as participants in past research read vignettes from a third-person perspective (i.e., as observers), however in the present research we asked participants to put themselves in the position of the protagonist (i.e., as the actor) in the vignettes. If participants do take this actor role, their interpretations might be less biased towards internal (personality flaw) blame.

There has been research conducted that has been able to manipulate the actor-observer bias. Galper (1976) presented two groups of participants with the exact same information content by way of a vignette, but manipulated their approach to the information, either by asking participants to picture the events clearly or by asking them to empathize with the protagonist in the story. This manipulation allowed elaboration for both experimental groups, but encouraged different perspectives. Results indicated that when empathizing with the protagonist, participants attributed blame to the situation rather than internally to the protagonist, supporting the hypothesis that information-processing approaches mediate the actor-observer bias. More recent research by Vescio, Sechrist and Paolucci (2003) indicated that perspective-taking adjustments were enough to override the frequently automatic and subconscious process of stereotyping while observing a job interview situation. Also consistent with these findings, vignette studies that examined the role of personal beliefs in attributions of blame found that participants whose belief system differed significantly from that of the protagonist described in the vignette were more like

to attribute blame to the protagonist rather than the situation (Blanchard-Fields, Hertzog, & Horhorta, 2012). This last study suggests that having less in common with the protagonist decreased the likelihood of empathizing and perspective-taking, and increased the distance (or observer perspective) from the protagonist.

All of these findings are important for the present research, because much of the present research focuses on participants taking on an actor role in the memory failure vignettes. While the actor-observer bias may not explain why prospective and retrospective memory failures are interpreted differently, the research focusing on manipulations of the effect will be particularly relevant to later chapters of this dissertation.

1.3.4 Memory failure interpretations. There is little research surrounding interpretations of prospective and retrospective memory failures specifically. However, Bieman-Copland and Ryan (1998) did find some age-related biases in overall memory performance interpretations. In a vignette study, when the protagonist committing the memory failure was older, the failures were seen as less controllable, more related to lack of ability and more worrisome, and memory successes were seen as less typical (Bieman-Copland, & Ryan, 1998). This lack of ability interpretation is consistent with the Munsat hypothesis explanation of retrospective memory failures. Bieman-Copland and Ryan (1998) did not distinguish between prospective and retrospective memory failures in their research paradigm, and so we cannot be sure what the influence of age is on the Munsat hypothesis specifically.

In a study that looked at interpretations of performance on an in-lab memory task, Blatt-Eisengart and Lachman (2004) had young, middle-aged and older adults perform a free recall test and then make attributions regarding their actual performance. This would be classified as an episodic retrospective memory task failure attribution. When performance was poor, internal but

uncontrollable factors (such as genes or natural ability) were more likely to be cited as causes by younger adults. Again, this finding is consistent with the Munsat hypothesis, in that retrospective memory failures tend to be interpreted as memory (i.e., natural ability) flaws. Unfortunately, this research did not address prospective memory failure interpretations.

1.3.5 The Munsat hypothesis. Over the past century, many researchers have posited that prospective memory failures tend to be interpreted as flaws in personality (Bennett, 1910; Freud, 1952). In 1967, Munsat made a claim comparing attributions of blame for prospective and retrospective memory failures, and wrote that “if a person makes memory claims about what he did in the past, and they are frequently wrong, we say his memory is unreliable. [However], if the person forgets to do things he said he would do . . . it is he we brand as unreliable” (p. 18). Interestingly, none of the aforementioned scholars provided a theoretical basis for such a hypothesis. Thus it appears this hypothesis is in fact based more on intuition than on empirical evidence. This is perhaps not surprising, given that the vast amount of empirical evidence presented in this chapter does not offer an explanation of the Munsat hypothesis.

Recent research has supported the Munsat hypothesis. Graf (2012) presented participants with vignettes describing another person committing either a prospective or retrospective memory failure. These memory failures were either social in nature (i.e., reflecting a promise made to another person) or asocial in nature (involving the protagonist alone), and were written from a third-person perspective. Results of this study indicated that retrospective memory were interpreted as being due to flaws in memory processes, whereas prospective memory failures were judged as the mark of a flawed personality and a lack of motivation (Graf, 2012).

1.4 The Present Research

There are several goals of the present research. Aside from the previously mentioned research by Graf (2012), this field is quite small. This means that to ensure the tendency to attribute prospective memory failures to personality flaws and retrospective memory failures to memory flaws is robust, there is a need for replication. Furthermore, the dearth of research in this area means that we are unclear about what kinds of properties of the memory failures themselves might influence the interpretations we make. Finally, little is known about the cognitive processes that might underlie the phenomenon. The present research was designed to address these issues.

In Experiment 1, new vignettes were created that varied properties of the memory failures themselves that were hypothesized to have an influence on memory failure interpretations. These factors were the sociality of the memory failure (i.e., social versus asocial), as well as the importance of the consequences of the memory failure (i.e., low and high importance).

A second issue that arises from the small amount of research is that little is known about the cognitive mechanism underlying the Munsat hypothesis. One manner of understanding a phenomenon such as the interpretation biases occurring under Munsat hypothesis is to manipulate them. In the present research, the goal was to make the difference between prospective and retrospective memory failure interpretations smaller. Research on interpretation biases has indicated that various factors, such as empathizing and perspective-taking, can have an impact on phenomena such as the actor-observer bias (e.g., Galper, 1976). With this information in mind, the goal of Experiment 2 was to design a priming procedure that would encourage participants to see themselves as equivalent to the protagonist in the memory failure vignettes. Therefore, Experiment 2 developed a priming procedure to make participants aware of their own memory fallibility, as measured by a self-report memory ability questionnaire.

Finally, Experiment 3 combined the two previous studies and examined whether or not priming participants to their own memory fallibility would encourage empathy and perspective-taking, and influence their subsequent interpretations of the causes of memory failures. As Blanchard-Fields and colleagues (2012) demonstrated, sharing characteristics with a protagonist increases empathy, and decreases internal attributions of blame, so the sense of memory fallibility induced in the participant should create this sense of similarity with the protagonist. The larger scope of Experiment 3 was to identify a potential underlying cognitive mechanism of the effect.

2 Experiment 1: Who is to Blame When We Forget?

The goal of Experiment 1 was to replicate findings from Graf (2012), and also to determine what properties of prospective and retrospective memory failures might influence interpretation biases. Two properties were examined, the sociality of the memory failures and the importance of the consequences of the memory failures.

In this study, I hypothesized that the sociality of the memory failure (i.e., whether or not it involves another person) would impact how critically memory failures were interpreted. Since prospective memory failures that involve another person frequently arise in connection with promises and commitments, these social memory failures should be particularly vulnerable to the bias of blame placed on the protagonist's personality. Given this possibility, vignettes were created that depicted memory failures involving other people (social memory failures) and memory failures that did not involve anyone else (asocial memory failures) so that the two scenarios could be directly compared.

Furthermore, I wanted to examine whether or not the interpretation bias occurred when memory failures had consequences that were very important or not important. Given that other interpretation biases, e.g., the self-serving bias, have been robust in the context of both large-scale failures (e.g., performance at the Olympics; Aldridge & Islam, 2012) and small-scale failures (e.g., performance on an anagram task; Levine et al., 1976), this research will examine whether the interpretation biases involved in Munsat hypothesis are similarly robust.

Essentially, Experiment 1 addresses three questions: question one – can we replicate the bias? I hypothesize that the effects demonstrated in Graf (2012) will be replicated, namely that prospective memory failures will be seen as resulting from personality flaws and lack of motivation, and that retrospective memory failures will be interpreted as the result of poor cognitive or

memory abilities. Question two – does the Munsat hypothesis hold when memory failures are both social and asocial in nature? I hypothesize that the bias will be more extreme against prospective memory failures that are social in nature because of the connotation of breaking a promise – they will be viewed as more serious and be more likely to involve personality flaw interpretations.

Question three – does the Munsat hypothesis occur when the consequences of the memory failure of both high and low importance? Consistent with research on the self-serving bias, I hypothesize that the memory failure bias will occur regardless of the importance of the consequences.

2.1 Method

2.1.1 Participants and design. Ninety-nine undergraduate students from the University of British Columbia Department of Psychology human subject pool were given partial course credit for their participation in the study (female = 83). Informed consent was obtained from each participant prior to beginning the experiment. The experiment was a 2 x 2 x 2 within-subjects design. The three within-subjects factors were: memory failure type (prospective and retrospective memory failures), the sociality of the memory failure (social and asocial), and the importance of the consequences of the memory failure (low and high importance).

2.1.2 Materials. Sixteen vignettes were created for the purposes of this study (see Appendix A). Each vignette was 4-6 sentences long. These vignettes varied on three dimensions; memory failure type (retrospective and prospective), importance (high and low) and sociality (social or asocial). Each vignette began by describing a situation that would be the context of the memory failure, and this description was from the point-of-view of the participant (e.g., ‘*You* recently met someone at a party...’). Following the description of the context, the memory failure itself was described. The phrase “forget” was avoided in the description of the failure so as not to bias participants’ later interpretations, and instead variations of the phrase “fail to recall” were used

wherever possible. Finally, the consequences of the memory failure were described so that participants did not have to make assumptions about the outcome of the memory failure. The consequences always concluded with focus on the protagonist (you), even for memory failures that were social in nature.

For the first of the three variables (memory failure type), the content of the memory varied. It was either a detail or event that was later unable to be retrieved for retrospective memory, or an intention, that was later unable to be retrieved for prospective memory. For the sociality variable, asocial failures had the protagonist as the only character involved in the memory failure, whereas for social failures there was another person involved in the memory failure – both the context and the failure itself. This other person was one of the following: a significant other, a romantic interest, a neighbour or a classmate. This variability in characters ensured the social memory failures crossed many relationship contexts. For social memory failures, while both people involved felt the consequences of the memory failure the main focus of the consequences described was always placed on the protagonist in an attempt to keep the social and asocial vignettes as similar as possible. For high and low importance memory failures, the seriousness of the consequences of the memory failure were varied. For low importance memory failures, the consequences were trivial and non-life altering (e.g., having to return to a store another day). For high importance memory failures, the consequences were serious and life-altering (e.g., having difficulty breathing).

There were two versions of the vignettes, and each participant only saw one version. Versions A and B maintained identical contexts, sociality and importance of the consequences. The only difference was a switch in terms of which situations involved prospective and retrospective memory failures (see Appendix A). This manipulation ensured there was nothing specific to the

context of the memory failure that resulted in a given interpretation, but the rather memory failure type itself was the causal factor of the interpretation.

The interpretation questionnaire, made up of 14 statements, was provided after each vignette. This questionnaire assessed the participants' interpretations of potential causes of the memory failures, and their interpretations of how serious and personally relevant the memory failures were (see Appendix B). The questionnaire was modified from Graf (2012), and assessed seven different constructs, which were each a composite of two statements. The seven constructs were the following: personal relevance of the failure (how much the participant could relate to it), seriousness of the failure, frequency of the failure (how often a failure like the one described occurred for the participant), external factors causing the failure (distraction, something out of one's control), cognitive/memory factors causing the failure (confusion, forgetfulness), personality flaws causing the failure (irresponsibility, unreliability) and lack of motivation causing the failure. The interpretation questionnaire required participants to rate their level of agreement to each statement on a 6 point Likert scale ranging from 1 = strongly disagree to 6 = strongly agree (see Appendix B). Higher ratings on the agreement scale indicated participants were endorsing the cause of the memory failure described in the statement, a higher severity level or greater personal relevance or frequency of the memory failure.

A four-item memory check questionnaire was created to assess the participants' recall of details in the vignettes. This questionnaire was designed to help identify those subjects who were not reading the vignettes carefully. A single multiple choice memory question was created for each vignette, and the question had three optional responses, a), b) or c). The question asked participants about a detail in one of the vignettes they had just read, which was a peripheral detail not specifically about the memory failure itself.

The NEO Five Factor Inventory (short version) (Costa & McCrae, 1992) was used to measure individual differences in personality factors, and to see if any personality traits correlated with memory failures interpretation tendencies. The questionnaire had 60 statements, and required participants to respond on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree to each statement, e.g., “I am a worrier” (this example assesses neuroticism). Traits assessed by the NEO are the ‘big-five’: Neuroticism, extraversion, openness to change, agreeableness and conscientiousness.

2.1.3 Procedure. Participants were run individually in a quiet room equipped with a desktop computer, which was used to display the critical experimental materials. Each session consisted of three phases, two sets of four vignettes separated by the NEO inventory. The experimenter started the computer program, at which point every participant was instructed, verbally and by the computer program, to read each vignette carefully and to imagine themselves as the protagonist in each vignette. They were also notified verbally that they would be asked a set of multiple choice memory questions about the vignettes, so they should pay close attention. For phase one, one vignette at a time was selected randomly and without replacement from Set 1 (or 2) of either version A or version B (see appendix A). The vignette was presented at the top of the screen alone until the participants pressed the right arrow key, which was the instruction on the screen. The participants were not given any time restriction on how long they had to read the vignette. After participants pressed the right arrow key, the vignette remained at the top of the screen and one statement at a time from the interpretation questionnaire was selected randomly and without replacement and presented in the centre of the screen. Below the statement was the six-point agreement scale (see figure 1).

You recently met someone at a party and you are very much romantically interested in/attracted to him/her. You arrange to go out on a first date, but when you meet this person for the date, you fail to recall his/her name. As a consequence, he/she is upset and is no longer interested in dating you.

A situation like this occurs because you must be an irresponsible person

1	2	3	4	5	6
Disagree	Disagree	Disagree	Agree	Agree	Agree
Strongly	Slightly	Somewhat	Somewhat	Slightly	Strongly

Figure 1. Depiction of vignette and interpretation questionnaire presentation.

Participants were asked to respond honestly when they rated their level of agreement to each statement, as it related to the vignette they had just read. Each statement remained on the screen until the participant made a response. When a response was made, another statement was randomly selected from the interpretation questionnaire. After the participants had responded to all 14 statements, a new randomly selected vignette from the remained three vignettes in Set 1 (or 2), version A (or B), would appear. The procedure was repeated for four vignettes.

After the fourth vignette was presented, one multiple choice memory question from Set 1, version A or B, was selected randomly and without replacement. Participants selected their response by entering the correct letter option on the computer keyboard: either a), b) or c). The next question was selected randomly from the remaining three questions. This procedure was repeated until four questions were asked, one question about each vignette.

Participants were notified at the beginning of the experiment that after the first set of vignettes and check memory questions, the computer screen would notify them they were to “take a break and do something different”. This was phase two of the experiment. At this point, participants were directed to the paper version of the NEO-FFI, where they were advised to circle

their responses to each statement, rating their level of agreement on a five-point scale to a series of statements about themselves.

Once the NEO-FFI was completed, participants were notified (via the computer program) to press the spacebar key to continue with the next set of vignettes (phase 3). The instructions were repeated before the participants began reading the vignettes again. This time, one vignette was selected randomly and without replacement from Set 2 (or 1), either version A or B (same version as phase one). The vignette, statement and memory question procedure was identical to phase one.

Vignette Sets 1 and 2 each included two prospective and two retrospective memory failures, two social and two asocial memory failures, and two high importance and two low importance memory failures. Sets 1 and 2 were counterbalanced across subjects, such that half of the subjects received Set 1 first, and the other half received Set 2 first. Half of the participants received version A vignettes and half of the participants received version B.

Once participants completed phase three of the study, they were informed that the study was over, they were debriefed and given their partial course credit. This study took approximately 30 minutes to complete.

2.2 Results

2.2.1 Preliminary analysis. Nine subjects' scores were dropped as general outliers in terms of their median reaction time to the 14-statement interpretation questionnaire. Overall median response time for the ratings was 4237 msec, with a standard deviation of 3451 msec. The response time data was screened for outliers by examining the distribution of median response times. In order to remove a discontinuity in the distribution, seven subjects, whose overall median response times approached 2.5 seconds, were deemed outliers. Two subjects' scores were dropped due to

median response times approaching 10 seconds. The concern with the especially short or long response times was that participants were either not taking time to consider the interpretation questionnaire statements, or were having difficulty understanding the objective of the experiment. One subject's scores were dropped due to extremely slow response times on a number of individual questions. This left a total of 89 participants (female = 74), and a distribution of median response times that was approaching normal.

The overall mean accuracy for the memory check questions was very high, $M = 91\%$, $SD = 11\%$. No participants had to be excluded because of poor performance on the memory check questions, as participants all scored significantly better than chance.

Correlations between 14 interpretation questionnaire statements that were intended to form the seven constructs were assessed. These correlations ensured that the statements were highly related before collapsing them and analyzing them as one construct. Each of the pairs of statements assessed was highly correlated, with one exception. These correlations are presented in table 1.

Table 1

Correlations between individual statements comprising seven constructs

Construct	Personal Relevance	Frequency	Seriousness	Lack of Motivation	Personality Flaws	External Factors	Cognitive/ Memory Factors
Correlations	.70**	.72**	.64**	.85**	.83**	.41**	.13

**indicates $p < .001$

The lack of a strong correlation between the cognitive/memory factor statements was due to ceiling effects for one of the statements, '*A situation like this happens because you must have forgotten*', with a mean score $M = 4.93$, $SD = .76$, on the six-point scale. This item was dropped in the final analysis, leaving only the confusion statement, '*A situation like this happens because you*

must have been confused', to assess the cognitive/memory factors construct causing the memory failure.

A 2 x 2 x 2 (memory failure type x importance x sociality) within-subjects ANOVA was run on all of the seven constructs (with the confusion statement assessed individually). All overall ANOVA's were run with a standard alpha-level cut-off of .05, with follow-up analyses restricted to an alpha-level of .01. This reduction in the alpha level was to maintain a reasonable family-wise error rate.

2.2.2 Personal relevance. The construct of personal relevance assessed how much the participants stated they were able to relate to the failure and whether or not the failure (or one like it) had occurred for them in their lives. The main effect of importance served as a manipulation check for our importance variable. Mean ratings on the personal relevance construct for memory failures with low importance consequences were expected to be higher, since the low importance failures were designed to be representative of common daily memory failures. This main effect of importance was highly significant, $F(1,88) = 203.40, p < .001$, partial $\eta^2 = .27$, as can be seen in the data represented by figure 2. As predicted, low importance memory ($M = 4.23, SD = .97$) failures were overall much more personally relevant than memory failures with high importance consequences ($M = 2.46, SD = .95$). There were a number of other significant effects and interactions, however they were all qualified by a significant three-way interaction (depicted in figure 2) of memory failure type (retrospective, prospective) x importance (high, low) x sociality (asocial, social), $F(1,88) = 20.11, p < .001$, partial $\eta^2 = .08$. Follow-up analyses focused on differences between prospective and retrospective failures in the context of sociality, and so importance of the consequences was held constant. For high importance failures, there were no significant follow-up effects – all of the memory failures were rated equally low on the personal relevance construct by participants. This is not surprising given that the consequences of these memory failures were

written to be rather extreme. For low importance failures, there was a significant interaction between memory failure type and sociality, $F(1,88) = 13.79$, $p < .001$, partial $\eta^2 = .29$. To understand the differences between ratings on the personal relevance construct for prospective and retrospective memory failures, social and asocial failures were analyzed separately. In general, I expected ratings would be lower for prospective memory failures due to the potentially negative connotation associated with prospective memory failures. This pattern was observed for social memory failures, where retrospective memory failures ($M = 4.24$, $SD = 1.41$) were more relatable than prospective memory failures ($M = 3.80$, $SD = 1.56$), however this difference was only marginally significant under the more stringent alpha level, $t(88) = 2.28$, with $CI_{99} = [-.07, .93]$, $p = .025$. For asocial failures, the opposite pattern emerged, where prospective memory failures ($M = 4.97$, $SD = 1.22$) were more relatable than retrospective memory failures ($M = 3.93$, $SD = .97$), $t(88) = 6.82$, with $CI_{99} = [.63, 1.43]$, $p < .001$. These follow-up results are also shown in figure 2.

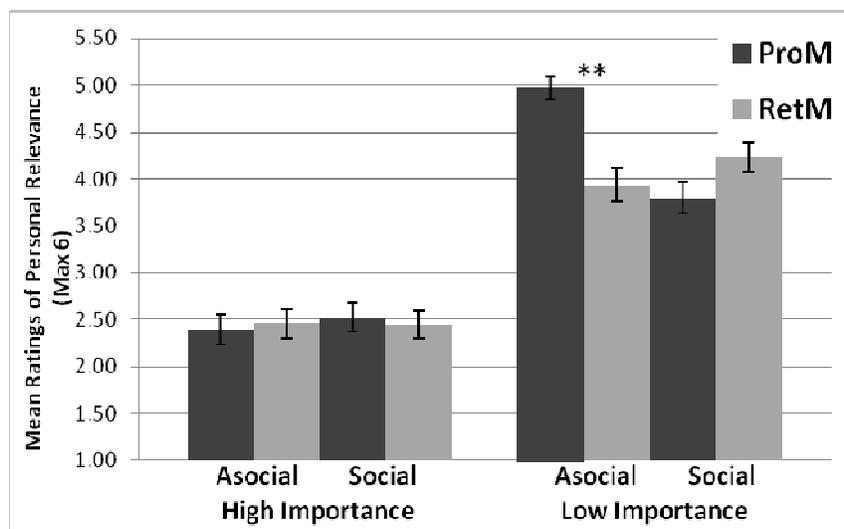


Figure 2. Mean ratings on personal relevance. Figure depicts three-way interaction of memory failure type x importance x sociality. ProM = prospective memory failures; RetM = retrospective memory failures. Error bars represent standard error of the mean; ** indicates $p < .001$.

2.2.3 Frequency. The construct of frequency of the memory failures assessed how often the participants stated they experienced similar failures. The main effect of importance again served as a manipulation check for our importance variable, higher mean ratings on the frequency construct were expected for memory failures with low importance consequences. This expectation is consistent with the data presented in figure 3. A significant main effect of importance, $F(1,88) = 143.40, p < .001$, partial $\eta^2 = .62$, implied the manipulation of importance was successful, such that low importance memory failures ($M = 2.81, SD = .81$) were deemed more frequent than high importance memory failures ($M = 1.79, SD = .60$). There were several other significant effects, but these effects were qualified by a significant three-way interaction depicted in figure 3, of memory failure type x importance x sociality, $F(1,88) = 12.67, p = .001$, partial $\eta^2 = .13$. Given the main effect of importance, follow-up analyses were conducted again by analysing high and low importance memory failures separately. I wanted to know whether participants considered prospective and retrospective memory failures as occurring equally frequently. Potentially, prospective memory failures will be rated as less frequent given the negative connotation associated with them. For high importance failures, there were again no significant effects; all memory failures were rated equally as infrequent. However, for low importance memory failures, there was again a significant memory failure type x sociality interaction, $F(1,88) = 30.45, p < .001$. For asocial failures, prospective memory failures ($M = 3.46, SD = 1.34$) were rated as more frequent than retrospective memory failures ($M = 2.85, SD = 1.39$), $t(88) = 3.87$, with $CI_{99} = [.19, 1.01], p < .001$. For social failures, retrospective memory failures ($M = 2.73, SD = 1.27$) were rated as more frequent than prospective memory failures ($M = 2.21, SD = 1.09$), $t(88) = 3.67$, with $CI_{99} = [.15, .89], p < .001$.

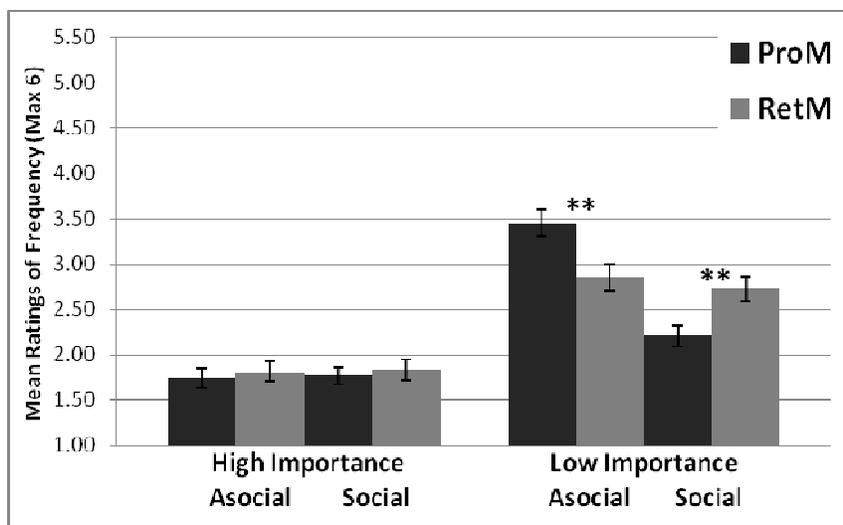


Figure 3. Mean ratings on frequency. Figure depicts three-way interaction of memory failure type x importance x sociality. Error bars represent standard error of the mean; ** indicates $p < .001$.

2.2.4 Seriousness. The construct of seriousness of the memory failures assessed just that -- how serious the participants considered the memory failures to be. The ratings on the seriousness construct were the most direct measurement of the importance manipulation. Naturally, I expected higher mean ratings on the seriousness construct for memory failures with high importance consequences, which is consistent with the data presented in table 2. A resoundingly significant main effect of importance $F(1,88) = 705.90, p < .001$, partial $\eta^2 = .89$, indicated the manipulation was successful, as high importance memory failures were rated as significantly more serious than low importance failures. The analysis of this construct also allowed an assessment of the hypothesis that social memory failures would be considered more serious. However, the main of sociality, $F(1,88) = 46.56, p < .001$, partial $\eta^2 = .35$, revealed that asocial memory failures were rated as more serious. This puzzling result was qualified by the significant two-way interaction between sociality and importance, $F(1,88) = 285.23, p < .001$, partial $\eta^2 = .76$. As demonstrated in table 2, in high importance contexts, asocial memory failures were rated as more serious, $t(88) = 17.59$, with $CI_{99} =$

[1.39, 1.88], $p < .001$, but for low importance failures, the pattern was opposite, $t(88) = 7.04$, with $CI_{99} = [.45, .98]$, $p < .001$. Implications of these results will be discussed later in this chapter.

Table 2

Mean ratings on seriousness for importance x sociality

Importance	High		Low	
Sociality	Asocial	Social	Asocial	Social
Mean (SD) Rating	5.53 (.56)	3.90 (.86)	1.86 (.87)	2.57 (.83)

In order to determine whether or not prospective memory failures were considered to be more serious than retrospective memory failures, I examined the significant interaction of memory failure type x sociality, $F(1,88) = 11.61$, $p < .001$, partial $\eta^2 = .12$, with means contributing to this interaction presented in table 3. Follow-up analyses of this interaction revealed that prospective memory failures were only considered more serious when the memory failures were social in nature, $t(88) = 3.01$, with $CI_{99} = [.04, .65]$, $p = .003$.

Table 3

Mean ratings on seriousness for sociality x memory failure type

Sociality	Asocial		Social	
Memory Type	ProM	RetM	ProM	RetM
Mean (SD) Rating	3.66 (.60)	3.72 (.59)	3.40 (.85)	3.06 (.81)

2.2.5 Lack of motivation. The construct lack of motivation assessed participants endorsement of statements suggesting lack of interest or motivation caused the memory failure. This construct is particularly relevant to the idea that making the conscious choice not to remember might be more readily associated with prospective memory. Consistent with this possibility, as well as findings from past research (Graf, 2012), I anticipated that prospective memory failures would be interpreted as resulting from motivation more than retrospective failures. Table 4 depicts means contributing to the main effect of memory failure type, which was consistent with the expected result, $F(1,88) = 6.13$, $p = .015$, partial $\eta^2 = .07$.

Table 4

Mean ratings on lack of motivation construct for memory failure type

Memory type	ProM	RetM
Mean Ratings	3.50 (.85)	3.30 (.89)

2.2.6 Personality flaws. One of the main hypotheses of the present research was that prospective memory failures would be attributed to personality flaws more than retrospective memory failures. Furthermore, I wanted to find out if this bias occurred when memory failures had both important and unimportant consequences, and what the influence of sociality would be on the bias. Consistent with the hypothesis, there was a significant effect of memory failure type in the expected direction, $F(1,88) = 22.29, p < .001$, partial $\eta^2 = .20$, (prospective; $M = 3.01, SD = .84$; retrospective; $M = 2.61, SD = .89$). The significant interaction depicted in figure 4 between memory failure type and sociality, $F(1,88) = 24.34, p < .001$, partial $\eta^2 = .22$, indicated that sociality does impact the hypothesized effect. Prospective memory failures were only rated as being more personality-based when the failures were social, $t(88) = 6.85$, with $CI_{99} = [.45, 1.01], p < .001$. Furthermore, a non-significant interaction between memory failure type and importance indicated that the bias is not influenced by the importance of the memory failure's consequences.

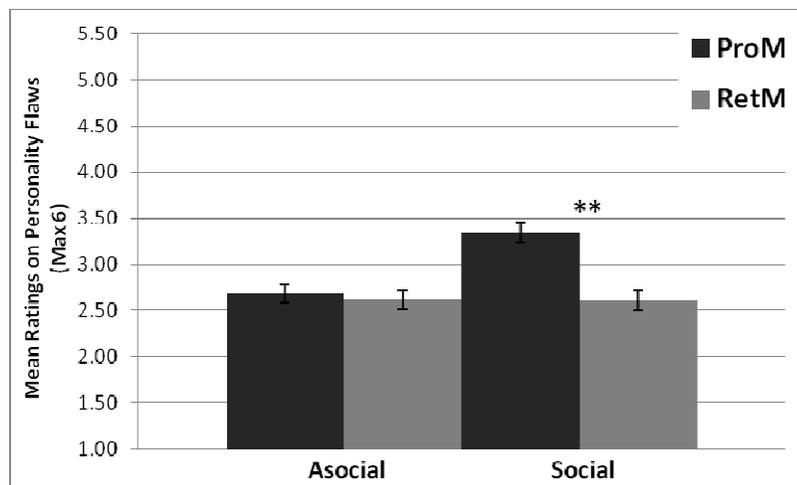


Figure 4. Mean ratings on personality flaws. Figure depicts two-way interaction of sociality x memory failure type. Error bars represent standard error of the mean; ** represents $p < .001$.

2.2.7 External factors. Mean ratings on the external factors construct demonstrated participants' likelihood for endorsing statements blaming memory failures on issues outside of the protagonist's control. I anticipated lower mean ratings on external factors for prospective memory failures, given the expectation that they would be interpreted as having more internal causes. There were significant main effects of all three independent variables. For memory failure type the effect was in the direction opposite of what was expected (prospective; $M = 3.74$, $SD = .77$; retrospective; $M = 3.30$, $SD = .77$), $F(1,88) = 31.87$, $p < .001$, partial $\eta^2 = .27$. This effect was qualified by a significant three-way memory failure type x importance x sociality interaction, $F(1,88) = 7.50$, $p = .007$, partial $\eta^2 = .08$. Consistent with previous follow-up analyses, importance was held constant. For both high importance [$F(1,88) = 14.54$, $p < .001$, partial $\eta^2 = .14$] and low importance [$F(1,88) = 14.54$, $p < .001$, partial $\eta^2 = .14$] failures, there significantly higher mean ratings on external factors causing prospective memory failures. The means contributed to these simple main effects are depicted in figure 5. No other effects were significant in the follow-up analyses.

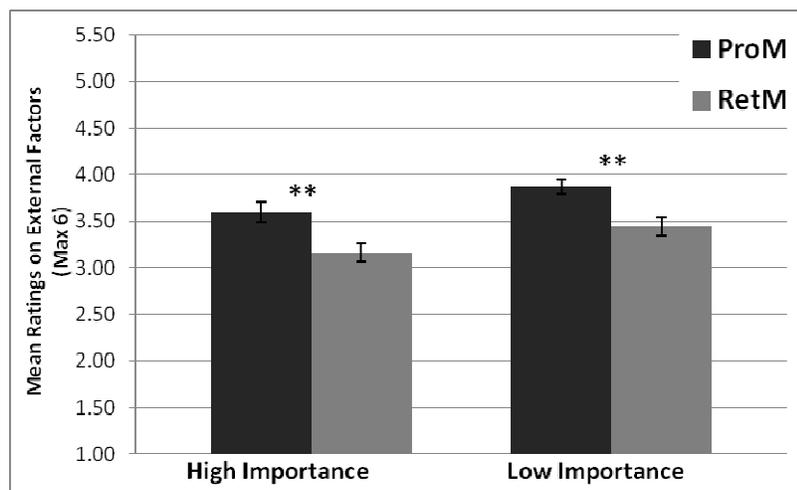


Figure 5. Mean ratings on external factors. Figure depicts significant simple main effects of the memory failure type at both high and low importance. Error bars represent standard error of the mean; ** indicates $p < .001$.

2.2.8 Confusion. One item was dropped from the cognitive/memory factor construct analysis due to ceiling effects, therefore the final analysis of this construct will only focus on the statement assessing confusion. Consistent with past research and the Munsat hypothesis, I hypothesized that retrospective memory failures would be interpreted as resulting from confusion more than prospective failures. A significant main effect of memory failure type (prospective; $M = 2.78$, $SD = .95$; retrospective; $M = 3.50$, $SD = 1.02$), $F(1,88) = 57.72$, $p < .001$, partial $\eta^2 = .40$, supported this hypothesis. Other significant main effects and interactions were again qualified by a significant three-way memory failure type x importance x sociality interaction $F(1,88) = 12.49$, $p = .001$, partial $\eta^2 = .12$. In-keeping with the standard of previous follow up analyses, importance was held constant. There were no significant effects for high importance failures, though the expected effect of memory failure type was approaching significance, $F(1,88) = 5.41$, $p = .022$, partial $\eta^2 = .06$. For low importance memory failures, there was a significant memory failure type x sociality interaction, $F(1,88) = 18.36$, $p < .001$, partial $\eta^2 = .17$, as demonstrated in figure 6. As expected, retrospective memory failures were attributed more frequently to confusion for both asocial, $t(88) = 9.17$, with $CI_{99} = [1.11, 2.00]$, $p < .001$, and social failures, $t(88) = 4.51$, with $CI_{99} = [.29, 1.10]$, $p < .001$. These effects are depicted in figure 6.

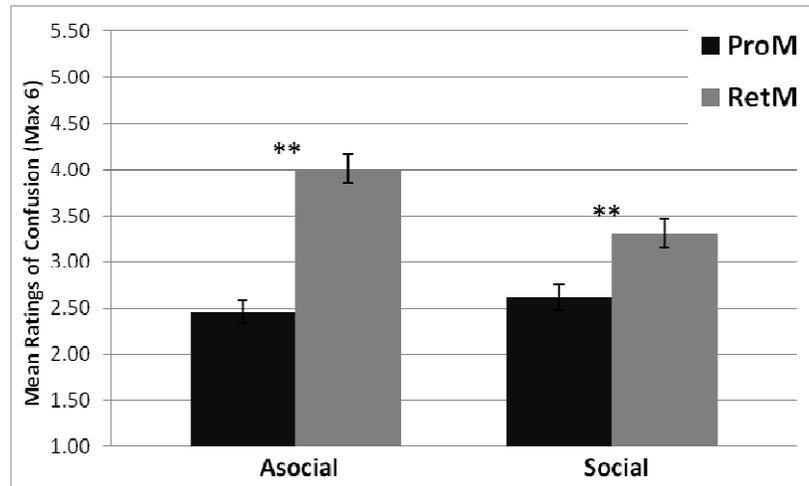


Figure 6. Mean ratings on confusion. Figure depicts interaction of memory failure type x sociality, for low importance failures. Error bars represent standard error of the mean; ** indicates $p < .001$.

2.2.9 Correlational analyses. Correlations among individual statements assessing the same constructs were presented in the preliminary analysis section. Correlations were run among the seven constructs to determine what causal factors or interpretations were related to one another. Correlations were also run among the seven constructs and the NEO personality traits to see if any of the participants' individual differences in personality traits were related to the interpretations they made. These values are presented in table 5.

Table 5

Correlations between interpretation questionnaire constructs and NEO traits

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Personal Relevance	1											
2. Frequency	.58**	1										
3. Seriousness	-.09	-.08	1									
4. Lack of Motivation	-.32	-.21	.11	1								
5. Personality Flaws	-.15	-.15	.20	.37**	1							
6. External Factors	.14	.20	.08	-.22*	-.11	1						
7. Confusion	.05	.07	.03	-.07	.01	.48**	1					
8. Neuroticism	.12	.28**	.07	-.01	.13	.06	-.07	1				
9. Extraversion	-.17	-.11	.20	.17	.03	-.06	.03	-.41**	1			
10. Openness	-.02	-.11	.01	-.09	-.05	-.07	.14	-.19	.35**	1		
11. Agreeableness	.03	-.04	-.07	-.16	-.26*	.14	.03	-.34**	.33**	.02	1	
12. Conscientiousness	-.08	-.15	.09	.03	-.04	-.09	-.09	-.14	.29**	.04	.11	1

* indicates $p < .05$; ** indicates $p < .01$

As expected, there was a significant positive correlation between frequency and personal relevance of the memory failures. There were also significant negative correlations between lack of motivation and frequency, as well as lack of motivation and external factors. Critically, a strong positive correlation between lack of motivation and personality flaws suggests that not being interested or motivated is, as hypothesized, strongly related to causal interpretations of irresponsibility or unreliability. Surprisingly, there was a strong positive correlation between external factors and confusion, which was unexpected because these two interpretations were initially thought to be theoretically separate constructs. Two possibilities explaining this surprising finding will be considered in further detail in the discussion section.

Few correlations were significant between the personality traits and interpretation questionnaire constructs. Overall there was a strong positive correlation between neuroticism and frequency of memory failures suggesting participants high on neuroticism were more likely to think the memory failures in the vignettes occur more frequently for them in daily life. Given past research that has linked performance on both forms of memory to neuroticism (Meier et al., 2002; Cuttler & Graf, 2007), this result was not surprising. There was also a strong negative correlation between agreeableness and the personality flaw construct suggesting participants high in agreeableness were less likely to blame personality flaws for memory failures.

2.3 Discussion

In terms of the replication goals of Experiment 1, consistent with the Munsat hypothesis and previous findings (Graf, 2012), retrospective memory failures were more likely the result of cognitive/memory factors, in this case represented by the single statement related to confusion. Also consistent with previous research (Graf, 2012) were significant differences in personality-based interpretations of prospective memory and retrospective memory failures. However, contrary to

past research, these differences only arose when the memory failures were social in nature. Furthermore, participants were not more likely to agree that personality flaws caused prospective memory failures, they were simply less likely to disagree as the mean score was at approximately the mid-point of the six-point agreement scale ($M = 3.34$, $SD = 1.01$). This suggests the effect was somewhat weaker in this experiment compared to past research by Graf (2012). A potential explanation for the weakening of the effect relates to what we know from research on the actor-observer bias -- that increased actors of a failure are less likely to place the blame on internal (personality) factors (e.g., Jones & Nisbett, 1971). The vignettes in this experiment were written from the participant's perspective, which encouraged participants to take the position of the protagonist in the vignette, thus decreasing personality flaw interpretations.

Also consistent with previous research was that prospective memory failures were judged as arising significantly more frequently from lack of motivation (Graf, 2012). This result lends important support to the idea that consciously choosing not to recall something is more frequently attributed to intentions, i.e., prospective memory, than events or experiences, i.e., retrospective memory. Furthermore, ratings on motivational factors were correlated with personality flaw ratings, suggesting that the choice to let go of an intention is associated with our personality flaw interpretations, as was hypothesized in an earlier chapter of this dissertation.

In findings somewhat contrary to past research, sociality appears to have a strong impact on interpretations of memory failures. In the present research, personality flaw ratings were higher for prospective memory failures only when the failures were social in nature. It appears as though there is something unique about breaking a promise to someone that colours our interpretations of possible causes of the memory failure. Furthermore, participants were less likely to personally relate to low importance social failures and less likely to report them occurring frequently. Thus it

appears as if participants adhere to the negative connotation of prospective memory failures, and do not like to admit they failed to follow through with a promise or commitment, even if the consequences of the prospective memory failure are minor. Even more compelling support for the importance of sociality in interpretations of prospective memory failures specifically is the fact that similar retrospective memory failures did not show a bias against social failures, (e.g., for personality flaws).

One problem with the present research was that the item assessing forgetfulness and contributing to the cognitive/memory factors construct showed ceiling effects, and therefore could not be used in the analysis. This problem will be addressed in later studies, by modifying this item on the interpretation questionnaire.

Results from the constructs assessing seriousness, personal relevance and frequency of the memory failures demonstrated evidence of successful manipulation of importance in the vignettes, such that the low importance memory failures were judged as less serious, more frequent and more easily relatable compared to high importance failures. Furthermore, the importance of the consequences of the memory failures appeared to have little effect on the main constructs associated with the Munsat hypothesis, personality flaw ratings and cognitive/memory factor ratings. Participants were more likely to blame personality flaws for prospective memory failures regardless of the importance of the consequences, and cognitive/memory factor ratings were also higher for retrospective memory failures at both low and high importance consequences. These findings are important as they suggest the bias is robust in both important and unimportant contexts, similar to the self-serving bias which occurs for important and unimportant contexts alike (e.g., Aldridge & Islam, 2012; Levine et al., 1976).

Some surprising results arose from analysis of the seriousness construct for the social and asocial memory failures. Participants judged asocial failures as more serious than social failures when the consequences were important, which was somewhat perplexing. One possible explanation for this puzzling result is that the types of high importance social memory failures presented in the vignettes revolved around romantic relationships. These issues may not have resonated with the young adult subject pool as strongly as the asocial failures, which involved missing an exam and not having necessary asthma medication. Research has indicated adolescents at 19 years of age are less likely to emphasize friendship or companionship in their romantic relationships (Shulman & Scharf, 2000). These results suggest young adults may see romantic relationships as less important than their other close relationships that *do* offer friendship or companionship. Participants' relationship status could also have influenced how seriously they rated the romantically-based social memory failures, as being currently involved in a romantic relationship can impact the level of understanding of reciprocity and cooperation in such relationships (Laursen & Williams, 1997), and thus may affect the perception of importance of failures negatively impacting romantic relationships. Unfortunately, there was no measure of current romantic relationship status of the participants in this experiment. In future research, high importance social memory failures will be created that do not solely rely on participants maintaining a level of value for romantic relationships that might be higher than expected at their age.

Another surprising result was that external factors such as distraction or something out of one's control were more likely to be blamed for prospective memory failures. This result was surprising given the finding that personality flaws, an internal factor, were also blamed for these same memory failures. There are a few possible explanations for this result. One possibility is that

participants equated being easily distracted or lacking control with having an irresponsible or unreliable personality. However, the correlational analysis did not show any relationship between the external factors and personality flaws constructs making this possibility less likely.

Another possible explanation for this surprising result is a lack of validity in the questionnaire statement. Perhaps it was not clear to participants that when they were asked about distraction or something out of one's control these statements were looking to place the blame outside of the self. A strong correlation between the external factors construct and the confusion statement (an internal construct) lends some support to this notion. However, another reason why these constructs might be related is because natural cognitive ability is a different kind of uncontrollable factor (Blatt-Eisengat & Lachman, 2008), but still similar to external factors.

A third compelling possibility is that participants were making excuses. A theory of excuse making suggests that externalizing a negative outcome has benefits to self-esteem, personal performance and one's sense of control (Snyder & Higgins, 1988). Given that participants were asked to put themselves in the place of the protagonist in the story, and that prospective memory failures appear to have particularly negative connotations, it is possible that participants were protecting their own self-image by blaming external factors. This hypothesis is in line with the self-serving bias (Zuckerman, 1979). In order to test this hypothesis, it is necessary to create a situation in which participants are more likely to take the perspective of the protagonist in the vignette. Experiment 2 looks to develop a procedure that will induce a sense of memory fallibility. This procedure will ultimately be used to facilitate empathy with the protagonist, and influence later memory failure interpretations.

2.3.1 Summary. The findings from this first study provide more support to previous research and to the Munsat hypothesis, such that we do tend to interpret prospective memory failures as

the mark of a poor personality or a lack of motivation and retrospective memory failures as poor cognitive functioning (in this case, confusion). However, participants were approximately neutral on the rating scale for personality flaw ratings of prospective memory failures, and did also tended to blame external factors for the memory failures. These findings suggest that the Munsat hypothesis may be weaker when vignettes are written from the participants' perspective. This finding led to a new hypothesis that priming memory fallibility could further manipulate the interpretation bias associated with memory failures.

3 Experiment 2: Designing a Priming Procedure

The main objective of this experiment was to develop a procedure that would decrease participants' self-perceived memory ability. Ultimately this procedure will be used in the context of memory failure vignette interpretations, but first the procedure must be designed and tested. There are two areas of relevant research I examined to help me design this procedure: priming and mood induction.

Priming procedures can influence behaviour, particularly in terms of self- and situation-perception. A review of the priming literature by Smeester, Wheeler and Kay (2010) provided compelling evidence that priming can change perceptions of the self, and that prime effects are much stronger when they are self-relevant. Furthermore, the review indicated that situational perception is strongly affected by primes (Smeester, Wheeler, & Kay, 2010), which has implication for the procedure's later application (to influence vignette interpretations). Recent research has suggested that primes are most effective when they are attributed to one's own thoughts rather than an external source (Loersch & Payne, 2012). Given these findings, having participants exposed to their own memory failures should have a significant effect on reducing their self-perceived memory ability.

Research on mood induction offers some suggestions on how best to expose participants to their own memory failures. For mood induction, the goal is to have participants experience genuine happiness or sadness. It has been demonstrated that autobiographical recollection of sad and happy personal events is more effective in inducing mood than other techniques (Brewer, Doughtie, & Tubin, 1980), and that autobiographical recollection results in more intense mood induction (Salas, Dadovic, & Turnbull, 2011). Taking these research findings into the context of the present

research, an option to induce a sense of memory fallibility is to ask participants for autobiographical recollection of their own memory failures.

Consistent with the priming and mood induction research, in Experiment 2 participants were asked to recall a series of memory failures: prospective and retrospective memory failures and social and asocial failures. I assessed the effectiveness of the priming procedure by asking participants to complete a self-report measure of memory problems. The memory functioning questionnaire (MFQ) was designed to measure self-reports of the number and severity of various common memory complaints (Gilewski, Zelinski, & Schaie, 1990), and so it assessed whether the priming procedure was able to decrease self-perceived memory ability.

3.1 Method

3.1.1 Participants and design. Sixty-seven undergraduate students (female = 48) from the University of British Columbia Department of Psychology human subject pool were given partial course credit for their participation in the experiment (female = 48). Informed consent was obtained from each participant prior to beginning the experiment. The experiment was a one-way between-subjects design, with group as the one between-subjects factor. There were three groups: the memory failures experimental group, the general failures experimental group and the control group. The general failures group was included to assess whether it was simply the act of recalling failures that was influencing ratings of memory ability, or whether recalling memory failures specifically was required.

3.1.2 Materials. The priming procedure required an instruction sheet, read from by the experimenter and provided to the participant, followed by a structured interview (see Appendix C). The instruction sheet was a one-page document that provided a brief description of prospective memory with an example of a prospective memory failure (which was asocial in nature), followed

by a brief description of retrospective memory with an example of a retrospective memory failure (which was social in nature). The last paragraph on the instruction sheet briefly explained what the participants would be asked to provide to the experimenter, and advised them to keep the instruction sheet in mind when providing examples. For the general failures group, the instruction sheet only explained differences in social versus asocial general performance failures, and provided one example of each. These examples were performance-based failures (burning cookies while baking, striking out while playing baseball), so that participants were steered in the performance failure direction.

All groups were also provided with a sheet of follow-up questions (see Appendix D). These questions asked participants to recall context details of the failure (approximate date, location, and time of day), rate their opinion of how serious the failure was (1 = not at all serious to 4 = very serious), rate how vividly they recollected the failure experience (1 = no detail to 4 = lots of detail) and their emotional response to the failure. For this last question, the follow-up question sheet provided some optional emotion words, (e.g., sad, angry, etc.) and a 'no effect' option.

The Memory Functioning Questionnaire (MFQ) (Gilewski et al., 1990) is a 64-item questionnaire that is a self-report measure of the occurrence of common memory complaints, and the severity of one's own memory problems. Statements about memory problems are rated on a seven-point scale, which varies according to the question. For example, if the question was "How often do these items present a problem for you: Faces" the ratings scale would read "1 = Always... 4 = Sometimes... 7 = Never". In contrast if the statements was "How well you remember things that occurred last month is" the ratings scale would be "1 = Very Bad... 4 = Fair... 7 = Very Good". Over and above overall self-perceived memory ability, the MFQ also has four subscales: general frequency of forgetting (33 items), seriousness of memory problem (18 items), retrospective

functioning (5 items) and mnemonics usage (8 items). Because our sample was predominantly young adults from 17-23 years of age ($M = 20.42$, $SD = 3.34$), three items from the retrospective functioning subscale were not applicable or redundant and so were dropped from the questionnaire (How well do you remember things that happened [10 years ago/20 years ago/when you were 18]?). This left a total of 61 items.

A post-experiment interview was created. The experimenter asked a series of open-ended questions to assess how participants felt in general about the study and what failures were most difficult to recall (overall, retrospective or prospective, social or asocial). Most importantly the interview was used to determine whether or not the participants were naive to the goal of the research. This interview can be viewed in Appendix E.

The NEO Five Factor Inventory (Costa & McCrae, 1992) was used to measure individual differences in personality traits, as well as potential relationships between these traits and ratings on the MFQ. The questionnaire is identical to what was used in Experiment 1, except it was administered via desktop computer (see procedure).

3.1.3 Procedure. Participants were tested individually in a quiet room equipped with a desktop and a laptop computer. When they arrived to the experiment, they were randomly assigned to one of the three groups; the memory failures experimental group, the general failures experimental group, or the control group.

All three groups began by completing the NEO on the computer. The experimenter started the program and participants were told (verbally and by the program) they would be rating their level of agreement on a 1 (strongly disagree) to 5 (strongly agree) scale to a series of statements about their personality, and they were to select their response on the number pad of the keyboard. Once the experimenter started the program, one statement at a time was selected randomly and

without replacement from the 60-statements of the NEO-FFI, with the ratings scale presented below the statement. Each statement remained on the screen until the participant made their response. After all 60 items had been presented, participants were advised via the computer program to let the experimenter know they were finished with this portion of the experiment.

The order of the remainder of the tasks varied depending on the participant's randomly assigned experimental group. The control group followed the NEO with the MFQ, and finished with the priming procedure. The memory failures group and the general failures group completed their respective priming procedures second, and completed the MFQ last.

The MFQ was presented on the computer as well. Once the experimenter started the program, participants were told both verbally and by the program that they would be making response ratings to a number of questions, that the ratings would be on a 1 to 7 scale, and that they should pay careful attention to each rating scale as they changed depending on the question. The 61 questions were presented in sequential order as originally designed by Gilewski et al. (1990). The presentation was sequential because the rating scales of the questionnaire change depending on the question, and I wanted to limit participant confusion by changing the ratings scale the minimum amount possible (which would be four times). Participants responded to the questions by rating on the 1-7 scale on the keyboard's number pad. Each statement and the corresponding ratings scale were presented one at a time and remained on the screen until the participant responded.

The priming procedure began with the experimenter providing the participant the instruction sheet (see Appendix C), and reading through the sheet while the participant followed along. Once participants indicated they understood the example failures provided and what was expected of them, the structured interview began (Appendix C). Participants were either asked to provide eight (four within the last month and four within the last week) or 12 (four within each of

the last week, month and year) examples of failures. The time frame of the failure was kept sequential (week, month, then year), but the type of example the participant was asked to provide (retrospective social, retrospective asocial, prospective social or prospective asocial for the memory failures group, and social or asocial for the general failures group) was selected randomly and without replacement from the possible options within each time frame. As the participant provided the memory failure example, the experimenter typed the example into a word document on a laptop computer. Whenever possible, the interview script was followed exactly. If participants struggled to provide their own examples, they were directed back to the instruction sheet to consider the examples provided there.

Once all the failure examples were provided (either eight or 12), the participant was given a sheet of follow-up questions (see Appendix D), and was asked about each memory failure example they had provided. The experimenter would read back the examples the participant had provided one at a time, and following each example participants were asked each follow-up question one at a time in sequential order. For the context details the participants were asked, "Do you remember approximately what date it was, where you were, and what time of day it was when this failure occurred?". Any of those three details the participant provided were recorded by the experimenter next to that failure example in the word document. Then the participant's responses on the four-point seriousness and vividness scales were recorded by the experimenter. The final follow-up question asked participants to describe how the failure made them feel. They were directed to the optional responses on the follow-up question sheet, including no effect, but also told they could choose any other word they felt fit the situation.

At the end of the experiment, the post-experiment interview was run through (Appendix E). The goal of this interview was to find out if participants were naive to the goal of the research, and

also to help to refine the method by determining what was most challenging for participants. The experimenter read each question to the participant in sequential order, and recorded their responses in a separate word document on the laptop. The participant was first asked about how they felt about the experiment, then asked if/when they had difficulty during the experiment, and if any of the failures were easier to recall than others (prospective or retrospective, social or asocial). They were then asked if they were aware of the goal of the experiment. Finally, they were asked if they had any further comments or suggestions.

The last step for all participants was to be debriefed and given their partial course credit. The entire study took approximately 45-60 minutes to complete.

3.2 Results

3.2.1 Preliminary analysis. One participant's scores were dropped because she was unable to provide enough failure examples to complete the required priming procedure. This left us with 66 participants (female = 47), $n = 22$ per group.

To determine whether or not the different number of examples the participants had to provide (eight versus 12) had an influence on the participants' MFQ scores, an initial between-subjects ANOVA was run on the total MFQ score and each subscale including group as the between-subjects factor and number of examples as a covariant. There were no significant effects of number of examples, except on the MFQ subscale of retrospective functioning, $F(1,62) = 5.47, p = .023$. Participants in the 12-example procedure scored themselves significantly lower than those in the eight-example procedure. This effect was likely due to the fact that the participants receiving the 12-example procedure were explicitly asked to recall memory failures within the last year, and then the retrospective functioning subscale of the MFQ specifically asked participants to estimate their memory for things that occurred during the last year. Given participants frequency of citing the

'year' category as the most difficult in the post-experiment interview ($n = 15$ out of 33, or 45.45% of participants in this 12-example procedure), being required to think back specifically over the past year and having difficulty doing so is likely influenced their scores on this one subscale. Because the retrospective functioning subscale of the MFQ only included two items (of the MFQ's original five) in our analysis and was therefore not a critical subscale contributing to the overall MFQ score, and the number of examples provided had no other significant effects, the data were collapsed across number of examples and analyzed together.

3.2.2 Effectiveness of the priming procedure. In order to assess the effectiveness of the priming procedure, one-way between-subjects ANOVAs were run on the overall mean MFQ score for the three groups, as well as the mean scores for the three groups on each of the MFQ subscales. It is critical to note that lower scores on the MFQ always indicate poorer self-reported memory ability or greater severity of the memory problem. The mean scores of the three groups on the MFQ overall as well as each of the MFQ subscales are reported in table 6. ANOVA results are described below. Unless otherwise reported, Levene's test of homogeneity of variance was non-significant.

Table 6
Mean ratings on the overall MFQ and its subscales by group

<i>Mean (SD) MFQ scores</i>	Experimental Group		
	Control	Memory Failures	General Failures
Overall	4.52 (.60)	4.08 (.47)	4.05 (.39)
Seriousness of memory problems	4.31 (1.08)	3.55 (.71)	3.58 (.89)
Mnemonics usage	3.97 (1.19)	3.34 (.99)	3.01 (.71)
General Frequency of forgetting	4.80 (.79)	4.54 (.57)	4.56 (.40)
Retrospective functioning	3.95 (1.01)	4.25 (1.21)	3.91 (1.69)

3.2.3 MFQ analysis. I predicted that the lowest overall score on the MFQ would be in the memory failure group because they had just considered their own memory failures prior to completing the a self-report measure of memory ability, and the highest score on the overall MFQ would be in the control group because they had completed the questionnaire without having

recalled their own memory failures. There was a significant effect of group on the mean scores on the total MFQ, $F(2,63) = 6.32$, $p = .003$, partial $\eta^2 = .17$. Tukey's HSD indicated a significant differences between the memory failures group and the control group, $d = .82$, with $CI_{95} = [.08, .80]$, as well as the general failures group and the control group, $d = .93$, with $CI_{95} = [.12, .83]$, however no significant difference between the memory failures group and the general failures group (see means in table 6). The results of this ANOVA and the follow-up tests are presented in figure 7. These results indicate that overall score on the MFQ, and therefore self-perceived memory ability, was significantly lower for those who had to complete either of the priming procedures prior to the MFQ.

Each of the subscales of the MFQ were also assessed for differences between groups. The same predictions as the overall MFQ scores were relevant for each of the subscales -- that the experimental group would have the lowest scores and the control group would have the highest scores. For the MFQ subscale of seriousness of memory problems, recall that lower scores on the MFQ indicate poorer functioning, and in this case also indicate more serious memory problems. A significant effect of group emerged, $F(2,63) = 4.99$, $p = .010$, partial $\eta^2 = .14$. The results of this ANOVA are presented in figure 7. Tukey's HSD indicated an identical pattern of results as for the total MFQ score -- that the memory failures group considered the memory problems they have as significantly more serious compared to the control group, $d = .83$, with $CI_{95} = [.11, 1.42]$, as did the general failures group, $d = .74$, with $CI_{95} = [.07, 1.38]$; however the memory failures group and general failures group did not differ significantly from one another in their MFQ seriousness ratings (see means in table 6, and figure 7 for depiction of significant follow-ups).

For the mnemonics usage subscale, lower scores indicated a greater dependency on various mnemonic devices, and the same pattern of prediction holds for this subscale. A marginally

significant Levene's test of homogeneity of variance, $F(2,63) = 2.67, p = .077$, led me to analyze the subscale of mnemonics usage via Welch's corrected ANOVA statistic. Welch's test revealed a significant effect of group, $F(2,39.99) = 5.23, p = .010$, partial $\eta^2 = .15$. Tukey's HSD revealed a slightly different pattern from previous results. There were still significantly lower ratings for various mnemonics (e.g., a date book), which indicated a greater necessity for these items, in the general failures group compared to the control group, $d = .98$, with $CI_{95} = [.24, 1.66]$, however the difference between the critical memory failures group and the control group was only approaching significance, $d = .58$, with $CI_{95} = [-.08, 1.33]$. The results of this ANOVA and the follow-up tests are presented in figure 7. This was a relatively small sample, on 22 participants per group, so the lack of difference between the memory failures group and the control group may be an issue of low power, particularly given the fact that the effect was approaching significance. There were again no significant differences between the memory failures and general failure groups (see means in table 6).

The two remaining subscales of the MFQ did not show a significant effect of group, though general frequency of forgetting was trending in the same pattern as the preceding subscales and overall MFQ scores (see figure 7) but did not show a significant effect of group, $F(2,63) = 1.27, p = .288$. The retrospective functioning subscale also did not show an effect, $F(2,63) = 0.42, p = .657$. The retrospective functioning subscale was composed of only two items, and the variability within groups was quite large, which likely influenced this non-significant effect. Means are represented in table 6 and figure 7.

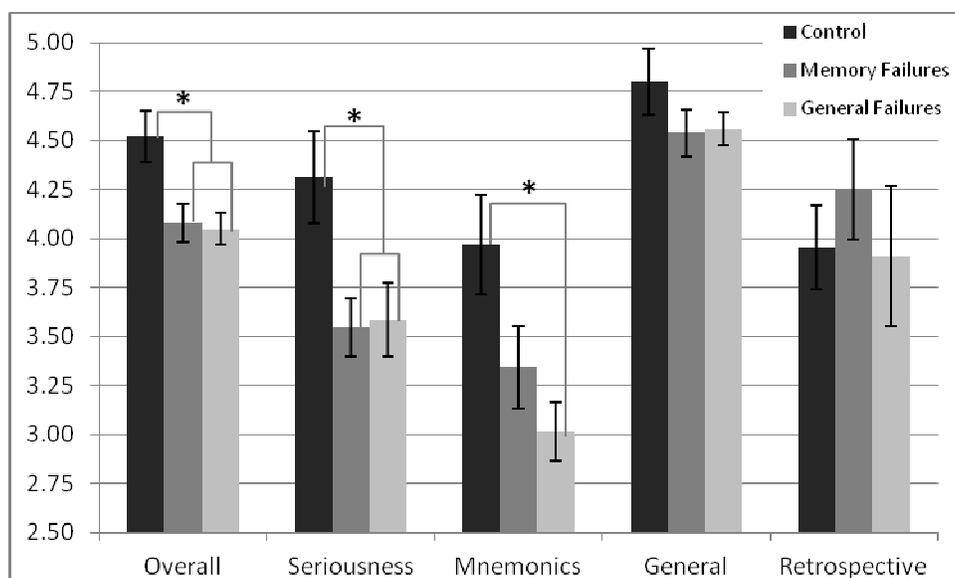


Figure 7. Mean ratings on the overall MFQ and its subscales by group. Higher scores on the graphs indicate better self-perceived memory ability, less serious memory problems, and fewer mnemonics required. Error bars indicate standard error of the mean. * indicates $p < .05$.

3.2.4 Follow-up question analysis. The questions following the failure examples assessed the number of context details of the failure (location, date, time of day) the participant could recall, their opinion of the seriousness of their failure (on a 1-4 scale), how vivid their recollection of their experience was (on a 1-4 scale) and how their failure made them feel. The mean overall responses for the follow-up question analysis for each group are presented in table 7. I wanted to determine whether or not there were differences between groups on any of the follow-up question scores because differences may have implications for how effectively the priming procedure induced a sense of memory fallibility (particularly for the two experimental groups). One-way between-subjects ANOVAs were run on the means of the experimental groups on each of the follow-up questions (see table 7). Levene's test of homogeneity of variance was non-significant unless otherwise reported.

Table 7
 Mean ratings on follow-up questions by group

Mean (SD) Scores on Follow-up Questions	Experimental Group		
	Control	Memory Failures	General Failures
Context Details	2.29 (.49)	2.31 (.35)	2.23 (.41)
Seriousness Ratings (for social failures)	1.99 (.51)	1.80 (.47)	2.19 (.50)
Vividness Ratings	3.00 (.41)	2.74 (.39)	3.07 (.43)
Emotion Words	.67 (.23)	.76 (.26)	1.21 (.43)

Two independent coders counted the number of context details provided per failure example, to a maximum of three full details (means in table 7). While there were no specific predictions of which group might recall more details, it was thought that if some groups could recall more details, the influence of recalling these detailed failures might be stronger in terms of the effect on the MFQ scores. However, there were no significant differences in the number of context details between groups, $F(2,63) = 1.04$, $p = .314$, partial $\eta^2 = .06$.

Mean ratings of perceived seriousness of the failure examples were calculated for each participant, based on their ratings on the four-point scale provided in the follow-up questionnaire (see Appendix D). These means were calculated for all failures overall, as well as separately for social and asocial failures. Again, there were no specific predictions about group differences, but I believed that seeing failures as more serious would have a larger impact on later MFQ scores, because participants would be more affected by the priming procedure. There were significant differences on seriousness ratings between groups when failures were social in nature, $F(2,63) = 3.43$, $p = .039$, partial $\eta^2 = .10$. Tukey's HSD test revealed that the memory failures group rated social failures significantly less seriously than the general failures group rated their social failures, $d = .78$ with $CI_{95} = [.03, .75]$. This finding has implications for the effectiveness of the priming procedure the lack of differences between the memory failures and general failures groups and the MFQ and its subscales. The mean scores for each group are presented in table 7, and the means

contributing to the effect and the follow-up analyses are presented in figure 8. Later correlational analyses determined if seriousness ratings are associated with MFQ scores.

Similar to seriousness ratings, I believe that the more vividly failures are recalled the greater impact they will have on the MFQ score because the effect of the priming procedure should be more intense. Mean ratings of vividness were calculated for each participant in the same manner as for seriousness ratings, and the pattern for overall vividness was identical to the pattern for seriousness ratings. There was a significant effect of group (see means in table 7), $F(2,63) = 3.90$, $p = .025$, partial $\eta^2 = .11$. Tukey's HSD test revealed that again, the memory failures group rated failures the recalled as experienced significantly less vividly than the general failures group rated their failures, $d = .80$, with $CI_{95} = [.07, .77]$. Again, this finding, as depicted in figure 8, has implications for the lack of differences between the general and memory failures groups. Later correlational analyses determined the relationship between vividness ratings and the MFQ scores.

Two independent coders counted the number of emotion words each participant used and converted this number to a mean score on emotion words. If the response 'no effect' was provided, the response was coded as '0'. Overall mean number of emotion words were calculated for each participant, in the same way as context details, seriousness and vividness ratings. Levene's test of homogeneity of variance revealed that the group variances were significantly different, $F(2,63) = 4.82$, $p = .011$. Therefore, I ran Welch's test, which indicated a significant effect of group, $F(2,63) = 17.95$, $p < .001$, partial $\eta^2 = .36$. Tukey's HSD test demonstrated that the general failures group used significantly more emotion words than both the memory failures group, $d = 1.27$, with $CI_{95} = [.22, .68]$ and the control group, $d = 1.57$, with $CI_{95} = [.31, .77]$. The means contributing to this effect are listed in table 7. These results have similar implications as the seriousness and vividness ratings, and

again correlational analyses determined if the number of emotion words used was associated with MFQ scores.

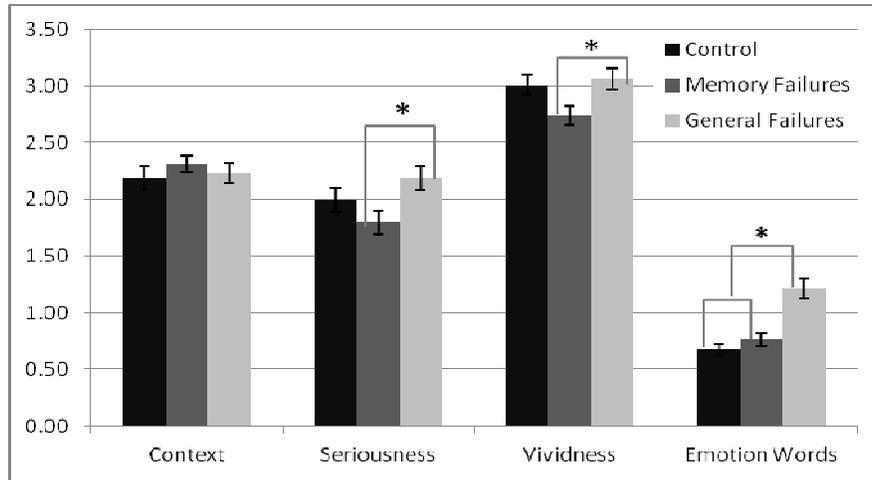


Figure 8. Mean scores on follow up questions by group. Figure depicts group ratings assessing number of context details, seriousness, vividness, and number of emotion words chosen in reference to failure examples. Error bars represent standard error of the mean; * indicated $p < .05$.

3.2.5 Correlation analysis of MFQ and follow-up questions. The correlational analyses run on the MFQ scores and the follow-ups question scores helped determine if there was a relationship between the manner in which participants reacted to their failure examples and their scores on the MFQ. These correlations are represented in table 8.

Table 8
Correlations between MFQ scores and follow-up questions

Measures	1	2	3	4	5	6	7	8	9
1. MFQ-Overall	1								
2. MFQ-General Frequency	.76**	1							
3. MFQ-Seriousness of Forgetting	.74**	.21	1						
4. MFQ-Retrospective Functioning	.28*	.23	.10	1					
5. MFQ-Mnemonics Usage	.43**	.02	.29*	.01	1				
6. Seriousness Ratings	-.20	.07	-.38**	-.07	-.13	1			
7. Vividness Ratings	-.06	.10	-.29*	.27*	.05	.38**	1		
8. Context Details	.08	.15	-.04	.12	-.02	-.13	-.01	1	
9. Emotion Words	-.15	-.04	-.13	-.05	-.19	.16	.17	.22	1

* indicates $p < .05$; ** indicates $p < .01$

There were significant negative correlations between average seriousness ratings and MFQ ratings of seriousness of memory problems. As expected, the more seriously participants rated their own failures, the more seriously they rated the memory problems in the MFQ. Average vividness ratings were positively correlated with MFQ retrospective functioning, and more importantly negatively correlated with MFQ seriousness, which was another expected relationship. These results indicate the more vividly participants rated their own failures the more serious they considered their memory problems in the MFQ. The implications of these relationships will be discussed in a later section of this chapter.

3.2.6 Correlation analysis of NEO and MFQ. Correlational analyses were also run on NEO results and MFQ scores to determine if personality traits had an influence on the MFQ scores. A correlation matrix is presented in table 9.

Table 9
Correlations between NEO traits and MFQ scores

Measure	1	2	3	4	5	6	7	8	9	10
1. MFQ-Overall	1									
2. MFQ-General Frequency	.76**	1								
3. MFQ-Seriousness of Forgetting	.74**	.21	1							
4. MFQ-Retrospective Functioning	.28*	.23	.10	1						
5. MFQ_Mnemonics_Usage	.43**	.02	.29*	.01	1					
6. Neuroticism	-.34**	-.45**	-.01	-.29*	-.14	1				
7. Extraversion	-.04	.00	-.07	.16	-.07	-.24	1			
8. Openness	-.10	.13	-.15	.13	-.40**	.06	-.08	1		
9. Agreeableness	-.02	-.02	-.03	.16	-.01	-.10	.35**	.05	1	
10. Conscientiousness	.02	.25*	-.11	.20	-.36**	-.18	.09	.29*	.07	1

* indicates $p < .05$; ** indicates $p < .01$

Results revealed that neuroticism was negatively correlated with overall MFQ score, general frequency of forgetting, and retrospective functioning, which indicates those that score higher on neuroticism rate their overall memory, general forgetfulness and retrospective functioning more poorly. The result was not surprising as neuroticism has been linked with memory performance. Openness to change was negatively correlated with mnemonics usage.

Conscientiousness was negatively correlated with mnemonics usage and positively correlated with general frequency of forgetfulness. Those scoring high on openness to change and conscientiousness are more likely to report using mnemonics, and those that are high in conscientiousness are more likely to have better scores on general forgetfulness (that is to forget less). This last finding is interesting as it illuminates the potential relationship between conscientiousness and the frequency of memory failures.

3.2.7 Post-experiment interview analysis. The goal of the post-experiment interview was to determine whether or not participants were aware of the goal of the experiment. No participants correctly guessed the purpose of the study. The post-experiment interview was also used to find out which failures during the priming procedure were the most difficult to recall so that the procedure could be refined. The proportion of responses provided by participants are listed as percentages in table 10. The number of subjects responding to the ‘easiest memory type’ question differed from the rest of the post-experiment interview questions because only two groups were required to provide memory failure examples. The category of “other” on the most difficult column refers to those participants who reported having difficulty the whole time, no difficulty, or found individual examples difficult.

Table 10

Percentage of participants’ responses to post-experiment interview questions

Most Difficult	Proportion of Responses (n = 66)	Easiest: Sociality	Proportion of Responses (n = 66)	Easiest: Memory Type	Proportion of Responses (n = 44)
Year	45.45%; $n = 33^a$	Social	42.42%	ProM	50.00%
Month	19.70%	Asocial	28.79%	RetM	25.00%
Week	9.09%	Neither	28.79%	Neither	25.00%
Other	48.48%				

^aindicates only procedure one, as participants in procedure two were not asked to provide memory failures from over the past year

Interpreting the percentages listed in table 10, the proportion of participants that found social failures easier to recall was greater than the proportion that found asocial failures or neither easier to recall. Half of the participants required to recall memory failures found prospective memory failures easier to recall. Finally, when participants were asked to provide failures from over the past year, almost half of the participants mentioned they struggled with that specific time frame. Overall, there was greater difficulty for failure examples that were older (e.g., within the past month or year). These findings have important implications for refining the priming procedure to make it more manageable.

3.2.8 The general failures condition. An important and unexpected finding was that participants in the general failures condition were frequently providing memory failures rather than performance failures as examples. At the end of the study, two independent coders counted the number of memory failures provided (examples where the word ‘forgot’ was actually used, or ones where it was strongly implied). These results are listed in table 11, and we can see a large proportion of examples in the general failures condition were memory failures, and on average at least one memory failure was provided per participant. These findings have implications for the lack of differences between the memory failures and general failures groups’ scores on the MFQ. These implications will be discussed in the following section.

Table 11

Proportion of memory failure responses in the general failures group

Type of Response	# of Responses	Proportion	Mean Memory Responses (SD)
Memory	38	17.27%	1.73 (1.93)
Total	220		

3.3 Discussion

Overall, the results of this study suggest that the priming procedure was successful in inducing a sense of memory fallibility within the subjects. The participants that participated in the

priming procedure prior to completing the MFQ had mean scores that were significantly lower than those in the control group. Furthermore, participants who had undergone the priming procedure reported on the MFQ that they consider their memory problems more serious. However, there were no significant differences between the memory failures group and the general failures group on the overall MFQ and the seriousness subscale, which suggests that simply priming fallibility at all will influence MFQ scores. However other analyses offer possible explanations for why the two procedures had similar effects.

The follow-up questions revealed that the general failures group rated their social memory failures as significantly more serious. The same pattern of results emerged for vividness of the failures -- the general failures group rated the recollection of their failures as more vivid compared to the memory failures group. Importantly, seriousness and vividness ratings were significantly correlated with the seriousness subscale of the MFQ. Therefore the MFQ scores of the general failures group would likely be low because of how vividly and seriously they considered their failures. I can speculate that the term 'failure' might have a particularly serious or negative connotations outside the context of memory (as evidenced by higher seriousness and vividness ratings), and that is why the influence of recalling general failures might be just as strong (if less relevant) on the self-report of an ability (in this case memory ability).

A second explanation for the lack of difference on the MFQ scores of the memory and general failure conditions is that participants actually frequently provided memory failures in the general failure condition rather than performance type of failures. In fact, participants provided a memory failure 17% of the time overall, and on average they reported more than one memory failure per session ($M = 1.73$). Therefore, even though I was not trying to prime memory fallibility in the general failures group, the tendency to provide memory failures an average of at least once per

participant may have unintentionally had that effect. I believe the aforementioned explanations account for the comparable MFQ scores between the critical memory failure and general failure groups, and so I believe the memory failures procedure was demonstrated as effective in inducing a sense of memory fallibility.

One possible criticism of this procedure is that the very act of attempting to recall a specific situation, and having difficulty doing so, might account for the decrease in MFQ scores. However, there are multiple reasons why this concern is not legitimate. First, there was no influence of the effect of having to recall 12 versus eight examples of failures on MFQ scores. Furthermore, the MFQ items require retrospective thinking by their very nature (i.e., they ask participants to consider how frequently in the past certain memory issues present a problem), so regardless of whether they had gone through the priming procedure or not, they were being asked to think back and consider their memory functioning.

The post-experiment responses indicated participants found it especially difficult to provide failures from within the last year and/or month specifically. Furthermore more participants reported that prospective memory failures and social failures were easier to recall. Taking these responses into consideration the priming procedure was adjusted. In Experiment 3, participants did not have to provide memory failures within a certain time frame and were only asked to provide social memory failures.

3.3.1 Summary. Experiment 2 provided evidence that the priming procedure was successful in inducing a sense of memory fallibility. The post-experiment interview provided suggested there should be no time frame placed on the recollection of the memory failure, and the procedure would be more manageable should participants only have to recall failures that are social in nature.

4 Experiment 3: Thanks for the Memory...Failures!

Experiment 3 combined the findings from the first two experiments. The goal of this experiment was to manipulate the effect established in Experiment 1 (i.e., the Munsat hypothesis), by exposing participants to their own memory fallibility via the priming procedure developed in Experiment 2, prior to making interpretations about memory failure vignettes.

Research on interpretations biases has indicated that sharing characteristics with the protagonist and empathizing with a protagonist in a failure situation will lead to less internal (personality-based) blame for the failures (Blanchard-Fields et al., 2012; Galper, 1976). Furthermore, the actor-observer bias suggests that we are more likely to blame the situation for our own failures, but place the blame internally when we observe another person's failure (Jones & Nisbett, 1971). In this experiment, I anticipate that having participants recall their own memory failures will facilitate empathy with the protagonist and taking more of an actor role in the vignettes, because of shared characteristics between the participant and the protagonist (namely, memory fallibility). This expectation, and the research upon which it is based, leads to two measurable hypotheses. Hypothesis one suggests that participants will be less likely to blame personality flaws when they are primed to their own memory fallibility and hypothesis two maintains that more blame for these failures will be placed on uncontrollable situational external factors.

Some key findings from Experiments 1 and 2 described in preceding chapters influenced the procedure in this study. First, Experiment 1 identified sociality as a key factor in memory failure interpretations. Critically, personality flaw interpretations only differed between prospective and retrospective memory failures when the failure was social in nature. Additionally, as mentioned with respect to the priming procedure used in Experiment 2, the majority of participants found it

easier to recall memory failures that were social in nature. As such, the vignettes in this experiment are all social in nature, and participants were only required to provide memory failure examples that were social in nature.

4.1 Method

4.1.1 Participants and design. Eighty-three undergraduate students (female = 55) from the University of British Columbia Department of Psychology human subject pool were given partial course credit for their participation in the study. Informed consent was obtained from each participant prior to beginning the experiment. The experiment was a 2 x 2 x 2 design, with one between-subjects factor and two within-subjects factors. Experimental group (control, $n = 40$, or experimental, $n = 43$) was the only between-subjects factor. The two within-subjects factors were memory failure type (prospective and retrospective) and importance of the consequences of the memory failure (high and low importance).

4.1.2 Materials. Half of the vignettes used in this experiment were the same social vignettes used in Experiment 1 (see Appendix A). The remaining vignettes from Experiment 1 were adjusted to be social in nature, so that all vignettes involved two people (Appendix A, Experiment 3 vignettes). These vignettes were still 4-6 sentences long, and this time varied only on two dimensions, memory failure type (retrospective and prospective) and importance of consequences (high or low). As in Experiment 1, versions A and B of these vignettes maintained identical contexts and consequences, but switched which situations involved prospective and retrospective memory failures. This was done, as in Experiment 1, to ensure there was nothing specific to the situation that resulted in the interpretation bias, but rather it is the influence of the memory failure type itself causing the interpretations.

The priming materials used for the memory failures group in Experiment 2 were used in this study. Participants were given the same instruction sheet explaining the difference between prospective and retrospective memory and example failures (Appendix C), and the same sheet of follow-up questions (Appendix D). Because vignettes were all social in nature, the only modification to the priming materials was that participants were only asked to provide examples of social memory failures that were either prospective or retrospective.

Three questionnaires were used in this study. The first is the NEO Five Factor Inventory questionnaire (short version) (Costa & McCrae, 1992). This questionnaire was identical to what was used in experiments one and two, and was presented on the computer in the same manner as Experiment 2.

The 14-statement interpretation questionnaire from Experiment 1 was used in this experiment, with one item but modified. Due to the ceiling effects on the item: *“A situation like this happens because you must have forgotten”*, this item was reworded to read: *“A situation like this happens because you must have a poor memory”*, and was intended to measure the cognitive/memory factors construct (see Appendix B).

The final questionnaire used was the Cognitive Failures Questionnaire (CFQ) (Broadbent, Cooper, FitzGerald, & Parkes, 1982). The CFQ is a 25-item self-report measure designed to assess the frequency of various cognitive blunders (e.g., Do you read something and find you haven't been thinking about it and must read it again?). Participants must rate how frequently these types of events occurred on a zero (never) to four (very often) scale. This questionnaire was included to determine whether regularly experiencing memory failures had an influence on memory failure interpretations, or whether being primed to the experience of committing memory failures was more influential on later ratings on the interpretation questionnaire.

4.1.3 Procedure. The experiment was completed by participants individually in a quiet room, equipped with a desktop and a laptop computer. When they arrived to the room, participants were randomly assigned to one of two groups; experimental or control. Both groups completed the same four tasks but in different orders. The experimental group began with the priming procedure, then Set 1 (or 2) of the vignette interpretations, followed by the NEO, then Set 2 (or 1) of the vignettes (as in Experiment 1). The last task for the experimental group was the CFQ. The only difference in task order for the control group was when the priming procedure was completed last, rather than first.

For the priming procedure, participants were provided with the same instruction sheet and follow-up questions as in Experiment 2 with which they could follow along. The instructions procedure was almost identical to Experiment 2, with three differences. In this experiment, participants were only asked for memory failures involving another person. A second difference in this version of the priming procedure was that the follow-up questions were asked after each individual memory failure example, rather than after all examples were provided. This was done so that participants considered each memory failure carefully before moving on to a new example. The questions were identical to Experiment 2 (see Appendix D). The final difference between this procedure and Experiment 2 was that participants were asked to provide six memory failure examples in total, and the procedure was modified such that no restrictions on time frame (i.e., within the last week/month/year) were placed on the participants examples, to make the task less difficult.

The vignette presentation was identical to Experiment 1, and both groups followed the same procedure. For the first group of four vignettes, they were selected one at a time randomly and without replacement, from Set 1 (or 2) of version A or B. Again, each participant only saw

vignettes from version A or version B. Following the four vignettes from Set 1 (or 2), the participants responded to memory check questions (as in Experiment 1), then completed the NEO, which was completed electronically rather than on paper (as in Experiment 2). The second set of four vignettes were presented identically to the procedure in Experiment 1. Each set of vignettes had one high importance retrospective failure, one low importance retrospective memory failure, one high importance prospective failure and one low importance retrospective memory failure. The same counterbalancing procedures as Experiment 1 were used for Sets 1 and 2 and versions A and B.

After all eight of the vignettes were read and interpreted, the next step of the experiment for both groups of participants completed the CFQ to assess their perception of how frequently they experience cognitive blunders. This questionnaire was also completed on a computer, with each one of the 25 questions selected randomly and without replacement. One question appeared at a time with the rating scale provided below it, and remained on the screen until the participants made their response on the computer keyboard.

For the experimental group, the CFQ was the final step in the experiment and so the subjects were debriefed and provided with their partial course credit. For the control group, following the CFQ they completed the priming procedure (see above), then were debriefed and given their partial course credit. The entire experiment took 45-60 minutes.

4.2 Results

4.2.1 Preliminary analysis. Performance on the memory check questions was very good, $M = 95\%$, $SD = 8\%$, no participants scored below chance, and almost all participants ($n = 77$) answered seven of eight questions correctly.

The 14-statement interpretation questionnaire from Experiment 1 assessed the same seven constructs of interest, with each construct comprised of two statements. Correlations were

examined to ensure the individual statements comprising each construct were correlated with one another before collapsing the 14 statements into the seven constructs. Each of the items assessed were significantly correlated, with the same exception as Experiment 1. These correlations are presented in table 12.

Table 12

Correlations between statements comprising seven constructs (Experiment 3)

Constructs	Personal Relevance	Frequency	Seriousness	Lack of Motivation	Personality Flaws	External Factors	Cognitive/ Memory Factors
Correlations	.79**	.65**	.68**	.85**	.84**	.27*	.16

**indicates $p < .001$, * indicated $p < .05$

The lack of a strong correlation in the final set of questions was not due to ceiling effects as in Experiment 1, and so the statements regarding “confusion” (*‘A situation like this occurs because you must have been confused’*) and “poor memory” (*‘A situation like this happens because you must have a poor memory’*) will be assessed individually as unique constructs.

A 2 x 2 x 2 (memory failure type x importance x experimental group) mixed between-within ANOVA was run on each of the collapsed six constructs and the two individual statements. Memory failure type and importance were the within-subjects factors and experimental group was the between-subjects factor. This ANOVA was run for all eight vignettes, and was also run for just the first set of four vignettes. This decision was based on the fact that participants completed the NEO – a 60-item questionnaire – between the first four vignettes and the last four, thus allowing for the strength of the priming procedure to diminish considerably. Only conflicting results between all eight and the first set of vignettes will be reported. Consistent with the precedent set in Experiment 1, follow-up analyses restricted the alpha-level to .01 to maintain a reasonable family-wise error rate. Importantly, there were no overall differences on the between-subjects factor – the experimental and control groups did not differ overall on any of the constructs

4.2.2 Personal relevance. I anticipated the same main effect of importance as in Experiment 1 to serve as a manipulation check for our importance variable – mean ratings on the personal relevance construct for memory failures with low importance consequences should be higher (since they were designed to be representative of common daily failures). As predicted, there was a significant main effect of importance $F(1,81) = 212.79, p < .001, \text{partial } \eta^2 = .72$ (see means in table 13). Low importance memory failures were overall much more relatable to participants than memory failures with high importance consequences. No effects or interactions were significant.

Table 13

Mean ratings on personal relevance for high and low importance

Importance	High	Low
Mean (SD) Rating	2.31 (.89)	4.02 (1.04)

4.2.3 Frequency. Similar to the personal relevance construct and consistent with Experiment 1, I expected that participants would be more likely to agree that low importance memory failures occur frequently compared to high importance failures. A significant main effect of importance, $F(1,81) = 100.57, p < .001, \text{partial } \eta^2 = .55$, implied the manipulation of importance was successful (see means in table 14). Overall, ratings of frequency were on the low end of the six-point scale, potentially because all of the memory failures were social in nature. However, low importance memory failures were still rated as significantly more frequent than high importance memory failures. No other effects were significant.

Table 14

Mean ratings on frequency for high and low importance

Importance	High	Low
Mean (SD) Rating	1.88 (.69)	2.72 (.88)

4.2.4 Seriousness. A final check for the manipulation of the importance variable was mean ratings on seriousness of the memory failures. Here the expectation was that high importance failures would be rated as more serious. I also expected that prospective memory failures would be

judged as more serious, as was the case in Experiment 1. As expected, a significant main effect of importance, $F(1,81) = 741.38$, $p < .001$, partial $\eta^2 = .90$, indicated that high importance memory failures were rated as significantly more serious than low importance failures (see table 15).

Table 15

Mean ratings on seriousness for high and low importance

Importance	High	Low
Mean (SD) Rating	4.92 (.57)	2.50 (.78)

Consistent with predictions, there was also a main effect of memory failure type, $F(1,81) = 16.00$, $p < .001$, partial $\eta^2 = .17$, indicating prospective memory failures were rated as more serious than retrospective memory failures. However, figure 9 demonstrates that this effect was qualified (in the first set of vignettes) by a significant memory failure type x group interaction, $F(1,81) = 6.08$, $p = .016$, partial $\eta^2 = .07$ (see table 16). The goal of this experiment was to reduce interpretation biases between prospective and retrospective memory. As such the prediction is that there would be smaller differences in seriousness ratings between retrospective and prospective memory failures in the experimental group. To determine whether or not this manipulation was successful, the control group and experimental group were assessed separately. Follow-up analyses indicated that, as expected, prospective memory failures were only interpreted as more serious than the retrospective memory failures in the control group, $t(39) = 4.73$, with $CI_{99} = [.18, .55]$, $p < .001$. This result is the first indication that the priming procedure was successful in influencing memory failure interpretations.

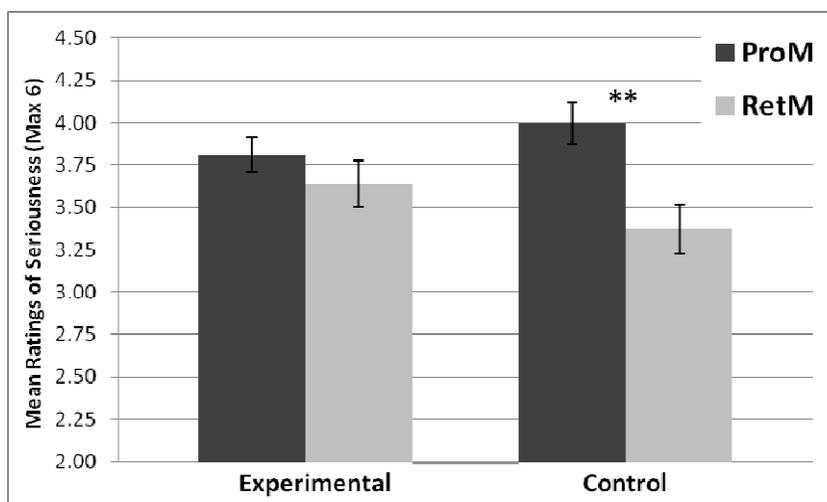


Figure 9. Mean ratings on seriousness. Figure depicts the memory failure type x experimental group interaction for the first set of vignettes. Error bars represent standard error of the mean; ** indicates $p < .001$

4.2.5 Lack of motivation. For the construct assessing the lack of motivation interpretation of memory failures, I expected a bias of higher ratings for prospective memory failures. Table 16 provides the means for the two significant main effects for this construct. As expected a main effect of memory failure type revealed prospective memory failures were more likely to be interpreted as a lack of motivation problem compared to retrospective memory failures, $F(1,81) = 10.48, p = .002$, partial $\eta^2 = .12$. A main effect of importance revealed low importance memory failures were more likely to be blamed on a lack of motivation than high importance memory failures, $F(1,81) = 21.02, p < .001$, partial $\eta^2 = .21$.

Table 16

Mean ratings on lack of motivation for memory type and importance

Memory Type	ProM	RetM
Mean (SD) Rating	3.53 (.88)	3.31 (.78)
Importance	High	Low
Mean (SD) Rating	3.19 (.95)	3.65 (.84)

A separate pattern of results arose from analyzing the first set of vignettes alone. There was still a significant main effect of importance, $F(1,81) = 6.61, p = .012$, partial $\eta^2 = .08$, but there was no significant main effect of memory failure type, so prospective memory failures were no longer more likely to be interpreted as arising from a lack of motivation. However, there was a significant three-way interaction of importance x memory failure type x group, $F(1,81) = 4.57, p = .036$, partial $\eta^2 = .05$, and the means contributing to this interaction are provided in figure 10. Group was held constant to assess different patterns between the control and experimental groups. The control group was always more likely to cite motivational factors as a cause of prospective memory failures (for high and low importance failures), but the experimental group had opposite patterns for high and low importance failures. However, under the reduced alpha rate ($< .01$), there were no significant results for either the experimental group or the control group.

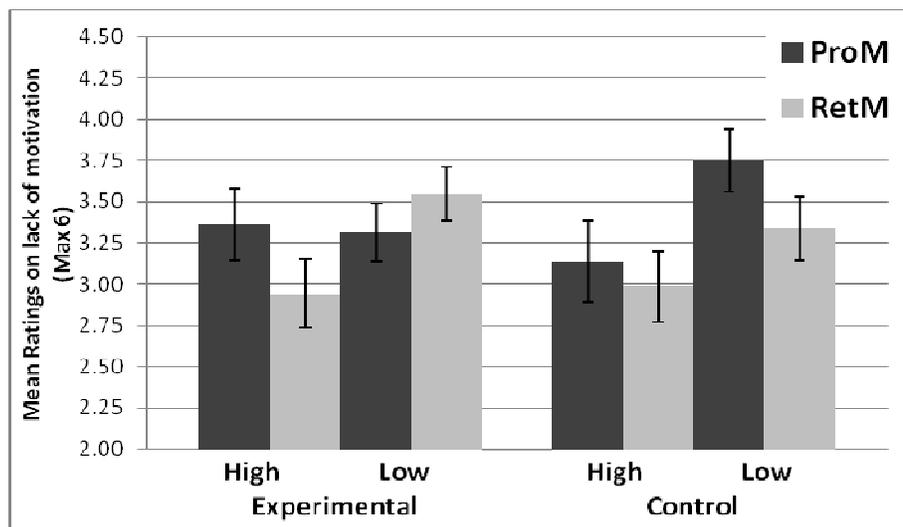


Figure 10. Mean ratings on lack of motivation. Figure depicts memory type x importance x experimental group interaction. Follow-up tests revealed no significant effects within the experimental and control groups. Errors bars represent standard error of the mean.

4.2.6 Personality flaws. From the results of Experiment 1 and the Munsat hypothesis itself, I expected that participants mean ratings of personality flaw interpretations would be higher for prospective memory failures. In light of the goals of the present research, I also hypothesized that this bias against prospective memory failures would decrease for the experimental group. The means presented in table 17 demonstrate that the significant main effect of memory failure type occurred in the expected direction, $F(1,81) = 51.07, p < .001$, partial $\eta^2 = .39$. A significant main effect of importance, $F(1,81) = 35.53, p < .001$, partial $\eta^2 = .31$, also revealed that high importance memory failures were attributed to personality flaws to a greater degree than low importance memory failures, as demonstrated by the means in table 17. However, there was significant two-way interactions of memory failure type x importance, $F(1,81) = 7.99, p = .006$, partial $\eta^2 = .09$. This interaction was driven by larger differences between prospective and retrospective memory failures for high importance, $t(82) = 6.86$, with $CI_{99} = [.11, .45], p < .001$, compared to low importance, $t(82) = 3.31$, with $CI_{99} = [.06, .58], p = .001$, failures. However, the difference was significant at both importance levels and in the same direction, indicating that the Munsat hypothesis still holds regardless of importance of the consequences.

Table 17

Mean ratings on personality flaws for memory failure type x importance

Importance	High		Low	
Memory Type	ProM	RetM	ProM	RetM
Mean (SD) Rating	3.66 (1.04)	2.96 (.95)	2.93 (1.00)	2.64 (.98)

Most critically, in-keeping with this experiment's main hypothesis, there was a significant memory failure type x group interaction for the first set of vignettes $F(1,81) = 4.24, p = .043$, partial $\eta^2 = .05$ (see figure 11). Follow-up tests indicated that the difference between prospective and retrospective memory failure interpretations was significant for the control group, $t(39) = 4.19$, with

$CI_{99} = [.40, 1.16]$, $p < .001$, but was only approaching significance for the experimental group, $t(42) = 2.48$, with $CI_{99} = [-.03, .67]$, $p = .017$. This result is depicted in figure 11.

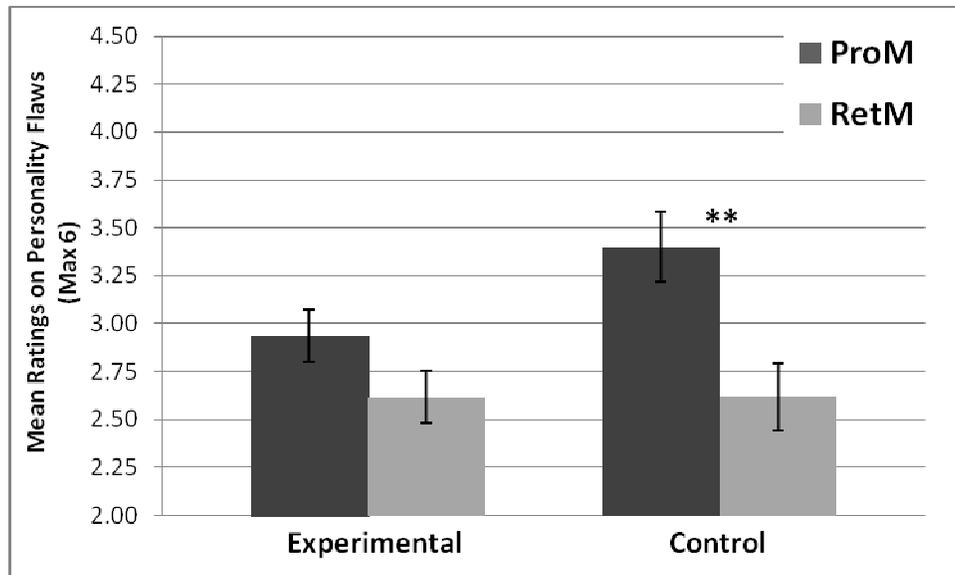


Figure 11. Mean ratings for personality flaws (experiment 3). Figure depicts memory type x experimental group interaction for the first set of vignettes. Error bars represent standard error of the mean; ** indicates $p < .001$.

4.2.7 External factors. As per the results of Experiment 1, I anticipated that prospective memory failures would be attributed to external factors. I also expected that this difference would be larger for the experimental group, consistent with the second hypothesis of this experiment. Table 18 depicts means contributing to the significant main effect of memory failure type, $F(1,81) = 28.65$, $p < .001$, partial $\eta^2 = .26$, which indicated that prospective memory failures were more frequently attributed to external factors over retrospective memory failures. There was also a significant main effect of importance, $F(1,81) = 7.36$, $p = .008$, partial $\eta^2 = .08$, which indicates that it was more common for low importance failures to be interpreted as arising from external factors than high importance failures (see table 18). Contrary to the second hypothesis of this experiment,

there was no influence of experimental group and therefore no influence of the priming procedure on external factor interpretations.

Table 18

Mean ratings on external factors for memory failure type and importance

Memory Type	ProM	RetM
Mean (SD) Rating	3,71 (.68)	3.29 (.61)
Importance	High	Low
Mean (SD) Rating	3.41 (.63)	3.59 (.60)

4.2.8 Confusion. As previously mentioned, the statements intended to comprise the cognitive/memory factors construct were assessed individually due to a low correlation between them. Consistent with Experiment 1, I anticipated that retrospective memory failures would be attributed to confusion more than prospective memory failures. The significant main effects of memory failure type, $F(1,81) = 128.38, p < .001$, partial $\eta^2 = .61$, supported this hypothesis. Consistent with the anticipated effect, retrospective memory failures were more likely to be rated as being caused by confusion than prospective memory failures (see table 19 for means).

Table 19

Mean ratings on confusion by memory failure type

Memory Type	ProM	RetM
Mean (SD) Rating	2.68 (.91)	3.66 (.79)

4.2.9 Poor memory. Because the statement concerning poor memory explicitly asked participants about the influence of natural memory ability, I anticipated that retrospective memory failures would have higher ratings on this statement, consistent with the Munsat hypothesis. As expected, there was a significant main effect of memory failure type, $F(1,81) = 10.70, p = .002$, partial $\eta^2 = .12$, where retrospective memory failures were more likely to be attributed to poor memory than prospective failures. This main effect was qualified by a significant interaction of memory type x group $F(1,81) = 5.35, p = .023$, partial $\eta^2 = .06$. Figure 12 depicts this interaction, where there were significantly higher ratings on the poor memory statement for retrospective

memory failures in the control group $t(39) = 3.57$, with $CI_{99} = [.11, .84]$, $p = .001$, but no difference in the mean ratings for the experimental group $t(39) = 0.76$, with $CI_{99} = [-.37, .21]$, $p = .454$. This finding is important, because while memory ability is internal, it can be considered an uncontrollable factor. Therefore, it is possible that our experimental manipulation (i.e., the priming procedure) had an influence on this statement rather than the external factors construct (as in the initial hypothesis).

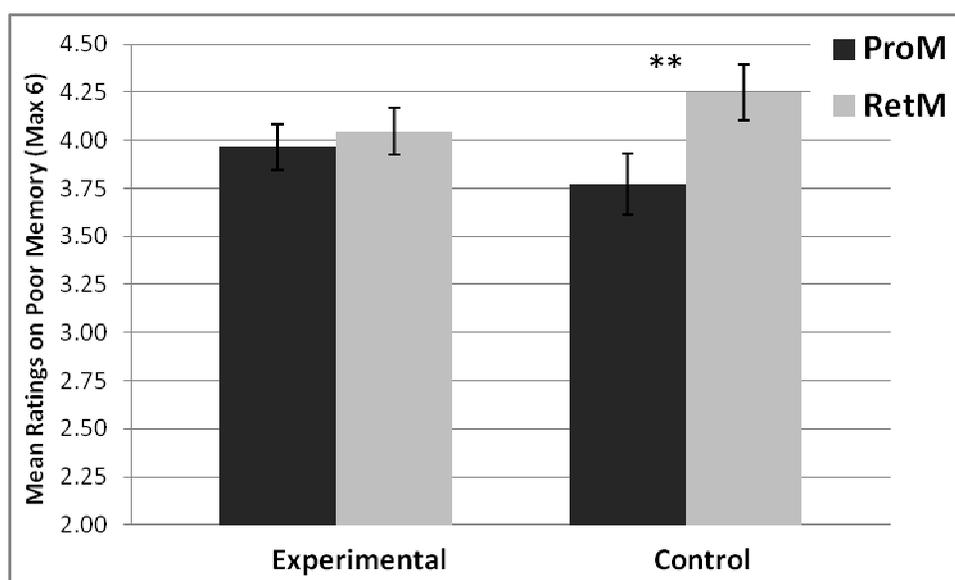


Figure 12. Mean ratings on poor memory. Figure depicts memory failure type x group interaction. Error bars represent standard error of the mean; ** indicates $p = .001$.

4.2.10 Correlational analyses. Correlations among individual statements comprising the seven constructs of interest were presented earlier in preliminary analysis section. Once these constructs were created, correlations were also run between the constructs. As expected, there was a significant positive correlation between personal relevance and frequency of the memory failures, $r(81) = .72$, $p < .001$. Somewhat surprisingly, external factors were correlated with confusion, $r(81) = .43$, $p < .001$ and poor memory, $r(81) = .24$, $p = .030$. This findings lends support to the notion that both cognitive abilities and external factors can be interpreted as uncontrollable. The influence of

the priming procedure on the poor memory statement supports this explanation. As in Experiment 1, personality flaw ratings were positively correlated with lack of motivation, $r(81) = .63, p < .001$, lending more support to the importance of the motivational aspect of prospective memory influencing our interpretations of its failures. Personality flaw ratings were also correlated with seriousness, $r(81) = .39, p < .001$.

Correlations run between personality traits as measured by the NEO and the interpretations questionnaire constructs revealed no significant correlations. Finally, correlational analyses were run on the CFQ and the interpretation questionnaire construct to see if generally poor self-perceived cognitive functioning had an impact on memory failure interpretations. Overall, the only significant correlations were between CFQ scores and personal relevance of memory failures $r(81) = .37, p = .001$ as well as frequency of memory failures $r(81) = .44, p < .001$. This is not surprising, as participants more likely to state that they commit various cognitive blunders regularly would be expected to relate more to memory failures and consider them as occurring more frequently.

4.2.11 Prime data. Data from the priming procedure was coded in exactly the same manner as in Experiment 2. Therefore, analyses were run on context details, seriousness ratings, vividness ratings and emotion words. For Experiment 3, a mixed between-within 2 x 2 (memory failure type x experimental group) ANOVA was run for the number of context details, seriousness ratings, vividness ratings and the number emotion words. Furthermore, correlations between the follow-up data and the ratings on the interpretation questionnaire were run to determine whether or memory failures that were recalled more vividly and thought to be more serious had an impact on interpretations of the memory failure vignettes.

Table 20
Mean ratings on follow-up questions by memory failure type

Question	ProM	RetM
Mean (SD) Context Details	2.66 (.34)	2.63 (.40)
Mean (SD) Seriousness Ratings	2.20 (.60)	1.72 (.58)
Mean (SD) Vividness Ratings	2.99 (.56)	2.86 (.65)
Mean (SD) Emotion Words	0.97 (.51)	0.87 (.40)

There were no significant differences in the number of context details provided for prospective and retrospective memory failures (see table 20), or the number of context details provided between groups.

There was a significant main effect of memory failure type in terms of how seriously participants rated their own memory failures, with examples of prospective memory failures being rated as more serious than retrospective memory failures, $F(1,81) = 38.14, p < .001$, partial $\eta^2 = .32$ (see table 22). Seriousness ratings of participants' memory failure examples were also significantly correlated with ratings of seriousness on the interpretation questionnaire, $r(81) = .34, p = .002$.

There were no significant effects of memory failure type on ratings of vividness. However, the control group ($M = 3.04, SD = .44$) rated their memory failures as more vividly remembered than the experimental group ($M = 2.82, SD = .54$), $F(1,81) = 3.96, p = .050$, partial $\eta^2 = .05$. Vividness ratings were negatively correlated with personality flaw ratings on the memory failure vignettes, $r(81) = -.29, p = .009$, meaning the more vividly people recalled their own memory failures, the less likely they were to cite personality as a causal factor. This result is not surprising, and suggests that the more participants relived their own memory failures, the more likely they were to empathize with, or take the place of, the protagonist in the memory failure vignettes. In turn, they were less likely to rate memory failures as resulting from personality flaws.

There were no significant differences in the number of emotion words used for memory failure type or experimental group. However, the number of emotion words had a significant

negative correlation with personality flaw ratings $r(81) = -.23, p = .033$, and ratings of lack of motivation $r(81) = -.24, p = .027$. The more emotion words participants used to describe how they felt about the memory failure, the less likely they were to cite personality or lack of motivation as a causal factor in the memory failure vignettes. The explanation for this finding is similar to that described above; the more emotionally participants reacted to their own memory failures, the more likely they were to empathize with, or take the place of, the protagonist in the memory failure vignettes. In turn, they were less likely to rate memory failures as resulting from personality flaws or lack of motivation.

4.3 Discussion

Many of the findings from Experiment 1 were replicated in this experiment. While sociality was no longer a variable in this study, since all vignettes were social in nature, low importance memory failures were again rated as more personally relevant, frequent, and less serious. Prospective memory failures were rated as more serious, arising from a lack of motivation, personality, and external factors; retrospective memory failures were attributed to causes of confusion and poor memory. These main effects replicated findings from Experiment 1 as well as previous research (Graf, 2012).

Several of the results in this study indicated that the priming procedure was effective. First, prospective memory failures were only rated as more serious and more due to personality flaws for the control group, but not for the experimental group. Interestingly, the effect of the prime also showed no differences between prospective and retrospective memory failures on poor memory ratings in the experimental group. These results indicate that having participants consider their own memory fallibility prior to having them make interpretations does influence their subsequent interpretations of memory failures presented in vignettes. Social cognition literature suggests that

empathising with the actor in an actor-observer bias paradigm results in fewer dispositional attributions (Galper, 1976). Thus perhaps the combination of recalling their own memory failures with reading vignettes written from their perspective (i.e., *you* committed the memory failure) facilitated empathy from the participants, or taking even more of an “actor” role in the failures they read about in the vignettes. Furthermore, the more vividly participants rated their recollections of their own memory failures, the less likely they were to cite personality as a causal influence. This is more evidence that supports the effect of the priming procedure on relating more with the protagonist and ultimately influencing memory failure interpretations.

Interestingly, the priming procedure did not have an influence on the attribution of blame to external factors. This result was contrary to the hypothesis that priming memory fallibility would facilitate the actor-observer and/or self-serving bias and thus encourage participants to place the blame on factors out of their control (Nisbett & Jones, 1967; Zuckerman, 1979). One possibility for this null result was that the majority of participants (66%) were female. A fair amount of research has indicated that males tend to attribute successes to themselves and failures to external factors, but females do not tend to have substantial differences in their interpretations of the two outcomes (Feather & Simon, 1973; Aldridge & Islam, 2012). Because we were only looking at failures, and the participants were predominantly female, it could be that external factors were simply not being blamed. In fact, pilot research has indicated that female protagonists are blamed more harshly than male protagonists when they commit prospective memory failures in the context of romantic relationships (Yew, Cuttler, & Graf, 2003) and in other social contexts (Solomon, Crease, & Graf, 2013). The vignettes were all social in nature and the participants were mostly female, and so the likelihood of blaming external factors may have been decreased. Although statistical analyses did

not demonstrate an effect of participant sex, the unbalanced distribution (female = 55, male = 29) could have impacted this null effect.

A second possibility is that rather than increasing blame on uncontrollable external factors (distraction, something out of their control), participants were more likely to blame uncontrollable internal factors (poor memory). The control group showed the standard tendency for retrospective memory failures to be attributed to poor memory to a greater degree than prospective memory failures (Graf, 2012). However, the experimental group did not show this bias. Therefore it is possible that the self-serving bias is still in effect, similar to the findings of Blatt-Eisengart and Lachman (2004), where blame for memory failures was placed on uncontrollable internal factors such as natural ability and even genetics.

A limitation in this experiment that was also problematic in the first experiment is that the two statements meant to assess the cognitive/memory construct were not significantly correlated with one another, and had to be assessed as separate constructs. This issue is something that must be addressed in future research as drawing similar conclusions from individual statements compared to multi-item constructs is not ideal. Furthermore, given that these two statements were not correlated it is possible that they are not validly measuring what they were intended to measure.

4.3.1 Summary. Experiment 3 was successful in manipulating the interpretation bias implied by the Munsat hypothesis, which was supported in Experiment 1, via a memory fallibility priming procedure developed in Experiment 2. Prospective memory failures were no longer rated as more serious or a result of personality flaws, and more likely to be rated as a result of poor memory after participants were primed to their own memory fallibility. This finding lends some insight into some potential cognitive mechanisms underlying the effect, which will be discussed in the next section.

5 General Discussion

The overall goal of the present research was to develop a better understanding of the Munsat hypothesis which suggests that prospective and retrospective memory failures tend to elicit different interpretations. The specific objectives of Experiment 1 were to replicate the findings of past research, and to determine what properties of the memory failures themselves have an influence on their interpretations. Experiment 2 was designed to develop a procedure that would prime memory fallibility. Finally, the objective of Experiment 3 was to use the priming procedure developed in Experiment 2 to manipulate the interpretation bias established in Experiment 1.

5.1 Summary of Present Research

Six critical findings emerged from the research described in the preceding sections. There were three empirical findings in Experiment 1. First, the effect established in previous research (Graf, 2012) was replicated, prospective memory failures were interpreted as resulting from a poor personality and lack of motivation, and retrospective memory failures were interpreted as resulting from poor cognitive or memory abilities. Second, sociality was identified as a critical property of memory failures influencing interpretations, because personality flaw interpretations only arose when prospective memory failures were social nature. Unlike sociality, the importance of the consequences of the memory failure did not influence interpretation biases. Retrospective memory failures were interpreted as cognitively-based and prospective memory failures were interpreted as personality-based regardless of the importance of the consequences. Third, prospective memory failures were unexpectedly attributed to external factors (e.g., something out of your control) more than retrospective memory failures. This result was surprising given that participants were also more likely to place the blame for these same failures internally on personality flaws.

Experiment 2 demonstrated two critical methodological findings. First, it showed that a priming procedure can be used to induce a sense of memory fallibility, as measured by scores on the memory functioning questionnaire (MFQ). Second, participants indicated that they found it easier to recall prospective memory failures and failures that were social in nature.

The critical finding from Experiment 3 was that the priming procedure successfully reduced differences in interpretations between prospective and retrospective memory failures, by decreasing ratings of seriousness and personality flaw causes while at the same time increasing ratings of poor memory causes for prospective memory failures. These findings provided some potential theoretical accounts for the interpretation bias effect. In the subsequent sections I will describe the interpretations and implications of each of these critical findings.

5.1.1 Empirical findings. The present research was able to replicate findings in past research on the Munsat hypothesis (Graf, 2012). The replication indicates that the interpretation bias described by the Munsat hypothesis is robust, as the biases between prospective and retrospective memory failures occurred with new vignettes describing different contexts and using different protagonists. Furthermore, the present research used a different subject pool and the effect still occurred.

Finally, the effect occurred regardless of the importance of the consequences of the memory failures. Manipulation checks indicated that the importance manipulation was successful, and therefore this last finding provides additional evidence that the Munsat hypothesis pertains to a large variety of contexts.

However, unlike the importance of the consequences, Experiment 1 indicated that sociality is an essential property of memory failures that influences interpretations. This result establishes some limits for the Munsat hypothesis, and suggests it does not necessarily generalize to all forms

of prospective and retrospective memory failures. The poor character interpretation bias for prospective memory failures only occurred when the failures were social in nature. This finding might be due to the fact that prospective memory is frequently used in the context of promises or commitments made to someone else.

The finding that sociality is an important property in memory failure interpretations leads me to speculate about the differences in the language we generally use for prospective memory that is social versus asocial. Using language associated with promises or commitments is much more common in prospective memory when the memory involves another person, and this language has emotional connotations. In contrast, we tend to use much less emotionally-laden language for prospective memory not involving another person, such as when it concerns private plans or intentions. Similarly, the language associated with retrospective memory, regardless of whether or not it is social in nature, tends to revolve around words that are cognitively-based, such as remember or recall. Given the findings that social prospective memory failures have negative, personality-based connotations compared to their asocial and retrospective counterparts, it is conceivable that the social prospective memory vignettes I used for the present research naturally evoked emotionally-laden words like 'promise' or 'commitment', even if those words were not explicitly stated.

We know that language can influence our interpretations about the characteristics of people. For example, research by Levin et al. (1994) suggested that when we use formal language we are seen as more intelligent but less trustworthy. It is therefore possible that this automatic link between social prospective memory failures and promise-type language is influencing participants' interpretations, shifting blame towards the character of the person who failed. Because asocial and

retrospective memories do not share this same kind of language association, they do not receive the same kind of interpretation.

Finally, in Experiment 1 I had expected that participants would be more likely to blame external factors (such as distraction or something out of one's control) in the context of retrospective memory, and not for prospective memory because prospective memory failures tend to be blamed on internal, personality flaws. However, I was surprised to find that the opposite was the case, prospective memory failures were more likely to be attributed to external factors. This led to me to a closer examination of the mean ratings on personality flaw interpretations, where I found that participants were not more likely to agree that personality flaws caused prospective memory failures, but rather less likely to disagree with this interpretation (compared to retrospective memory failures). These findings might be explained by the actor-observer bias (Jones & Nisbett, 1971), where the actor of a failure blames the situation, but the observer of a failure blames disposition. In previous research, participants were reading vignettes written from the third person perspective (Graf, 2012), and as such they were truly observers of the failures and therefore blamed them on personality rather than external factors. The present research asked participants to place themselves in the position of the protagonist in the vignette, thus having them take on more of an actor role, which both increased their likelihood of placing blame on the situation, and decreased their level of agreement that personality factors were to blame.

5.1.2 Methodological findings. The objective of Experiment 2 was to create a priming procedure that successfully made participants aware of their own memory fallibility, and the results suggest that the priming procedure successfully accomplished this objective. In addition to the main finding, when I asked participants to rate how serious they considered their own memory failures, and how vividly they were able to recall their failures, I found that the scores were negatively

correlated with their self-perceived memory ability. Together, these findings suggest that recalling memory failures reduces self-perceived memory ability, and it appears to do so by having participants re-experience the failures (as seen in the vividness ratings) and their consequences (as seen in the seriousness ratings).

After the priming procedure, participants reported that they had found it easier to recall prospective memory failures and social failures. This finding is important and implies that prospective memory failures and social memory failures are particularly memorable or salient, which might offer some insight into why these types of memory failures get the most negative interpretations. If we are more likely to recall occurrences of these memory failures compared to their asocial or retrospective counterparts, so too must we recall their consequences. Because they and their consequences are more easily recalled, social and prospective memory failures might be more readily associated with negative outcomes when we are reading about them in vignette form. Therefore it is more likely for us to associate these kinds of failures with negative personality traits. This speculation is particularly compelling when we combine the ease with which participants recalled social failures and the importance of sociality in the results of Experiment 1.

The importance of social memory failures in both Experiments 1 and 2 led to the decision to refine the general method used in Experiment 3, such that both the priming procedure and the vignettes only used social memory failures.

5.1.3 Findings with theoretical implications. In Experiment 3, I used a procedure which reduced the differences in interpretations between prospective and retrospective memory failures predicted by the Munsat hypothesis. I believe the reduction in dispositional blame (i.e., personality flaws) and increase in blame placed on uncontrollable factors (i.e., poor memory) for prospective

memory failures observed in Experiment 3 suggests the same mechanisms underlying the actor-observer bias might be in effect.

Given the success of the priming procedure in Experiment 2, for Experiment 3, I had hypothesized that having participants provide examples of their own memory failures would make them aware their memory fallibility, and thus would share characteristics with the protagonist in the vignette. Given research on interpretations, I hypothesized that sharing characteristics with a protagonist would increase empathy with that protagonist (Blanchard-Fields et al., 2012), and in turn this would decrease the bias towards dispositional blame (Blanchard-Fields et al., 2012; Galper, 1976; Vescio et al., 2003). The results of Experiment 3 supported this hypothesis.

Another potential theoretical explanation for the reduction of differences in interpretations of prospective and retrospective memory failures in Experiment 3 (in terms of the seriousness, personality flaw, and poor memory ratings) is related to the dual-process theory of response bias. This theory posits that responses to certain situations can be mediated either by heuristic (automatic and frequently biased) or analytic processes (influenced by rational thought) (Stanovich & West, 2008). In the preceding sections of this chapter, I have described potential mechanisms by which prospective memory failures are seen as heuristically more negative (e.g., we associate them with emotional promise-type language and find them more salient/memorable). This heuristic bias might be why we interpret prospective memory failures as personality flaws. As Stanovich and West (2008) have explained, we can be motivated to override a heuristic response with an analytic response. In the context of the present research, the priming procedure acted as motivation to override the heuristic response of personality flaw interpretations. Participants did not want to interpret prospective memory failures (that were just like their own) as a result of personality flaws, because this would mean they too were flawed. Instead, they thought more carefully about other

possible attributions of blame, for example poor memory. The results of Experiment 3 provide evidence that participants primed to their own memory fallibility were more likely to equate prospective and retrospective memory failures on a number of characteristics, because not only were prospective memory failures attributed less to personality flaws, but they were also seen as less serious and more the result of poor memory. These results suggest rational or analytic thinking about prospective memory failures being no different than retrospective memory failures, instead of the natural heuristic response.

5.2 Future Directions

In future research, I would like use modified lab-based as well as field-based experiments to compliment the findings from the methodology used in the present research. One question raised by the methodology in the present research is a potential lack of ecological validity, particularly in connection with the vignette method. There are two issues that could decrease the generalizability of the findings using the current method. The first issue is that participants are not actually committing the memory failure; they are just imagining it. Secondly, and particularly relevant to prospective memory, is that the intentions described in the vignettes were provided to the participants; they did not create the intention themselves. These concerns are common when we attempt to equate in-lab and daily life prospective memory. There is clear evidence of these problems in research related to performance differences of older adults in lab compared to field tasks. In lab tasks, older adults generally perform worse than young adults on prospective memory tasks (Henry, MacLeod, Phillips & Crawford, 2004), however in field tasks, older adults outperform young adults in both important and unimportant prospective memory tasks (Ihle, Schnitzspahn, Rendell, Luong & Kliegel, 2012). This type of research indicates that it is important to replicate

findings, particularly in terms of prospective memory, in field tasks in order to ensure effects are generalizable to the context of daily life.

One option for dealing with the issue of imagining versus experiencing memory failures is to have participants actually commit memory failures and then make attributions about the causes of those failures. To do this, I could use a similar approach as Blatt-Eisengart and Lachman (2004), who had participants interpret their failures on a free recall test. In the context of my research questions, I could have participants commit a real retrospective memory failure, such as forgetting a detail provided to them by the experimenter, and a real prospective memory failure, such as forgetting to carry out a task assigned by the experimenter, and then ask them to interpret causes of those two failures using the interpretation questionnaire developed for the present research. This type of experimental manipulation would be difficult, as we would have to rely on the participants failing at both tasks to be able to compare their interpretations to the two forms of memory. However, the results would be more generalizable as they would be reactions to genuinely experienced memory failures.

The research option described above still provides the intention of the prospective memory to the participant. Using a diary study is another option that can help deal with both ecological validity concerns. In such a study, participants would have to record and interpret the cause of their own real memory failures, which ensures that they are experiencing the memory failures, and the memory failures are a result of their own self-generated intentions. In both of these cases, I would anticipate replication of the trend in present research's results; that participants would be less likely to blame personality when it is their own prospective memory failures they are interpreting. Even though consequences of memory failures in the context of daily life might be more serious compared to those described in vignettes, the present research has indicated the interpretation

biases occur, and the biases were similarly manipulated, regardless of the importance of the consequences.

Another avenue for future research is to directly vary the self-other dimension in the context of who is committing the memory failure. This manipulation could be achieved through vignettes presented in a within-subjects design, which will be a more direct comparison of the influence of the actor-observer bias on memory failure interpretations. Another option allowing for direct comparison between self- and other-committed failures, that also addresses ecological validity, is to have participants record their own and another person's memory failures in a diary study, such as a roommate (e.g., Thompson, 1982). By bringing both the participant and his/her roommate in to interpret the exact same events, we can have a direct and ecologically valid comparison between these interpretations. Based on the current research, I would expect that the person committing the memory failure would be more likely to interpret it as a result of various uncontrollable factors, but prospective memory failures committed by the other person would be interpreted as a result of poor character. While some experimental control would be lost in this design, such as control over the seriousness of the memory failure, the benefits of gaining insight into how two people interpret the same real memory failures with real consequences outweigh the costs.

Another reason to replicate the findings of the present research is the potential influence of the age and sex of the participants in these studies. Because all participants were UBC undergrads and predominantly female (73.95% across the three studies), they shared very similar characteristics. Furthermore, because they were putting themselves in the position of the protagonist in the vignettes, their personal characteristics (e.g., age and sex) were projected onto these protagonists. This issue has a number of important implications.

First, in terms of the influence of age, research has indicated that younger adults are more prone to biased responding than middle-aged adults (Follett & Hess, 2002), which suggests that participants in this study might be particularly vulnerable to interpretation biases. Secondly, because participants projected their demographics onto the protagonist in the vignettes, the predominance of female participants might have also had an impact on their interpretations. Some interesting pilot research has begun to look at the possible influence of protagonist sex on memory failure interpretations. Female protagonists tend to be blamed more severely when the memory failures occur, particularly in a social context (Solomon, Crease & Graf, 2013; Yew, Cuttler & Graf, 2007). With predominantly young and predominantly female participants in the present research, the bias against prospective memory failures might have been compounded. It is therefore possible that the experimental manipulations in the present research might have had different effects in a broader, community-living sample, composed of equal numbers of male and female participants. Testing a community-living sample with the same method might help to remove some of the potential issues with the sample used in the present research. Another option is to systematically vary the demographics (age, sex) of the protagonists in these memory failure vignettes to determine empirically what the influence of these factors might be.

One final avenue of future research may help contribute to the neuroscience literature on this interpretation bias. By presenting participants with memory failure vignettes similar to those used in the present research then asking them to reflect upon the protagonist and the potential causes of the memory failures while in an fMRI, we can get an idea of the differences in brain regions associated with the differences in interpretations, and to a potential biological basis of this difference.

5.3 Conclusions

The present research has implications regarding conflicts surrounding memory failures in the context of daily life, and how these conflicts might be avoided. Just by making the bias against prospective memory failures known might have important implications on our day-to-day interactions with one another. First, we might more carefully select our explanations for missing meetings, dates, and breaking other social promises. For example, if I do not want to be judged irresponsible, it might be better to say I forgot the location of a meeting (retrospective) than to say I forgot about the meeting (prospective). Secondly, if we are encouraged to consider the ubiquity of prospective memory failures in our own lives, we might empathize with the person that has committed a prospective memory failure. In this way respond analytically rather than heuristically when we interpret the memory failure, and place less blame on the person's character and more blame on his/her memory abilities.

This research was both challenging and rewarding. The sheer amount of data to be analyzed and some of the unexpected findings were at times discouraging, but have since led to better theoretical understanding of the phenomenon and a wealth of future research opportunities. The fact that this research is so applicable to daily life made the process of conducting it extremely rewarding. Memory failures, both prospective and retrospective, are particularly relatable experiences. As Shakespeare said, "But men are men; the best sometimes forget" – it is therefore critically important that we understand the implications of forgetting, and that not all forgetting is created equal.

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Appendices

Appendix A: Memory Failure Vignettes

Experiment One: Version A

RETROSPECTIVE, HIGH IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version A, Set 1

You have filled a prescription for important asthma medication and brought it home. You fail to recall where in your home you left the medication. As a consequence, you are having difficulty breathing.

RETROSPECTIVE, LOW IMPORTANCE AND SOCIAL MEMORY FAILURE-Version A, Set 1

You are at a coffee shop and you are speaking with a neighbour about his/her pet dog. You fail to recall the dog's name yet again. As a consequence, your neighbour has to correct you and you feel foolish.

PROSPECTIVE, HIGH IMPORTANCE AND SOCIAL MEMORY FAILURE-Version A, Set 1

You are thinking of a special surprise birthday gift for your significant other (boyfriend/girlfriend/husband/wife). You decide to buy the best available tickets to an upcoming Vancouver Canucks game. His/her birthday comes and goes and you fail to recall your intention to purchase the tickets. As a consequence, he/she is very disappointed and is not speaking to you.

PROSPECTIVE, LOW IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version A, Set 1

On a best seller list, you see a murder mystery you are very much interested in reading. You plan to stop at the book store on the way home to purchase the book. You fail to recall your plan to stop at the book store. As a consequence you will have to make a trip to the book store another day.

RETROSPECTIVE, HIGH IMPORTANCE AND SOCIAL MEMORY FAILURE- Version A, Set 2

You recently met someone at a party and you are very much romantically interested in/attracted to him/her. You arrange to go out on a first date, but when you meet this person for the date, you fail to recall his/her name. As a consequence, he/she is upset and is no longer interested in dating you.

RETROSPECTIVE, LOW IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version A, Set 2

There are two shows you enjoy on television at the 8PM this evening. You know one show is a repeat and one show is brand new. You cannot recall which one you have seen and thus you watch the wrong show. As a consequence, you miss the new episode of the show you enjoy.

PROSPECTIVE, HIGH IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version A, Set 2

You have a psychology final coming up worth 50% of your grade. On the day of the exam, you fail to remember to go to the scheduled exam and do not write it. There are no make-ups for this exam. As a consequence, you receive a failing grade in the course.

PROSPECTIVE, LOW IMPORTANCE AND SOCIAL MEMORY FAILURE-Version A, Set 2

You borrowed a pen from a classmate. He/she tells you it is one of his/her favourite pens. You agree to return the pen at the next class meeting. You realize you have failed to recall your plan to bring the pen with you to class. When your classmate asks for the pen back, you cannot return it. As a consequence, you are embarrassed.

Appendix A: Memory Failure Vignettes (continued)

Experiment One: Version B

RETROSPECTIVE, HIGH IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version B, Set 1

You have a psychology final today worth 50% of your grade. You fail to recall where (in which room) the exam is being held and you miss the exam. There are no make-ups for this exam. As a consequence, you receive a failing grade in the course.

PROSPECTIVE, HIGH IMPORTANCE AND SOCIAL MEMORY FAILURE-Version B, Set 1

You recently met someone at a party and you are very much romantically interested in/attracted to him/her. You agree to go out for dinner the next day, but you fail to recall your plan to meet him/her. As a consequence, he/she is upset and is no longer interested in dating you.

RETROSPECTIVE, LOW IMPORTANCE AND SOCIAL MEMORY FAILURE-Version B, Set 1

You borrowed a pen from a classmate. He/she tells you it is one of his/her favourite pens and he/she would like it back. At the next class meeting, you fail to recall where you left your classmate's favourite pen. You give him/her back the wrong pen. As a consequence, you are embarrassed.

PROSPECTIVE, LOW IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version B, Set 1

At 8PM a new episode of a show you enjoy will be on television. However, you are busy studying and by the time you look at the clock, it is 8:30PM, and you have failed to recall your intention to change the channel to your show. As a consequence, you miss the new episode of the show you enjoy.

RETROSPECTIVE, HIGH IMPORTANCE AND SOCIAL MEMORY FAILURE-Version B, Set 2

You are thinking of a special surprise birthday gift for your significant other (boyfriend/girlfriend/husband/wife). You decide to buy the best available tickets to an upcoming Vancouver Canucks game. You fail to recall that your significant other dislikes hockey. As a consequence, when you present the gift, he/she is very disappointed and is not speaking to you.

PROSPECTIVE, HIGH IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version B, Set 2

You plan to stop at the pharmacy on your way home to pick up important asthma medication. You fail to recall your plan to stop at the pharmacy and you do not have the required medication. As a consequence, you are having difficulty breathing.

RETROSPECTIVE, LOW IMPORTANCE AND ASOCIAL MEMORY FAILURE-Version B, Set 2

On a best seller list, you see a murder mystery you are very much interested in reading. While you are in the bookstore, you fail to recall the title of the book you went in to purchase. As a consequence, you will have to return to the store another day.

PROSPECTIVE, LOW IMPORTANCE AND SOCIAL MEMORY FAILURE-Version B, Set 2

You meet your neighbour at a coffee shop. You agree to accompany him/her when he/she takes his/her dog for a walk later that day. However, you fail to remember your intention to meet your neighbour for a walk at the appointed time. As a consequence, your neighbour walks his/her dog alone, and you feel foolish for missing the opportunity to join in on a nice walk.

Appendix A: Memory Failure Vignettes (continued)

Experiment Three: Version A¹

RETROSPECTIVE, HIGH IMPORTANCE-Version A

You have filled an important prescription for your mother's asthma medication and brought it home. Now you are unable to recall where you left the medication. As a consequence, your mother is having difficulty breathing and you are very concerned.

PROSPECTIVE, HIGH IMPORTANCE-Version A

You and a friend have a psychology final coming up worth 50% of your grade. You agree to drive your friend to the exam. On the day of the exam, you fail to recall your intention to pick up your friend, and as a result he/she does not arrive in time to write it. There are no make-ups for this exam. As a consequence, your friend receives a failing grade in the course and you feel terrible.

RETROSPECTIVE, LOW IMPORTANCE-Version A

There are two shows your roommate enjoys on television at the 8PM this evening. He/she has watched one of the episodes and has not yet watched another. Your roommate asks you to PVR the episode he/she hasn't seen. At 8PM, you cannot recall which show he/she has seen and thus you record the wrong show. As a consequence, your roommate misses the new episode of the show he/she enjoys and you feel responsible.

PROSPECTIVE, LOW IMPORTANCE-Version A

You are checking out a best-seller list, and your classmate notices a murder mystery he/she is very much interested in reading. Since you plan to go to the bookstore later, you agree to pick up the book for your classmate. But then you fail to recall your plan to stop at the bookstore. As a consequence, your classmate will have to make a trip to the bookstore another day and this makes you feel badly.

Experiment Three: Version B

RETROSPECTIVE, HIGH IMPORTANCE-Version B

Your friend has a psychology final today, which counts for 50% of the course grade. Your friend does not know the campus well, and asks you to take him/her to the examination room. Because you fail to remember the correct location of the exam room, you take your friend to the wrong location. By the time you figure out the correct location, your friend is too late for the exam, receives a failing grade in the course, and you feel responsible.

¹ Only new vignettes created for experiment three are presented here. Experiment three also used the social vignettes from experiment one.

Appendix A: Memory Failure Vignettes (continued)**PROSPECTIVE, HIGH IMPORTANCE-Version B**

You plan to stop at the pharmacy on your way home to pick up asthma medication which your mother requires for her health. You fail to remember your plan to stop at the pharmacy and now your mother does not have the required medication. As a consequence, your mother is having difficulty breathing and you are very concerned.

RETROSPECTIVE, LOW IMPORTANCE-Version B

You are checking out a best-seller list, and your classmate notices a murder mystery he/she is very much interested in reading. Since you are going to the bookstore later, you agree to pick up the book for your classmate. While you are in the bookstore, you fail to recall the title of the book your classmate wanted to have. As a consequence, your classmate will have to return to the store another day and you feel badly.

PROSPECTIVE, LOW IMPORTANCE-Version B

At 8PM a new episode of a show your roommate enjoys will be on television. He/she asks you to PVR it for him/her. However, you are busy studying and by the time you look at the clock, it is 8:30PM, and you have failed to remember your intention to record your roommate's show. As a consequence, your roommate misses the new episode of the show he/she enjoys and you feel responsible.

Appendix B: Interpretation Questionnaire

Ratings scale for all statements:

Agree strongly	Agree somewhat	Agree slightly	Disagree slightly	Disagree somewhat	Disagree strongly
1	2	3	4	5	6

Experiments One and Three

Statements assessing personal relevance construct:

A situation like this has occurred in your life

You can relate to a situation like this

Statements assessing frequency construct:

A situation like this occurs for you only very rarely (reverse scored)

A situation like this occurs for you very often

Statements assessing seriousness construct:

A situation like this has minimal consequences (reverse scored)

A situation like this is very serious

Statements assessing lack of motivation construct:

A situation like this happens because you must not have been motivated

A situation like this reflects a lack of interest or desire

Statements assessing personality flaw construct:

A situation like this happens because you are an unreliable person

A situation like this happens because you must be an irresponsible person

Statements assessing external factors construct:

A situation like this occurs because of something out of your control

A situation like this occurs because something must have happened to distract you

Experiment One

Statements assessing cognitive/memory factors construct:

A situation like this happens because you must have been confused

A situation like this happens because you must have forgotten

Experiment Three

Statements assessing cognitive/memory factors construct:

A situation like this happens because you must have been confused

A situation like this happens because you must have a poor memory

Appendix C: Priming Procedure Interview

Instructions provided to participants in memory failure condition (experiments 2 and 3):

There are two different types of memory, prospective and retrospective memory. Prospective memory involves carrying out a plan in the future. A failure to carry out such plan would constitute a prospective memory failure. An example of a prospective memory failure would be the following: *“On Monday on my way to class, I had planned to stop at the mailbox and mail a letter. Once I arrived on campus, I went straight to class and realized that I had forgotten to stop and mail the letter.”*

In contrast, retrospective memory involves recall of past events, which could be personal experiences or simply facts. When we fail to recall these experiences or facts, we are committing a retrospective memory failure. An example of a retrospective memory failure would be the following: *“On Wednesday on my way to class, I ran into someone I went to high school with, but as hard as I tried, I could not recall his/her name”*. Do you understand the distinction?

I will be asking you to recall one of these memory failure types at a time. Please try to be specific and give some detail about each memory failure. Think back to the examples provided to give you an idea of the details we are looking for. Keep the definitions of prospective and retrospective memory failures in mind when you are imagining these memory failure experiences.

Prospective memory failures that are asocial (only used in experiment two)

Think back to the last (week/month/year), and tell me about a specific prospective memory failure you experienced then. Remember, a prospective failure is a failure to carry out a specific plan. Right now, I am only interested in a memory failure that involves you alone, not a commitment you made to someone else. Remember the case of forgetting to mail a letter to help you come up with an example.

Retrospective memory failure – asocial (only used in experiment two)

Think back to the last (week/month/year), and tell me about a specific retrospective memory failure you experienced then. Remember this is a failure to recall details from the past, a prior experience or fact you should know. Right now, I am only interested in a retrospective memory failure that involves you alone, not a failure that involves another person. For example, you went shopping and were trying to pay for your purchases but you couldn't remember the pin to your credit card.

Appendix C: Priming Procedure Interview (continued)

Prospective memory failures – social

Think back to the last (week/month/year)², and tell me about a specific prospective memory failure you experienced then. Remember, a prospective failure is a failure to carry out a specific plan. Right now, I am only interested in a memory failure that involves another person, a commitment or promise you made to someone else. For example, you had promised to call your friend when you got home from school but you forgot.

Retrospective memory failure – social

Think back to the last (week/month/year)¹, and tell me about a specific retrospective memory failure you experienced then. Remember this is a failure to recall details from the past, a prior experience or fact you should know. Right now, I am only interested in a retrospective memory failure involves another person. Consider the example of forgetting your high school friend's name.

² In experiment three, participants were not asked to think back to a specific time frame

Appendix C: Priming Procedure Interview (continued)

Instructions provided to participants in general failures condition (experiment 2 only):

I'm going to be asking you to recall some examples of personal failures you have experienced. Sometimes these failures don't involve anyone else, for example, *"One evening last month, I was at home by myself and I decided to try baking some cookies. I left them in the oven for too long and I burned them, so I had to throw them out."* Other times, there are other people that are involved with, or affected by, the failure, for example, *"last week I was playing in a softball game on campus. I was the last batter and I struck out to end the game."* I will be asking you to recall these different kinds of failures from different points in time, so please listen carefully to the kinds of failures I am looking for.

Please try to be specific and give some detail about each failure. Think back to the examples provided to give you an idea of the details we are looking for.

Structured Interview (general failures):

General Failures – Asocial

Think back to this past (week/month/year), and tell me about a time when you failed at something. Right now, I am only interested in a failure that involved you alone. Think back to the baking cookies example for some guidance.

General Failures – Social

Think back to this past (week/month/year), and tell me about a time when you failed at something. Right now, I am only interested in a failure that involves another person. Think back to the example provided (striking out in the softball game) if you need some help coming up with an example.

Appendix D: Priming Procedure Follow-up Questions

1. What was the context of this memory failure (approximate date, time, place, etc.)?

2. How serious were the consequences of this memory failure?

Not at all serious

Very serious

1

2

3

4

3. How vivid (rich in detail) is your recollection of this memory failure?

No detail

Lots of detail

1

2

3

4

4. Describe how this memory failure made you feel about yourself:

Examples: Happy Sad Embarrassed Ashamed Stupid Silly No effect Other____

Appendix E: Experiment Two - Post-Experiment Interview

Read to participants: *This is the end of the study, and in just a minute, I will give you a debriefing about it. Before I do so, however, I would like to ask a few general questions about the study, or more specifically, about your impressions of this study.*

1. First of all, how did you feel about the study? [If participant is struggling to come up with opinion, prompt with “was it interesting, difficult, too long, boring” etc.]
2. Did you have any difficulty recollecting memory/general failures? If so, at what point did you begin to have difficulty?
3. Were some memory/other failures easier to recall than others? If so, which ones:
4. Were RetM easier than ProM, or vice versa? (omitted for general failures)
5. Were asocial easier than social, or vice versa?
6. Can you describe any strategies (methods) you used to recollect specific memory/other failures?
7. What do you think the purpose was of having you recall your own memory/other failures?
8. Do you have any further comments/questions about this study?