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Remembering to Remember and the Consequences of Forgetting: The Role of Prospective Memory in Consumer Intentions

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**REMEMBERING TO REMEMBER AND THE CONSEQUENCES OF FORGETTING:
THE ROLE OF PROSPECTIVE MEMORY IN CONSUMER INTENTIONS**

by

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ABSTRACT

REMEMBERING TO REMEMBER AND THE CONSEQUENCES OF FORGETTING: THE ROLE OF PROSPECTIVE MEMORY IN CONSUMER INTENTIONS

Eyad M. Youssef
Old Dominion University, September 2010
Committee Chair: Dr. John B. Ford

Picking up your dry cleaning after work, returning library books before the due date, picking up a friend at the airport; all of these tasks have one underlying feature that links them together. The tasks cannot be completed when the initial intention is formed. Prospective memory can be defined as remembering to remember (Winograd, 1988). It can also be defined as either remembering to do something at a particular moment in the future or as the timely execution of a previously formed intention (Kvavilashvili and Ellis, 1996). Remembering to do things (prospective memory) is just as much a use of memory as remembering information in the past (retrospective memory) (Harris, 1984). Yet psychological and marketing research on memory has dealt almost exclusively with remembering information rather than remembering to do things.

Ellis and McGann (2003) have argued that the degree to which specific cognitive skills are required for successful prospective memory depends not only on the characteristics of an intention but also the circumstances under which it should be realized. Simply stated, by analyzing prospective memory focusing only on the tasks at hand, one neglects the contextual components of the activity. In this case the social context within which the prospective memory task takes place is neglected. Munsat (1966) stated that there is a moral aspect that accompanies prospective memory failures: If retrospective memory fails, the person's memory is seen as unreliable, but if the prospective memory fails, the person is seen as unreliable. In this regard prospective memory failures are relevant to our social lives. A memory failure in these social contexts is embarrassing and affects the credibility that other people give us (Brandimonte and Ferrante, 2008). Meacham (1988) argued that in order to truly understand prospective memory, researchers should consider the nature of the interpersonal relationships involved.

Given the importance of the social dimensions of prospective memory, there again seems to be a gap in the literature. To date there are only a handful of published articles concerned with this aspect of prospective memory. It is the goal of this dissertation to provide a link between prospective memory and its social consequences through an investigation of the effect of the relationship strength and the direction of benefits on the outcome of an assigned prospective memory task. This experiment examined the effect of social strength on the completion rate of various prospective memory tasks and the effect of directional benefit on prospective memory task performance.

Prospective memory performance was significantly higher when another individual was present during the experiment. With respect to the relationship of the individual, contrary to the hypothesis, respondents improved prospective memory performance when a stranger was present. In terms of the direction of benefit, prospective memory performance significantly improved when an additional incentive was given to the respondent, with maximum performance occurring in the social importance condition. These results suggest that managers should encourage shoppers to bring another individual during the shopping experience. And the managers should separate out the benefits, offering either a personal reward or a social reward for completing an action. Suggestions for future research is discussed as well as the limitation to this study.

This dissertation is dedicated to my family, Hanaa, Mohamed, Louay, Menna, and Hebba. Each of you has played a critical role in the completion of this dissertation. Mom, your great meals and loving care has given me the strength to make it through the long nights of studying, researching and writing. Dad, your academic experience has proven to be a valuable asset and your patience to allow me to experience the ups and downs of writing a dissertation is appreciated. Louay, thank you for your up-front opinions and keeping me focused on the end goal. Menna, thank you for all the carpool conversations and allowing me to bounce research ideas off of you. Hebba, thank you for your youthful energy, you might not know it, but I have stolen some of it when you were not looking.

Thank you all for believing in me and helping me through this long journey.

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CHAPTER 1

INTRODUCTION

What is Prospective Memory?

Picking up your dry cleaning after work, returning library books before the due date, picking up a friend at the airport; all of these tasks have one underlying feature that links them together. The tasks cannot be completed when the initial intention is formed. With the dry cleaning example, one does not drop off their dry cleaning and then immediately pick it up. There is a delay between when the dry cleaning is dropped off and when it is available for pickup. The same goes for the library books. When checking out material from the library one forms the intention to return the material before the date stamped on the back cover. The intention of picking up a friend at the airport was formed when the individual asked you to do so. All three examples are termed prospective memory tasks. And although all three intentions share some characteristics, there are aspects of all three that differentiate them from each other. The dry cleaning task has multiple opportunities for completion. The library task imposes a penalty for each day the book is out past its due date. The friend task has a social dimension, where the consequences of forgetting can be great. As evident from the examples, prospective memory involves a complex set of cognitive processes in addition to remembering and that is why some researchers have used terms other than prospective memory to describe this phenomenon (Graf and Uttl, 2001). A handful of researchers have opted for the neutral term, “realization of delayed intentions.” Prospective memory and realization of delayed intentions describe the same process and in recent years prospective memory has been more prevalent term used in the literature (McDaniel and Einstein, 2007).

Simply put, prospective memory can be defined as remembering to remember (Winograd, 1988). It can also be defined as either remembering to do something at a particular moment in the future or as the timely execution of a previously formed intention (Kvavilashvili and Ellis, 1996). This type of memory is prevalent in all aspects of life. It is associated with everyday tasks such as, returning a library book, passing a message along, or picking up the children from school. These memories are integrated into our work lives with such tasks as remembering to post a reading assignment for a lecture, remembering departmental meetings, or even remembering to mail a manuscript before the deadline. Philosophers have even gone as far as defining human behavior as events caused by intentions (Harre, 1982; Brand, 1984). Tulving (2002) suggests that the episodic memory system, the preservation system of one's mental record of their personal past, may play a role in fundamental human existence and the success of the species. Tulving (2002) discusses *prospectic chronesthesia* which deals with the fact that specific episodic memory allows individuals to mentally place themselves forward in time (Tulving, 2002). This forward-thinking concept is exclusive to and essential to human existence (Johnson and Sherman, 1990).

Remembering to do things (prospective memory) is just as much a use of memory as remembering information in the past (retrospective memory) (Harris, 1984). Yet psychological research on memory has dealt almost exclusively with remembering information rather than remembering to do things. In explicit retrospective memory tests a person is directed to be in a retrieval mode (Tulving, 1983; Craik, Govoni, Naveh-Benjamin, and Anderson, 1996). What is being experimented with is the subject's ability to reproduce or identify previously learned material/information. Remembering to recall is minimized by the experimenter providing explicit instructions. A subject may be asked to recall items on a list that was committed to

memory. The subject is then presented with a list of items and later in the experiment is asked to recall as many of the items as possible. In this type of experiment the subject rarely, if ever, forgets to try and recall. This is potentially reversed in a naturalistic/realistic life setting. Unlike retrospective memory tasks, for prospective memory tasks, there is no external agent that prompts the subject to enter a retrieval mode. Often, the information to be recalled might be easy to remember but remembering to recall may prove to be difficult. Take for example remembering to pass a telephone message onto a colleague. It is possible that we see the colleague and remember that there is a message to be passed along but cannot recall what the message was. Or, it is possible that we see the colleague and forget entirely to tell the person that there was a message.

History of Prospective Memory Research

Given the importance of prospective memory, there has been surprisingly little research investigating the theoretical and experimental aspects. Prior to 1985, there were ten published experimental studies on prospective memory, most of which were in edited volumes (Harris, 1984). Kvavilashvili and Ellis (1996 p.23) noted, “that there were approximately 45 papers were published over the past 20 years,” when discussing amount of publications in the field prior to 1996. Marsh et al. (2006) conducted an analysis of the growth of prospective memory research and their study produced a graph that depicted the sudden rise in the amount of publications in the field. Using PsycInfo citations, they were able to group the amount of publications into two-year groups and produce a line graph showing a consistent rise in citations. Using a similar methodological approach, Figure 1 was extended to show the continued growth to the present day. There were more prospective memory articles published during the period ranging from 2005 to 2006 (122 articles) than there were from all the years preceding 1998 summed together.

And more recently, in the years 2007 and 2008, there were a total of 162 articles published concerning the issue of prospective memory. This rapid growth of prospective memory has produced four books, two conferences with a third scheduled for 2010, and two special journal issues comprised of entirely prospective memory topics (see Table 1 for details). The recent rise has broadened the examination of prospective memory and provided a structured foundation from which more practical applications are now being presented. What was once a topic confined to psychological memory journals can now be found in disciplines such as mental health, neuroscience, social psychology, and cognitive development. Each respective discipline has contributed to the overall understanding of how individuals recall intentions.

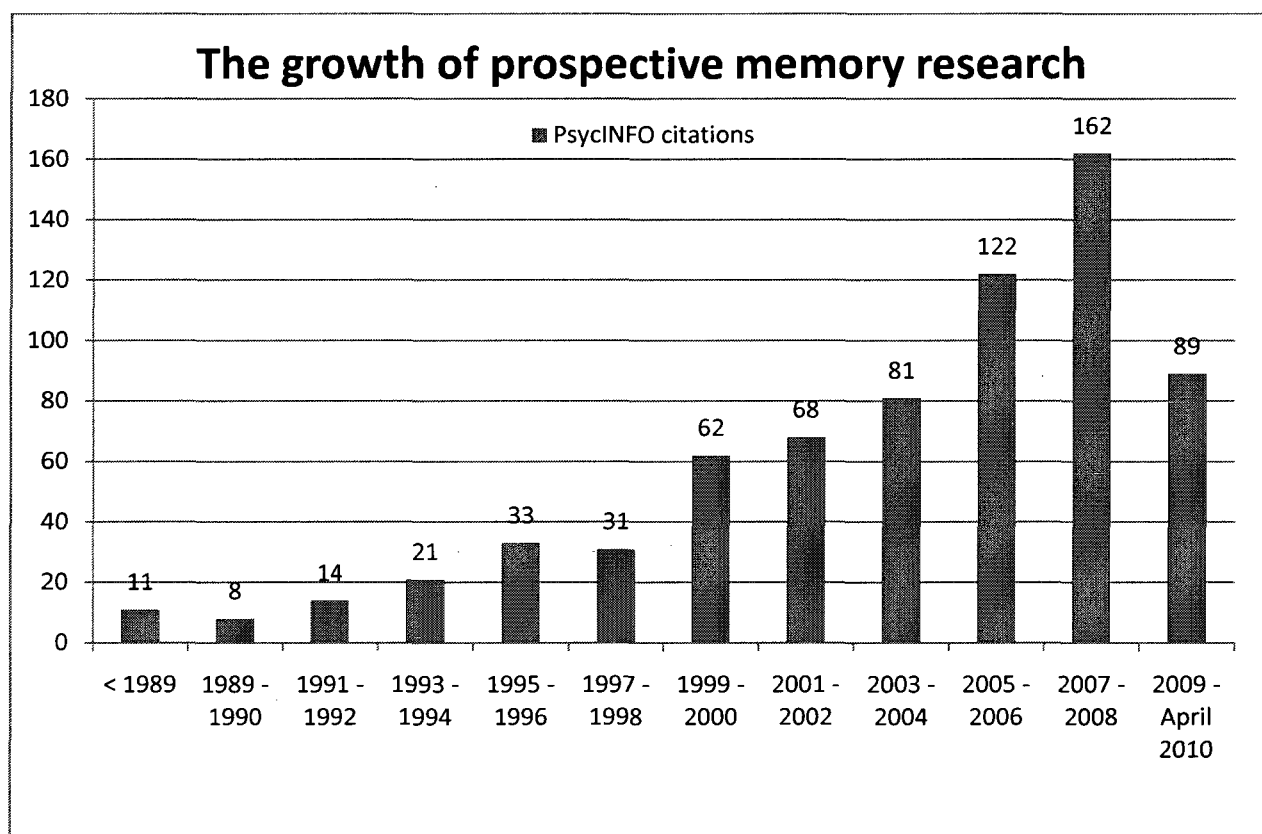


Figure 1: An extension of the Marsh et al. (2006) study depicting the growth of prospective memory research. Numbers atop the columns indicate the amount of PsycInfo citations for the given two year period. The exceptions are the first column, which is the cumulative years before 1989, and the last column, which is incomplete.

Books

Brandimonte, M., Einstein, G. O., and McDaniel, M. A. (1996). *Prospective Memory: Theory and Applications*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Glicksohn, J. and Myslobodsky M. S. (2006). *Timing the future: The case for time based prospective memory*. World Scientific Publishing Company.

McDaniel, M. A., and Einstein, G. O. (2007). *Prospective Memory: An overview and synthesis of an emerging field*. Los Angeles: Sage Publications Inc.

Kliegel, M., McDaniel, M. A., and Einstein, G. O. (2008). *Prospective Memory: Cognitive, neuroscience, developmental, and applied perspectives*. New York: Lawrence Erlbaum Associates.

Conferences

1st International Conference on Prospective Memory. Hatfield, United Kingdom. 2000.

2nd International Conference on Prospective Memory. Zurich, Switzerland. 2005.

3rd International Conference on Prospective Memory. Vancouver, Canada. 2010.

Special Journal Issues

New Perspectives in Prospective Memory. Applied Cognitive Psychology. Volume 14 Issue 7. 2001.

Prospective Memory: The delayed realization of intentions. International Journal of Psychology. Volume 38 Issue 4. August, 2003.

Table 1: Select publications in Prospective Memory

The Social Dynamics of Prospective Memory

“The best way to remember your wife’s birthday is to forget it one time” – anonymous

“The failure of memory that caused me the most pain was the time I forgot to pick up my 3 year old son and his friends after nursery school and take them to their play group.” - (Winograd, 1988)

The growth of prospective memory research in the past decade is undeniable. In the last ten years we have enhanced our understanding of how intentions are translated into action. This explosion has tapped multiple disciplines with researchers ranging from behavioral scientists to neurologists, all investigating the phenomenon under both normal and abnormal conditions in adults, children, and the elderly. What is surprising is that very little has been said about the social aspects of prospective memory. Ellis and McGann (2003) have argued that the degree to which specific cognitive skills are required for successful prospective memory depends not only on the characteristics of an intention but also the circumstances under which it should be

realized. Simply stated, by analyzing prospective memory focusing only on the tasks at hand, one neglects the contextual components of the activity. In this case the social context within which the prospective memory task takes place is neglected.

Munsat (1966) stated that there is a moral aspect that accompanies prospective memory failures: If retrospective memory fails, the person's memory is seen as unreliable, but if the prospective memory fails, the person is seen as unreliable. In this regard prospective memory failures are relevant to our social lives. A memory failure in these social contexts is embarrassing and affects the credibility that other people give us (Brandimonte and Ferrante, 2008). Meacham (1988) argued that in order to truly understand prospective memory, researchers should consider the nature of the interpersonal relationships involved. In other words, the strength of the relationship should be considered as an important factor in the completion of a prospective memory task. Private intentions can be forgotten with minimal social consequences; however, visible intentions with social ties are seen as being more stable, longer lasting, and having a causal effect on one's behavior (Meacham, 1988). Intentions can also be seen as motivational states. Thus, social factors can affect variables such as, strength of motivation, strength of a person's intention, and even quality of implementation (Brandimonte and Ferrante, 2008). The social group to which one belongs can also dictate which goals are desirable, feasible, or socially important (Atkinson, 1957; Lewin, 1951). Prospective memory appears to be sensitive to the social value of the action to be performed (Kvavilashvili, 1987; Meacham and Kushner, 1980). The social question that comes to the surface is: how does the strength of the relationship influence the completion of a prospective memory task? Is one more likely to remember a prospective memory task that involves a close friend as opposed to one that involves a stranger? Another interesting aspect of prospective memory that has not been investigated

deeply over the years is the direction of the benefit associated with the task. What affect does the strength of relationship have when the directional benefit is manipulated? The concept of directional benefit refers to whether the to-be-performed action benefits the person involved or another person.

Given the apparent importance of the social dimensions of prospective memory, there again seems to be a gap in the literature. To date there are only a handful of published articles concerned with this aspect of prospective memory. Out of the over 500 articles published on prospective memory, there have been only eleven experimental papers on the social influences. It is the goal of this dissertation to provide a link between prospective memory and its social consequences through an investigation of the effect of the relationship strength and the direction of benefits on the outcome of an assigned prospective memory task. Chapter two will discuss the framework of prospective memory and its integral components. A classification of various prospective memory tasks will be introduced as well as a clear demarcation as to what is to be considered a prospective memory task. Once the foundations of prospective memory have been discussed, the chapter will then focus on past studies of the social dynamics involved. The proposed model will focus on an area in a growing field that has yet to be addressed; the role of social interaction and social value upon an intended action. Chapter three will detail both the experiment used to analyze the effect of social strength on the completion rate of various prospective memory tasks and the effect of directional benefit on prospective memory task performance. Chapter four examines the results of the experiment and the procedures taken during the analysis. Chapter five discusses the implications and theory associated with the results. And chapter six focuses in on the limitations of the experiment, future studies, and managerial implications of the results.

CHAPTER 2: LITERATURE REVIEW

What are intentions?

Prospective memory refers to the fundamental relationship between intentions and memory. Any discussion of prospective memory must first examine this relationship and begin with definitions of the following terms; intent, intention, and delayed intentions. And more importantly, one must explain what qualifies as an intention to be included in a prospective memory study. McDaniel and Einstein (2000) pointed out that “one challenge for researchers has been to define the characteristics that distinguish prospective memory tasks from retrospective tasks” (p S127). A clear definition of what is a delayed intention would help in addressing this particular challenge.

A simple and elementary way to define intentions would be to relate back to the Latin root ‘*intendere*’ which means “to direct action.” In this case, and in line with action theory, an intention can be seen as acting with the aim of accomplishing a specific purpose. With the intention of finishing the dissertation the graduate student visited the library. In this case the reference is to a goal intention, a commitment to obtain a specific outcome (Heckhausen and Beckmann, 1990). Instead of referring to the reason for an intention, an intention can refer to an action in the future. The graduate student intends to finish the dissertation the next time they are in the library. In this example, the reference is to a behavioral intention.

Many action philosophers have attempted to define intention (see Mele, 1997, for a detailed review). Past philosophers have categorized intentions into components of desire and belief. An intention includes a motivational component. The intent to complete the dissertation implies a desire to complete the dissertation. The concept of desire is rather ambiguous when it

comes to intentions, because one could also have the intent to become a millionaire with the same underlying desire. Davis (1984) therefore makes a distinction between volitive desire and appetitive desire. Volitive desire refers to wanting and wishing while appetitive desire refers to an urging or craving or longing. These two are logically independent (Davis, 1984) since we can want to do something without having some intrinsic appeal. One example of this involves the completion of household chores (washing dishes, laundry, or vacuuming). We can view an act as appealing (thus craving it) but not want to do it, as in the case of eating unhealthy foods. Appetitive desire can and at times does generate and motivate a volitive desire; therefore, intentions can entail only a volitive desire (Davis, 1984). Volition and intentions are related, but the terms are not synonymous. Volition, can be seen as the act of exercising will or the ability to make conscious choices. In this regard volition is more closely associated with the term intent; however, the distinction is subtle. If volition is the act of choosing a course of action, then intent is the decision. Volition can be thought of as encompassing intent. The volition leads to the intent, but does not itself immediately cause the action. If intents are volitional and volition is a decision; thus, an intention is a decision about an action that consciously references a prior plan (Smith, 2008).

Intent

How do intentions differ from other forms of intent? The main distinguishing factor is the reference to the past. But before a detailed breakdown is given, one must first distinguish between two types of intents: intentional intent and nonintentional intent (Brand, 1984). Intentional intent refers to an action that is part of a plan that was formed before the action occurred, while a nonintentional intent does not involve this formation. For example, suppose while working in an office there is an unexpected knock on the door with an invitation for lunch.

At that moment your intent is to answer the knock and accept the invitation, but you did not intend to do so until the action occurred (the knock on the door and the presentation of the invitation). In contrast, suppose that you planned to go to lunch with some colleagues at noon and at the appropriate time there is a knock on your door with an invitation to lunch. This time your intent was intentional because it was planned before the action occurred (knock on the door with an invitation). It is this planned action that is of interest to prospective memory researchers, and it is what is referred to when the term intention is used. The formation of a plan of action prior to the execution of the action thereby forces all intentions to be prospective. Searle (1983) also makes this distinction but uses the terms intentions-in-action and prior intentions.

Delayed intentions

Intentional intents (intentions) can also be broken down into two types: immediate intentions and delayed intentions (Gauld and Shotter, 1977). Both types still require a prior plan of action to be formed before the action has occurred, the difference is found in the transition from plan to action. Immediate intentions transition from plan to action without the intention ever leaving the focus of attention. Under immediate intentions, one forms a plan of action and begins to fulfill the plan while it remains the focus of conscious awareness. The delayed intention is always postponed, and the intention is realized at some designated moment in the future.

In many ways, prospective memory has been used as an umbrella term, describing both a type of task and the process underlying the performance of the task (Ellis and Freeman, 2007). Researchers have used the term prospective memory to investigate either the unaided retrieval of an intended action or its progression from inception to success or recovery from failure. The unfortunate result from this is that prospective memory is assumed to imply that only memory

processes are key factors in determining the performance on the task. In reality there are many variables that influence the outcome of a prospective memory task, which includes but is not limited to, planning, attention, action control, and others (Ellis, 1996; Kliegel, Eschen and Thone-Otto, 2004; Kliegel, McDaniel and Einstein, 2000; Martin, Kliegel and McDaniel, 2003). Thus this umbrella concept can only constrain the research process and provide an incomplete term of what is meant by prospective memory.

A Brief Overview of the Phases of Prospective Memory

In developing a conceptual framework of prospective memory, Ellis (1996) adopted a broad definition that includes both the task and the processes involved. This model begins with a decision to act, the formation of the intention and concludes with the evaluation of outcomes (see Figure 2). It has been widely accepted by the majority of researchers that prospective remembering proceeds through the following phases: encoding, retention interval, retrieval, execution, and evaluation (Ellis, 1996; Einstein and McDaniel, 1996).

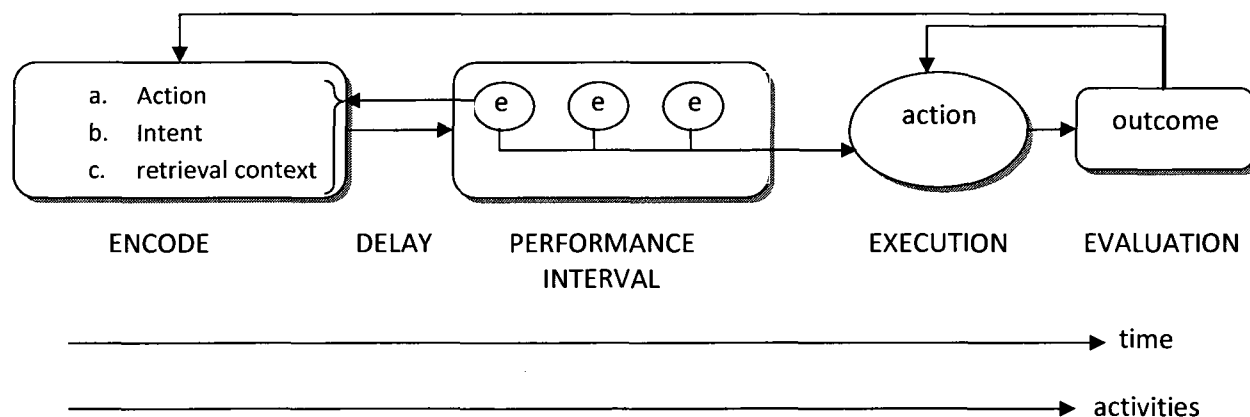


Figure 2: Schematized view of the phases involved in the realization of a delayed intention. Note: e = event, and so forth, to signal retrieval context. SOURCE: (Ellis, 1996).

The first phase of prospective memory is concerned with the content of the delayed intention, or what Einstein and McDaniel (1990) refer to as the retrospective component. Generally speaking this phase deals with three aspects: what the individual wants to do (action), the decision to do it (intent), and the determination of when they should perform the task (retrieval context). The three parts can be exhibited in the following example. The graduate student will (intent-element) return his/her library books (action-element) after lunch (retrieval context).

Failures in prospective memory occur when the intended action is not performed. But what happens when an individual forgets the content component of a prospective memory task? Is that still considered a failure? Suppose that one formed the intention to return three library books and pick up two more. If the individual only remembers to return the books and forgets to pick up the others, does that classify as a prospective memory failure? Or one may remember the action element but fail to remember the retrieval context. For example, you could remember that you must return the library books but have forgotten when. And finally, there is the case of remembering the retrieval context but forgetting the action element. On these occasions one might have a feeling that they must accomplish some task, but cannot remember what that task is. Using Einstein and McDaniel's (1990) demarcation of the retrospective and prospective components, we can begin to classify different types of prospective memory failures. Failures in the retrospective component will still be classified as failures of prospective memory for the simple fact that one cannot complete a task if one does not remember what the task is (Kvavilashvili and Ellis, 1996). This has lead researchers to argue for an integration of principles of retrospective memory with prospective memory (Marsh et al., 2006).

The second phase, delay, deals with the time period between which the intent is encoded and the opportunity to complete the intention appears. This is sometimes referred to as the retention interval (Einstein and McDaniel, 1990). In the same example dealing with the return of library books, the intent may be encoded the previous night at 9pm as one is wrapping up his/her reading. But the opportunity for actually performing the action is not until the next day after lunch (approximately 1pm). Therefore, the retention interval, or the delay period would be sixteen hours.

Phase three involves the actual performance interval or the period in which the intended action should be retrieved. Harris and Wilkins (1982) have referred to this as the window of opportunity. In relation to the previous example, the performance interval may last only thirty minutes, if that individual has a meeting scheduled for 1:30 pm. The duration of both the retention and the performance intervals may vary depending on specific circumstances tied to the intention, and the delayed intention may be realized during anyone of these two intervals. Successful retrieval depends upon an individual correctly identifying an event as the proper retrieval context and its association with the intended act. Then, once the event is correctly identified, the individual must recall the action element (what was to be performed). Building off the previous example, in order for one to successfully remember to return the library books, the individual must remember that the completion of lunch (the retrieval context) is an indicator that the intended action should be performed. Not only must they remember that an action must be completed after lunch, but they must also remember what that action is. Failure to remember what action is to be performed still classifies as a prospective memory failure.

The fourth and fifth phases deal with the execution and subsequent evaluation of the intended action. In the final phase some record must be kept noting the outcome of the intended

action, so as to avoid an unnecessary repetition of the intended action or to ensure the future success of a postponed or failed intention. If one did not remember that they had returned the library books, they might make another unnecessary trip to the library or waste time looking for books that were already returned. In the other possible outcome, if one had forgotten to return the books, this failure can function as a reminder that the next day after lunch the borrowed books must be returned.

Classification of Intentions

Kvavilashvili and Ellis (1996) proposed a classification schema based on the previous stated phases of prospective memory (see Figure 3). The schema proposed will help identify characteristics and properties of the various types of intentions. Each stage of the prospective memory process has a unique type of delayed intention.

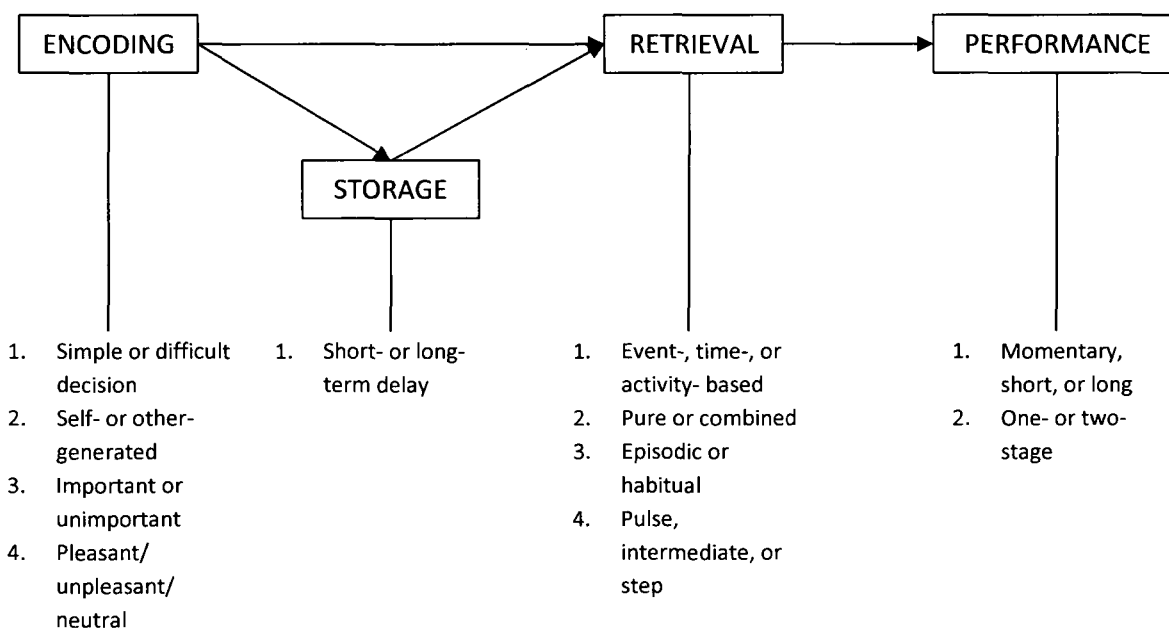


Figure 3: Illustrating possible types of delayed intentions, classified according to variations at the encoding, storage, retrieval, and performance phases of prospective memory. SOURCE: Kvavilashvili and Ellis (1996)

Encoding

Simple or difficult decisions are in reference to the complexity of the intention. The formation of an intention could be based on momentary decisions that are simple and immediately formed, or intentions can be formed on the bases of difficult time-consuming decisions. It is often hypothesized that forgetting an intention for simple decisions is higher than forgetting decisions for difficult ones. One main factor contributing to this is that simple decisions are typically less time consuming while more difficult ones require more planning. The planning component has been identified by past researchers to be an important aspect of prospective memory (Dobbs and Rule, 1987; Rabbitt, 1996; Shallice and Burgess, 1991). The degree to which planning occurs is based on the characteristic of the prospective memory task as well as individual differences. As mentioned earlier, the complexity of the task is an important characteristic (Kvavilashvili and Ellis, 1996). Complex tasks that are associated with multiple steps may require one to formulate a plan of action, while simple tasks may not. Another aspect of complexity is associated with previously scheduled plans. In this case, deciding to go to dinner with friends when you already have a busy schedule may create a difficult decision scenario. Deciding to go to dinner may require one to rearrange or reschedule previously planned activities (Marsh, Hicks, and Landau, 1998).

Intentions can be further divided into those that are self-generated, formed based on a personal need to accomplish a task, or those that are other-generated, formed as the result of a request from another individual (Cohen, 1989; Ellis and Nimmo-Smith, 1993). The main differentiating factor between the two is where the task originated. McDaniel, Waddill and Einstein (1988) suggested the influence of a generation effect. The generation effect refers to the findings that items that are generated by an individual are better remembered on explicit tests of

memory than items that are provided by a researcher (Roediger, Weldon, and Challis, 1989). A generation task induces a consistent relational or distinctive processing of the material to be remembered. A positive generation effect is observed when either or both relational or distinctive processes are used. In relation to intentions, there is another factor involved. In the case of a request from another person, there must be the presence of the extrinsic need to comply with that request. In other words, there must be a desire to complete the intention, and without this there is no relevant intention formed, even if the individual agrees to fulfill the request. For example, if one has no desire to pass a phone message on to a colleague, then there is no delayed intention formed. What this implies is that some form of personal commitment is needed to complete the intention. This would not differ from self-generated intentions, since the encoding procedure is likely to be equal for both types of intentions. Kvavilashvili and Ellis (1996) proved this in a preliminary experiment in which subjects were asked on a questionnaire to rate how frequently they forgot to pass along a message (other-generated intentions) and to tell someone something (self-generated intention). The results indicated no significant difference in the forgetting rates for these intentions, and those who performed well on the self-generated tasks tended to perform well on other-generated tasks, and vice versa.

Delayed intentions can be classified with reference to their importance. What makes one intention more important than another can be determined by comparing the consequences associated with the failure to complete the intention to the benefits associated with successful completion. Empirical evidence has shown that forgetting intentions is more likely to occur with relatively unimportant intentions as opposed to relatively important ones (Ellis, 1988a; Kvavilashvili, 1987; Meacham and Singer, 1977; Somerville, Wellman and Cultice, 1983). More recent findings have suggested that the relationship between the strength of the intention

importance and performance may occur during a retrieval phase. Kliegel, Martin, McDaniel and Einstein (2001, 2004) reported that importance improves performance when the characteristics of the intention make it more likely that retrieval will require the employment of strategic processes. Kliegel et al. (2001) found that emphasizing the importance of the prospective memory task improved prospective memory performance for a time-based task but not for an event-based task. Kliegel et al. (2004) also compared the effects of task importance directly by informing subjects that one task (either the prospective memory task or the on-going task) was more important than the other. Consistent with their hypothesis, emphasizing the prospective memory task improved prospective memory performance. Einstein, McDaniel, Thomas, Mayfield, Shank and Morrisette (2005), replicated similar results with one addition, they also examined the effects of the importance instructions on the speed of performing the on-going task. They found that compared to moderate emphasis, high emphasis on the prospective memory task significantly slowed the on-going task performance of the subjects. The slowing performance of the on-going task was an indication that the subjects had increased their monitoring for cues associated with the prospective memory task. This increased monitoring significantly improved performance on the prospective memory task.

The last type of distinction between intentions during the encoding phase relates to the emotional tone of the intention: pleasant, unpleasant, or neutral (Birenbaum, 1930). In this distinction, unpleasant intentions are more likely to be forgotten as opposed to pleasant ones (Meacham and Kushner, 1980). Unpleasant intentions are more likely to be postponed or cancelled. One reasoning behind this is that postponement or cancellation provides a resolution to a temporary conflict between a perceived need to satisfy the intention and the basic desire to avoid painful experiences (Oatley and Johnson-Laird, 1987). The majority of studies have

focused on neutral intentions. Meacham and Kushner (1980), however, conducted a study that suggests that intentions reported as remembered but not executed were described as more uncomfortable than those that were remembered and satisfied.

Of the four distinctions of intentions made during the encoding phase, only one appears reasonable for empirical investigation. This is due to the fact that other distinctions may be difficult to manipulate experimentally (Kvavilashvili and Ellis, 1996). In order to explore the theoretical implications of these distinctions, researchers may have to depend on naturalistic studies using either questionnaires or structured diaries (Andrzejewski et al., 1991; Ellis 1988a; Ellis and Nimmo-Smith, 1993).

Storage and Retention

During the storage (retention) phase, one way to differentiate intentions is based on the time period between the initial formation of the intention and the designated moment for retrieving and carrying out the intention. Baddeley and Wilkins (1984) suggest that this can be divided into short and long term intentions. Their argument for this general distinction was based on past research involving retrospective memory. Ebbinghaus (1964) observed that retrospective memory performance declines with increasing delays between the encoding and recall. This delay took a logarithmic function, initially rapidly declining with a slower decline as the delay extended to longer periods. Baddeley and Wilkins (1984) argued that this distinction may be appropriately applied to prospective memory as well. Research to date on the delay interval in prospective memory has been ambiguous. Loftus (1971) observed poor performance after a longer delay (15 questions versus 5 questions). Meacham and Leiman (1982) also observed poorer performance in longer delay periods (5-8 days versus 1-4 days) with the absence of an external cue. In contrast, Wilkins (1986) failed to observe any decline in performance across a

series of delay periods (1-36 days). No differences in performance were reported in experiments that used shorter retention intervals (15 minutes versus 30 minutes in Einstein, Holland, McDaniel and Guynn, 1992 and 4 minutes versus 20 minutes in Guynn, McDaniel and Einstein, 1998).

A possible explanation for this lies in the fact that retention intervals are usually filled with one or more activities. The characteristics of these activities may influence prospective memory performance. Sellen, Louie, Harris and Wilkins (1997); suggested that researchers might evaluate unfulfilled intentions during natural breaks in activity. Kvavilashvili (2005) provided similar observations in a comparable study and concluded that thoughts about one's intentions frequently coincided with breaks or changes in activity. In a series of empirical experiments manipulating both the number of activities (single or multiple activities) and the extent of the retention period (2.5 or 15 minutes), similar results were found (Hicks, Marsh and Russell, 2000). The finding was that, providing breaks in activity led to improved prospective memory performance, after either long or short intervals. Moreover, Hicks et al. (2000) found that longer intervals lead to higher prospective memory performance than shorter ones. This could be due to the fact that longer intervals provide more natural fluctuations in attention, thus providing the opportunity to review one's current goals.

Retrieval

During this phase an appropriate opportunity to carry out an intention occurs. It is in this phase that the intention is either recalled or forgotten. In the prospective memory literature, there is an argument as to how to distinguish between three types of intentions. Kvavilashvili (1990) describes three types of prospective remembering: event-based, time-based, and activity-based. Einstein and McDaniel (1990) only draw a distinction between event-based and time-based

intentions. Harris (1984) proposes a distinction between appointment keeping intentions (time-based) and intentions to do one thing before or after another (activity-based). The extent to which these classifications differ from one another is a function of the retrieval occasion. Event-based intentions are tasks that must be performed when a specific target event occurs in the environment (Kvavilashvili and Ellis, 1996; Einstein and McDaniel, 1990). This target event is an occurrence that is relatively independent of an individual setting the intention. For example, when you see a colleague, you pass the message along. In this case, the target event is contact with the colleague. An activity-based intention requires the identification of one's own actions rather than something that is independent of those actions (Harris, 1984; Kvavilashvili and Ellis, 1996). Activity-based intentions can be as simple as remembering to take one's medication after dinner. In this case the activity of dinner precedes the intention and must serve as a cue to perform the action. Also, a time-based intention involves tasks that are to be carried out at a certain time or after a set amount of time has passed (Kvavilashvili and Ellis, 1996, Einstein and McDaniel, 1990). For example, remembering to leave the office at 5 o'clock or taking the cookies out of the oven after 15 minutes.

Einstein and McDaniel (1990) suggest that the difference between event-based and time-based prospective memory might be in the different process requirements. In event-based intentions, the event provides an external cue for remembering. The intended action is performed when this external cue presents itself. The cue prompts the individual to remember, but in time-based intentions no such cue exists. Time-based intentions are more reliant on a self-initiated retrieval process. The individual must remember to perform the intention at a certain time or when a given period of time has elapsed. There is no obvious or specific external cue the individual could monitor and use as an indicator to perform the intention. Due to these

differences, Einstein and McDaniel (1990) suggest that time-based intentions are more difficult to retrieve relative to event-based ones. In terms of process requirements, there is no such distinction between event-based and activity-based intentions. Finishing one activity before proceeding to another could be considered an event-based task, with the preceding activity functioning as the external cue. One dimension, with which activity-based intentions may be differentiated from the group, is found in the retrieval of the delayed intention (Kvavilashvili and Ellis, 1996). In both event-based and time-based intentions, there is a need to interrupt a current task to perform a delayed one. This is not the case in activity-based intentions where there is no interruption required. The delayed intention is either done after finishing one activity or before starting another. By using the dimensions of presence/absence of an external cue along with interruption/non-interruption, Kvavilashvili and Ellis (1996) offered a series of propositions regarding the ease of retrieval of the delayed intention. First, activity-based intentions are the easiest to remember, because they do not require the interruption of an on-going activity and they benefit from the presence of an external cue (the preceding or trailing event) (Kvavilashvili and Ellis, 1996). Second, time-based intentions are the most difficult to remember because they require the individual to self-initiate the retrieval process and interrupt an on-going activity (Kvavilashvili and Ellis, 1996). Because event-based tasks share traits with both time-based (interruptions of on-going activity) and activity-based (presence of an external cue) tasks, it is theorized that the difficulty of retrieval lies at the intermediate level (see table 2 below)

	Time-Based	Event-Based	Activity-Based
Interruption of an on-going task	☆	☆	
Absence of External Cues	☆		
Probability of Remembering the task	Low \Longrightarrow Intermediate \Longrightarrow High		

Table 2:Differences between types prospective memory task

There have been two studies that have justified a portion of Kvavilashvili and Ellis (1996) theory. Sellen, Louiel, Harris and Wilkins (1997) did a direct comparison of event-based and time-based prospective memory tasks as did Einstein, McDaniel, Richardson, Guynn and Cunfer (1995). Both studies revealed that there is a distinction between time-based and event-based tasks. In the first study, Sellen et al (1997) found that the event-based task was significantly easier to carry out, as is evident in the fact that the event-based task had a higher percentage of correct hits relative to the time-based task. Also in reports from post-interviews, most subjects indicated that there was relatively less need to think about the event-based task, as opposed to the time-based task. In Einstein et al. (1995), subjects were given an on-going task of answering general knowledge questions. To implement the event-based prospective memory task, subjects were instructed to press the F8 key whenever a question with the word president appeared. To implement the time-base prospective memory task, other subjects were instructed to press the F8 key after 5-minute periods had elapsed. In the event-based condition the word president appeared six times during the course of the on-going activity. Comparably, in the time-based condition, the on-going task lasted thirty-minutes, allowing for 6 five-minute segments. The results indicated that performance in the event-based condition were significantly better than that in the time-based condition.

Are the intentions involved pure or combined? The distinction of intentions based on this dimension is relevant to the argument between prospective memory studies set in a laboratory or a naturalistic environment. Laboratory studies typically focus on pure intentions while naturally-occurring intentions are often combined intentions. Pure intentions are those that can be clearly labeled as event-, time- or activity-based, while combined intentions tend to blend multiple retrieval cues (West, 1988). For example, remembering to give a colleague a phone message is a pure event-based intention. But, remembering to give a colleague a message when they show up at 8:00 is a combination of an event-based and time-based intention. On the whole, combined intentions are easier to remember because they provide more cues for retrieval (West, 1988). Loftus (1971) examined this phenomenon. In his research, half the participants in a verbally-administered questionnaire were asked to state their place of birth at the conclusion of the questions (pure, activity-based intention). The other half of the participants were asked to state their place of birth at the conclusion of the questionnaire, and they were also informed as to what the final question would be (combined, activity-based and event-based). Those participants in the combined group were more likely to state their place of birth relative to those in the pure group.

Another way to differentiate intentions is based on the regularity of the retrieval occasion. This characteristic was first indicated by Meacham and Leiman (1975). They contend that episodic intentions are intentions that are performed infrequently or have no basis in regularity, for example, buying bread on the way home from work. Habitual intentions, on the other hand, are carried out in a regular routine, such as buying the newspaper on the way to work every morning. Meacham and Leiman (1975) suggested that habitual intentions are easier to remember relative to episodic ones, due to the fact that habitual intentions provide external cues from the

environment as well as preceding activities. Kvavilashvili (1992) further divided episodic intentions into single and repeated intentions. The difference between the two is that single intentions only have to be recalled once while repeated ones have to be recalled several times. For example, picking up a colleague on the way to work on Monday is a single intention, but picking up a colleague on the way to work every day this week is a repeated intention. Repeated intentions are considered an intermediate stage

Retrieval occasions can be classified with regard to the length of opportunity to complete the prospective memory task. Harris and Wilkins (1982) address this as the 'window of opportunity.' Some intentions have to be remembered in a narrow time interval, for example, calling a colleague at 1:00 pm. Other intentions may have a longer retrieval opportunity, such as, calling a colleague after lunch. Kvavilashvili and Ellis (1996) introduced a classification scheme to capture this. They referred to intentions with a narrow window of opportunity as pulse intentions, while, intentions with a much larger window of opportunity, were referred to as step intentions. Those that fell between those two were referred to as intermediates. For example, one may have to return a library book at 1:00pm (pulse), or after lunch (intermediate), or while on campus (step). Using the pulse-intermediate-step classification scheme, one can make a prediction as to the probability of remembering an intention. Step intentions are more likely to be recalled than either pulse or intermediate ones. This proposition was supported by Maylor (1990), who asked subjects to telephone her within a certain time interval each day (step) or at the same exact time each day (pulse). Those subjects in the pulse condition made more errors in relation to memory failures and the number of calls that were made than those in the step condition. Andrzejewski et al. (1991) suggested that step-pulse intentions may be mediated by the importance of these intentions. In a diary study, subjects reported satisfying pulses slightly

more than step intentions when they had to keep important appointments. For unimportant appointments more steps were carried out successfully when compared to pulses (Andrzejewski et al., 1991).

A Comparison of Prospective Memory and Retrospective Memory

In a direct examination of prospective and retrospective memory, Einstein and McDaniel (1990) found no obvious relationship between the two. In two sets of experiments, prospective memory performance was not found to be related to the performance on any of the retrospective memory tests used. The lack of a relationship, they went on to say, suggests that different memory processes are at work. If one were to conceptually dissect the two, the differences would probably be clear. In a prospective memory task, an individual must remember two things: (1) the action that must be performed and (2) the appropriate time to perform this action. For example, in remembering to pass a message to a colleague, one must remember the action (passing the message) and one must also remember the appropriate moment (seeing the colleague). Einstein and McDaniel (1990) proposed dividing the phases of prospective memory into two components. The former would be referred to as the retrospective memory component and the latter the prospective memory component. The retrospective memory component refers to the first phase of the framework, encoding. It is focused on the content of the delayed intention. While the prospective memory component refers to the remaining phases of the framework and is concerned with the identification and execution of the appropriate actions at the appropriate moment.

Retrospective memory is memory for past events, such as remembering words from a list or the names of old high school friends. Memory tests of the retrospective variety often center on a researcher prompting the subject to recall or recognize. In other words, the experimenter is

placing the subjects into a retrieval mode (Tulving 1983). According to past theories of recall and recognition, retrieval is activated by the explicit request to remember (Raajmakers and Shiffrin, 1980; Hintzman, 1988). The retrieval process typically does not involve a response to environmental cues, but when recall is requested, processes are “turned on” to assemble cues and retrieval structures, or when recognition is requested, matching processes are activated. Prospective memory tests, on the other hand, require the subject to recognize an event/time as the appropriate time to initiate an action. In the case of prospective memory the subject is not placed into a retrieval mode by an external agent. It is this retrieval dimension of memory that Craik (1986) uses as a distinguishing factor. A major aspect for successful prospective memory performance is the identification of the event trigger. Successful recognition of the event trigger (external cue) will lead to an increase in performance of the prospective memory task. This distinction is important because it reveals some principles of retrospective memory theory that can be applied to prospective memory (Marsh, Cook and Hicks, 2006).

Characteristics of Prospective Memory tasks

McDaniel and Einstein (2007) identified five characteristics of a prospective memory task. First, execution of the intended action is not immediate. Actions that individuals begin to carry out immediately after the intention has been formed are trivial in terms of prospective remembering (Harris, 1984; Kvavilashvili and Ellis, 1996).

Second, the prospective memory task must be embedded in an ongoing activity. Tasks that have a delayed intention component are not sufficient to be classified as a prospective memory task. The key factor is that the delayed task must not be implicit. In other words, stimuli supporting the intention should not be unambiguous signals (Einstein, Smith, McDaniel and Shaw, 1997; Harris 1984). The presentation of such stimuli would essentially serve as a proxy

for the instructions. In typical prospective memory tasks, the stimulus does not directly or unambiguously demand performance of the previously intended action. The prospective memory stimuli appear to be a natural part of another task or situation (Graf and Uttl, 2001). Typical experiments have the prospective memory task embedded in an ongoing activity. Therefore, performance of the ongoing task must be interrupted or suspended to allow for the execution of the prospective memory task. Some theorists consider this characteristic of prospective memory to be the most essential (Morris, 1992; Shallice and Burgess, 1991). Other theorists use this characteristic to distinguish between different types of prospective memory tasks. Kvavilashvili and Ellis (1996) differentiate between time-, event-, and activity- based prospective memory. Both time- and event-based prospective memory require one to interrupt ongoing tasks while activity-based does not. For example, remembering to buy milk on the way home from work requires one to interrupt the drive home when coming across a supermarket. When remembering to call a friend or colleague at 11:00am, one must interrupt the ongoing work activity at hand. For activity-based, because the tasks are signaled upon completion of an activity, they do not require a direct interruption. For example, remembering to take medication after breakfast, one can argue, does not require the interruption of an ongoing activity. It simply requires one to complete a prospective memory task during the gap between the completed ongoing activity and the next activity in the routine. Einstein and McDaniel (2007) argue that this assertion may depend on the interconnectivity of the activities involved in the routine.

Third, the window for response initiation is constrained. There must be a “window of opportunity” in which the intended action can be appropriately performed. For example, my intention to read a book is appropriately fulfilled if I complete that task today, tomorrow, next week or next year. Such intentions do not qualify as prospective memory tasks. Typically,

prospective memory tasks require a constraint window and an opportunity to remember or forget the task. The length of this constraint window may vary from seconds to several days (Ellis, 1988a; Ellis 1988b). For example, the window for remembering to pass a phone message to a colleague may involve a few seconds or minutes, while remembering to buy plane tickets may be framed in several days. Not remembering the task within the constraint window reflects a failure of prospective memory.

Fourth, the time frame for response execution is limited. The fourth characteristic involves the timeframe needed to execute the intended activity. It is trivial to include completing a book as successfully completing a prospective memory task or the failure to read the book as a prospective memory failure (Roediger, 1996; Winograd, 1988). The same goes for writing a book, taking a trip, or getting a job. All these behaviors give rise to intentions that cannot be realized immediately and are not signaled by explicit requests to remember. The difference between these tasks and prospective memory tasks is their time frame for execution. Prospective memory tasks do not require the extended time frame as the previously stated examples. As Winograd (1988) put it, “they cast a long shadow forward in time,” (p. 352). All of the stated activities require significant and concrete alterations in day-to-day activities, thus creating an increase in the time needed to execute the intended action itself. Kvavilashvili and Ellis (1996) define prospective memory tasks as those that can be accomplished in no more than several hours. Even given this time constraint, tasks associated with a couple of hours for completion are likely to be different from those tasks that require seconds or minutes (Kvavilashvili and Ellis, 1996).

And fifth, there must be an intention. It is useful to constrict the definition of prospective memory to instances that include consciously formed intentions or plans (Morris, 1992; Graf and

Uttl, 2001). This helps in eliminating other behaviors that would otherwise fall under the umbrella of prospective memory. Kvavilashvili and Ellis (1996) classified an intention as a readiness to act in a certain way in the future. If this is the case, then other behaviors with future orientations can be grouped under the topic heading of prospective memory. For example, classical conditioning has the pairing of an unconditioned stimulus with a neutral stimulus. The individual in such a case has the readiness to act in a certain way in the future when the condition stimulus appears. This would not be considered a prospective memory task because the actions performed by the individual are not related to a consciously formed intention.

Implementation Intention and Prospective Memory

Gollwitzer (1993, 1996, 1999) proposed that goal achievement is improved by the creation of an if-then statement that specifies when, where and how the person will instigate responses that promote goal realization. These if-then plans were referred to as implementation intentions and take the form of, “when situation X arises, I will perform response Y” (Gollwitzer, 1999 p. 494). The objective of implementation intentions is to connect good opportunities to act with cognitive or behavioral responses that are effective in accomplishing one’s goal. According to Gollwitzer’s implementation intention, the statement, “I intend to return my library books” would be classified as a goal intention. And the statement, “when I get to campus I intend to head to the library to return my library books” would be classified as an implementation intention. The difference between a goal intention and an implementation intention is based on their content and structure. Goal intentions refer to what one intends to do, while implementation intentions point out the when, where, and how one intends to achieve it. The two key components of an implementation intention are: (1) the person must identify a response that will

promote goal attainment and (2) the person must anticipate a suitable occasion to initiate that response (Gollwitzer and Sheeran, 2006).

Two main studies investigated the effectiveness of implementation intentions. Sheeran and Orbell (1999) examined the use of implementation intentions to help individuals remember to take a vitamin C pill. Subjects were instructed to take a vitamin C pill each day for the next three weeks. Some subjects were encouraged to form general intentions about taking the pills, while others were instructed to form an implementation intention. The subjects in the implementation intention condition had to plan when and where they would take the pill each day. During the last eleven days of the testing cycle, individuals who formed implementation intentions performed significantly better with regards to remembering to take the daily pill. In their second experiment, Sheeran and Orbell (1999) sought to measure the advantage of forming implementation intentions. They found that over a 3-week period 61% of the control subjects forgot to take at least one pill while only 26% of the implementation intention subjects forgot to take one pill.

Milne, Orbell and Sheeran (2002) examined implementation intentions with regard to college students and exercise. Students were split into one of three conditions. The first group was asked to form an intention to exercise. The second group was instructed to form an intention to exercise and was given motivational material for the exercise intention. The motivational packet included information related to the severity of coronary heart disease and the association of exercise with reducing heart disease. The third group was given the motivational material and instructed to form an implementation intention in relation to exercising. Only 29% of the students in the control condition exercised the following week. Of the students given the

motivational material, only 39% remember to exercise the following week. And those students who were asked to form an implementation intention, 91% remembered to exercise.

Gollwitzer (1999) proposed that the reason why implementation intentions are effective is that encoding an intended action has several cognitive consequences. First, the implementation intention produces an encoding with heightened accessibility. Second, linking the intended action to specific situational cues allows automatic triggering of the intention when the cues are encountered. And third, initiation of an intended action that is encoded as an implementation intention requires fewer cognitive resources, and may even be executed with little or no conscious intent. Theoretically these strong assumptions have been able to explain the effectiveness of an implementation intention but there is little research that examines them in detail.

Due to recent debates, there is an increased interest in the comparison of implementation intention to prospective memory. This comparison stems from how prospective memory tasks are retrieved from memory. Are prospective memory tasks retrieved spontaneously or do they require one to strategically monitor the environment for cues? McDaniel and Einstein (2000) proposed the multi-process theory. There are three main assumptions to the multi-process theory. First, there are several different kinds of processes one can use to support prospective memory. These processes range from strategic monitoring to spontaneous retrieval. Second, the particular process that an individual may rely on and the effectiveness of the process depend on such factors as: (1) characteristics of the prospective memory task, (2) the nature and demand of the ongoing task and (3) the characteristics of the individual. For a brief outline of the effects of these factors see table 3 below. And third, individuals have a bias against regularly monitoring the environment and would prefer to rely on the spontaneous retrieval process.

Conditions Favoring a Spontaneous Retrieval Approach to Prospective Memory Tasks	Conditions Favoring a Monitoring Approach to Prospective Memory Tasks
Focal cues Demanding or absorbing tasks Low importance of the prospective memory task Long retention intervals Strong cue-target associations Distinctive cues Cognitive abilities (i.e. low working memory resources) Personality (i.e. low compulsiveness) Extensive Planning	Nonfocal cues Nondemanding and nonabsorbing tasks High importance of the prospective memory task Very short retention intervals Weak cue-target associations Nondistinctive cues Cognitive abilities (i.e. high working memory resources) Personality (i.e. compulsiveness) Anticipation of absence of a good cue

Table 3: Summary of factors effecting retrieval process SOURCE: McDaniel and Einstein (2007)

Using the multi-process theory (McDaniel and Einstein, 2000), successful prospective remembering can be mediated by a spontaneous retrieval. In order for this to occur, the cue must automatically interact with a memory trace for a prospective memory intention to be retrieved. When there is sufficient interaction, the result is the memory trace for an intended action is automatically brought to consciousness. Therefore, successful prospective remembering is determined by the strength of association between the cue and the memory trace. These aspects of spontaneous retrieval have implications for theory building in implementation intention. Gollwitzer's model builds off of this and suggests that an intended action can be made automatic if the implementation intention is well formed. In other words, by using an implementation intention, an individual transfers from a strategic monitoring type of retrieval to one that is centered on the detection of situational cues.

Ellis and Freeman (2008) compare and contrast prospective memory and implementation intention. The main concern was the lack of a clear delineation of the two concepts. Cohen and Gollwitzer (2008) suggest that implementation intentions are a special case of prospective memory. In prospective memory, tasks are sometimes referred to as cue-specific or cue-

unspecific. For example, a cues-specific task would be, “I intend to stop by the supermarket to pick-up milk.” In this example the supermarket serves as the cue for the prospective memory task. In contrast, a prospective memory task that is cue-unspecific may be, “I intend to pick up milk today.” There are structural similarities between goal intentions and cue-nonspecific tasks while implementation intentions and cue-specific tasks share structural similarities. Cohen and Gollwitzer (2008) go on to propose that implementation intentions can be considered a subpart of prospective memory in the sense that it is a strategy that helps translate ill-defined intentions into more clearly specified intentions.

Social Aspect of Prospective Memory

As Ellis and McGann (2003) determined, the specific cognitive skills required for successful prospective memory depends not only on the characteristics of the intention but also the circumstances under which it should be realized. Prospective memory is an integral part of our everyday lives and has social elements. An intended action can be done in the interest of maintaining or fostering social relationships or the intended action may have been requested by another. Remembering a spouse’s birthday would be an example of the former, while being asked to bring home milk after work would be an example of the latter. There is a moral aspect that accompanies prospective memory failures: If retrospective memory fails, the person’s memory is seen as unreliable, but if the prospective memory fails, the person is seen as unreliable (Munsat, 1966). In past research, prospective memory tasks have been found to vary as a function of the social context of the to-be-performed task (Meacham and Kushner, 1980). Tasks with a more social nature (i.e. picking up children) are more likely to be remembered than those with an object oriented task (i.e. picking up dry cleaning).

The Presence of Others

A straightforward form of social interaction is the simple presence of another individual. Ever since the works of Triplett (1898) and Allport (1924) the relationship between the simple presences of another individual and individual performance on a task has been of particular interest to social psychologist. Bond and Titus (1983) conducted a meta-analytic review of past findings that showed that the presence of others has either a social facilitation effect or a social inhibition effect. In terms of social facilitation, the presence of another individual can increase the speed of performance and accuracy of well-learned simple tasks. Social inhibition refers to a decrease in performance and accuracy in poorly-learned complex tasks. Zajonc's (1965) explanation for this phenomenon is that the presence of others increases what he referred to as the dominant response. The dominant response is defined as the response that first appears in a person's repertoire of responses to a specific stimulus in the environment. The dominant response is typically correct for simple tasks and often wrong for complex tasks.

An individual's memory is affected by social interactions. Being a forgetful person may cause others to lose confidence in a friendship. Given the functional and social importance of prospective memory in everyday lives, it is not surprising that individuals have employed a multitude of strategies to serve as a reminder for the to-be-performed tasks (Harris, 1984). In relation to prospective memory, one such strategy with a social component is the reliance on another individual to help in remembering (Intons-Peterson and Newsom, 1992). This external memory aid ranks above average among rated memory strategies (Harris, 1980; Soler and Ruiz, 1996). Intons-Peterson and Fournier (1986) found that the reliance on others has the broadest applicability among 19 memory aids, with college students reporting it as the most often used across a variety of specific memory situations. The frequency of using others as a memory aid

has been found to vary based on gender (Soler and Ruiz, 1996), age (Cavanaugh et al., 1983; Harris, 1980) and expertise in the field (Park et al., 1990).

The reliance on others in remembering can be deconstructed based on Einstein and McDaniel's (1990) prospective/retrospective component classification mentioned earlier. The assistance of others can be used in remembering either the prospective component of the intention, remembering that there is something to do, or it can be used in the retrospective component, remembering what to do. In terms of the prospective component we may ask for aid in triggering the future performance of an intention. For example, 'remind me to stop at the supermarket'. Or we may ask for assistance in remembering the retrospective component of intention, for example, 'remind me to buy milk and bread when we stop at the supermarket.' Findings on the relationship between the two components have been mixed. Kvavilashvili (1987) found the two components to be independent of one another. One can remember one and forget the other. It is interesting to note, however, that Shapiro and Krishnan (1999) did not find this independence to exist among the two components.

Reliance on others as a prospective memory tool is a convenient strategy but it might not be optimal for two reasons. One, the burden of remembering is placed on individuals that might not be available when the task must be performed. And second, the performer of the intentions is assuming that the person aiding in the remembering is a more proficient rememberer. The second reason has been examined in a series of studies which began with Kobayashi and Maruno (1992), who found in post-experimental reports that performance success on a prospective memory tasks was positively correlated with subjects having had conversations with others about the task. The post-experimental findings led to another study in which Kobayashi and Maruno (1994) asked subjects to mail in a questionnaire on a specified date. Participants in one group had the same

mail-in date while the mail-in date for the other group varied. The researchers believed that the shared mailing date would promote more discussion and reminder of the task among participants thus increasing the probability that an individual would successfully complete the task. Their results showed that participants with similar mailing dates performed significantly worse on the prospective memory task and were less likely to remember to return the questionnaire relative to those individuals with varied dates. In a post-experimental questionnaire, those with similar mailing dates stated that they expected a reminder from others about the intended task, suggesting reliance upon others to help with the intention. Also in the post-experimental questionnaire, participants reported frequent conversations related to the prospective memory task, but surprisingly this factor was unrelated to task performance. Kobayashi and Maruno (1994) suggested that there could be an implicit expectation of a reminder from others rather than a direct request for a reminder.

Schaefer and Laing (2000) also examined the role of others in prospective memory. In this study they focused on both relying on others to serve as a reminder and reminding others of an intended task. The subjects were broken into three groups: (1) participants who would receive a reminder of a task from someone else, (2) participants who were required to remind someone of a task, and (3) participants who were serving as both a reminder and receiver. The assumption being made was that those individuals depending on others to serve as a reminder would be less likely to complete an intended action when compared to those of the other two groups. The findings supported the predictions with participants in the receive-only condition performing the fewest tasks, and their performance was significantly lower than that of the other two conditions. In a post-experimental questionnaire no individuals completely forgot the intentions to be performed and all participants remembered at least one task.

Schaefer and Laing's (2000) findings may be interpreted in terms of the regulation of self-reminding activities. Participants, as a result of the reminding expectations, either increase or decrease their self-reminding operations. An increase is likely when an individual is asked to serve as a reminder while a decrease is likely when one is told that a reminder will be provided. The explanations to this phenomenon have taken the route of cognitive processing. One reduces the amount of self-reminder episodes because they expect to receive a reminder. An alternative explanation is that social consequences have either been reduced or eliminated so that the cost of forgetting is minimized. As stated earlier, when a past event is forgotten, the individual is seen as having unreliable memory, but when an individual forgets a promise to fulfill an obligation, he/she is seen as being an unreliable person (Munsat, 1966). When a person relies on another individual to serve as a reminder, then the other individual can be blamed if the person forgets an intention. For example, if one asks their spouse to remind them to buy a birthday gift for a neighbor and they forget to buy a gift, then the spouse becomes the scapegoat. The ability to shift the consequences of forgetting onto another individual may be the cause of the increase/decrease in self-reminding activities. Conversely, by serving as a reminding agent, the consequences of forgetting are increased. As a result, the following hypotheses are offered:

***H1a:** Subjects that have another individual present during the experiment will complete a greater percentage of prospective memory tasks when compared to subjects that complete the experiment alone.*

***H1b:** Subjects that have a friend present during the experiment will complete a greater percentage of prospective memory tasks when compared to subjects that have a stranger present during the experiment.*

The Direction of Benefit

Prosocial behavior constitutes a voluntary behavior that is carried out to benefit another person without anticipation of external rewards (Bar-Tal, 1976). Two reasons for the existence of prosocial behavior are altruism and reciprocity (Bar-Tal, 1976). In terms of altruistic prosocial behavior, the act is done out of the goodness of one's heart and the benefit is directed toward another person rather than one's self (Waltser and Piliavin, 1972). The ultimate goal in this case is for the individual to improve the welfare of others. While reciprocal prosocial behavior occurs when a person who has received help reciprocates by helping the original donor, the action is done voluntarily for the sake of restitution (Bar-Tal, 1976). In the past, prosocial behavior has always focused on the intrinsic value of committing an act. More recently, researchers have begun to focus on the social effects of committing a prosocial act. There has been considerable debate as to whether prosocial behavior is motivated by self-less motives or by egoistic motives (Batson, 1998). Carlo and Randall (2001) have argued that some types of prosocial behaviors may be egoistically-motivated while others may be selflessly motivated. There is considerable evidence for the existence of both selflessly-motivated prosocial behavior (Batson et al, 2002; Eisenberg, 2003) and egoistically-motivated prosocial behavior (Ciadini et al, 1987).

Prospective memory performances are particularly relevant in an individual's social life and are sensitive to social values (Cicogna and Nigro, 1998; Kvavilashvili, 1987; and Meacham and Kushner, 1980). The argument has been made that in order to understand prospective memory better, researchers should take into account the quality of interpersonal relationships (Meacham, 1988). Variables such as strength of motivation, strength of a person's intention or goal, and the quality of implementation have been found to be moderated by social factors (Gollwitzer, Bayer, and Bargh, 2005). These findings hold in line with classical motivation

theories that state that individuals are more prone to commit to goals where the attainment of the goals is perceived as highly desirable and feasible. One's social group typically establishes which goals are desirable, feasible, or socially important (Atkinson, 1957; Lewin, 1951).

Task importance has also been determined to have some beneficial effects on prospective memory performance. Meacham and Singer (1977) were the first to show that high incentive conditions promoted better prospective memory. Using a \$5 incentive they showed that subjects performed significantly better with incentives than those given no incentive to perform the task. Subsequently, others have shown the beneficial effects of perceived task importance (Brandimonte et al, 2007; Cicogna and Nigro, 1998; Einstein et al 2005; Kvavilashvili, 1987). Kliegel et al. (2001) suggested that task importance has a moderating effect on prospective memory performance. Namely, that task importance improves prospective memory performance in situations where strategic allocation of attentional monitoring resources are required but not in tasks that rely on automatic retrieval processes. Kliegel et al.'s (2004) study found that varying task importance improves performance on event-based prospective memory tasks that required monitoring but not for event-based prospective memory tasks that did not. The one downside of the Kliegel et al. (2004) study is that their study told the participants which task was relatively more important, the on-going task or the prospective memory task. This narrow examination of the importance-unimportance dichotomy is common among most prospective memory studies. Meacham and Kushner (1980) were the first to examine the social dimensions of task importance. Their findings showed that social tasks were more likely to be remembered and performed than tasks that were object oriented. Cicogna and Nigro (1998) referred specifically to the social importance of a prospective memory task. Subjects in this experiment were asked to complete a questionnaire in 15 minutes during which time the researcher gave the subjects a

specific task to perform while he/she left the room. The task varied in importance with the researcher saying either that:the phone will ring in 5 minutes and he/she is expecting an important call and that the subject should answer the phone (high importance conditions) or that they are expecting a call from a colleague (low importance condition). The results indicated that a significantly greater number of subjects performed the prospective memory task when it was seen as socially important. The limitation of this experiment was that the focus was on a time-based prospective memory task, which makes it difficult to determine whether the influence was motivational or attention-based.

The previously stated studies have attempted to isolate the conditions of task importance within a socially relevant environment. The manipulation of task importance, however, was did not consider the motivational effects of goal value. One way to investigate the role of motivation in the activation of intentions is to manipulate the direction of benefit of the prospective memory task. The main hypothesis offered is that manipulating the value of the goals should influence the strength of the motivation, and as a consequence the activation of the intention. As a result the following hypotheses are posited:

***H2a:** Subjects in the social and personal importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the social importance condition*

***H2b:**Subjects in the social importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the personal importance condition*

***H2c:**Subjects in the personal importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the no importance condition*



Figure 4: Proposed Model

The proposed model above (Figure 4) depicts the relationship of the two factors on prospective memory performance. The direction of benefit variable identifies who is the recipient of benefits associated with the successful completion of the prospective memory task. In the social condition, the beneficiary is another individual (either a friend or family member), whereas in the personal condition the subject is rewarded for successful completion. In the condition that has social and personal benefits both the subject and another individual (either a friend or family member) are rewarded. Examining this dimension with respect to prosocial behavior, one can assume that because of the social aspects of prospective memory discussed earlier, the direction of benefit is expected to significantly influence the subjects' performance on the prospective memory task.

The second factor addressed in the model relates to the presence of another individual in the experimental environment. As stated before, the simplest social interaction is the presence of another individual. Schaefer and Laing (2000) have examined the effects of the presence of another individual as a reminding agent. Their results indicated that another individual present during the experiment helped ensure that the subject would complete the prospective memory task. The proposed model examines the effect of presence with respect to the direction of benefit.

CHAPTER 3

METHODOLOGY

The ongoing task selected for this research is the calculation of a discount percentage. The prospective memory task selected is the ability to remember to check the purchase box when the discount is larger than 17%. In this research the ongoing task is purposely selected to be very demanding when compared to the prospective memory task. The type of prospective memory task selected falls into the category of activity-based. As stated earlier, activity-based prospective memory tasks are a specific form of an event-based prospective memory task and are assumed to be the simplest situation among prospective memory tasks (Kvavilashvili and Ellis, 1996). This is due to the fact that an activity-based prospective memory task does not require the interruption of an ongoing activity or monitoring for a target event; hence, retrieval in an activity-based prospective memory task relies very similarly to an if-then plan (Brandimonte and Ferrante, 2007). A strong mental link is created between the ongoing task as well as the prospective memory task. This link will allow for the investigation of motivation-based importance, because the prospective memory task will not depend on strategic monitoring of the environment. The subjects in this case will not need to monitor the environment to detect the end of the task. Previous research has shown that if goals, desires, and “if-then” plans are sources of activation capable of sustaining activation without monitoring, then any effects of importance under activity-based prospective memory conditions should also reflect precognitive, motivation-based mechanisms rather than attention-based mechanisms (Anderson, 1983; Gollwitzer, 1999). Manipulating goal value should affect the strength of motivation and as a consequence the activation of the intention.

Methodological Issues

Recently, prospective memory researchers have realized the effects of instructional emphasis and its influence on prospective memory performance. Mentioned earlier, research by Kliegel et al. (2001, 2004) and Einstein et al. (2005) found that emphasizing the importance of the prospective memory task in a laboratory setting will increase monitoring of prospective memory tasks and thus will lead to improved prospective memory performance. Because of this, at the 2005 International Conference on Prospective Memory, researchers were in agreement that studies should take great care in determining the instructional emphasis on the prospective memory task relative to the ongoing task. It was also decided that prospective memory studies should present these instructions verbatim in their published papers.

Experimental Design

The experimental design selected for this study is a 3x2x2 between-subjects design. The first independent variable is the presences of others in the experiment. This variable has one of three options: (1) there are no other persons present with the subject during the experiment, (2) the subject completes the experiment with a friend present, and (3) the subject completes the experiment with a stranger present. The second variable examines whether or not a social value is attached to the prospective memory task. Finally the third variable examines the presence of a personal value attached to the prospective memory task. Thirty participants will be assigned to each of the twelve groups being examined (see Table 4), making the overall sample size for this experiment 360 subjects.

Dependent Variable

The dependent variable was measured as the percentage of successfully completed prospective memory tasks (Einstein and McDaniel, 1990). A prospective memory response was

scored as successful if the participant checked the purchase box went the prospective memory target appeared. Within the experiment there were five opportunities to complete the prospective memory task that were randomly distributed among the forty on-going tasks. The potential values for the dependent variable are: 1.0, 0.8, 0.6, 0.4, 0.2, or 0.

Subject Constraints

The subjects were selected at random from a pool of participants. The only limitation placed on the subject pool is that they must be between the ages of 18 and 25 with no history of mental illness or brain trauma. This constraint is placed due the effects of aging and brain damage on prospective memory performance (see Uttl 2008 for a meta-analytic review). Initial screening of the subjects filtered out any subjects not meeting the minimum constraints.

	Alone		Stranger		Friend	
	Social Importance	No Social Importance	Social Importance	No Social Importance	Social Importance	No Social Importance
Personal Importance	Group 1	Group 2	Group 5	Group 6	Group 9	Group 10
No Personal Importance	Group 3	Group 4	Group 7	Group 8	Group 11	Group 12

Table 4: Diagram of Experimental groups

Data Collection Method:

The primary data collection for the experiment was done via a computer interface. Subjects were instructed to schedule appointments at a computer lab in order to participate in the study. The use of a computer-based data collection method provided a series of advantages. First, the computer-based experiment allowed for the control of miscalculation errors. The subject was instructed to input the results of his/her calculation into a blank input box on the computer screen. If the value entered is incorrect then the subject was instructed to try again. The subject was not allowed to proceed until discount percentage is correctly calculated (see Figure 5 below,

Experimental Flow Chart). This was one safe-guard to help ensure that not clicking the purchase button was a result of a prospective memory failure and not a miscalculation of the percent discount. If the subject correctly calculated the discount percentage and still checks the purchase box when it is not appropriate, discount is not greater than 17%, that subject was eliminated from the experiment.

The second advantage to using a computer-based experiment is that it allowed for additional testing of task difficulty and its potential effects on prospective memory performance as a covariate. The computer-based experiment allowed for the measure of the amount of time a subject spent on each calculation (the response time). Using response time as a proxy for task difficulty, the computer-based experiment allowed for a comparison of subjects based on their response times (Hicks, Marsh, and Russell, 2000; Smith, 2003; Marsh, Cook, and Hicks, 2005). This comparison will allowed for the testing of task difficulty on prospective memory performance. Task difficulty was also assessed by analyzing the amount of incorrect input calculations. Each occurrence of an incorrect input was recorded and stored. This count allowed for a comparison of prospective memory performance among those subjects that few calculation errors versus those that have a relatively large amount of calculation errors.

And the third advantage to using a computer-based experiment is that it allowed for a complete randomization of the prospective memory task. The computer program was set to randomly display a prospective memory task within the ongoing task, therefore removing any research bias as to when the prospective memory task will appear. Given these three advantages, the experiment was conducted in localized computer labs with the researchers present at all times.

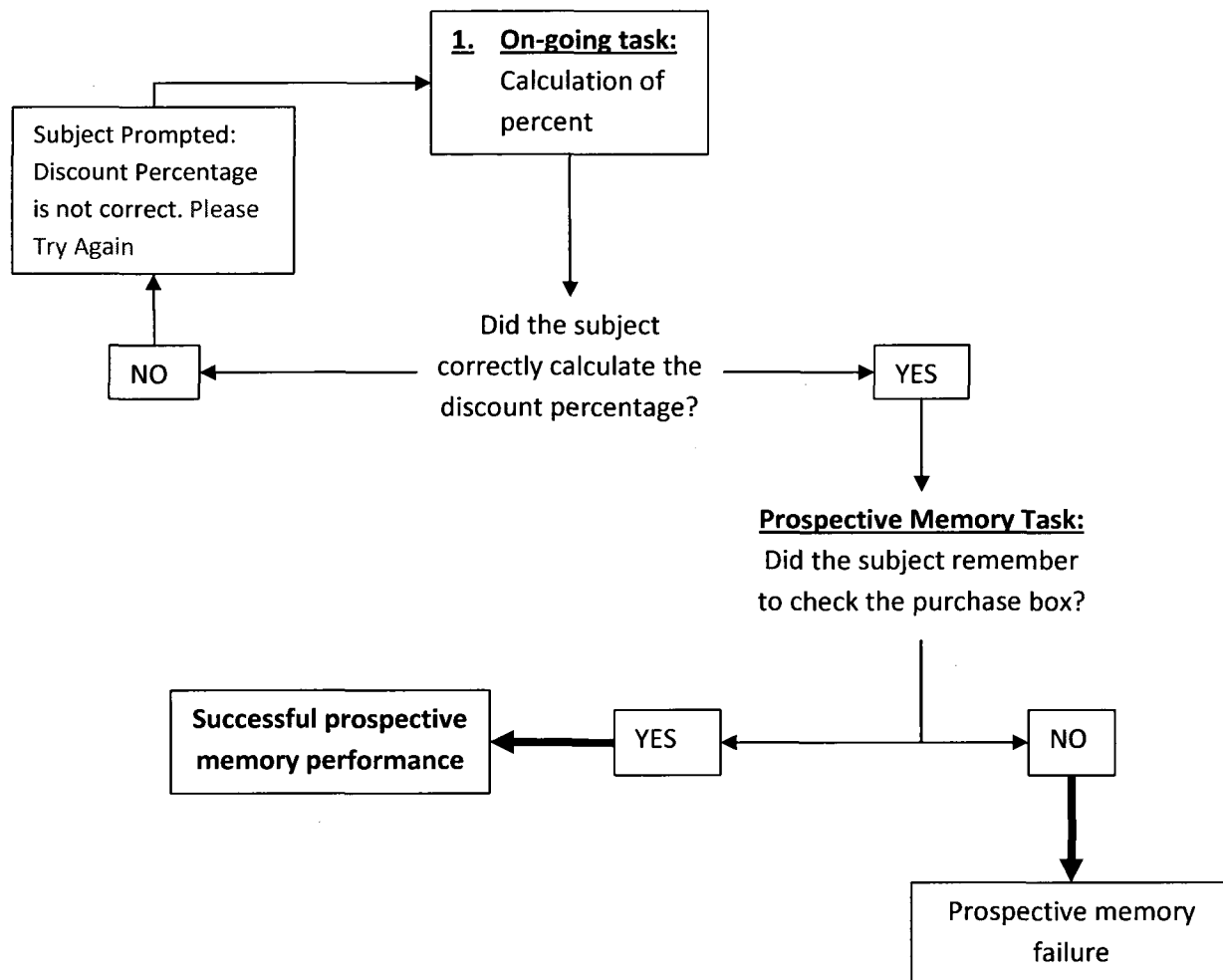


Figure 5: Flow chart for computer-based experiment

Procedure

This set of procedures was adapted following the results of a pretest. The procedure, results, and conclusion of the pretest can be found in the appendix. Individuals were sent invitations via e-mail to schedule appointment times. Those individuals selected for the “friend” condition were asked to invite a friend to come along and participate in the research study. Those individuals in the “stranger” condition were informed that another individual will be in the testing center with them. See the appendix for each of the specific e-mail invitations.

In the “alone” condition, the subject were informed that he/she will have to perform a shopping task(identifying the presence of a 17% discount). When a 17% discount is present, then the subject was instructed to check the purchase box. The subject was presented with 40 shopping tasks and only five of the listed products will have a discount greater than 17%. The importance of the to-be performed task was manipulated by attaching to the action a different value in terms of benefits that will be produced. The subject in the “alone” condition received one of three instructions: (a) if you remember to check the purchase box when it is discounted greater than 17%, you will receive an additional 10% off (personal importance); (b) if you remember to check the purchase box when it is discounted at greater than 17%, you will be able to give an additional 10% discount to a friend or family member (social importance); (c) if you remember to check the purchase box when it is discounted at greater than 17%, you will receive an additional 10% discount as well as give a friend or family member a 10% discount (personal and social importance). For the control condition (neither social nor personal importance was manipulated), the subject was not given any additional instructions in relation to the benefits associated with their actions. Upon receiving the instructions to their respective conditions, the subjects were required to practice three example computations. The goal was familiarize the

subject with both the experimental procedures as well as the calculation of a 17% discount. One of the three practice tasks contained a discount of greater than 17% so that the subject can recognize the proper procedure. Before the actual experiment took place each subjects was asked when they are required to check the purchase box to ensure that he/she understood the instructions.

For the conditions involving the presence of another person, the procedure involved testing couples of participants. In the “friend” condition, the subject was asked to invite a trusted friend to come with them to the experiment. While in the “stranger” condition, the participant was assigned a random individual to accompany them during the experiment. On arrival, the two individuals were designated as either a participant or a confederate. Both the participant and the confederate were informed that they will both have to perform the shopping task stated earlier. For each incident when the discount is greater than 17%, the participant was required to check the purchase box and to remind the confederate of the prospective memory task. Each time the confederate is given a discount of greater than 17% they were instructed to buy the product without reminding the participant. The participant and confederate were then placed in separate adjacent cubicles and therefore did not have visual contact with each other. In order to manipulate the importance of the to-be performed task, the direction of the benefit were changed. As in the “alone” condition, the subject received one of three instructions: (a) if you remember to check the purchase box when it is discounted greater than 17%, you will receive an additional 10% off (personal importance); (b) if you remember to check the purchase box when it is discounted at greater than 17%, you will be able to give an additional 10% discount to a friend or family member (social importance); (c) if you remember to check the purchase box when it is discounted at greater than 17%, you will receive an additional 10% discount as well as give a

friend or family member a 10% discount (personal and social importance). For the control condition (neither social nor personal importance is manipulated), the subject was not given any additional instructions in relation to the benefits associated with their actions. Upon receiving the instructions to their respective conditions, the subjects were required to practice three example computations. Before the actual experiment takes place each subject was asked when they are required to check the purchase box to ensure that he/she understands the instructions.

Post-Test Measures

At the completion of the experiment the subjects were asked a series of wrap-up questions. Due to the nature of the on-going and prospective memory task, one must carefully measure the value consciousness of the respondents. The rationale is that consumers that are more prone to be influenced by discounted prices might score higher on the prospective memory task (identification of a 17% discount). The value consciousness scale was used in the post-test wrap-up to measure the affinity a respondent has for paying lower prices. This is a seven-item scale introduced by Netemeyer and Burton (1990) and will help to determine whether value consciousness may have contributed to an increase in prospective memory performance.

A self-reporting scale was used to determine whether the difficulty of the calculation task, the effort put forth by the subjects, or the clarity of the instructions played a role in the prospective memory failures. Difficulty of the ongoing task was assessed three ways. First, each participant was asked to evaluate on a 7-point Likert scale how difficult was the discount calculation task. Second, the average time each participant spent on the percent discount calculation. And third, the number of incorrect inputs each participant had in the percent calculation. Both the mean response time of the ongoing task and the accuracy of completing the ongoing task has been used in previous studies to proxy task difficulty (Hicks, Marsh, and

Russell, 2000; Smith, 2003; Marsh, Cook, and Hicks, 2005). The effort put forth by each participant in calculating the percent discount was assessed by a self-reported measure asking them to describe their level of effort during the ongoing task. The clarity of the instructions was also assessed by a self-reported measure asking the participant to indicate how clear the instructions were.

In assessing the potential effects of the social motivation for the incentives, two measures were used. The first was a prosocial scale used to assess the positive aspects of prosocial behavior. The scale is derived from a subsection of the Strengths and Difficulties Questionnaire (Goodman, 2001). The subject is asked to rate five items on a seven point scale ranging from; not true (scored as a 1) to certainly true (scored as a 7). The second measure was a self-reported importance rating for various groups of individuals involved in the subject's life. Each subject was asked to evaluate using a seven-point Likert scale how important it is for them to obtain discounts for various groups of individuals ranging from; family, friends, coworkers, neighbors and strangers. Both of these measures were examined to determine whether performance on the prospective memory task was significantly influenced by these outside factors.

The last question the subjects were asked was a manipulation check. Each subject was asked to recall the special instructions relating to the 17% discount. This question was used to determine whether or not a subject's failure to mark the purchase box was a result of failing to remember the task or a genuine prospective memory failure. Those subjects that could not recall the prospective memory task were eliminated from the subject pool and replaced.

CHAPTER 4:

RESULTS

Manipulation Checks

The rejection level of all analyses was set at 0.05. Prospective memory performance was measured as a proportion of successful responses. A prospective memory response was scored as successful if the participant checked the purchase box during the presentation of the prospective memory target (Einstein and McDaniel, 1990). Prior to analyzing the prospective memory data two measurements were examined. First, the manipulation check was examined to ensure that forgetting to check the purchase box was a result of a prospective memory failure and not a retrospective memory failure. At the conclusion of the experiment, participants were asked to respond to the following question, “What special task were you instructed to carry out if the discount percent was above 17%?” Nine participants in the “alone” condition and three participants in the “friend” condition could not recall the prospective memory cue. These twelve participants were eliminated from the experiment and replaced to maintain balance between the groups.

Second, false positives were examined to verify that perfect prospective memory scores were not a result of checking all the purchase boxes. False positives occur when a participant always checks the purchase box, regardless of what the percent discount was. This creates a problem when determining the percentage of prospective memory tasks completed. Individuals that checked the purchase box regardless of the discount rate would appear to score a perfect score on the prospective memory tasks. To ensure that these participants are not included in the analysis, a tally was used to count the amount of times the purchase box was checked. If this tally was greater than five, then the participant was eliminated from the experiment. On six

occasions a participant in the “alone” condition checked the purchase box after every discount calculation. Out of these six individuals, five also did not pass the manipulation check. Overall thirteen participants were eliminated from the experiment and replaced by others to maintain group balances.

Transformation

Given the proportional nature of the dependent variable (percent of PM tasks completed) and its binomial distribution, the appropriate transformation to make the variance independent of the mean is an arcsine, also referred to as an angular transformation or an arcsine square root (Hogg and Craig, 1995). Figure 6 reveals that the dependent variable is grouped near one end of the distribution, slightly skewing the data. An arcsine transformation does correct for this by stretching out both tails of the distribution relative to the middle, but data remained skewed (see Table 5). Comparing the ANOVA results of the original data versus the transformed data did not result in any differences (ANOVA results are in the appendix). Since the arcsine transformation did not enhance the data significantly in any way and because the resulting transformed numbers are harder to interpret, this study used the original dependent variable values throughout the analysis. For details concerning the transformation and the comparison results see the appendix.

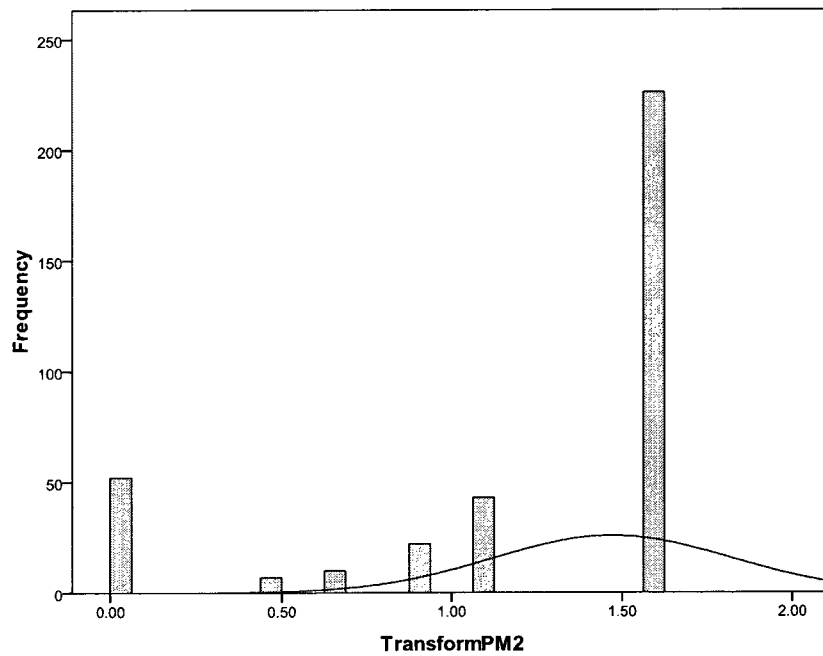
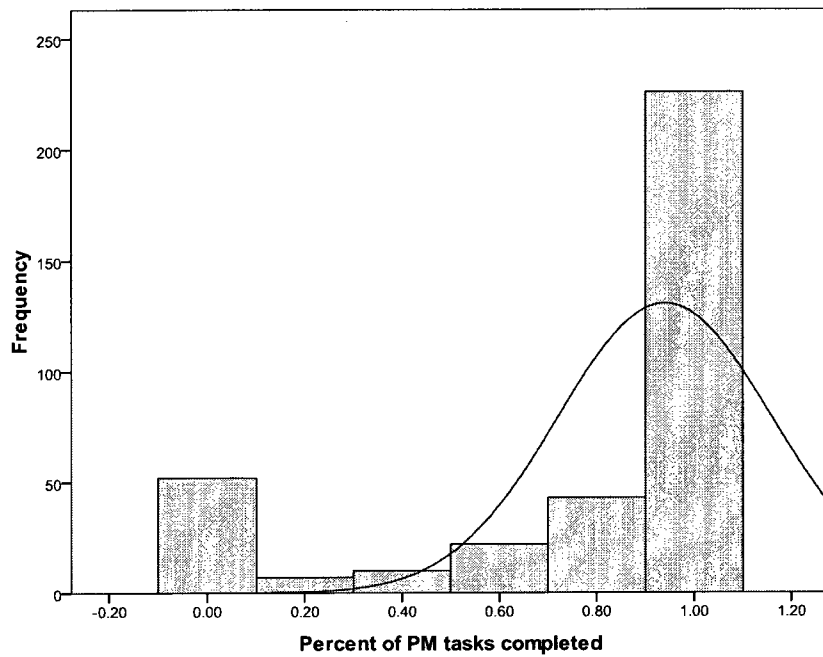


Figure 6: The top histogram represents the untransformed dependent variable and the bottom histogram represents the arcsine transformation

Descriptive Statistics							
	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Transformed DV	360	1.2005	.56584	-1.289	.129	.159	.256
Original DV	360	.7750	.36219	-1.392	.129	.320	.256

Table 5: Descriptive statistics of transformed versus untransformed data

Analysis of Variance

The means and standard deviations for the dependent variable, proportion of prospective memory tasks completed, are presented in Table 6. An ANOVA using proportion of prospective memory tasks completed as a dependent variable showed that the main effects for presence of others, $F(2,348) = 11.05$, $p = .000$, and social importance, $F(1,348) = 34.848$, $p = .000$ were significant, while personal importance, $F(1,348) = 3.015$, $p = .083$ was not. The various two-way interactions involving the social importance dimension were found to also be significant; Other Present*Social Importance, $F(2,348) = 3.062$, $p = .048$ and Personal Importance*Social Importance, $F(1,348) = 5.908$, $p = .016$. The three-way interaction between the Other Present, Personal Importance and Social Importance dimensions was not found to be significant, $F(2,348) = .808$, $p = .447$.

	Alone		Stranger		Friend	
	Social Importance	No Social Importance	Social Importance	No Social Importance	Social Importance	No Social Importance
Personal Importance	.7267 (.4250)	.6933 (.4448)	.9533 (.1008)	.9267 (.1337)	.9200 (.1448)	.6133 (.3963)
No Personal Importance	.8333 (.3448)	.5467 (.4637)	.9600 (.0814)	.7200 (.4055)	.8800 (.2265)	.5267 (.4441)

Table 6: Means and Standard Deviations for proportion of prospective memory tasks completed. Standard deviations are in parenthesis.

Source	df	Mean Square	F	Sig.	η^2
OthersPresent	2	1.227	11.05	.000	.176
Personal Importance	1	.336	3.015	.083	.009
Social Importance	1	3.885	34.848	.000	.091
OthersPresent*Personal Importance	2	.048	.431	.650	.002
OthersPresent*Social Importance	2	.341	3.062	.048	.017
Personal Importance*Social Importance	1	.659	5.908	.016	.017
OtherPresent*Personal Importance*Social Importance	2	.090	.808	.447	.005
Error	348	.111			

Table 7: ANOVA for the Presence of Others (labeled as OthersPresent) and Direction of Benefit (labeled as either Personal Importance or Social Importance)

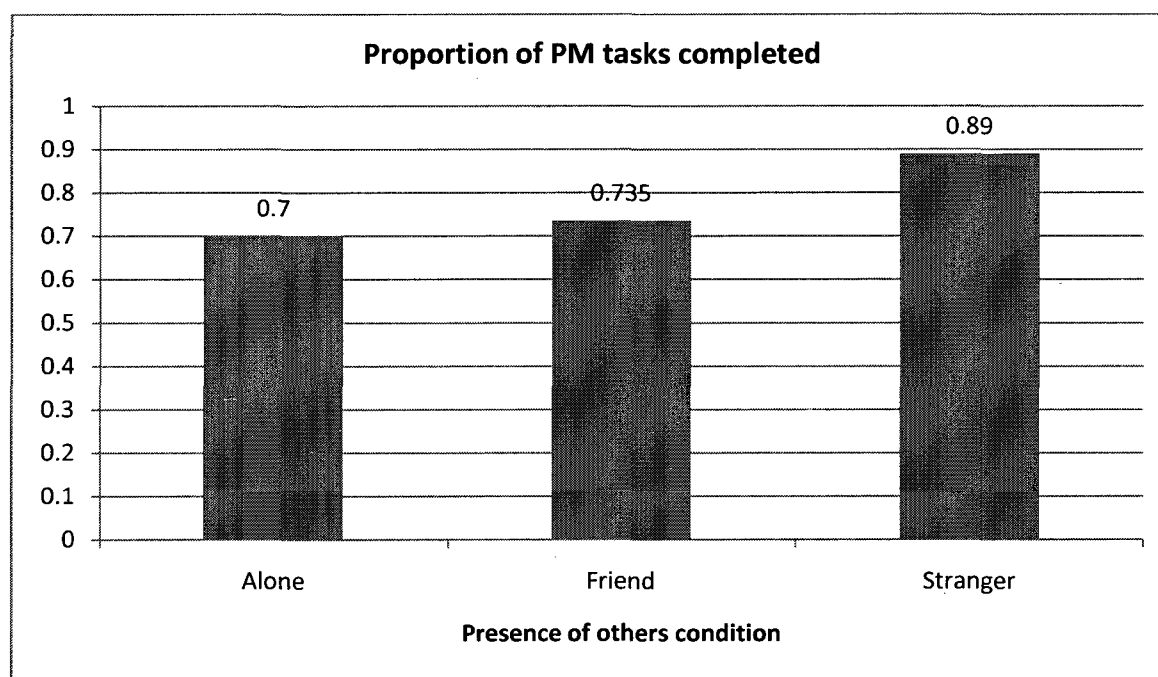


Figure 7: Mean proportion of prospective memory tasks completed as a function of the presence of another individual.

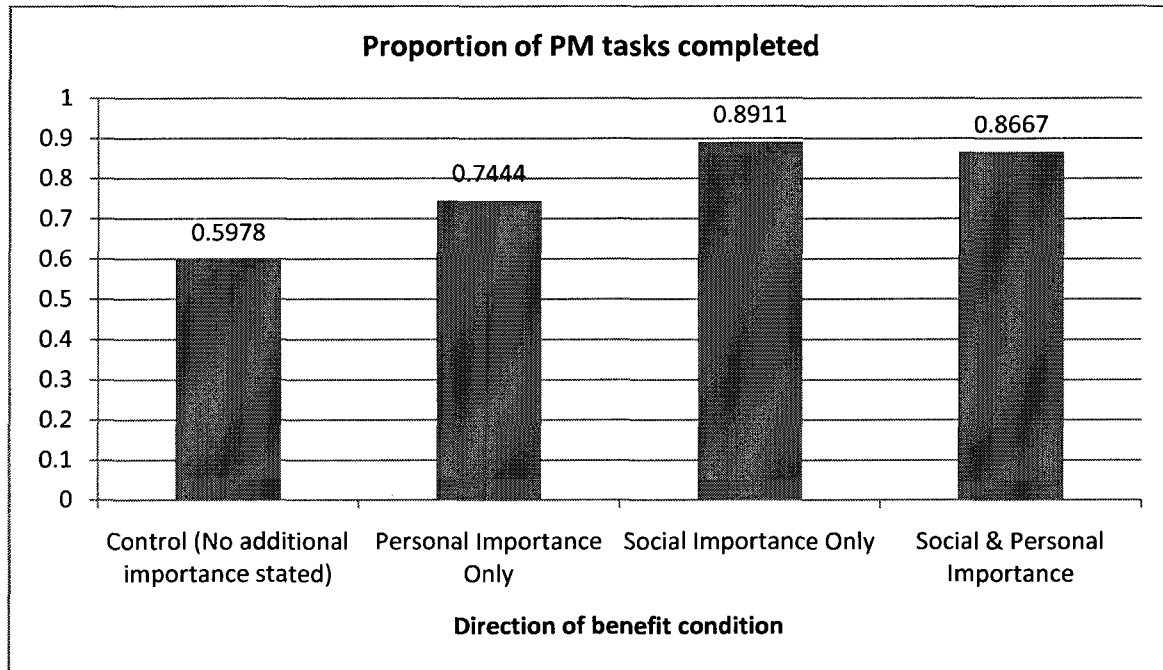


Figure 8: Mean proportion of prospective memory tasks completed as a function of the direction of benefit emphasized.

Figure 8 depicts the overall means of groups of individual respondents combined. Those in the Personal Importance condition are subjects who received only a personal incentive for correctly completing the prospective memory task across all three “others present” condition. Participants in the Social Importance condition are ones who received only a social incentive for correctly completing the prospective memory tasks across all three “other present” condition. And those individuals in the Social and Personal Importance condition are those individuals who received both social and personal benefits across all three “others present” condition. This particular type of grouping was selected because it remained in-line with the proposed hypotheses.

CHAPTER 5: DISCUSSION

Correlations

The post-test measures discussed previously were used to determine if there was a significant correlation with the performance of the prospective memory task. A Pearson correlation was conducted using the interval independent variables and the proportional measure of prospective memory to assess any potential correlation. Table 8 depicts the Pearson correlations for the following variables: 1.) proportions of prospective memory tasks completed, 2.) consumer value consciousness rating, 3.) prosocial behavior rating, 4.) the average amount of time spent on each calculation (the on-going task), and 5.) the average number of incorrect calculation inputs. Both the mean response time of the ongoing task and the accuracy of completing the ongoing task has been used in previous studies to proxy task difficulty (Hicks, Marsh, and Russell, 2000; Smith, 2003; Marsh, Cook, and Hicks, 2005).

Variables		Value Consciousness	Prosocial Rating	Average time	Average incorrect
Percent of PM tasks completed	Pearson Correlation	.056	.009	-0.144	0.014
	Sig. (2-tailed)	.286	.866	.006*	.788
	N	360	360	360	360

Table 8: Pearson correlations for post-test interval measures. LEGEND: PM = prospective memory, Value Consciousness evaluated using Netemeyer and Burton (1990), Prosocial Rating evaluated using Goodman (2001), Average time = average time spent on each calculation; Average incorrect = average number of incorrect calculation inputs.

The only significant relationship was between the percent of prospective memory tasks completed and the average amount of time spent on each calculation, $r = -0.144$, p (2-tailed) $< .05$, indicating an inverse relationship. The longer an individual spent on the on-going task, the

worse their performance on the prospective memory task, which is consistent with past findings (Hicks, Marsh, and Russell, 2000; Smith, 2003; Marsh, Cook, and Hicks, 2005).

For the ordinal measures, a Pearson correlation along with a Spearman rank correlation were used to assess whether or not there was a significant relationship between the post-test variables and the number of prospective memory tasks completed. The proportion of prospective memory tasks completed was not used in this analysis due to the nature of the Spearman rank correlation. Spearman's test works by first ranking the data and then applying Pearson's equation to those ranks. The rounding associated with the proportional value for prospective memory task completion might make any correlations that exist harder to detect. Table 9 depicts the Pearson and Spearman correlations between the following variables: 1.) number of prospective memory tasks completed, 2.) difficulty of calculation, 3.) effort put forth in calculating the percent discount, 4.) the clarity of the directions, 5.) the importance of obtaining a discount for family members, 6.) the importance of obtaining a discount for friends, 7.) the importance of obtaining a discount for coworkers, 8.) the importance of obtaining a discount for neighbors, and 9.) the importance of obtaining a discount for strangers. Each one of these independent variables was captured using a self-reporting measure; see the Appendix for the post-test questions.

Variable		Difficult	Effort	Clarity	Import Family	Import Friends	Import Coworkers	Import Neighbors	Import Strangers
Number of PM tasks completed	Pearson Correlation	.031	-.151	.033	-.081	.011	-.052	-.089	-.074
	Sig. (2-tailed)	.556	.004*	.532	.124	.833	.322	.092	.162
	Spearman Correlation	.014	-.151	.066	-.070	.024	-.530	-.086	-.070
	Sig (2-tailed)	.793	.004*	.213	.183	.653	.317	.103	.187
	N	360	360	360	360	360	360	360	360

Table 9: Pearson and Spearman correlations for post-test ordinal measures. LEGEND: Difficult, Effort, Clarity, Import Family, Import Friends, Import Coworkers, Import Neighbors, and Import Strangers were all evaluated using self-reported measures, 7-point Likert scale.

The only significant relationship found was between the number of prospective memory tasks completed and the effort placed forth on each calculation, $r = -0.151$, p (2-tailed) $< .05$, indicating an inverse relationship. The more effort placed on the on-going task, the worse the performance on the prospective memory task, reflective of past findings (Hicks, Marsh, and Russell, 2000; Marsh, Cook, and Hicks, 2005).

Two-way ANOVA

Due to the nature of the hypotheses, collapsing the 3x2x2 experimental design into a 3x4 two-way ANOVA analysis will ease the interpretation of the planned contrasts. The stated hypotheses combine various groups and do not investigate individual groups from Table 4. For example hypothesis 1a examines the relationship between the alone condition and the others present condition. The alone condition consists of test groups 1-4 and the others present condition consists of test groups 5-12. With relation to hypothesis two, the control condition (no additional benefits provided) consist of groups 4, 8, 12. The personal importance group consists of groups 2, 6, 10. The social importance group consists of groups 3, 7, 11. And the joint benefit (both social and personal importance emphasized) consists of groups 1, 5, 9. Table 10 below is a two-way ANOVA with respect to the dimensions “others present” and “direction of benefit.”

Source	df	Mean Square	F	Sig.	η^2
OthersPresent	2	1.227	11.01	.000	.059
Importance	3	1.627	14.59	.000	.112
OthersPresent x Importance	6	.160	1.43	.201	.024
Error	348	.111			

Table 10: Two-way ANOVA for the Presence of Others (labeled as OthersPresent) and Direction of Benefit (labeled as Importance)

Analysis of Covariates

Using the data from correlation analysis, the following variables were assessed as potential covariates to prospective memory performance: 1.) average amount of time spent on each calculation (AvgTime) and 2.) the effort put forth to complete the calculation task (Effort). Two analyses of covariance (ANCOVA) models were used to test the effects of the covariates. The first model inputted the average amount of time (AvgTime) as a covariate. The second examined the amount of effort as a covariate. As seen in Tables 11 and 12, the results of the ANCOVA model remained consistent regardless of the covariates. In both cases, either the covariate was found to be insignificant or did not affect the overall results.

The first analysis of covariance (ANCOVA) model tested the average amount of time spent on each calculation as a covariate (Table 11). As a result the AvgTime was found to be an insignificant covariate, $F(1,347) = 3.441$, $p = .064$. The second analysis of covariance (ANCOVA) model examined the amount of effort placed during the calculation as a possible covariate (Table 12). In this case the covariate was found to be significant, $F(1,347) = 4.102$, $p = .044$. When examined further, the results of the dependent variable and contrasts do not change when a simple analysis of variance (ANOVA) is run without the effort covariate. For this reason, the analysis of variance the (ANOVA) method was used.

Source	df	Mean Square	F	Sig.	η^2
AvgTime	1	.381	3.441	.064	.010
OthersPresent	2	1.012	9.140	.000	.050
Importance	3	1.586	14.323	.000	.110
OthersPresent x Importance	6	.160	1.448	.196	.024
Error	347	.111			

Table 11: Two-way ANCOVA for the Presences of Others and Importance Dimension with AvgTime as a covariate. NOTE: η^2 = effect size

Source	df	Mean Square	F	Sig.	η^2
Effort	1	.453	4.102	.044	.012
OthersPresent	2	.956	8.650	.000	.047
Importance	3	1.585	14.343	.000	.110
OthersPresent x Importance	6	.169	1.531	.167	.026
Error	347	.111			

Table 12: Two-way ANCOVA for the Presences of Others and Importance Dimension with Effort as a covariate.

NOTE: η^2 = effect size

Planned Contrasts

H1a: Subjects that have another individual present during the experiment will complete a greater percentage of prospective memory tasks when compared to subjects that complete the experiment alone.

H1b: Subjects that have a friend present during the experiment will complete a greater percentage of prospective memory tasks when compared to subjects that have a stranger present during the experiment.

The hypotheses above were tested using a planned contrast. Briefly stated, hypothesis 1a examined the effects of simply having another individual present while proceeding through the experiment, and hypothesis 1b examined how the type of individual present influenced prospective memory performance. Using a Helmert contrast to examine the presence of other dimensions, hypothesis 1a was supported, while hypothesis 1b was not. A Helmert contrast was used because it allowed for the evaluation of each level of a factor (except the last) to the means of subsequent levels. In a scenario where the factor has three levels, a Helmert contrast will examine two contrasts. First is the mean difference between the first level (the alone condition) and the other level (the friend and stranger condition combined). And second, the mean difference between the second level (the friend condition) and the third level (the stranger condition). Table 13 depicts the results from the planned contrast, and figures 9 and 10 graphically display the differences in means. *The planned contrast revealed that the simple presence of another individual during the experiment increases the average performance on the*

prospective memory task and this was found to be significantly different. Hypothesis 1b was not supported. Although there was a significant difference between the mean performances in the friend versus the stranger condition, the direction was not in-line with the hypothesis. Individuals improved performance on the prospective memory task when a stranger was present.

Contrast Results (K Matrix)

		Dependent Variable
		Percent of PM tasks completed
Presence of others condition Helmert Contrast		
Level 1 vs. Later Alone vs. Others	Contrast Estimate	-.113
	Hypothesized Value	0
	Difference (Estimate - Hypothesized)	-.113
	Std. Error	.037
	Sig.	.003
	95% Confidence Interval for Difference	
	Lower Bound	-.186
	Upper Bound	-.039
Level 2 vs. Level 3 Friend vs. Stranger	Contrast Estimate	-.155
	Hypothesized Value	0
	Difference (Estimate - Hypothesized)	-.155
	Std. Error	.043
	Sig.	.000
	95% Confidence Interval for Difference	
	Lower Bound	-.240
	Upper Bound	-.070

Table 13: Contrast for hypothesis 1

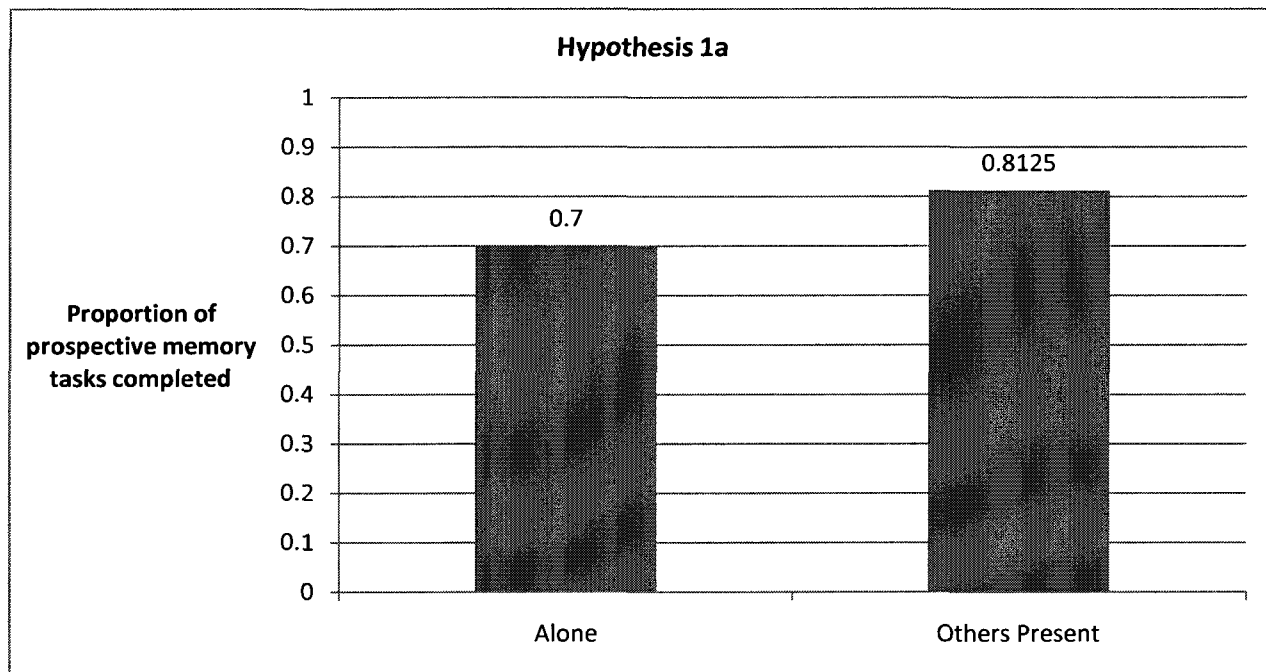


Figure 9: Mean proportion of hypothesis 1a – the difference was significant, $p=.003$

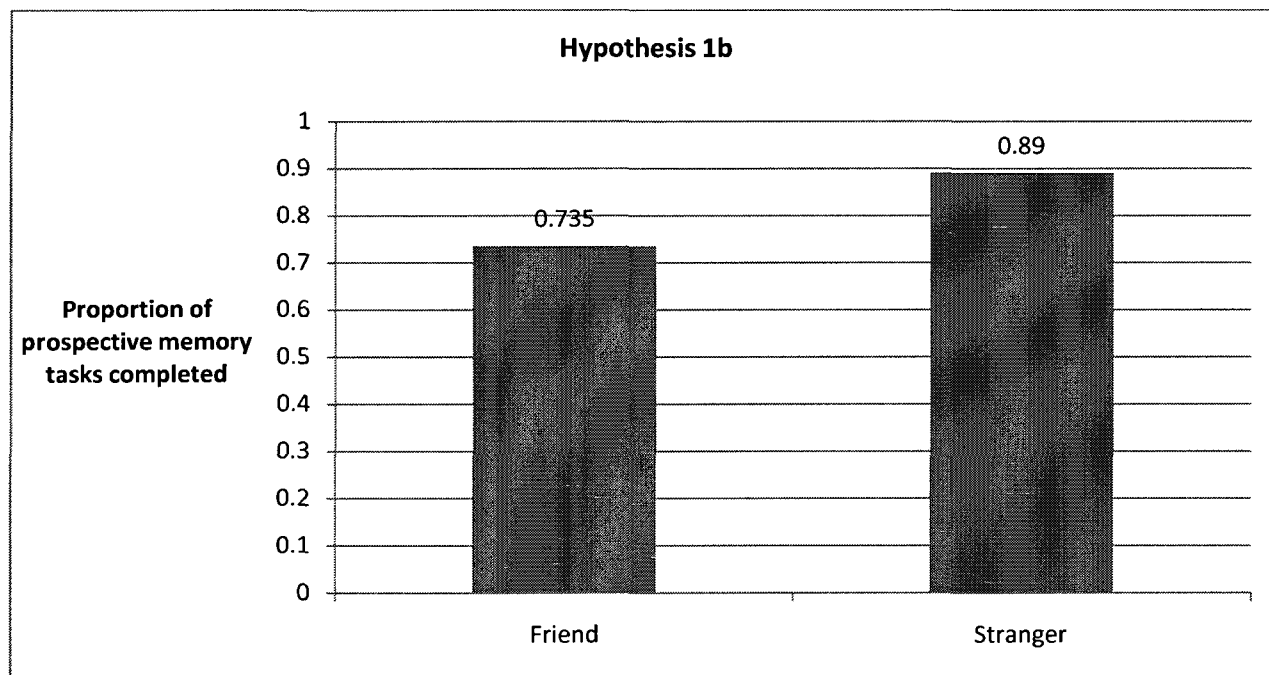


Figure 10: Mean proportion of hypothesis 1b – the difference was significant, $p=.000$

With respect to the first part of hypothesis one, the experimental data indicated that the presence of another individual, either friend or stranger, during the testing increased prospective memory performance. These findings are in-line with social facilitation theory. Zajonc (1965) first proposed that the presence of others causes arousal leading to an increase in the dominant response. In other words, given a task with others present, either as observers or co-actors, the dominant response will be enhanced while the subordinate (less common) response will be inhibited.

Mullen, Bryant, and Driskell (1997) predicted what the potential net change in arousal could be given a neutral situation and the type of others present. A neutral situation was defined where participants were either engaged in some innocuous task (Berger, 1981) or were simply waiting (Elliot and Cohen, 1981). According to Kiesler's (1966) speculation, neutral settings are expected to generate low levels of arousal, thereby setting the stage for the presence of others to increase arousal. The presence of others was classified in three ways. First, the mere presence of others was defined as individuals who are not engaged in the same behavior as the participant and who are explicitly not present to monitor and observe the participant's behavior (Green, 1973). Second, co-actors were defined as people who are engaged in the same behavior as the participant (Amoroso and Walters, 1969). And third, the audience was defined as people who are not engaged in the same behavior as the participant but who are explicitly present to monitor and observe the participant's behavior (Borden, Hendricks, and Walker, 1976). Given these two dimensions, Mullen et al. (1997) predicted that the net change in arousal for co-actors and audience members in a neutral situation would increase, and the mere presence of individuals would have no effect. This is in line with Bond and Titus' (1983) meta-analytic

review, which revealed that previous studies concluded that the presence of a co-actor increases the speed of performance of well-learned, simple tasks and improves performance accuracy.

To assess whether or not the experimental participants viewed the calculation task as simple, we can examine their responses to the self-reported measures of difficulty and effort (see tables 14, 15, 16 below):

	How difficult did you find calculating the discount percentage to be?	How much effort do you think you put forth to complete the calculation task?
N	360	360
Mean	6.27	3.54
Std. Error of Mean	.053	.089
Median	7.00	3.00
Mode	7	2
Std. Deviation	1.000	1.692
Variance	1.001	2.862

Table 14: Central tendencies measures for self-reported measures of difficulty and effort.

Self-reported Difficulty measure: How difficult did you find calculating the discount percentage to be?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Difficult	1	.3	.3	.3
Somewhat Difficult	7	1.9	1.9	2.2
Neutral	21	5.8	5.8	8.1
Somewhat Easy	29	8.1	8.1	16.1
Easy	108	30.0	30.0	46.1
Very Easy	194	53.9	53.9	100.0
Total	360	100.0	100.0	

Table 15: Frequency distribution of difficulty measure

Effort measure: How much effort do you think you put forth to complete the calculation task?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No effort	25	6.9	6.9	6.9
Minimal effort	121	33.6	33.6	40.6
Slight effort	36	10.0	10.0	50.6
Low effort	53	14.7	14.7	65.3
Medium effort	81	22.5	22.5	87.8
High effort	24	6.7	6.7	94.4
Maximum effort	20	5.6	5.6	100.0
Total	360	100.0	100.0	

Table 16: Frequency distribution of effort measure

The overwhelming majority of individuals (83.9%) found that the percent calculation task was either easy or very easy. With respect to the amount of effort placed forth to complete the calculation task, 65.3% stated that they placed; low, slight, minimal or no effort. Using these two bits of data, the majority of respondents viewed the calculation task as a simple task. Therefore, according to social facilitation theory, the presence of another individual during the testing procedure is expected to increase the performance level of the respondents.

With respect to the second part of hypothesis one, the data indicated a significant difference between the friend and stranger conditions. Those respondents in the stranger condition were found to outperform those in the friend condition. This was counter to the hypothesis. The initial belief was that the strength of the relationship between friends would serve as a better reminder tool as opposed to the strength of the relationship between strangers. This does not appear to be the case. The social consequences associated with forgetting to click the purchase box are greater in the stranger condition. Social facilitation theories do not distinguish whether or not familiarity with the other person is important. No study has specified the effects that might be expected with friends versus strangers. So in this regard, this examination of prospective memory adds to the literature of social facilitation.

The increased prospective memory performance in the presence of another individual would suggest that marketing managers should do their best to couple consumers together. What this experiment has shown is that the presence of another person can function as an external cue to the stored intention. Marketers should create scenarios or opportunities for a paired shopping experience.

***H2a:** Subjects in the social and personal importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the social importance condition*

***H2b:** Subjects in the social importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the personal importance condition*

***H2c:** Subjects in the personal importance condition will complete a greater percentage of prospective memory tasks when compared to those subjects in the no importance condition*

Hypothesis two manipulated the direction of benefit by emphasizing a personal, a social, or both a personal and a social benefit on completing the prospective memory task correctly. The control condition did not place any additional emphasis on the benefits of completing the prospective memory tasks correctly. Using a repeated contrast to examine the direction of benefit dimension, hypotheses 2b and 2c were supported, while hypothesis 2a was not. A repeated contrast compares the mean of each level of a factor to the mean of the subsequent level. In a four-level scenario, the mean of level one (control condition) was compared to the mean of level two (personal importance condition). The mean of level two (personal importance condition) was compared to the mean of level three (social importance condition), and the mean of level three (social importance condition) was compared to that of level four (social and personal importance condition). This comparison fell directly in-line with the hypotheses stated above. Table 17

depicts the results from the planned contrast, and figure 11 graphically displays the differences in means. The planned contrast revealed that there was no significant difference between those individuals that received a social importance emphasis versus those that received both a social and personal importance emphasis. *Individuals in the social importance condition out-performed those in the personal importance condition. And individuals in the personal importance condition out-performed those in the control condition, where no additional importance emphasis was placed.*

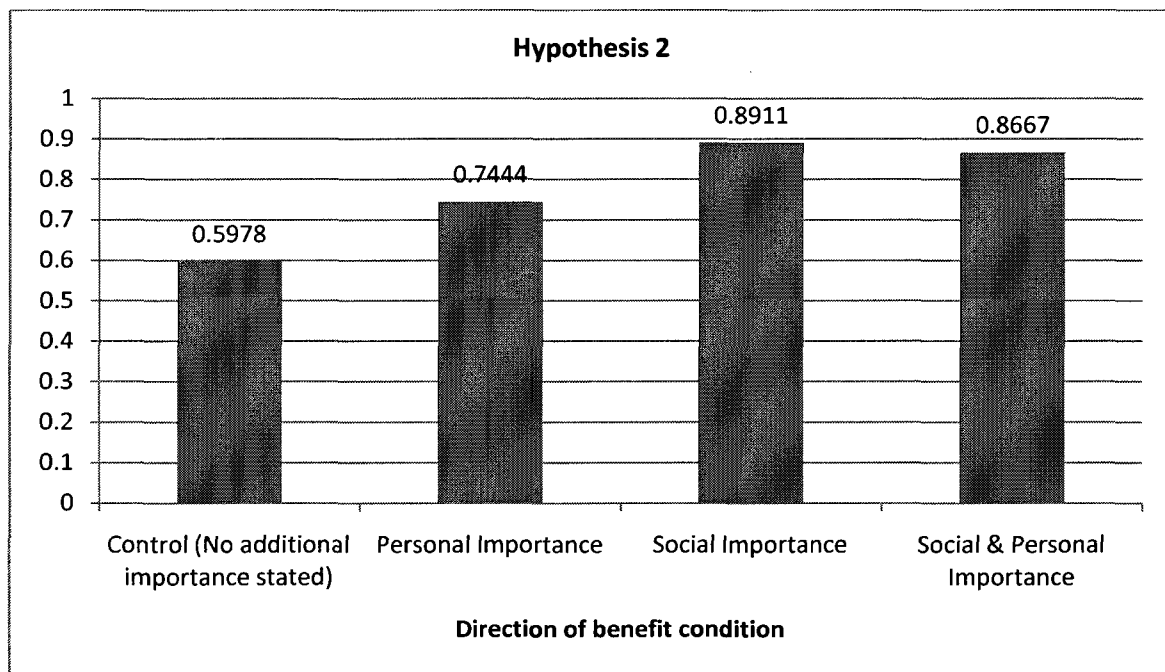


Figure 11: Mean proportions for hypothesis 2

Contrast Results (K Matrix)

		Dependent Variable	
		Percent of PM tasks completed	
Importance Repeated Contrast			
Level 1 vs. Level 2 Control vs. Personal	Contrast Estimate	-.147	
	Hypothesized Value	0	
	Difference (Estimate - Hypothesized)	-.147	
	Std. Error	.050	
	Sig.	.003	
	95% Confidence Interval for Difference	Lower Bound Upper Bound	-.245 -.049
Level 2 vs. Level 3 Personal vs. Social	Contrast Estimate	-.147	
	Hypothesized Value	0	
	Difference (Estimate - Hypothesized)	-.147	
	Std. Error	.050	
	Sig.	.003	
	95% Confidence Interval for Difference	Lower Bound Upper Bound	-.245 -.049
Level 3 vs. Level 4 Social vs. Social and Personal	Contrast Estimate	.024	
	Hypothesized Value	0	
	Difference (Estimate - Hypothesized)	.024	
	Std. Error	.050	
	Sig.	.624	
	95% Confidence Interval for Difference	Lower Bound Upper Bound	-.073 .122

Table 17: Contrast for hypothesis 2

The results of this portion of the experiment revealed that the personal importance, the social importance and the social and personal importance conditions significantly affected the retrieval of intentions. Participants in these three conditions performed significantly better on the prospective memory task when compared to the control condition of “no importance”.

Individuals in the “social” importance incentive outperformed the “personal incentive” conditions, which was in-line with the hypotheses. Contrary to the first part of hypothesis two, there was no significant difference found between the prospective memory performance levels of the social importance and the joint benefits (social and personal importance) conditions.

The joint benefits condition was hypothesized to outperform the social importance condition due to the additive nature of the incentive. One of the key principles of behaviorism is focused on how incentives increase the frequency of behavior. In addition, research focused on incentives in prospective memory studies has documented better performance in high incentive conditions (Meacham and Singer, 1977). It was believed that individuals would perform best in the “joint” condition because the individual received both a monetary benefit (additional discount) and a social benefit (ability to pass savings onto another). Examining the social psychology literature, past research has shown that under certain conditions, explicit incentives can lead to a decreased motivation and reduced task performance (Deci, 1975; Deci and Ryan, 1985).

Titmuss (1970) theorized that paying for blood undermines social values and therefore would reduce or totally eliminate the willingness of an individual to donate blood. The fundamental idea is that the monetary reward ‘crowds-out’ the intrinsic motivation to donate blood. Lepper and Greene (1978) described a similar phenomenon where monetary (external) rewards undermine intrinsic motivation. Providing a reward for undertaking an activity can have indirect negative consequences, provided that the intrinsic motivation is considered to be beneficial. The label of this phenomenon has had many terms, ‘the hidden cost of reward’ (Lepper and Greene, 1978), ‘overjustification hypothesis’ (Lepper, Greene and Nisbett, 1973) or ‘corruption effect’ (Deci, 1975). Recently these theories from social psychology have been

introduced into economic theory. The ‘Crowding-out Effect’ is an important anomaly in economics because it suggests a radical opposition to traditional economic thought. That raising monetary incentives reduces, rather than increases the supply. Therefore, under certain circumstances, it is not advisable to use a price mechanism to elicit a higher supply. One should rely on a different type of incentive, intrinsic motivation. Deci, Koestner and Ryan’s (1999) meta-analysis of 128 experiments exploring the effects of extrinsic reward on intrinsic motivation found that tangible rewards have a significant negative effect on intrinsic motivation for interesting tasks. Their overall conclusion was that rewards were used as a method to control people’s behavior. The negative effect of rewards is that they undermine self-regulation and as a consequence people take less responsibility for motivating themselves.

The joint importance condition falls under the umbrella of motivational crowding theory. In the scenario where both the participant and the confederate benefit, the resulting behavior is a lower prospective memory performance level. Although the performance level of the joint benefit condition was not significantly different from the social importance condition, it did not follow the direction hypothesized. The assumption here is that the personal benefit crowded-out the intrinsic benefits received from passing savings onto a friend or family member.

Managerial Implications

Prospective memory or “remembering to remember,” has multiple marketing implications. With respect to advertising, prospective memory failures may be minimized by focusing on the distinctiveness of the cues. It is important to establish cues that when a purchase or usage occasion occurs, it will trigger a memory of the intention. For example with in-store

point of purchase displays. The display must be distinct enough to trigger the stored memory of an intention to buy. The results of this study help improve the understanding of two critical factors in prospective memory. The first is the presence of another individual during the performance of the intention. The second is the direction of benefit associated with the successful completion of the prospective task. These results could be used to lay down the groundwork for managerial implications in relation to promotional strategies. More specifically, it identifies factors that marketing managers should take into consideration in order to increase the probability of remembering to perform an intended action in the future.

Presence of Others

The planned contrasts for hypothesis one tested in the previous section revealed that the simple presence of another individual increases the average performance on the prospective memory task. This observation is of some importance for Marketing Managers. The general implication is that the presence of another creates a social facilitation effect (Zajonc, 1965). Marketing Managers should take note of this and try to design scenarios where a previously formed intention can be completed with other consumers. As figures 9 and 10 indicated, the other consumer does not necessarily have to be a friend or someone with a strong social bond. The results of the second component of hypothesis one indicated that subjects' performance was improved on the prospective memory tasks when the other individual present was a stranger as opposed to a friend.

One way to take advantage of this finding is for Marketing Managers to encourage shopping or prospective memory retrieval using a social context. For the simple scenario of remembering to purchase a product at a future release date, Marketing Managers can create

shared shopping experiences. For example, the catch phrase, “join the millions of others waiting for this product to be released,” can be used to indicate to potential consumers that other consumers are involved waiting process. The overall goal of this strategy is to group individuals together who share a common affinity for the product or intention.

Direction of Benefit

Given the results reported in this study, in order to produce the maximum recall rate for a prospective memory task, managers should separate out the rewards of the task. This suggests that in order for intentional incentives to receive their maximum recall, promotional managers should look into separating rewards. Instead of provided a joint reward, where both the store patron and a friend/family member, receive an additional discount, promotional managers should create separate incentives. To maximize recall of the intentional incentives, promotional managers should focus more on the social benefits, allowing the participant to pass additional savings onto another individual, instead of giving him/her additional savings. By separating the intentional incentives managers are able to avoid any motivational crowding that may interfere with the participants choice/behavior.

The rise of social networks has given Marketing Managers an opportunity to implement and potentially monitor intentional memory for product purchases. In recent Nielsen ratings for the top web brands, Facebook (<http://www.facebook.com>) has consistently ranked either third or fourth. The site averaged approximately 117,000,000 unique visitors per month, with each person spending an average of about six hours and thirty minutes on the site (see appendix for January, February, and March 2010 rankings, The Nielsen Company, 2010). The prevalence of the social network site has caused marketers to take notice and create promotional campaigns.

Established brands like Pepsico, Starbucks, Burger King, Bravo, and MTV have all created Facebook applications in the past. Recently, Alice.com, a website that allows consumers to shop for everyday household items online, has implemented their Facebook marketing campaign (see appendix for a copy of the email campaign). In an email campaign, the site encouraged current customers to pass coupons onto their friends/family, with the hopes of increasing unique traffic to the site. The users of the site gain the social benefit of passing savings to new customers which may also serve as a potential reminder to the users of a previously formed purchase intentions.

Limitations

Laboratory versus naturalistic studies

The first set of limitations in this experimental study center on the testing environment. As indicated earlier in the introduction, good prospective memory is critical in everyday lives. The consequences of forgetting a prospective memory task vary. Forgetting to take a medication at the appropriate time has dangerous health implications and forgetting to pick-up an anniversary gift for a spouse has social consequences. These consequences are hard to capture in a laboratory experiment. Prospective memory demands are unique to the subject's natural environment and are hard to capture in the laboratory.

First, naturalistic prospective memory demands are embedded in meaningful events. In other words, most individuals perform a prospective memory task in the context of familiar sequences. For example, picking up a carton of milk on the way home from work, involves the familiarity of the driving home. This in itself can change the nature of the prospective memory

task. Ceci and Bronfenbrenner (1985) found that children were more efficient in time-based prospective memory tasks when the task was performed in the more familiar home environment as opposed to the laboratory environment. In relation to this experiment, price discounts might be more meaningful if the respondent was in an actual purchase environment. The performance on the prospective task could potentially improve within the more familiar shopping environment.

Second, a complex set of actions may need to be planned and initiated. In a naturalistic environment an individual may have several actions to perform within a given time period with no preferred order in performing the tasks. Individuals must perform prospective memory tasks within the context of their everyday lives and later activate a plan and execute it. This complex planning and initiation is hardly captured in laboratory studies. The overwhelming majority of prospective memory studies make the prospective memory task simple with the experimenter making the plan for the subjects. For example, in this experiment, the experimenter asked the subjects to perform an action whenever a stimulus appears (a percent discount greater than 17%). Kliegel, McDaniel, and Einstein (2000) devised a way to avoid this issue. By using a six-element task, Kliegel et al (2000) was able to examine performance on planning, initiation and execution processes. Subjects were given instructions regarding six open-ended tasks as well as rules for sequencing these tasks. The six tasks represented two sets of three different tasks. There were two sets of word-finding problems, two sets of arithmetic problems, and two sets of picture problems. The only constraint placed on the subjects in terms of the order in which they can be performed is that the two sets of the same task cannot be performed consecutively. The subjects are not given enough time to finish all these tasks. The challenge to the subjects is to schedule the order in which they can work on the tasks without spending too much time on one task. The six-element task is intended mimic a naturalistic intention scenario where some tasks have to be

terminated for the complex goal to be accomplished. The six-element task is one example of how researchers can create prospective memory studies that resemble reality.

Last, naturalistic prospective memory tasks often have long retention intervals. The delay between the presentation of the prospective memory task and the appearance of the target cue in laboratory prospective memory studies is brief relative to the real-world. Most laboratory studies would typically have delay intentions from 5 to 20 minutes, while in the real-world delays can be on the magnitude of hours, days or weeks. There have been a handful of studies that examined long-term prospective memory (Dobb and Rule, 1987; Kvavilashvili and Fisher, 2007; Meacham and Leiman, 1982). Delays extending beyond an hour or so have rarely been captured in tightly controlled laboratory conditions.

The purpose of mentioning the differences between laboratory and naturalistic studies of prospective memory is not to discredit this or existing research but rather it is to promote new ways of investigating prospective memory. Recent approaches to prospective memory research have looked at a variety of methods. One approach has been to make use of recorded past behaviors and examine prospective memory failures in a retrospective manner. Loukopoulos et al (2003) analyzed the cognitive demands of airline crews in safely launching, flying and landing aircraft. Analyzing reports from accidents as well as voluntary reports from pilots about crew errors gave the researchers insight into failures of prospective memory tasks. This historical assessment of prospective memory could be carried further by asking respondents to record past forgetting behaviors and search the reports for past prospective memory failures.

Another unique approach can be the use of virtual reality in the form of a computer initiated interface or the virtual week game. A growing method being employed in the neuropsychological field is the use of virtual reality interfaces. Recent reviews of neuropsychology have found that it

is not possible to translate test scores into either goals for rehabilitation or conclusions about the level of impairment, in other words, many conventional tests of memory related abilities lack ecological validity (Burgess et al., 2006; Chaytor and Schmitter-Edgecombe, 2003; Rabin, Burton, and Barr, 2007; Ruff 2003). Virtual reality has been touted as a tool that answers the need for ecological validity. Although “real-world” behavioral experiments would provide the most useful data, at times it is not feasible to test subjects outside the laboratory. The virtual reality environment provides a viable connection between conventional laboratory tests and behavioral observations. Virtual reality tests can be constructed to simulate the demands of everyday life. Within the virtual reality environment subjects can be tested on the ability to remember and initiate responses to more than one task. Subjects can also be tested on their ability to recognize salient cues for themselves without an experimenter identifying the appropriate time to act. The application of virtual reality in prospective memory studies is still in its infancy and still has a long way to go before it becomes a more mainstream method of investigation.

Another method to analyzing prospective memory is the use of the “Virtual Week” board game. The “Virtual Week” board game was developed as a laboratory prospective memory task that would mimic prospective tasks in everyday life. As a participant moves around the board, they are required to make choices about daily activities and must also remember to carry out prospective memory tasks. One key feature of the “Virtual Week” board game is the ability to incorporate different types of prospective memory tasks. Each day during the “virtual week,” ten prospective memory tasks are introduced (four regular, four irregular, and two time-check). The four regular tasks simulate the kind of “regular” tasks one might undertake in a normal day. Two of these tasks are time-based (i.e. take asthma medication at 11 am and 9 pm), and are triggered

by passing the 11am and 9pm squares on the board). The other two tasks are event based (i.e. take antibiotics at breakfast and dinner) and are triggered by event cards featuring breakfast and dinner. The two time-check tasks require the participant to break from the board game and conduct a lung-test (breathing into an apparatus) at two minutes and thirty seconds and at four minutes and fifteen seconds. The four irregular prospective memory tasks, stimulate occasional tasks that occur in daily life. For example the Monday start card would present two tasks, one event-based and the other time-based, “drop off dry-cleaning when shopping,” and “phone bank to arrange an appointment at noon.” During the game two other irregular prospective tasks are introduced. For example, one event card might read, “Your neighbor Brian drops by and asks if you could return a book for him when you go to the library today. In the meanwhile, do you and Brian: (a) have a coffee, (b) have a cool drink, or (c) not stop for a drink.” Then later on in the game there will appear an event card informing the participant that they are at the library to do some work. Upon reading this card the participant must remember to return Brian’s book in order to complete the prospective memory task. In the original design for “Virtual Week” the participants completed seven days (Rendell and Craik, 2000), but in more recent studies the board game has been reduced to five days (Rendell, Gray, Henry and Tolan, 2007) and three days (Henry, Rendell, Kliegel and Altgassen, 2007).

The strength of the Virtual Week board game lies in its psychometric properties. As stated earlier, generally speaking prospective memory tests lack reliability (Keleman, Weinberg, Alford, Mulvey, and Kaeochinda, 2006). One reason for this low reliability is due to the few opportunities given to perform a prospective memory tasks during and experiment. During the “Virtual Week” game there are ten opportunities for each virtual day, which contributes to a more reliable measure. Rose, Rendell, and McDaniel (2007) examined the reliability of “Virtual

Week” and found reliability estimated to range from .84 to .94 for the regular, irregular, and time-check tasks. Henry et al. (2007) found that the split-half reliability for an overall “Virtual Week” measure was .74. These two studies give a good indication that the “Virtual Week” is a good indicator of prospective memory function and should be incorporated into future studies.

Influence of importance emphasis

Another limitation of this study is the instructional emphasis on the prospective memory task. The questions often asked of prospective memory research is how to setup an experiment in which subjects are expected to remember to perform a task but cannot be explicitly instructed as to when the moment to remember is. Einstein and McDaniel (1990) have developed a general approach for controlling laboratory studies of prospective memory. To parallel the real world, subjects are busily engaged in an ongoing activity while they are trying to remember to perform an unrelated action at some predetermined point in the experiment. The issue is that emphasizing the prospective memory task in the instructions can influence the overall outcome of an experiment. Kliegel et al. (2004) found that emphasizing the importance of the prospective memory task does influence the overall performance on the task. Einstein et al (2005) examined the effects of the importance instructions on the speed of performing the ongoing task. They found that in the high emphasis condition (on the prospective memory task) significantly slowed the ongoing task performance of the subjects. The conclusion was that the instructional emphasis on the prospective memory task increasing monitoring for the prospective memory cue and thus leads to improved performance. At the 2005 International Conference on Prospective Memory in Zurich, there was an agreement that researchers should take great care in determining the

instructional emphasis on the prospective memory task relative to the ongoing task. And that published papers should present these instructions verbatim.

This study is faced with a similar problem when it comes to prospective memory task emphasis. An indication of this is that the prospective memory performance was significantly lower when no additional benefit was added to successfully completing the task (see Figure 11). In the three benefit conditions, there was an additional emphasis placed on the prospective memory task when the subject was given an additional benefit for completing the task. Because of this result, there is the question of whether the decreased performance is due to the lack of motivation (lack of incentive) or due to the fact that there was no repetition of the prospective memory task.

One way to control of this in future studies can be done by introducing a series of manipulations that mirror all four benefit conditions but without the presence of a prospective memory task. A researcher can record the average time spent on the calculation task (the ongoing task) in the presence of the prospective memory task and compare it with the average time spent on the ongoing task without a prospective memory task. This added analysis creates a time variable that can serve as a base-line in examining the effects of introducing a prospective memory task. This can be used to remove doubt as to whether the decrease in prospective memory performance is due to the lack of incentive or due to the instructional influence.

Future Studies

Remembering to remember is prevalent in our everyday lives. This study captured two dimensions of prospective memory and depicted how these two social factors influence the probability of recall of a previously formed intention. Looked at the process of prospective

memory (Figure 2) holistically one can see that this is but a small aspect of the model. This experiment focused on the recall of a prospective task within a controlled contextual environment. Future studies of prospective memory in marketing should tackle other components of this process and determine how they influence the probability of intentional recall.

With respect to encoding, the complexity of the task can facilitate the remembering of an intention (Kvavilashvili and Ellis, 1996). Complex tasks with multiple steps require further planning and scheduling, thus enhancing the probability of recall. Marketing researchers can investigate this by creating complex versus simple purchasing tasks for consumers and then testing how it contributes to the overall intention recall. Also with respect to encoding, research on who initiates the intention is still inconclusive. Cohen (1989) stated that intentions can be divided into those that are generated by a personal need to accomplish a task (self-generated intention) or those that are formed as a result of a request from another individual (other-generated intention). The origination of the prospective memory task can have a great effect on recall of an intention. Specifically, those intentions formed by individuals are better remembered than those provided by a researcher (Roediger, Weldon, and Challis, 1989). Futures studies may look into how social factors influence this. How does the relationship between the individual performing the task and the individual requesting the task influence the probability of recall. One may assume that those individuals with a closer relational distance (i.e. friends and family) have a greater influence when requesting an intention as opposed to those individuals with a larger relational distance (i.e. strangers or the researcher).

When examining the intentional request from another individual, researchers must also take note of the subjects' extrinsic need to comply with that request. The question arises regarding the desire to complete the intention. If the desire to complete the task is not present

then no delayed intention is formed. Kvavilashvili and Ellis (1996) examined this in a preliminary experiment where subjects were asked to rate how frequently they forgot to pass a message (other-generated intention) and to tell someone something (self-generated). The results indicated no significant difference in the forgetting rates. The issue with this study is that it did not take into consideration the relationship between those performing the intention and those requesting the intention. Future studies of prospective memory should take into consideration the impact of the relational distance when examining intentional requests. The marketing management implications of this potential study may add to the justified use of social networks. Researchers may find that intentional requests may by a friend via a social network carry a greater impact than those generated by a corporate entity.

Referring back to the process of prospective memory (Figure 2), future research can examine the period from when the intention was formed to the period when the intention can first be completed (the retention interval). Baddeley and Wilkins (1984) suggest that this can be broken into short versus long term delays. Again research has been inconclusive with respect to this aspect of the prospective memory process. Some researchers have observed a poor performance after longer delays (Loftus, 1971 and Meacham and Leiman, 1982), while others failed to observe any significant decline in performance (Einstein, Holland, McDaniel and Guynn, 1992; Guynn, McDaniel and Einstein, 1998; and Wilkins, 1986). And Hicks et al. (2000) found that longer intervals lead to higher prospective memory performance as opposed to shorter ones. These inconclusive results make it harder for marketing managers to create an ideal communication strategy as to when would be the appropriate time to request an individual to form and intention. Future studies should look into determining if there are any intervening factors present that are influencing these confounding results.

Future research opportunities also exist in the retrieval phase of the prospective memory process. It is in this phase that intentions are either forgotten or remembered. Kvavilashvili (1990) described three types of prospective remembering; event-based, time-based, and activity-based. This study only examined activity-based intentions. With respect to marketing there might be more interest in time-based intentions. Time-based intentions involve prospective memory tasks that are to be carried out at a particular time (Kvavilashvili and Ellis, 1996). Studies involving time-based prospective memory tasks are limited. Einstein and McDaniel (1990) suggest that time-based intentions are more difficult to retrieve relative to event-based or activity-based ones. This is due to the fact that time-based tasks are more reliant on self-initiated retrieval process. There are no external cues that an individual can monitor and use as an indicator to perform the intention.

Because of the lack of studies in this segment of prospective memory and future research would be recommended. Primarily it would be interesting to examine how the social consequences of forgetting impact time-based versus event-based prospective memory. Due to the difficulty of time-based tasks are the social impacts of forgetting reduced? In other words, because more mental resources are needed to complete a time-based prospective memory task are participants more willing to forgive a failure to remember an intention. More time-based prospective memory experiments are needed in order to form a more complete picture of the process.

These suggested future studies give insight that prospective memory's potential application in marketing is vast. The suggestions above are in no means all-inclusive. These future research suggestions only examined the potential research into the various process of prospective memory. They do not examine antecedent conditions that may be used to improve

prospective memory in subjects. For example, antecedent conditions like the feelings attached to the intention, habitual intentions, stated consequences associated with failure, or the benefit associated with successful completion, all contribute to prospective memory performance and can be used in future studies. These future research suggestions also do not include detailed components of each of the phases in the prospective memory process. The research potential for prospective memory in marketing is vast and its potential impact on all aspects of the marketing is limitless.

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APPENDIX

Pre-Test

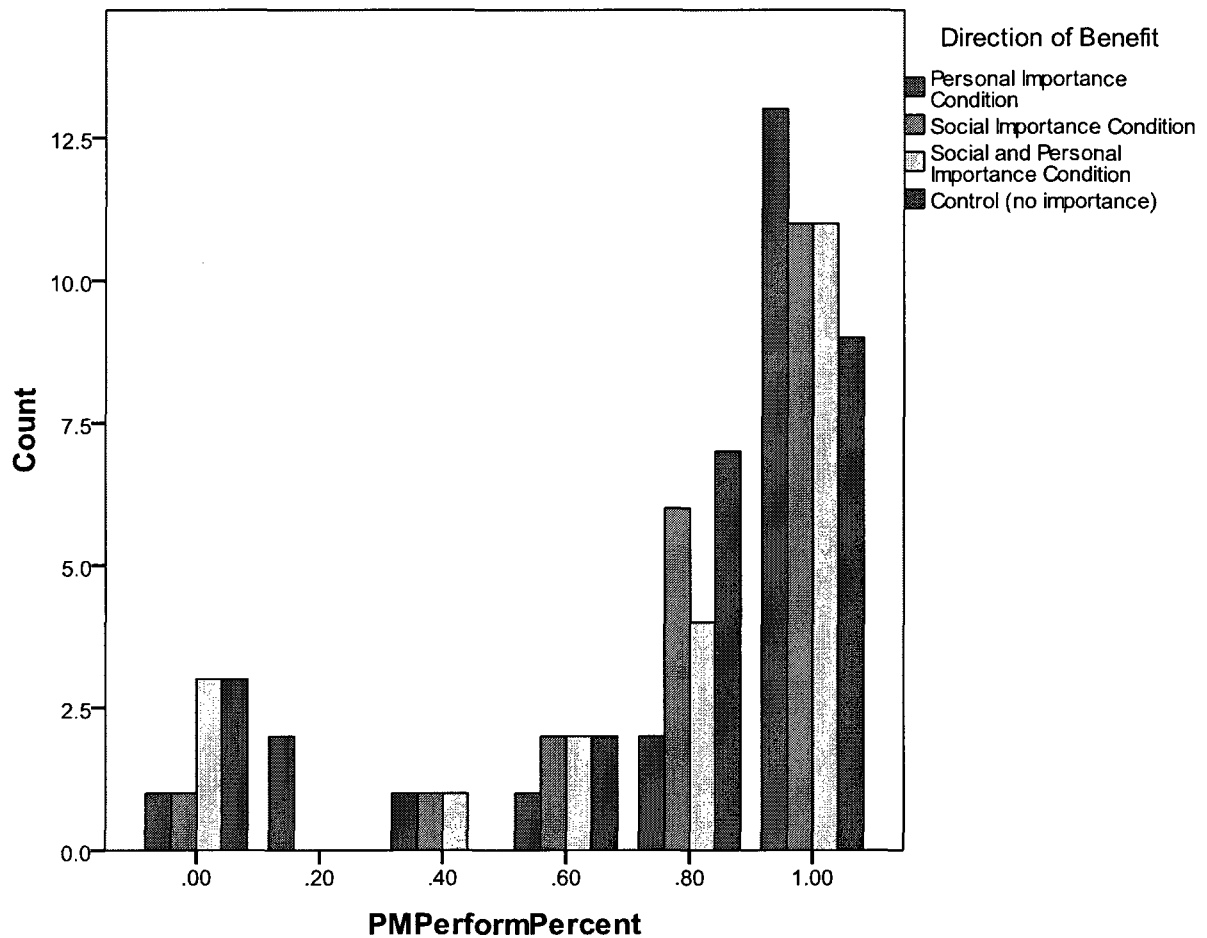


Figure A1: Pretest variance of Prospective Memory Performance (PMPerformPercent) across all four direction of benefit conditions.

Before carrying out the experiment a pre-test was initiated to help resolve the issue of ceiling scores and prospective memory cue saliency. Figure A1 above presents a main issue with a majority of prospective memory experiments. The pretest data is heavily skewed toward the 1.00 performance level, with a majority of subjects (53%) found at this mark. Table A1 below depicts the frequency distribution of the dependent variable, prospective memory performance at each of the levels. Ceiling effects are not unusual in prospective memory studies using the Einstein-McDaniel paradigm (Kelemen, Weinberg, Alford, Mulvey and Kaeochinda 2006). The

Einstein-McDaniel paradigm was defined by Marsh, Hancock and Hicks (2002) as a procedure where the participants of the experiment are asked to complete a background (on-going) task while responding in a particular way whenever an infrequent prospective memory target item appeared.

Prospective Memory Performance (Proportion Correct)	Frequency	Percentage
0.0	8	9.6
0.2	2	2.4
0.4	3	3.6
0.6	7	8.4
0.8	19	22.9
1.0	44	53

Table A1: Frequency Distribution of Prospective Memory Performance variable

Schmidt, Berg, and Deelman (2001) studied the inconsistencies related to the measures of prospective memory performance, their conclusion was that a majority of the inconsistencies can be due to the lack of reliability of the prospective memory measure. In a test-retest reliability analysis for subjects performing prospective memory tasks at one time and then again five weeks later, the reliability (.24) was low. The conclusion was that this was typically due to the limited opportunities to perform the prospective memory tasks relative to the opportunity to perform retrospective memory tasks. Building off of this study Kelemen, Weinburg, Alford, Mulvey and Kaeochinda (2006) have shown that prospective memory performance measures can improve their reliability by increasing the number of targets appearing in the ongoing task from six to thirty, resulting in an increase in reliability from .12 to .62. There are two main concerns about using this approach to increase the reliability. First, presenting a target item (the prospective memory task) thirty times across two-hundred trials changes the dynamics of the prospective memory task. The prospective memory tasks begins to take the form of a habitual task, resulting

in a different cognitive process associated with task completion. And second, the increase appearance of the prospective memory task is unrepresentative of “real-world” prospective memory demands (McDaniel and Einstein, 2007).

Kelemen et al. (2006) also found that they can also improve the reliability to .62 with six targets by using less salient target items. Using these less salient targets reduces the number of subjects who are at the ceiling of the measure and increases the range of prospective memory scores. Therefore, allowing greater opportunities for obtaining a reliable measure of prospective memory across different occasions.

Given the data of the pretest and the amount of individuals at the ceiling of the measure, the best course of action would be to decrease the saliency of the target item (the prospective memory task). One simple way to do so would be to increase the amount of ongoing tasks. The increase of the number of ongoing tasks from would theoretically decrease the number of subjects at the ceiling of the measure and thus giving a better distribution the dependent variable (prospective memory performance). The potential downside to increasing the number of ongoing tasks is respondent fatigue. Subjects could potential dropout of the experiment due to the fatigue from thirty-five to forty ongoing tasks (calculating the percent discount). Preliminary data from the pretests shows this might not be a significant factor. By looking at the average response times per discount calculations in Figure A2 below, one can see that the subjects are becoming more efficient at calculating the percent discount as the experiment proceeds. Therefore decreasing the amount of time spent on each subsequent ongoing task.

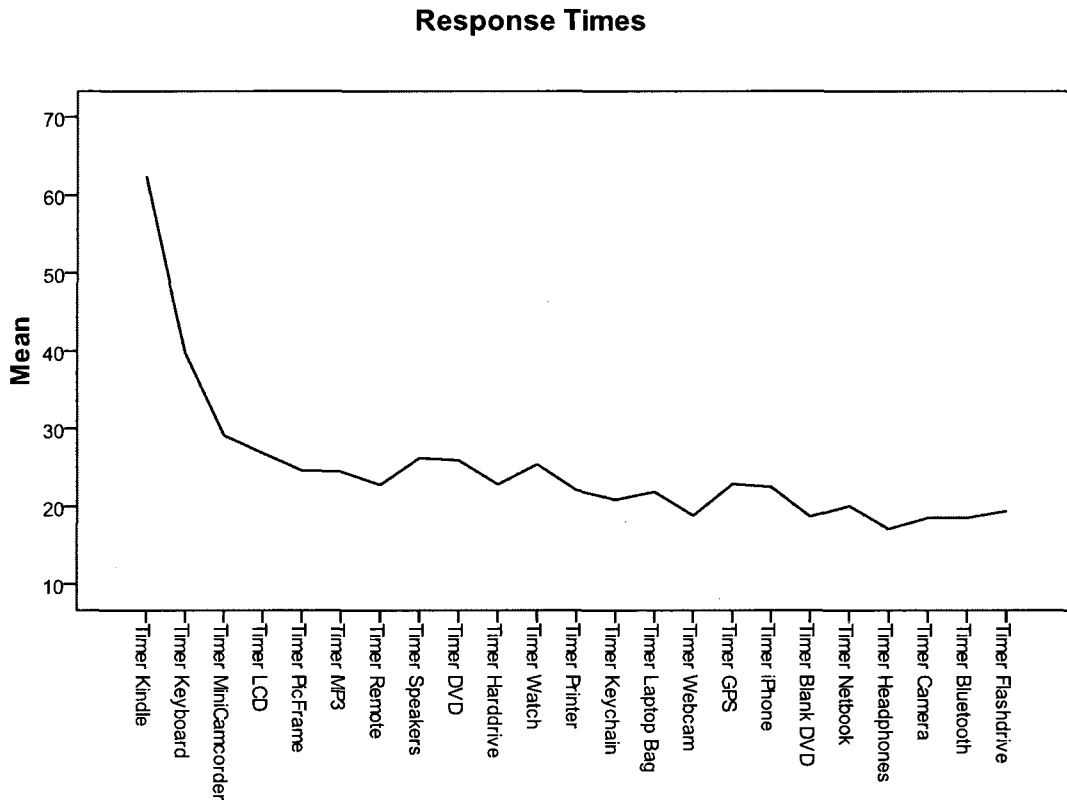
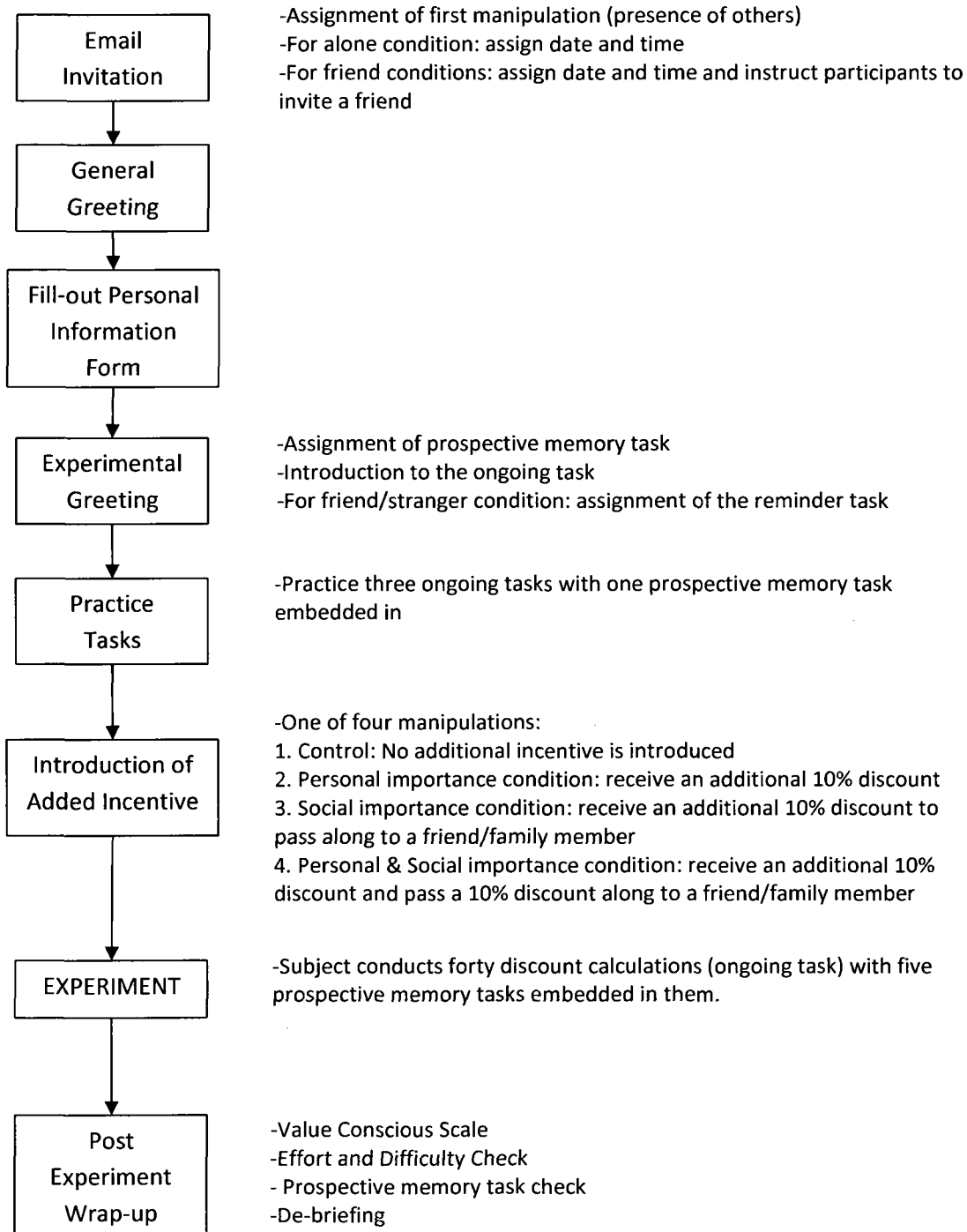


Figure A2: Average response time measured in seconds for each discount calculation

In addition to increasing the amount of ongoing tasks, the prospective memory task are made more salient by selecting a discount lower than twenty percent. By lowering the threshold when the respondent should check the purchase box, we can better hide the prospective memory task. The discount at which the subject should check the purchase box was reduced to 17%, with the majority of the ongoing discount calculations ranging from fifteen to eleven percent. The assumption is that by having the prospective memory task within the same teen-digits (i.e. 17, 16, 15, etc.) as the ongoing tasks it will decrease the distinctiveness of the cue. Differing from the original design where the ongoing task discounts were in the teen-digits while the prospective memory task cue was in the twenties.

Experimental Outline/Flowchart:**Figure A3:** Experimental flow chart

Assignment into the Alone, friend or stranger setting:

Before the experiment is to being the subject is assigned into one of three conditions:

Alone: the subject is asked to perform the tasks with no one else present in the room.

Friend: the subject is asked to invite a trusted friend to participate in the study. When this occurs the subject is labeled as the participant and the friend is labeled as the confederate.

Stranger: the subject is asked to participate in the study with a complete stranger. When this occurs the subject is labeled as the participant and the stranger is labeled as the confederate.

General Greeting:

Hello and Thank you for your participation in today's study. The study you are participating in today is about problem solving, memory, and attention and the relationship between them.

Before we describe the study any further it is important that you know that your responses are completely *confidential* and that you can withdraw your participation at any time without penalty.

We will start today's study with the completion of a *Personal Information Form*. Then we will proceed to a description of the tasks to be performed.

Before you perform these tasks you will be given the opportunity to **practice** the tasks. The goal of the practice session is to ensure that you have a firm understanding of the experimental tasks at hand.

Once the study is underway, each task should be performed by you **only**.

After the study is completed you will answer a brief questionnaire followed by a de-briefing as to the nature of the study.

Thank you again for your participation.

Instructions and Manipulation Check Page

The study you are participating in is about problem solving and discounted products. The task that you will be performing today is the **determination of the percent discount**. You will be shown a product and given two prices, the **Original Price** and the **Discount Price**. Using the two prices and the given mathematical formula, it is up to you to determine what is the percent of the discount (rounded to the nearest whole number). You may use a calculator to assist you in your calculation.

Whenever the percent of the discount is **equal to or greater than 17%** you must check the purchase box.

Please note, You will **not** be allowed to proceed to the next question unless the percent discount is calculated correctly.

Good luck on your task

To ensure you fully understand the experimental tasks, please answer the following question.

1. When should you check the Purchase box:
2. What happens if the percent discount calculated is incorrect?

Personal Information form:

3. Gender: Male Female
4. Age:
5. Please check all that apply
 American Indian or Alaskan
 Asian or Pacific Islander
 African American (not Hispanic)
 Hispanic
 White (not Hispanic)
 No Answer
6. How would you rate your health at the present time?
 Poor Fair OK Good Excellent
7. How many prescription drugs are you currently taking
 1 2 3 4 5 6 7 8 9+
8. How much do health problems limit your daily activity?
 None A little Some Frequent A lot
9. What is the highest level of education you have completed?
 Less than high school
 High School / GED
 Some college
 2 year college degree
 4 year college degree
 Master's degree
 Doctoral degree
 Professional degree
10. In your daily activities, which do you often work with (Please select the most appropriate one)
 Number/Figures
 Words/Vocabulary
 Physical activity

Additional Instructions for participant in the friend and stranger conditions:

As part of the study you are asked to support your neighbor. Whenever you encounter a discount of greater than seventeen percent, you are to turn to your neighbor and remind them that they are to check the purchase box when the discount is greater than ten percent.

(Instructions for the confederate in the friend and stranger condition do not vary from the alone condition.)

[SUBJECT IS SHOWN HOW TO CALCULATE THE PERCENT DISCOUNT]

[SUBJECT IS GIVEN THREE PRACTICE TASKS]

Group Assignment Instructions:

(Depending on the experimental group that the subject is assigned to, one of twelve instructions will appear.)

Personal and Social Importance (Groups 1, 5 and 9):

As an added incentive if you remember to check the purchase box you will receive an additional ten percent discount on the product as well as give a friend or family member a ten percent discount.

The experiment will begin when you click the next button

Personal Importance (Groups 2, 6, 10):

As an added incentive if you remember to check the purchase box you will receive an additional ten percent discount on the product.

The experiment will begin when you click the next button

Social Importance (Groups 3, 7, 11):

As an added incentive if you remember to check the purchase box you will receive an additional ten percent discount to pass on to your friends or family.

The experiment will begin when you click the next button

No Added Importance, Control Group (Groups 4, 8, 12):

The experiment will begin when you click the next button

[SUBJECT PROCEEDS TO THE EXPERIMENT]

Each subject will be given forty discount calculation tasks. Five of these calculations will be above seventeen percent. The five discounted products may vary by product category

POST-EXPERIMENT WRAP UP QUESTIONS

Value Conscious Scale

54. Please indicate your level of agreement with following statements:

Strongly disagree Disagree Somewhat disagree Neither agree or disagree
 Somewhat agree Agree Strongly agree

I am very concerned about low prices, but I am equally concerned about product quality.

When grocery shopping, I compare the prices of different brands to be sure I get the best value for the money.

When purchasing a product, I always try to maximize the quality I get for the money I spend.

When I buy products, I like to be sure that I am getting my money's worth.

I generally shop around for lower prices on products, but they still must meet certain quality requirements before I buy them.

When I shop, I usually compare the "price per ounce" information for brands I normally buy.

I always check the prices at the grocery store to be sure I get the best value for the money I spend.

Effort and Difficulty Check

55. How difficult did you find calculating the discount percentage to be?

Very Difficult Difficult Somewhat difficult Neutral
 Somewhat Easy Easy Very Easy

56. How much effort do you think you put forth to complete the calculation tasks?

No effort Minimal effort Slight effort Low effort Medium effort
 High effort Maximum effort

57. How clear were the instructions for the calculation of the percent discount?

Unclear Slightly clear Somewhat unclear Somewhat clear
 Moderately clear Extremely clear Perfectly clear

ProSocial Assessment

58. Please rate how true the following statements are in relation to you?

Very untrue Untrue Somewhat untrue Neutral Somewhat true
 True Very true

I am considerate of other people's feelings

I readily share with other individuals

I am helpful if someone is hurt, upset or feeling ill

I am kind to younger individuals

I often volunteer to help

Level of Importance for obtaining discounts

59. Please indicate how important it is for you to obtain discounts for the following group of individuals.

No important at all Low importance Slightly important Neutral
 Moderately important Very important Extremely important

Family _____

Friends _____

Coworkers _____

Neighbors _____

Strangers _____

Manipulation Check

What special task were you instructed to carry out if the discount price was above 17%?

De-briefing form:

Thank you for participating in this study. As mentioned at the beginning, we are interested in a variety of memory attributes and their relation to one another. We were particularly interested in knowing how likely a consumer is to remember to perform at task when distracters are present. We were mainly interested in relationship between the presence of another person in the testing environment and the direction of incentives presented to you the subject.

The pattern of data that you and the other participants in our study provided us with will help us to better understand the role of prospective memory in everyday consumer behavior.

If you are interested in the findings of the study or if you have any questions feel free to contact us: eyadyoussef@gmail.com or 360-389-2456.

Arcsine Transformation Results:

Dependent Variable: Arcsine Transformation of the percent of prospective memory tasks completed

Source	Type III SS	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	76.112 ^a	11	6.919	6.276	.000	.166
Intercept	2075.461	1	2075.461	1882.572	.000	.844
OthersPresent	22.005	2	11.003	9.980	.000	.054
Importance	45.944	3	15.315	13.891	.000	.107
OthersPresent * Importance	8.162	6	1.360	1.234	.288	.021
Error	383.656	348	1.102			
Total	2535.229	360				
Corrected Total	459.768	359				

a. R Squared = .166 (Adjusted R Squared = .139)

Dependent Variable: Percent of Prospective memory tasks completed

Source	Type III SS	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	8.294 ^a	11	.754	6.762	.000	.176
Intercept	216.225	1	216.225	1939.271	.000	.848
OthersPresent	2.454	2	1.227	11.005	.000	.059
Importance	4.880	3	1.627	14.590	.000	.112
OthersPresent * Importance	.959	6	.160	1.434	.201	.024
Error	38.801	348	.111			
Total	263.320	360				
Corrected Total	47.095	359				

a. R Squared = .176 (Adjusted R Squared = .150)

Top 10 Web Brands (The Nielsen Company, 2010)

Month	Brand	Unique Audience (000)	Time per person (hh:mm:ss)
January 2010	1. Google	153,056	1:26:22
	2. Yahoo!	137,459	2:29:04
	3. MSN/ Windows Live/ Bing	116,804	1:50:14
	4. Facebook	116,329	7:01:41
	5. Youtube	99,525	1:02:27
	6. Microsoft	98,180	00:41:36
	7. AOL Media Networks	87,629	2:14:12
	8. Apple	68,877	1:18:58
	9. Wikipedia	64,917	00:15:59
	10. Fox Interactive Media	63,925	1:23:09
February 2010	1. Google	153,833	1:11:42
	2. Yahoo!	134,142	2:18:35
	3. Facebook	118,813	6:27:43
	4. MSN/ Windows Live/ Bing	118,087	1:40:11
	5. Youtube	98,723	00:57:23
	6. Microsoft	96,433	00:38:46
	7. AOL Media Networks	85,992	1:56:56
	8. Wikipedia	66,967	00:13:50
	9. Apple	64,315	1:12:11
	10. Fox Interactive Media	59,631	1:04:01
March 2010	1. Google	149,129	1:18:58
	2. Yahoo!	131,392	2:35:06
	3. Facebook	117,109	6:59:15
	4. MSN/ Windows Live/ Bing	111,493	1:51:14
	5. Youtube	92,450	1:00:23
	6. Microsoft	89,262	00:43:36
	7. AOL Media Networks	85,140	2:14:38
	8. Wikipedia	62,074	00:15:19
	9. Apple	60,979	1:17:01
	10. Ask Search Network	56,182	00:12:32

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