Chapter One

Introduction
Chapter-One

Introduction

“Which were the three most important memory problems you had in the last week?” we put this question to all participants who attended memory training classes in an adult education institution in a midsized German town over the last two years. Of those interviewed, 62% indicated that at least one of the problems concerned the delayed execution of an intended action, e.g.; forgetting to give someone a call. This type of memory task has been labeled as prospective memory and interest in this rather new field of cognitive psychology is growing.”

(Brandimonte, Einstein, & Mc Daniel, 1996)

Unanimously accepted definition of memory describes it as a process by which information is encoded, stored and retrieved. However, this statement is not only true for the information related to past events rather it also holds true for remembering previously planned intentions that are to be implemented in future. Whereas, the term prospective memory (henceforth PM) refers to the ability to remember to carry out delayed intentions, more precisely, to remember to initiate and execute an intended action at some point in the future (Brandimonte, Einstein, & McDaniel, 1996; Kliegel, McDaniel et al., 2008). Examples of everyday prospective memory tasks are - to remember to do one’s homework, to take a cake out of the oven or to take medicine at a certain time.
The memory system is one of the most extensively studied topics by the researchers interested in human cognitive processes. Within this realm, most of the scholarly studies were concerned with remembering information or events from the past, which is termed as retrospective memory (henceforth RM) or retrospective remembering (e.g. Baddeley, 1990). By contrast, only a relatively small number of studies have addressed to another kind of memory ability, i.e. the ability to plan and remember to execute activities in the future. This distinct form of memory is referred to as PM (Brandimonte, Einstein and Mc Daniel, 1996). There are significant reasons to support why research in PM is relevant:

(1) It has great relevance in everyday life. Researchers have reported that 50-80% of all everyday memory problems are, at least to some extent, PM problems (e.g. Crovitz & Daniel, 1984; Terry 1988).

(2) PM has vast clinical relevance. In a study investigating patients attending the Heidelberg memory clinic, to date, about 40% of the patients have reported PM problems as their main symptoms (Kliegel & Martin, 2003). Several studies have also addressed the question of PM problems in neuropsychological patients (e.g. Fortin, Godbout, & Braun, 2002). However, recent efforts are being done concerning the mechanisms of these impairments (Kopp & Thone-Otto, 2003) as well as strategies of rehabilitation (Thone-Otto & Walther, 2003).

(3) PM research is of enormous theoretical relevance. Focusing on similarities and dissimilarities between PM and memory for previously learned information or RM (Guynn, Mc Daniel & Einstein, 2001, p.25). However, with immense work and recent researches on this topic, the concepts of PM, in general, are being advanced.
In sum, the present research focuses on exploring the potential correlates of PM which could be helpful in understanding the functioning of PM.

1.1 Differences in prospective and retrospective memory (“What”)

PM is contrasted with RM, which reflects the ability to remember information from the past, including processes of recall and recognition of previously acquired information (e.g. Craik, 1986). Typical everyday tasks requiring retrospective memory are to remember a phone number, to remember the name of familiar people or to recall moments from the last holiday. Therefore, externally prompted retrieval is a feature of RM tasks, while PM tasks are characterized by self-initiated retrieval of delayed intentions.

The current research also focuses on understanding the relationship between PM and RM. Addressing to the multiple views on the distinction between PM and RM, this research aimed to understand PM and the factors which affect it. Further, this research also aimed to study the relationship between PM and affective states. Since the role of affect on RM is extensively studied and researched, the question which is yet to be answered is whether affects effect PM performance too.

1.2 Understanding Prospective Memory

Researchers have distinguished between RM and PM as a memory for ‘content’ and memory for ‘intent’ respectively, (Kvavilashvili, 1987). The present research’s major focus is on understanding the memory for carrying out delayed intentions, i.e. prospective memory and to relatively highlight the factors that distinguish it from the memory for recalling past events or content; RM.
1.2.1 **Nature of prospective memory:** - the term PM refers to remembering to perform an intended action at some time in the future; in other words,’ remembering to remember”, (Harris, 1984). PM is defined as the ability to do previously planned actions in the future (Groot et.al. 2002). The term PM has been studied under various labels; ‘remember a plan of action’ (Cohen, 1996); ‘intention memory’ (Kuhl & Kazen 1999); ‘remembering intentions’ (Ellis, 1996) and ‘memory for future actions’ (Einstein and Mc Daniel, 1996).

Moreover, the capacity to shape and direct future behavior is of fundamental importance in the development, pursuit, and maintenance of an independent and autonomous lifestyle. It is largely dependent on the ability to enact intended actions at an appropriate moment in the future.

1.2.2 **Subdomains of prospective memory:** - an attempt has been made to postulate the subdomains of PM. According to Graf & Uttl (2001) PM can be understood in terms of its three subdomains’ namely:

1) Prospective memory proper

2) Vigilance and monitoring

3) Habitual prospective memory

The researchers have put forth that the function of PM proper is to bring back to awareness previously formed plans and intentions at the right time and place and thereby, allowing to act upon those plans and intentions. Thus, the function of PM is to bring the plan back to consciousness at the right time and place when approaching a PM cue.
Vigilance differs from PM proper as in vigilance the plan remains in the consciousness (Graf & Uttl, 2001; Einstein, Smith, Mc Daciel & Shaw, 1997; Mecham & Leiman, 1982). Vigilance tasks are those where an intention is maintained in consciousness until it needs to be executed. By contrast, for PM proper, intentions are not maintained in consciousness through the retention interval, while performing an ongoing task.

Vigilance and PM proper are regarded as part of a continuum of possible PM functions (see fig.1.). At one end of this continuum, the PM tasks dominate working memory and conscious awareness during the retention interval. At the other end, the PM proper end, the plan is out of working memory during the retention interval and conscious awareness is focused on competing activities. Graf & Uttl (2001), further postulate that what varies along the continuum is the proportion of available processing resources that are allocated to the prospective task during the retention interval. Whereas for vigilance; all or most of the available resources are allocated for competing activities.

![Fig.1.1 Shows resource allocation for vigilance and prospective memory tasks. A conceptual model (Graf. And Uttl, 2001)](image)

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In the case of habitual PM, a plan is made, leaves consciousness and needs to be brought back to the consciousness repeatedly at all time the PM cue calls for the plan’s performance. Thus, in PM proper the task changes from time to time; whereas in habitual memory tasks, there is repetitiveness. The term PM is commonly used to describe the means by which one succeeds or fails in carrying out activities like performing a previously planned action. Thereby, it is important to identify the key set of processes that are carried out in executing PM tasks.

1.2.3 Prospective memory stages and intention

Intention can be defined as a person’s readiness to act in a certain way in future (Kvavilashvilli & Ellis, 1996). Searle (1983) distinguished between two kinds of intentions: prior intention and intention-in-action. The former can be understood as the intention which is formed prior to action, while the latter is not associated with prior intention. A prior intention is always the result of conscious decision to act in a certain way (Brand, 1984; Nuttin, 1987). Further, a prior intention can be categorized as immediate intention or delayed intention. Under immediate intention, individuals start realizing their intention just after the formation of an intention. Under delayed intention, on the other hand, they postpone their intention for realization at some point in future.

PM involves delayed intention. Though PM failures are common in daily life, they are not the only source of failures that occur during performance of everyday activities. For example, errors of absent-mindedness may occur because of failure to realize immediate intention, whereas PM failure takes place at retrieval of the intended action. Intention can be categorized in relation to the various phases of PM stages, namely, encoding, storage, retrieval and performance as shown in Figure 1.2. A brief description of these stages follows.
Figure 1.2. Schematic representation of types of delayed intention classified according to variations at the encoding, storage, retrieval and performance phases of PM. (Source: Brandimonte, Einstein, and McDaniel, 1996).

1.2.3.1 Encoding

As mentioned in Figure 1.2, PM begins with the encoding of the intention. At the encoding stage of PM, intention can be simple or difficult; self- or other-generated; important or unimportant; and pleasant, neutral, or unpleasant. The intention that is formed as a result of the simple or momentary decision is most likely to be forgotten. On the other hand, intention formed as a consequence of a difficult decision is hard to forget.

Difficult decisions involve reorganization of activities, prioritization of activities and examination of future opportunities. A difficult decision requires an elaborate and distinctive processing of intention. This makes forgetting less likely than intention formed by a simple decision (Kvavilashvili, 1992a).

Intention can be further divided into self-generated or other-generated (Cohen, 1989; Ellis & Nimmo-Smith, 1993). The self-generated intention is formed out of a
personal need to do something in future, whereas other-generated intention arises out of demand from someone else. The self-generated intention is based on the intrinsic need of the person. Thus, there is a high probability of realizing self-generated intention successfully. Intention can be either important or unimportant. Important intention involves more integrative and organizational processing than unimportant intention. This leads to less forgetting of important intention.

Another distinction of intention at encoding stage is based on the emotional tone of the intention. According to Kvavilashvili and Ellis (1996), both unpleasant and pleasant intentions are equally likely to be remembered. But according to the Freudian concept of repression, pleasant intentions are more likely to be remembered than the unpleasant ones (Meacham & Kushner, 1980). However, these observations have been made in contexts other than PM.

1.2.3.2 Storage

Both short and long retention intervals are central to RM research. Baddeley and Wilkins (1984) argued that the same distinction can also be applied to PM. They divided intention into short-term and long-term intention. For example, an intention to take medicine in 5 minutes is qualitatively different from an intention to attend a meeting next month.

The study of short-term intention has been done using only laboratory methods. On the other hand, the long-term intention has been studied in natural settings (Kvavilshvili & Ellis, 1996). According to Dobbs and Reeves (1996), there is no clear division between short and long delay with respect to PM. In an experiment conducted by
Nigro and Cicogna (2000) to investigate the effect of delay on PM, the delay did not affect PM performance.

However, PM gets affected by the interference from interpolated activity (Ellis & Nimmo-Smith, 1993; Wichman & Oyasato, 1983). Kvavilashvili (1987) demonstrated a reliable effect of the intervening period from retention interval to performance interval using unimportant intentions, but no such effect was found with important intentions.

1.2.3.3 Retrieval

During the retrieval phase, the to-be-remembered intention is either recalled or forgotten.

The nature of to-be-realized intention varies in the following ways (Brandimonte, Einstein, & McDaniel, 1996):

(i) Event, time, or activity based intentions;

(ii) Pure or combined intentions;

(iii) Episodic or habitual intentions; and

(iv) Pulse, intermediate or step intentions.

Kvavilashvili (1990) distinguished three distinct kinds of PM tasks: (i) event-based, (ii) time-based, and (iii) activity-based. Contrary to this, Einstein and McDaniel (1990) have distinguished between event-based and time-based PM, whereas Harris (1984) has distinguished between appointment-keeping intention (time-based) and intention to do one thing before or after another (event-based). According to Einstein and McDaniel (1990), event-based PM task involves an external cue, whereas there is no external cue in the realization of a time-based PM task. Time-based PM realization
requires self-initiated retrieval processes. This could be one possible reason for the difficulty in remembering in time-based PM tasks (Craik, 1986). Activity-based tasks are probably easiest to realize. Unlike event-based and time-based tasks where there is an interruption of an ongoing task, activity-based tasks involve PM performance after completion of an ongoing task (Kvavilashvili, Kornbrot, Cockburn, & Milne, 1997).

In real life situations, retrieval can be either pure (time- or event-based) or in a combination of both event and time-based intentions (Ellis, 1996). In a study conducted by Loftus (1971), it was found that when there was a combination of intentions, the probability of success was greater than in the case of pure intention.

Another distinction has been made on the basis of regularity with which a retrieval occasion takes place. Meacham and Leiman (1975) made a distinction between episodic and habitual intentions. Episodic intentions are performed irregularly and infrequently, for example, going to receive somebody at the airport. On the other hand, habitual intentions are those that are performed on a regular basis, such as brushing one’s teeth every morning.

Episodic intentions have been further categorized into single and repeated intentions (Kvavilashvili, 1992b). A single intention has to be remembered only on one occasion in response to a single retrieval occasion. On the other hand, repeated intention is one that has to be remembered several times in response to recurring retrieval occasions. Meacham and Singer (1977) found no reliable difference between episodic and habitual intentions, but a study conducted by Andrzejewski, Moore, Corvette, and
Hermann (1991) to explore the relationship between these two kinds of intentions revealed a significant distinction between the two.

Intention can also be distinguished on the basis of the temporal specification of a retrieval occasion (Ellis, 1988a). Intentions may be required to be realized either within a narrow time interval (attending a meeting in an hour) or within a long period of time (visiting someone in the evening). The former is called pulse intention, and the latter as step intention. The intentions that lie between these two intentions are called intermediate intentions.

### 1.2.3.4. Performance

One of the defining features of PM is the retrieval of an intention at an appropriate moment. Although performance phase is not as important as retrieval phase, it does affect PM by influencing retrieval processes.

There are two kinds of intentions at the performance phase:

(i) Momentary, short, or long intention and
(ii) One- or two-stage intention.

The former is referred to as intention based on temporality and the latter as intention based on a number of actions/stages (Brandimonte, Einstein, McDaniel, 1996).

Momentary intentions are those that are executed within a few seconds or minutes, for example, switching off the oven after baking the cake. Short intentions require the realization of intention for more than few minutes but less than an hour. On the other hand, long intentions involve long execution time (more than an hour).
The second categorization is based on the number of actions one has to remember to perform the PM task successfully. In one-stage intentions, only one action has to be remembered, while for two-stage or multistage intentions, two or more than two actions are necessary.

1.3 Theories of Prospective Memory

PM is one of the most infant concepts in the area of cognitive psychology. Many psychologists have proposed their own theories to explain the nature and functioning of prospective memory. In the following section, some of the major theories are being reviewed.

1.3.1 Model of Attentional Control of Behavior: -Many psychologists have made an attempt to identify the processes underlying PM. The earliest approach was a model of the attentional control of behavior (Norman & Shallice, 1986). This model accounts for the retrieval of PM in the context of other ongoing behavior.

The first component of this model is contention scheduling which is used to control the behaviors that are routine and it also selects thought schemas or action schemas when it is sufficiently activated or its trigger conditions are met. The second component of this model is the executive or supervisory attentional system which is used to control the behavior. Its main function is to bias the contention scheduling by increasing the activation of unintended schemas. Its function is to monitor the environment for markers or target events.

1.3.2 Preparatory Attentional and Memory Processes (PAM) theory: -One of the most influential approaches is the PAM theory (Smith & Bayen, 2005). The PAM theory
proposes that there are two kinds of processes which are always involved in successful PM performance.

First the monitoring process, which begins when an individual forms an intention and is maintained until the entire action is performed. Monitoring makes use of capacity consuming processes such as those involved in attention. Second, there is an involvement of RM processes. These processes are required to discriminate between PM targets and non-targets and in the recollection of intended action. Thus, RM ensures that one remembers what it is that is supposed to be done in the future and the monitoring process is needed so that the required action is performed when the appropriate circumstances occur.

1.3.3 Multi-Process Theory: Einstein & Mc Daniel (2005) disagreed with the notion that successful PM performance always involves active and capacity consuming monitoring. They argued that sometimes the PM tasks are performed automatically without the need for active monitoring. Furthermore, they proposed the multi-process theory which suggests that there are various cognitive processes (including attentional processes) which can be used to perform PM tasks.

However, they stated that the detection of cues for a response on a PM task will typically be automatic (and does not involve the use of attention process when at least one of the following conditions is fulfilled:

1) The cue and the to-be- performed target action are highly associated.

2) The cue is conspicuous or salient.
3) The ongoing processing on another task being performed at the same time as the PM task directs attention to the relevant aspects of the cue.

Thus, the positive aspect of the multi-process theory is that the processing demands of a PM task do seem to depend on the three factors identified above. However many researchers (Einstein, Mc Daniel, Thomas, Mayfield, Shank, Marisette and Breneiser(2005) believe that even PM tasks which should-theoretically- be performed automatically and without monitoring nevertheless seem to involve (although sometimes significant) costs.

1.4 Models of Prospective Memory

The immense interest in the topic of PM is evidenced by the presence of literature of multiple frameworks for explaining the processes of PM (Guyn, Mc Daniel & Einstein, (2001), Einstein & Mc Daniel,1996a; Ellis,1996; Goshke& Kuhl, 1996).

1.4.1 Automatic Association Activation Framework is given by Guyn, Mc Daniel, and Einstein (1996). This framework is based upon Moscovitch’s (1994) model of episodic memory. They assumed that PM depends upon “the reflexive associative memory model”. The associative module is a proposed memory system which transfers a memory trace to consciousness if there is sufficient cueing; that is if there is a sufficient interaction between a cue and the trace. According to Guyn, McDaniel and Einstein’s framework (1996), the role played by associative memory module is quite similar. Thus, when a prospective memory target event is consciously processed, it moves into the automatic associative module.
Furthermore, if there is a sufficient interaction between the target and the memory trace that represents the action that is to be performed then that trace will be activated and the action will be automatically brought to consciousness. Following this automatic activation a strategic component, thought to be associated with the frontal lobes, comes into play. The role of this strategic frontal subsystem is to schedule activities or tasks.

The performance of an intended activity begins when a target that is attended to (consciously processed) will be fed into the automatic associative module. If there is sufficient interaction between the target and the trace of the intended action then the action will be brought to mind.

Thus, the action will be brought into consciousness. Failure to perform an action could occur when the target does not sufficiently interact with the trace of the intended action and the action is not brought to mind or because it may have been brought to mind but individual’s resources are insufficient to carry out task (frontal subsystem is overloaded, damaged or deteriorated then the intended action will not be maintained).

To summarize, if a PM target event is consciously processed, the input to the associative activation module is automatic. Once in the automatic associative module, if there is sufficient interaction the target and the representations encoded at the time the action was planned then the representation of the action will be activated and the action will be brought into consciousness.

Furthermore, once the action is activated, if there is sufficient capacity available to the frontal lobe subsystems to allow the intended and concurrent actions to be held in mind then the action will be performed.
1.4.2 Ellis’ Framework (1996): This framework is presented by Ellis (1996). According to this model, the PM task is divided into five phases:

Phase I comprises of formation and encoding of intention and action, it deals with retention of the content of a delayed action. Therefore, phase-I is concerned with three aspects of intention: what one intends to do, that one intends to do something, & when the task should be performed.

The ‘when’- aspect refers to the earlier mentioned retrieval context. The retrieval context “describes some characteristics of a future occasion that should prompt the retrieval of a delayed intention” (Ellis, 1996, p.5). These characteristics could be events, times, persons, locations etc. The what, that and when elements of Phase I make up the content of a PM task. This content is considered to be the retrospective component of a PM task.

The second and third phase refers to the interval of time. Phase-II, the retention interval is the interval between the encoding of the intention and the start of phase-III, i.e. the performance interval. The retention interval could be of any length and it is the delay part of the delayed interval. During the retention interval, the action schema may be recollected.

This recollection process would result in increased activation and could result in re-planning that might increase the possibility of eventual performance. As re-planning might lead to a better encoding of the trigger conditions which would make retrieval during the performance interval more likely. The performance interval is the period of time during which the intended action should be retrieved.
The processes that occur in Phase –III are considered, the prospective component of a PM task. Phase IV & Phase V are concerned with the actual performance of the action. Phase IV is made up of initiation and execution of the action. Determining whether completion as successful; & monitoring when a task has already been performed makes up phase-V, the execution of outcome phase.

PM performance: performance of an intended action depends on both the prospective and retrospective component. Recall that the retrospective component consists of the content of the intention. Ellis (1996) describes that the content is represented as an action-trigger-schema or ATS (Norman, 1981; Rumelhart & Norman, 1982). An ATS refers to a schema with a particular level of activation that represents the action with a particular level of activation that represents the action along with the trigger conditions. When the activation level of an ATS reaches the action threshold, that, action schema is selected. The activation of an ATS depends upon the triggering conditions being met.

The three elements of Phase I influence the action-trigger-schema. The what composes the action which determines which schema is used. The schema could be either an existing schema or a schema that is the result of modifying and elaborating existing schemas. The when provides the retrieval context, which serves to designate the trigger conditions for that action, to form the ATS, and both are associated with the ‘that’ i.e. the intent. The intent affects the ATS by giving it an intentional status which “might be expected to exert an influence on the activation level of that action” (Ellis, 1996, p.6).

Ellis (1996) specifies that activation level fades quickly and there must be more to PM performance than just the increased activation levels that are established at the time
of encoding. Ellis suggests ‘that variations in intentional status are likely to be reflected in the threshold value associated with a particular action schema’ (Ellis, 1996, p.6.) Thus, ATSs that are associated with an intention require less activation to come to mind, not because they have an increased level of activation, but rather because the amount necessary to reach consciousness is reduced for this particular schema (Smith & Rebekah, 1999).

Also, the retrospective component must be activated during the performance interval in order for the delayed intention to be achieved. This will happen if the trigger conditions are met. Therefore, if the retrieval context matches the retrieval context of the ATS representation at some point during the performance interval, then the ATS will be retrieved and the action will be initiated (Smith & Rebekah, 1999).

An additional factor that Ellis’s (1996) framework states are whether or not a performed delayed intention is similar to the frontal subsystem in the automatic associative activation framework. The supervisory system (Shallice & Burgess, 1991) regulates scheduling of activities by activating or inhibiting certain schemas. This system depends upon either hierarchical retrieval or brute retrieval.

Hierarchical retrieval works through a structured representation; example representation of daily routine. One’s daily routine contains anchor points activities that signal activity transition points associated with particular clock times. These can be used to signal appropriate times for the performance of a delayed action. While brute-retrieval depends upon particular markers.
It seems that certain types of PM tasks require that the trace of the intended action be a sufficient marker ‘to be’ retrieved on its own merits (Tulving, 1983, p.200). Thus, performance would be determined by the activation level of the action component of the ATS.

The kind of retrieval used will also depend upon the type of the task. Ellis distinguishes between Pulses and Steps (Ellis, 1996). A pulse must be performed at a particular clock time (e.g. make a phone call at 10:00 am). A step must be performed during a less specific time window (e.g. make a phone call sometime today).

Pulses are more likely to be retrieved through hierarchical retrieval thus will be associated with a restructuring of the Daily plan representation. Steps on another hand will rely more frequently on Brute retrieval: the representation of action should have either increased activation or decreased threshold.

Whether hierarchical or brute retrieval is used they both depend upon the activation of the ATS during performance interval. In the latter case, this activation depends upon the nature of the daily routine representation, while the former depends more upon the particular nature of the ATS for the specific action.

1.4.3 Goshke and Kuhl’s Framework: the representation of an intended action also plays an important role in Goschke and Kuhl’s (1996) framework. They begin with a propositional network and certain terminology which is quite similar to Elis’s (1996) framework. There is a familiar use of the retrospective and prospective component distinction in Goschke and Kuhl’s (1996) framework.
However, the components are not always referred to in exactly these terms. Goschke and Kuhl (1996) refer to studies that use performance of the action as the dependent measure of interest as studies focused on the prospective aspect. The term retrospective component refers to the representation of the content of the intention in their framework and it holds primary focus. According to them, understanding the performance of postponed intentions must involve a thorough analysis of memory for the intentions. Acknowledging the importance placed on the representation of the content of an intention, a description of the representation is given herewith.

The representation: the content of an intention consists of four parts in this framework. The first two elements, the what and the when, are the same as those found in the action trigger schema of Ellis (1996). The what consists of the action that is to be performed. Whereas the when consists of the condition under which the action should be performed.

The third part is the agent of the action for example “I intend to perform, I am the agent.” Thus, “I” is the part of the content. The intent is included in the retrospective representation, but rather just being associated with a schema as it was in the model of Ellis, Intent determines the relationship between the ‘what’, the ‘when’, and the ‘I’. Intent joins the ‘I’ and the ‘what’ and the ‘when’ to form an ‘I will’ relation.

Thus, the four parts of an Intended action are:

1) What- the intended action object node,

2) When- the retrieval context node,

3) I-the agent node, and
4) The intent-the node representing the relationship between the other three nodes

The representation of these elements is part of a propositional network model (Kuhl, 1986). The representation is a relationship between nodes. Once this representation has been established there are several factors that will be retrieved. Activation of intention is a key. This activation can occur either because of a high degree of overlap between the retrieval context and the representation of the execution condition as stored in the when node.

Furthermore, Goschke and Kuhl (1996) explains that intention does not just increase the level of activation momentarily, rather a particular node is an intention node means that it will not lose its activation as quickly as other nodes, even in the absence of rehearsal. This maintenance of activation is referred to as persistence.

Accomplishing postponed intention is determined by which form of persistence is involved. There are four forms of persistence-two of which are involved in fairly automatic intention performance. These are procedural and implicit respondent persistence. Procedural persistence is associated with well-practiced actions that have highly specified retrieval context. Implicit respondent persistence is associated with intentions that have a less well-learned action that must be accomplished in a retrieval context that is not as clearly defined. Both of these forms of persistence are initiated by external cues. In contrast, the third form of persistence—associated must be in a more self-initiated way (called the explicit operant intention). This contrast is similar to the event-based/time-based distinction used by Einstein and Mc Daniel (1996).
An important point for differentiating implicit respondent and explicit operant intentions depend upon their heightened level of activation alone for initiation. The final form of persistence, involuntary explicit persistence, is related to the intentions that have some sort of detrimental result associated with failure to perform the intentions or intentions that have some sort of detrimental results associated with the failure to perform the intentions or intention that are perhaps difficult.

The representation of these intentions can come to mind frequently and can be intrusive. Whether the intention depends upon environmental cues or is more self-initiated depends upon the nature of particular intention. This, in turn, will determine how the action is initiated (Rebekah & Smith, 1999).

1.5 Outline of the Chapters

Following this Introduction, the next chapter consists of Review of Literature. In this chapter relevant historical account of correlates of Prospective Memory, including cognitive and non-cognitive factors are discussed. It is followed by a section about Objectives of the present research. This chapter ends with research questions.

This chapter is followed by Chapter-Three which includes Study 1 titled ‘Role of gender and depressive symptoms on prospective memory’. This chapter consists of three sections within which – Method, findings of the study are presented and discussed.

This chapter is followed by Chapter-Four which includes study 2 titled ‘Understanding everyday prospective memory, the role of nature of the task, importance
of the task and depressive symptoms on prospective memory’. This chapter consists of three sections within which – method, findings of the study are presented and discussed.

This chapter is followed by Chapter-Five which includes study 3 titled ‘Understanding the nature of prospective memory among patients of substance abuse’. This chapter consists of three sections within which – method, findings of the study are presented and discussed.

This dissertation ends with Chapter-6, which is named as General Discussion. In this chapter findings of all the three studies are summarized as well as discussed and compared with previous studies. At the end of this chapter, limitations of the present work and prospective research in this particular area have been suggested.