Contents

MONDAY, 17th July

9: 30 Registration

10: 45 Welcome Talk: **Overview of the Conference**

THEME: AGEING AND PROSPECTIVE MEMORY

11: 00 **Event-cued ProM Proper differences in old age**
B. Uttl, Oregon State University; P. Graf, University of British Columbia

11: 20 **Effect of working-memory demand on prospective memory in young, young-old and old-old individuals**
D. Shum, A. Toivanen, L. Hohaus, Griffith University

11: 40 **Remembering event-, time-, and activity-based tasks in young, young-old and old-old adults**
L. Kvavilashvili, D. Kornbrot, V. Mash, University of Hertfordshire; J. Cockburn, University of Reading; A. Milne, University of Aberdeen

Keynote Lecture

12: 00 **Prospective memory across the lifespan**
E.Maylor, University of Warwick

1: 00 ***Lunch***

2: 30 **Determinants of prospective memory decline in the aged population**
F.A. Huppert, University of Cambridge; T. Johnson, MRC Biostatistics Unit; J. Nickson, Institute of Public Health, Cambridge

2: 50 **Naturalistic prospective remembering in ageing and dementia: Neuropsychological aspects**
G.J. Kinsella, B. Ong, R.L. Hester, La Trobe University; E.Storey, Department of Neurosciences, Alfred Hospital

3: 10 **Are prospective memory measures of the RBMT more vulnerable to cognitive impairment than retrospective memory measures?**
J. Cockburn, University of Reading; J. Keene, University of Oxford; T. Hope, Institute of Health Sciences, Oxford

3: 30 ***Tea / Coffee***

4: 00 **The relationship between prospective memory and executive functioning in young, young-old, old-old and brain injured adults**
C. Mateer, I. Friesen, S. Mish, H. Tuokko, University of Victoria

4: 20 **The Neuropsychology of prospective memory: The role of central executive functions**
M. Martin, M. Kliegel, German Centre of Research on Ageing, Heidelberg; M.A. McDaniel, University of New Mexico; G.O. Einstein, Furman University

4: 40 **Counting on prospective memory: Advantages of logistic and log linear models over ANOVA and Correlations**
D. Kornbrot, University of Hertfordshire

Keynote Lecture

5: 00 **Age-related changes in prospective memory: Empirical findings and theoretical reflections**
F. Craik, University of Toronto

19: 00 ***POSTER SESSION and extended wine reception with buffet***

TUESDAY, 18th July

THEME: COGNITIVE RESOURCES IN PROSPECTIVE MEMORY

9: 10 **Resource allocation and prospective memory test performance**
L.M. Harris, S.R. Cumming, R.G. Menzies, University of Sydney

9: 30 **Successful initiation of delayed intentions require capacity**
R.E. Smith, Georgia Institute of Technology

9: 50 **Two processes underlying spontaneous nature of prospective remembering**
T. Morita, Kansai University

10: 10 **Effect of concurrent task processes and divided attention on prospective remembering**
D. McGann, University of Portsmouth; J. Ellis, University of Reading; A. Milne, University of Aberdeen

10: 30 *Tea / Coffee*

11: 00 *Outing to Hatfield House and Lunch*

Bus leaves at **11: 00**.
Guided tours at **12:10** and **12:20**.
Bus returns at **2:20**

THEME: REPRESENTATIONS OF INTENTIONS AND PLANS

2:50 **The encoding and representation of delayed intentions**
J. Freeman, J. Ellis, University of Reading

3:10 **Representation of plans: Activation in memory**
H. Watanabe, J. Kawaguchi, Nagoya University

3: 30 ***Tea / Coffee***

THEME: NON-COGNITIVE VARIABLES IN PROSPECTIVE MEMORY

4:00 **"Please, remind me...": The role of others in prospective remembering**
E.G. Schaeffer, M. Laing, University of Winnipeg

4: 20 **Anxiety, depression, and prospective memory task performance**
S.R. Cumming, L.M. Harris, University of Sidney

4: 40 **Prospective memory and pregnancy**
P.G. Rendell, A. Cambrell, Australian Catholic University

Keynote Lecture

5: 00 **Noticing intention-related events: The role of task switching, production rules, and executive control**
J.L. Hicks, Louisiana State University; R.L. Marsh, University of Georgia

19: 30 ***Conference dinner in St. Albans***

Bus leaves at **19: 15**
Bus returns at **11: 30**

WEDNESDAY, 19th July

THEME: NEUROPSYCHOLOGY OF PROSPECTIVE MEMORY

9: 30 **Frontal lobe hypothesis and prospective memory**
G. d'Ydewalle, E. Brunfaut, W. De Bruycker, University of Leuven

9: 50 **Role of executive functions and memory processes in delayed intentions after head injury**
U.A. Kopp, A.I.T. Thöne, University of Leipzig

10: 10 **Everyday planning and organisational deficits in patients with frontal lobe lesions**
E.C. Miotto, R.G. Morris, Institute of Psychiatry, London

10: 30 *Tea / Coffee*

11:20 **Neural correlates of prospective memory**
R. West, S. Crewdson, University of Notre Dame

11:40 **Brain regions responsible for time-based and event-based prospective memory tasks: A positron emission tomography study**
J. Okuda, T. Fujii, A. Yamadori, H. Ohtake, T. Tsukiura, K. Suzuki, R. Kawashima, H. Fukuda, M. Itoh, Tohoku University

Keynote Lecture

12: 00 **The cognitive neuroscience of prospective memory**
P. Burgess, Institute of Cognitive Neuroscience, University College London

1: 00 *Lunch*

2: 30 **Neural bases of prospective memory**
S. Umeda, Keio University; M. Kato, Tokyo Dental College Ichikawa General Hospital; T. Koyazu, Keio University

2: 50 **Prospective memory in Parkinson's disease**
P.S. Bisiacchi, University of Padua

3: 10 ***Discussion*** (Discussant - P. Burgess)

3: 30 ***Tea / coffee***

THEME: PROSPECTIVE MEMORY IN CHILDREN

4: 00 **Prospective memory in children: The effects of age, type of task and practice**
D. Messer, F. Kyle, L. Kvavilashvili, University of Hertfordshire

4: 20 **Remembering event- and activity- based tasks in children with word finding difficulties and controls**
J. Dockrell, R. George, South Bank University; D. Messer, L. Kvavilashvili, University of Hertfordshire

4: 00 **A comparison of prospective memory in children with and without ADHD using the CyberCruiser paradigm**
K.A. Kerns, University of Victoria

Keynote Lecture

5: 00 **Prospective memory retrieval and delayed execution: Multiple memory processes and age-related effects**
M.A. McDaniel, University of New Mexico; G.O. Einstein, Furman University

6: 00 ***Conference ends***

ICPM - Posters

POSTER SESSION

There will be a poster session in the evening of Monday, 17 July, starting at 19:00 p.m.
Posters will remain on display until Wednesday afternoon.

THEME: AGEING AND PROSPECTIVE MEMORY

1. **Individual differences in prospective memory performance: Some methodological considerations**
   P.T. Smith, J. Cockburn, University of Reading

2. **Prospective memory and ageing: A quantitative review**
   A.R. Birt, P. Graf, University of British Columbia

3. **Prospective memory and ageing: Effect of divided attention and type of task**
   B. De Germain, B. Le Bouedec, University d'Angers

4. **Ageing and prospective memory: Multiple task design related to personality and metamnestic beliefs**
   M. Occhionero, M. Mereu, University of Bologna; G. Nigro, University of Naples; P.C. Cicogna, University of Bologna

5. **Prospective memory and planning: Good plans help younger and older adults**
   M. Kliegel, M. Martin, German Centre for Research on Ageing, Heidelberg; M.A. McDaniel, University of New Mexico; G.O. Einstein, Furman University

THEME: PROSPECTIVE MEMORY IN NORMAL ADULT POPULATION

6. **Prospective memory task performance using vertual reality**
   B.M. Brooks, C. Robinson, F.D. Rose, E.A. Attree, University of East London

7. **Type of rehearsal and prospective memory for psychotherapeutic homework assignments**
   K.D. Arbuthnott, University of Regina; D.W. Arbuthnott, Bastian Arbthnott & Associates

8. Incidental reminding: The effects of direct and indirect cues on prospective memory
D.J. Walker, J.A. Ellis, University of Reading

9. Availability of external memory devices in everyday prospective memory situations
K. Kobayashi, Shizuoka University

10. Cancelling delayed intentions: Implications for everyday planned actions
P.M. Dockree, J.A. Ellis, University of Reading

11. Fractionation of prospective memory: Evidence from dual task experiments
P.S. Bisiacchi, A. Pichler, University of Padua

12. Cognitive resources that enable event-based prospective remembering
C. Jacova, P. Graf, University of British Columbia; B. Uttl, Oregon State University

13. Can Suppressing a thought lead to enhanced prospective memory ?
J. Erskine, University of Hertfordshire

14. Recreation drug use and prospective memory: A preliminary study
T.M. Heffernan, University of Northumbria; J. Ling, University of Teeside

15. Using multiple tasks to investigate the role of learning in retrospective and prospective memory
J. Wilson, University of Wales

THEME: NEUROPSYCHOLOGY OF PROSPECTIVE MEMORY

16. Novel measures for the assessment of prospective memory
S.A. Raskin, C.A. Buckheit, Trinity College

17. Cognitive rehabilitation of prospective memory deficits following brain injury
S.A. Raskin, C.A. Buckheit, Trinity College

18. Prospective memory in the real world: Which abilities are the best predictors in a head-injured sample?
A.H. Quayle, Institute of Cognitive Neuroscience, University College London

19. Executive dysfunction in schizophrenia: An explanation of deficits in prospective memory
S.J. Ouriache, University of Hertfordshire

ALPHABETIC LIST OF ABSTRACTS

Prospective memory while performing a set-switching task: Effects of cue distinctiveness for young adults, traumatic brain injured patients and matched controls

K.D. ARBUTHNOTT, A.A. AFSAR, & D.P. ALFANO

Department of Psychology, University of Regina, Regina, SK S4S OA2, Canada

There is considerable evidence that prospective memory performance involves the frontal cortex and research is beginning to explore whether this frontal involvement overlaps with executive processes of working memory. In this study, an event-based prospective memory task was embedded in a set-switching task that involved unpredictable switches between three simple judgements. Flexible switching of attention among goals involves central executive control and may also be an important process underlying prospective memory performance. Prospective memory events were cued with three types of cues that varied in distinctiveness from the visual set-switching stimuli: a novel shape, a brightness change, or the presentation of a tone. Performance on this task was compared across three groups: young adult university students, individuals with traumatic brain injury, and controls matched with the TBI patients. Correlations between set-switching and prospective memory performance, as well as sample differences in prospective memory, will be discussed.

Type or rehearsal and prospective memory for psychotherapeutic homework assignments

K.D. ARBUTHNOTT, & D.W. ARBUTHNOTT

Department of Psychology, University of Regina, Regina, SK, S4S OA2, Canada

During psychotherapeutic treatment, therapists frequently assign clients "homework" which is to be completed prior to a subsequent therapy session. Failure to complete such prospective plans is typically assumed to indicate resistance to therapeutic change, although prospective memory failure seems a viable alternative explanation. Furthermore, laboratory research suggests that the type of rehearsal given at the time of assigning a prospective task may influence prospective memory success. Specifically, enactment has been shown to impair prospective memory performance relative to verbal

rehearsal (Schaefer et al., 1998). To investigate the frequency of forgetting therapeutic homework plans, we measured prospective memory for homework assignments in a sample of clients undergoing psychotherapeutic treatment. When the homework was assigned, clients rehearsed the plan in one of three ways: enactment, imagery, or verbal repetition. Results indicated that prospective memory failure accounted for more cases of homework non-completion than did non-compliance. No difference was observed as a function of rehearsal type, suggesting that this factor that is shown to influence prospective memory in laboratory settings does not generalise to a psychotherapeutic situation.

Prospective memory and ageing: A quantitative review

A.R. BIRT [1], & P. GRAF [2]

[1] *Department of Psychology, Dalhouse University, Falifax, Nova Scotia, Canada B3H 4JI*;
[2] *University of British Columbia, 2136 West Mall, Vancouver, BC V6T 1Z4, Canada*

A quantitative review was conducted to determine the extent to which prospective memory functioning declines with age. Specifically, the primary theoretical claims about prospective memory and ageing were tested, and various subject- and task-related variables were explored as potential moderator variables. The results indicate that, in general, prospective remembering declines with increasing age. However, the degree of age-related change depends upon many factors, including type of experiment (artificial laboratory, naturalistic laboratory, and naturalistic field), type of task (event- vs. time-based), age, task load, retention interval, response window, and scoring criterion. This paper provides a thorough quantitative review of the research on age changes in prospective remembering to date and offers many ideas and directions for future research.

Prospective memory in Parkinson's disease

P.S. BISIACCHI

Department of General Psychology, University of Padua, Via Venezia 8, 35131 Padua, Italy

Fifteen patients with a mild form of Parkinson's disease (PD) and sixteen matched controls were tested in neuropsychological tasks designed to assess a variety of cognitive functions and in particular retrospective and prospective memory abilities. Our findings suggest that prospective memory (PM) is impaired in PD with spared retrospective memory abilities, but impaired executive functions. The findings are discussed in the light of PM as a multicomponent process.

Fractionation of prospective memory: Evidence from dual task experiments

P.S. BISIACCHI, & A. PICHLER

Department of General Psychology, University of Padua, Via Venezia 8, 35131 Padua, Italy

In the present paper we intended to study the role of working memory and monitoring on the execution of an event-based Prospective Memory (PM) task. A total of 182 subjects participated in five different experiments: two baseline experiments (naming and prospective memory) and three dual task experiments (a working memory dual-task and two monitoring dual-tasks). The five experiments measured reaction times and accuracy for all stimuli (prospective and neutral). Reaction times, in primary task, were affected by the dual task conditions, but not errors. Furthermore, PM performance was differently influenced by the different dual task conditions. The findings are discussed in the light of models of attention, automaticity and memory load.

Prospective memory task performance using virtual reality

B.M. BROOKS, C. ROBINSON, F.D. ROSE, & E.A. ATTREE

Department of Psychology, University of East London, Romford Road, London, E15 4LZ

Laboratory-based prospective memory studies have problems with ecological validity whereas "naturalistic" studies have problems maintaining scientific control. Virtual reality may provide a solution to these problems by allowing prospective memory to be measured in a pseudo real-life situation whilst retaining a laboratory level of scientific control. In this exploratory study, 24 participants organised furniture and objects in a virtual bungalow according to which room they thought they should occupy in a new house. The prospective memory tasks were: to put "Fragile" notices on the five items with glass components (event-based task); to press a button beside a clock in the hall at exactly five minute intervals to allow removal men access (time-based task); and to keep the kitchen door closed to keep the cat in (activity-based task). Performance in the three tasks was compared with performance in a free recall test of all the items and with participants' ratings of their prospective memory.

The cognitive neuroscience of prospective memory

P. BURGESS

Institute of Cognitive Neuroscience, University College London, 17 Queen Square, London WC1N 3AR , UK

There are two critical questions for cognitive neuroscience relating to the realisation of delayed intentions (RDI). The first is whether there are dedicated processes that support this behaviour. The second concerns localisation of the brain structures that support them. Four kinds of evidence are considered in relation to these questions: single-case studies of patients who show RDI failures; group studies of the relationship between RDI problems and other cognitive control problems; the neuroanatomical locus of prospective memory (PM) deficits according to group lesion studies; and evidence from functional imaging. It is argued that evidence from the first two types of study demonstrate single dissociations between PM impairments and other problems that suggest a theoretical structure for the relation between retrospective memory, planning and prospective memory. This model was verified in a large group study of neurological patients. The results, together with those from a further group study, showed that patients with lesions involving the most anterior, polar and medial aspects of the frontal lobes showed specific problems with the RDI. Promising cross-method concordance was also found in two PET studies of PM. The first showed that bilateral BA 10 rCBF changes occurred when a PM target was expected, regardless of whether it appeared. In the second, BA 10 rCBF decreases were associated with intention execution. It is argued that these studies suggest a special role for the most anterior and medial parts of the human brain in the formation, maintenance and execution of delayed intentions.

Are prospective memory measures of the RBMT more vulnerable to cognitive impairment than retrospective memory measures?

J. COCKBURN [1], J. KEENE [2], & T. HOPE [3]

[1] *Department of Psychology, University of Reading, RG6 6AL;* [2] *University of Oxford, Department of Psychiatry, Warneford Hospital, Oxford, OX3 7JX;* [3] *Ethox Institute of Health Sciences, Headington, Oxford, OX3 7LF*

Huppert & Beardsall (1993) indicated prospective memory (PM) might be a more sensitive indicator of early dementia than retrospective memory (RM). However, analysis of Rivermead Behavioural Memory test (RBMT) scores obtained during a longitudinal study of dementia suggests differences are as great across different PM tasks as between PM and RM. This paper reports performance on

the RBMT by 49 people (mean age 78 years), with a clinical diagnosis of dementia (DSM III-R), divided into Minimal (CAMCOG score 78-102, n=25) and Moderate (CAMCOG 60-77, n=24) impairment. Comparison of performance on 3 prospective and 2 retrospective memory items of the RBMT at initial assessment yielded significant differences for immediate message and immediate and delayed route measures. Results are interpreted as suggesting that task demands may be more influential than classification as PM or RM. The designation of the message item as PM is also questioned.

Age-related changes in prospective memory: Empirical findings and theoretical implications

F. I.M. CRAIK

Department of Psychology, University of Toronto, Toronto, Ontario, Canada M5S 3G3

Recent research has shown that older adults typically perform less well on prospective memory (PM) tasks, and the studies to be reported were designed to probe aspects of this age-related inefficiency. Both sets of studies used paradigms that reflected familiar, real-life situations. The first study explored age differences in "lapses of intention" – situations in which the intention to perform an action may be forgotten temporarily over the course of minutes or even seconds. For this purpose we used a simulated "cooking breakfast" task, and found that older participants were much less efficient at remembering to carry out actions at the appropriate times. The second study examined age differences in longer-term PM – memory for planned actions during the course of an average week. The first version of this task was simulated as a board game ("Virtual Week"), and younger adults outperformed older adults on this version. When the same tasks were carried out in real life, however, in an "Actual Week" version of the experiment, old adults were now superior. Reasons for these various results are discussed along with implications for theoretical accounts of age-related changes in prospective memory.

Anxiety, depression, and prospective memory task performance

S.R. CUMMING, & L.M. HARRIS

School of Behavioural & Community Health Sciences, The University of Sydney, P.O. Box 170 Lidcombe, 1825 NSW Australia

Recent studies have examined the association between prospective memory and measures of negative affect, particularly anxiety (Cockburn & Smith, 1994; Harris & Menzies 1999) and depression (Rude

et al, 1999). These findings have been contradictory. Both Cockburn and Smith (1994) and Harris and Menzies (1999) found that anxiety, rather than depression, was important for predicting prospective memory performance, while Rude et al. (1999) found that depression was associated with reduced prospective memory. These studies used tasks that were non-naturalistic, in terms of the delay over which prospective remembering must occur (typically short), and/or the significance of the material to be remembered (typically low). This paper presents the findings of a three-week diary study examining the relationship between mood measures and prospective memory for a personally relevant task. While both anxiety and depression correlated with prospective task performance, only depression remained correlated with prospective memory when anxiety was held constant.

Frontal lobe hypothesis and prospective memory

G. D'YDEWALLE, E. BRUNFAUT, & W. DE BRUYCKER

Department of Psychology, University of Leuven, Tiensestraat 102, B - 3000 Leuven, Belgium

One of the central components of prospective memory is assumed to be its reliance on planning and scheduling activities, and executive functioning. Therefore, one has to predict the frontal parts of the brain to be more important in prospective memory than in retrospective memory as executive functioning is typically located in the frontal lobes. The main goal of the present paper is to review the available evidence for the frontal lobe hypothesis, with a particular emphasis on our own studies. The review covers 3 series of experiments: studies with frontal lesion patients, research with Korsakoff patients, and time-based prospective-memory research among the elderly. Evidence in favour of the frontal lobe hypothesis is found to be weak. It is concluded there is in prospective memory research a need to fractionate executive functioning into subprocesses that are associated with different anatomical locations within the frontal lobes.

Prospective memory and ageing : Effect of divided attention and type of task

B. DE GERMAIN, & B. LE BOUËDEC

Laboratoire de Psychologie « Cognition, Involution et Développement » UPRES EA 2646, Université d'Angers, 11 Boulevard Lavoisier, 49045 ANGERS CEDEX 01

This experiment examined the effect of divided attention and type of prospective memory task (event- and time-based task) on younger and older adults' prospective memory performance. Younger and older participants performed an anagram solving task and were also required to perform an action

either whenever a specific letter appeared in an anagram or every five minutes. For half of the participants, attention was divided by adding some (unrelated) messages. Results yielded age differences only for the time-based version of the prospective memory task. The younger participants increased their performance from event to time version of the prospective memory task and the older participants had the same performance from event to time version of the task with a detrimental effect on the background task. Moreover, divided attention had no effect on older adults' performance. The results raise interesting issues concerning both strategies used by older participants and their skill in the background task (i.e., solving anagrams).

Cancelled delayed intentions: Implications for everyday planned actions

P.M. DOCKREE, & J.A. ELLIS

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The intention superiority effect (ISE) is characterised by faster response time to task material for future performance compared to neutral material with no associated intention or material that is linked to a cancelled intention. The existence of the ISE under more naturalistic conditions has been explored here. Participants were required to remember prospective tasks that were presented under the guise of preparatory tasks for the next participant. After encoding a pair of tasks, participants were informed that one task no longer needed to be performed. Subsequent lexical decision data exhibited the expected effect; faster response time for intended items relative to cancelled items. The effect has remained robust across three experiments using different task material and different control groups. From a theoretical standpoint, the influence of activatory and inhibitory processes is of interest. Further experiments are planned to help quantify potential differences between standard priming effects, 'intent priming' and 'inhibition effects' as a consequence of intent cancellation.

Remembering event- and activity-based tasks in children with word finding difficulties and controls

J. DOCKRELL [1], R. GEORGE [1], D.MESSER [2], & L. KVAVILASHVILI [2]

[1] *Division of Psychology, South bank University, 103 Borough Rd, London SE1 0AA, UK;*
[2] *Department of Psychology, University of Hertfordshire, College Lane, Hatfield, Herts AL10 9AB*

The aim of this study was to investigate prospective memory in children who have difficulty producing words. In addition, we wanted to explore (a) the effects of type of task (event- vs.

activity-based) on prospective memory, (b) the cross-situational consistency in prospective memory performance on these two types of tasks, and (c) a relationship between prospective memory, age, non-verbal intelligence, retrospective memory as well as various measures of verbal abilities. In order to achieve these goals, two prospective memory tasks (one event- and one activity-based) were embedded in a test battery administered to 30 children with word finding difficulties (age range: 7 years 2 months and 8years 10 months) and 30 control children matched on age and IQ. Activity-based task involved remembering to give an experimenter a coloured star each time children finished any particular test or task whereas event-based task involved remembering to do something each time they encountered a picture of an animal while being engaged in a picture naming game. The results showed that there was no effect of type of task in control children whereas the performance of children with word finding difficulties was significantly worse in activity-based task. Performance on event- and activity-based tasks did not correlate with each other. Finally, different patterns of correlations emerged for prospective and retrospective memory tasks. Theoretical implications of these findings will be discussed.

Can suppressing a thought lead to enhanced prospective memory ?

J. ERSKINE

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Thought suppression refers to the act of deliberately trying to inhibit certain thoughts from entering one's conscious stream of thought. Research has shown that actively suppressing thoughts is usually followed by a period when the formerly suppressed thought tends to spring to mind with greatly increased frequency. This phenomenon has been termed a rebound effect. The mechanism underlying the rebound effect is thought to be due to an increase in the activation level of the formerly suppressed concept. This study attempted to use the rebound effect to enhance prospective memory performance, by actively suppressing or expressing the prospective memory targets during the retention interval. The results indicated that active suppression or expression of prospective memory targets did not result in enhanced prospective memory relative to suppression or expression of a totally unrelated concept.

The encoding and representation of delayed intentions

J. FREEMAN, & J. ELLIS

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Goschke and Kuhl (1993) observed heightened activation of action scripts intended for future enactment compared with items intended for verbal report: the intention superiority effect. They argue that this effect is directly attributable to the intentional status of the encoded information. An alternative interpretation is that it reflects an advantage for the motoric or sensorimotor information available for intentions that require a motor response and thus indicative of an 'action superiority effect'. The processes underlying such an effect may resemble the advantage that has frequently been observed for actions performed at encoding over items that are verbally encoded. We report a series of studies in which participants were asked to encode action verbs either verbally or through enactment and expected to recall those items in one of these two (enact, report) modes. Faster recognition latencies to action words intended for future enactment was eliminated following enactment at encoding. This suggests similarities between planned and performed actions and is consistent with an action superiority effect account of Goschke and Kuhl's findings.

Resource allocation and prospective memory test performance

L.M. HARRIS, S.R. CUMMING, & R.G. MENZIES

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Performance on tests of prospective memory is adversely influenced by a range of variables, including normal ageing (e.g., Einstein et al., 1995) and anxiety (e.g., Harris & Menzies, 1999). It may be suggested that the common factor underlying these effects is a restriction of available attentional capacity. Park et al. (1997) suggests that event-based prospective tasks in particular require relatively high levels of sustained attention. The present study uses a dual task methodology to examine the resource requirements of an event-based prospective task compared to a matched retrospective recognition memory task. Subjects achieved much greater success on the recognition task compared to the prospective task. Reaction times to tones presented either with target words, with distracter words, or when no words were present suggested that subjects were allocating relatively more resources towards potential targets on the prospective memory task.

Recreation drug use and prospective memory: A preliminary study

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[1] *Division of Psychology, University of Northumbria, Newcastle, UK;*
[2] *Psychology Section, University of Teesside, Middlesborough, U.K.*

MDMA (3,4-methylenedioxymethamphetamine), or "ecstasy", is a widely used recreational drug and has been shown to produce significant impairments in memory for the past (Parrott & Lasky, 1998). The present study explored the putative effects of regular MDMA use on prospective memory. Prospective memory is memory for future events and is the type of memory one would think might be affected by the regular use MDMA. A group of regular ecstasy users and non-users were tested on their prospective memories using the Prospective Memory Scale developed by Hannon, Adams, Harrington, Fries-Dias, & Gibson (1995), which assesses short- and long- term prospective memory for everyday events. Overall, ecstasy users had significantly impaired prospective memory when compared to non-users, this was after controlling for other drug use and the use of strategies to aid memory. These findings provide new insights into prospective memory dysfunction in recreational drug users.

Noticing intention-related events: The role of task switching, production rules, and executive control

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[2] *Department of Psychology, University of Georgia, Athens, GA 30602-3013, USA*

Noticing that an event or object is relevant to a previously established intention may feel spontaneous. However, our own previous work suggests that some optimal level of executive resources are needed for successful identification of a cue in an event-based prospective task. Based on Anderson's (1983) ACT* model, ongoing cognitive activity can be depicted as a series of production rules. We will present evidence from several experiments that manipulate the number and character of production rules that are required to perform a cover task in which a target is embedded. We find that unless multiple production rules are compiled into a single rule, prospective memory suffers. In other experiments that will be discussed, we extend this logic to explore how the firing of a production rule related to an intention affects the cover task, and vice versa. We conclude that executive control is necessary to co-ordinate ongoing activity and responding to a previously established intention.

Determinants of prospective memory decline in the aged population

F.A. HUPPERT [1], T. JOHNSON [2], & J. NICKSON [3]

[1] *Department of Psychiatry, Box 189 Addenbrook's Hospital, Cambridge CB2 2QQ, UK;*
[2] *MRC Biostatistics Unit;* [3]*Department of Public Health and Primary Care, Box 113 Institute of Public Health, Cambridge CB2 2SR, UK*

In a multi-centre study of cognitive ageing (Medical Research Council Cognitive Function and Ageing Study), a brief test of prospective memory was administered at the screening phase to almost 12,000 people aged 65 and above. The prospective memory task was event-based and required respondents to carry out two actions. The influence on performance of age, gender, education, social class and geographical location will be reported. The screening test also included the MMSE, a measure of Activities of Daily Living and an algorithm for dementia diagnosis, and their association with performance on the prospective memory task will also be reported. The major finding is a profound age-related decline in the proportion of respondents who are able to carry out at least one action without reminder. The frequency of the impairment in this representative population sample has major implications for the successful and safe performance of day-to-day activities at older ages.

Cognitive resources that enable event-based prospective remembering

C. JACOVA [1], P. GRAF [1], & B. UTTL [2]

[1] *University of British Columbia, 2136 West Mall, Vancouver, BC V6T 1Z4, Canada;*
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A study with eighty young adults tests the effects that two foreground tasks with distinct resource demands have on event-based prospective memory (ProM) performance. The tasks are identical except for the type of response, which requires either processing speed or processing capacity. While performing the foreground task, subjects are shown sets of common pictures, among which the ProM cue. The cue is shown repeatedly, its size increasing with each presentation, until it is noticed. The size at which the cue is detected is the dependent measure. The study also examines the contribution that different types of resource make to ProM performance. In addition to speed and capacity, ideational resources, operationalized as divergent thinking, are assessed. The results will show whether speed and capacity influence ProM to a different extent, and whether resource accounts of ProM can be strengthened by introducing factors related to ideational production.

A comparison of prospective memory in children with and without ADHD using the CyberCruiser paradigm

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Prospective memory for time based events not only has a memory component, but also involves elements of working memory, temporal ordering, initiation, inhibition, and self-monitoring. Developmental Attention Deficit Hyperactivity Disorder (ADHD) has been associated with deficits in both behavioural inhibition and working memory. Results will be reported for two separate studies in which children with and without ADHD completed a computer based driving task, the CyberCruiser, designed to assess prospective memory, as well as other measures of cognitive ability. Results indicated that children with ADHD had more prospective memory errors on the task (i.e., running out of gas), despite similar rates of gas checking. Both percentage of hits and the inhibition measure of a CPT task accounted for significant variation in prospective memory after ADHD status was statistically controlled for. The results suggest that prospective memory is related to aspects of attention and inhibitory control.

Naturalistic prospective remembering in ageing and dementia: Neuropsychological aspects

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The present study investigated the potential for age-related changes in prospective remembering (ProR), using a recently developed quasi-naturalistic task. The study also evaluated the impact of early dementia on ProR and the relationships between ProR task performance, self-report of ProR and neuropsychological measures of individual differences. The sample consisted of healthy adults (30 young, 30 older adults) and 15 patients with mild dementia. Results demonstrated that when event-based ProR is assessed in low demand working memory conditions, older adults perform as well as younger adults. By contrast, patients with mild dementia were significantly impaired in ProR. Interestingly, there was no relationship between self-report and performance on the quasi-naturalistic ProR task. The intercorrelations between performance on ProR and neuropsychological measures of individual differences will be evaluated within a model of working memory resources. The advantages and disadvantages of the study methodology for clinical neuropsychological assessment of ProR, ageing and dementia will be considered.

Prospective memory and planning: Good plans help younger and older adults

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Recently, Kliegel, McDaniel, and Einstein (in press) have introduced a paradigm to investigate prospective memory performance in complex environments. In this paradigm, participants plan and execute six tasks. In contrast to traditional single-task measures, the authors report age effects in prospective memory performance. These age effects were related to less efficient plans of the older participants. In the present study, we further investigated the role of plans in supporting prospective remembering. Thirty younger and 30 older adults had to solve the complex prospective memory task. One half of both age groups was provided with a plan how to approach the task. Results show that both younger and older participants benefit from the provision of plans. However, age effects in prospective performance still exist. They are related to age differences in working memory and inhibition. Findings generally support the importance of planning for solving complex prospective memory tasks.

Availability of external memory devices in everyday prospective memory situations

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External memory devices (EMDs) are useful, but not always available in everyday prospective memory situations. What is it that makes an EMD available or unavailable? In previous studies, metamemory, which is originated in the studies of internal memory strategies, has been hypothesized as the sole candidate. Because previous researchers have considered only a face of EMDs as a "tool" of memory, on which they seem to be equivalent to internal memory strategies. However, EMDs have also faces as "things" and a "sign," which lead to some problems of availability with EMDs. The application of the metamemory hypotheses to EMDs must be restricted. To overcome the limitation, I propose to add two other mechanisms to metamemory: "life-style," which structures and maintains a user's encounter with an EMDs, and "sign-work," which makes and operates a network of meanings around them.

ICPM - Abstracts

Role of executive functions and memory processes in delayed intentions after head injury

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The execution of event-based prospective memory (PM) tasks is triggered by environmental cues. First, the cue elicits a feeling of familiarity (*noticing*) that initiates a goal-directed "*search*" for the source of that feeling. These processes which are *both* closely related to the so-called executive functions guide the retrieval of the content of PM tasks (Einstein & McDaniel, 1996). Head injuries can disturb this retrieval process during any of the mentioned stages. We embedded a PM task in a 2-back working memory (WM) paradigm and administered an operation span to assess WM capacity independently. Neurological patients were divided preexperimentally into 4 groups on the basis of their WMS-R delayed recall Index and their age corrected BADS score (indicating absence or presence of deficits in executive functions). Additionally, 19 age-matched controls were examined. We found that patients with disturbed executive functions detected less cues than any other group irrespective of their retrospective memory performance. Thus, executive functions play a critical role in PM performance whereas intact retrospective memory seems to be a necessary but not sufficient prerequisite. Operation span did not differ between groups nor could we find a relationship between WM capacity and the number of detected cues. However, PM tasks imposing a higher load on working memory may rely more on this cognitive function.

Counting on prospective memory: Advantages of logistic and log linear models over ANOVA and correlations

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Prospective memory research often uses counts of occasions remembered as the main dependent variable. It is common practice to convert these counts to probability of memory success, or equivalently percentages recalled; and then perform ANOVA or correlation analyses. Such probabilities of success violate the basic assumptions underlying ANOVA and correlation. This may lead to seriously wrong conclusions. In particular, important effects of explanatory variables may be missed because of ceiling and floor effects (probabilities near zero or one). Furthermore, it may be erroneously concluded that interactions occur because it is much easier to improve on 60% correct than 90% correct. Logistic regression and log linear models avoid these problems. They also have the major advantage of modelling directly the theoretical construct of interest - that is the probability of remembering. The advantages of logistic and log linear methods are illustrated using several prospective memory studies.

Remembering event-, time- and activity-based tasks in young, young-old and old-old adults

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The study investigated the effects of age and type of task on prospective memory using a modified version of a paradigm described in Einstein et al. (1995; Exp. 3). Seventy-two young (18-30 years), 79 young-old (61-70 years) and 72 old-old (71-80 years) participants were engaged in answering general knowledge questions and, in addition, had to remember to type in six numbers either when they encountered a question about a telephone (event condition), once every 3 minutes (time condition) or after finishing each block of questions (activity condition). Half of the participants were presented with questions at a normal rate and the other half at a fast rate. Several measures of cognitive functioning, retrospective memory, anxiety and depression were also taken throughout the session. The analyses of results revealed a pattern that is different from that reported in Einstein et al. (1995). Thus, performance on activity- and time- based tasks was reliably better than on event-based task and there was no interaction between age and type of task. In addition, however, the results showed that prospective memory performance started to decline only in those participants who were in their 70s, and the effect of age mostly disappeared when other variables were taken into account. Possible reasons for obtaining the present pattern of results will be discussed. It is concluded that future research on prospective memory and ageing should distinguish various age groups among older participants (e.g., those in their 60's vs. 70's) rather than regard them as a homogeneous group.

The neuropsychology of prospective memory: The role of central executive functions

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Few studies have reported data on neuropsychological mechanisms possibly underlying prospective memory in normal healthy adults. Available results, based on standard laboratory paradigms, support the clinical finding that executive functions can be linked to prospective remembering. In the present study, we examined the influence of central executive functions on performance in prospective task that investigates prospective memory in complex task environments (Kliegel, McDaniel, & Einstein,

in press). Fourty younger and 40 older adults received six standard tests of distinct aspects of executive functioning. In addition, participants received the complex prospective memory task. Results reveal that more than 50 percent of the variance in the complex prospective memory task is predicted by the executive measures. Measures of planning and of cognitive flexibility seem to be particularly important predictors. Findings support previous reports on complex prospective memory as well as the assumption that prospective memory performance is related to executive functioning.

The relationship between prospective memory and executive functioning in young, young-old, old-old and brain injured adults

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Research examining prospective memory (PM) and ageing, particularly in relation to other cognitive abilities, has grown enormously in the last decade. In Study I, the performance on PM measures in older adults (n=129) was shown to be more related to executive functions than to retrospective memory, attention, or general verbal ability. In Study II, performance on the Prospective Memory Test (PMT) was compared in young, young-old, old-old, and brain injured adults (n=114). Performance varied by age and injury status, and was again more related to measures of executive function than to other cognitive abilities. Age differences were also observed in an analysis of errors. The results will be discussed in terms of age and injury effects on PM performance, the relationship of PM to retrospective memory, attention, and executive functioning, the task variables that appear to impact PM performance, and possible implications of results from the error analysis.

Prospective memory across the lifespan

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Research on prospective memory (PM) has been relatively neglected until recently, particularly with respect to changes in PM across the lifespan. Although there have been some mixed results, it will be shown that PM does develop in childhood, and decline in old age, with further decline in dementia. Both in development and in normal ageing, PM appears to be more affected when the attentional demands of the task are high. For example, it seems that effects are greater when attention-switching

is required between the background task and PM task demands. Data will be presented to show that PM is no more affected by dementia than retrospective memory (RM), although patients' PM failures are more frustrating to carers than their RM failures. In terms of the activation of PM tasks during the retention interval between encoding and execution, PM tasks are less represented in long-term memory by a heightened level of activation in old age and dementia than in young adults, which could account for at least some of the deficits shown. When PM is successful in old age and dementia, it is achieved at the expense of greater effort than in the young. The issue of whether there is anything special about PM will be discussed, and, in particular, the question of whether we can simply predict PM changes across the lifespan on the basis of what we know about RM changes.

Prospective memory retrieval and delayed execution: Multiple memory processes and age-related effects

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Successful prospective memory requires that attention be redeployed from ongoing tasks to thinking about the previously encoded intention that needs to be performed. One theory assumes that this process is primarily voluntary and strategic. Another approach assumes that the intended actions are automatically retrieved and delivered to consciousness. Neither view is completely consistent with existing research. We propose a multiprocess framework that assumes that characteristics of the prospective memory task determine the extent to which prospective memory is supported by strategic or relatively automatic processes. Several experiments are reported that provide support for this new framework.

Effect of concurrent task processes and divided attention on prospective remembering

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The transfer-appropriate framework and divided attention manipulation were used in two experiments to determine the extent to which attentional resources play a part in prospective memory

tasks which are either conceptually-focused (Experiment 1) or perceptually-focused (Experiment 2). Study-test changes in the semantic context of targets had a negative effect on prospective memory performance when participants were engaged in a conceptually-focused (sentence verification) task. Also, study-test changes in perceptual format (font) had a deleterious effect on prospective remembering in the context of a perceptually-focused (readability rating) ongoing task. However, although dividing attention in a conceptual prospective memory context had a negative effect on performance at retrieval, the additional task had no effect in a perceptual prospective memory context. Findings are discussed in relation to models of prospective remembering.

Prospective memory in children: The effects of age, type of task and practice

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Kvavilashvili and Ellis (1996) have recently distinguished activity-based prospective memory tasks from the event-based ones and proposed that different mechanisms may be involved in remembering these two types of tasks. In order to test this hypothesis, the prospective memory of 3-, 5- and 7-year old children was tested on two separate sessions (with an interval of 3-6 weeks). Those children who were tested with an event-based task (i.e., remembering to do something when seeing a target picture) in Session 1 received an activity-based task (to do something after finishing an activity book with pictures) in Session 2 and vice versa. In addition, various measures of retrospective memory and general cognitive abilities were obtained for each child using British Ability Scales. There was an overall effect of age (7-year olds > 5-year olds = 3-year olds). Although performance on event-based task was generally better than on activity-based one, this effect was statistically reliable only in 3-year old children. In addition, there was a complex pattern of interactions. The findings are discussed in relation to the way that ongoing activities may interfere with prospective memory performance. Other results that will be reported refer to the effects of age on children's prospective and retrospective memory performance as well as the relationships between them and various other measures of cognitive functioning.

Simulated planning and execution of everyday activity in patients with frontal lobe excisions

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Twenty five prefrontal excisions patients and 25 controls completed a 'board game' task where they 'executed' specified activities within a four day time limit. Some involved preparing for a trip overseas and others related to the four days context. The variables explored were: (1) Prospective Memory - certain tasks should be completed by a specified time; (2) Complexity - defined as the number of activities comprising an overall unit; (3) Context - whether the activities concerned the current or distant (trip overseas) context; (4) Distraction - whether distracter (non specified) activities related to the current or distant context. The frontal patients showed specific impairment with less complex activities, and increased distraction with current context items. Smaller unit of activities may be less efficiently cued following frontal lobe damage. Immediate context distraction may occur more frequently because of the reduced threshold for activating schema associated with the current context.

Two processes underlying spontaneous nature of prospective remembering

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This study was conducted to provide evidence for the existence of two processes underlying spontaneous nature of prospective remembering, which differ in the degree to which they rely on automatic versus controlled retrieval processes. Subjects were instructed to perform an action whenever target words occurred during a short-term memory task. The character of cognitive processing in prospective remembering was manipulated by involving lure words which were considered to have almost the same familiarity as the target words in word sets of the short-term memory task for half of the subjects. As a result, the subjects in lure present condition showed significantly faster responding to the target words when the cognitive load was low than when the cognitive load was high. However, subjects in lure absent condition did not show such an enhancement. The results will be discussed in terms of the Noticing + Search model developed by Einstein & McDaniel (1996).

Ageing and prospective memory: Multiple task design related to personality and metamnestic beliefs

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This research aims to assess the performance of elderly people in event-based, time-based and activity-based tasks. Furthermore, it explores the relationship between metamnestic beliefs, personality factors and prospective memory performance. Thirty subjects took part in the experiment. They were divided into two groups of 15 participants each, one from 61 to 69 and the other ranging from 70 to 79. The sample was homogeneous with respect to social and cultural factors.
Participants were administered a battery of questionnaires and had to attempt the three types of task. Results indicated that only time-based prospective memory tasks are affected by age. Furthermore, performances are related to metamnestic beliefs and personality factors (state- vs. action-oriented).

Brain regions responsible for time-based and event-based prospective memory tasks: A positron emission tomography study

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We examined with positron emission tomography brain regions associated with time-based and event-based prospective memory tasks. Regional cerebral blood flow (rCBF) was measured while young normal subjects performed two prospective memory tasks and a control task. The subjects were required to clench their hands at pre-specified time for a time-based prospective memory task and when a pre-specified stimulus was presented for an event-based prospective memory task while they were engaged in an attention-demanding mental arithmetic task (background task). When compared with the control task, in which only the background task was required, significant rCBF increase was commonly observed in bilateral prefrontal cortices, medial parietal cortices and basal ganglia in both prospective memory tasks. Different areas in the prefrontal cortices, however, were responsible for

the two tasks. The results indicate that different prefrontal areas, as well as several common brain mechanisms, are involved with the two types of prospective memory tasks.

Executive dysfunction in schizophrenia: An explanation of deficits in prospective memory?

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This study presents results that suggest prospective memory problems associated with schizophrenia may be explicable in terms of executive dysfunction. 15 subjects with ICD10 or DSM-IV diagnosis of schizophrenia undertook neuropsychological tests of executive ability and prospective memory. Correlations between the two batteries suggests that some functions and prospective memory are not dissociable, and that failure to remember to perform an action may not be a mnemonic issue. In the light of these findings, it is proposed that while prospective memory processes and related executive functions can be distinguished usefully at the conceptual level, clinically they need to be treated as part of the same disorder. This would mean that prospective memory processes would sometimes need to be subsumed under the rubric of the central executive, and understood in that context.

Prospective memory in the real world: Which abilities are the best predictors in a head-injured sample?

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Appointment-keeping could be argued to be the most salient indicator of prospective remembering ability in a clinical setting. The present study examined the relationship between appointment-keeping and patterns of impaired versus preserved ability on a broad spectrum of measures in a head-injured inpatient population. Ten people each attended 12 appointments in their unit. During these appointments they performed tests of prospective memory (event, time and activity-based), plus clinical measures of executive function, intelligence and memory. Appointment-keeping behaviour was assessed covertly for both promptness and appropriateness of verbal responses in relation to time-keeping. Patients' ability to keep appointments was found to be unrelated to age, intelligence or memory abilities, nor to experimental tests of event-based or activity-based prospective remembering. However, performance both on time-based prospective memory tasks and on clinical tests of

executive function was predictive of appointment-keeping behaviour, with regression analysis showing the time-based prospective memory performance to be the best predictor. The results are discussed in relation to the need for demonstration of ecological validity in prospective memory research and the possible distinctions between time, event and activity-based prospective remembering.

Cognitive rehabilitation of prospective memory deficits following brain injury

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This study investigated the efficacy of prospective memory training in individuals with traumatic brain injury. Previous studies have suggested that prospective memory training might be one area in which remediation is possible. Data are presented on 10 subjects with traumatic brain injury. Each subject served as their own control in an A-B crossover design. Multiple baselines were collected on a prospective memory probe, which was then used at each session. Efficacy was measured using a test of prospective memory developed in our laboratory. Generalization was measured with questionnaires and diaries.

Novel measures for the assessment of prospective memory

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Prospective memory has been reported to be a particularly important symptom after traumatic brain injury (TBI). However, it has not been systematically studied. This study created a measure of prospective memory that examines the following variables: time delay, type of cue given for response, difficulty of distracter, and whether the response is verbal or an action. Individuals with TBI performed more poorly than matched normal control subjects with increased time delay and with the more difficult distracter. Interestingly, with the more difficult distracter TBI subjects showed the expected increase in performance when the response was an action. This was not true for the easier distracter. Performance was also compared to a battery of neuropsychological tests. Performance was related to retrospective recall, verbal fluency, and complex attention, but not to time estimation or planning. Performance was also not related to self-report of prospective memory ability.

Prospective memory and pregnancy

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There is a wide spread perception that memory performance is impaired during pregnancy. The few empirical studies have focussed on retrospective memory and found pregnancy has little effect. This study compared a group of pregnant and non-pregnant women on a laboratory and a naturalistic prospective memory (PM) task. The laboratory task was a board game (Virtual Week) that simulated a week of planned actions over an hour or so while the naturalistic task involved logging the time over a chronological week. The groups did not differ on the laboratory PM tasks, or on laboratory tests of retrospective memory, but on the naturalistic PM task pregnant women performed worse than non-pregnant women. Pregnant women sustained concentration during laboratory session but were possibly distracted by their pregnancy for PM tasks over a longer period in daily life. Possibly pregnant women find remembering in daily life harder because daily life is less familiar.

"Please remind me...": The role of others in prospective remembering

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In a study examining the effects of reminding expectations on prospective remembering, participants were asked to perform 3 internally- and 3 externally-cued tasks following a 30-minute filler activity. Experimental participants were informed that at the time for performance they were to: remind another (confederate) participant about the tasks; receive a reminder about the tasks from the confederate; or both. Control participants heard nothing about reminders. Those led to expect a reminder were significantly less likely to perform the tasks than those not, regardless of whether they were to provide a reminder. Those expecting to provide a reminder but not led to expect one were more likely to perform the tasks than were control participants. In all conditions, externally-cued tasks were performed more often than internally-cued tasks. The results are discussed in terms of modifications to the activation levels of the to-be-performed activities and/or to participants' self-reminding strategies as a function of reminding expectations.

Effect of working-memory demand on prospective memory in young, young-old, and old-old individuals

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This study aimed to clarify the role of working memory in prospective remembering. Seventeen young (17 to 25 years), 16 young–old (65 to 74 years), and 14 old-old individuals (75 to 84 years) took part in the study. Participants were required to perform an action whenever an animal word appeared while undertaking a lexical-decision task that had two levels of working-memory demand. In the Low condition, the words appeared as a whole whereas in the High condition, the letters of the word appeared one by one. The Letter-Number Sequencing subtest from the WMS-III was also administered. Participants in the old-old group had a significantly larger decrease in prospective-memory performance in the High condition than participants in the young group. Significant correlations were found between performance on the Letter-Number Sequencing Subtest and the prospective memory task. These findings point to the importance of working memory in age-related difference in prospective memory.

Individual differences in prospective memory performance: Some methodological considerations

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This paper examines the performance of 100 elderly volunteers on a variety of prospective memory tasks (varying in the delay between instruction and execution, and whether primary and secondary tasks are interleaved or successive). Preliminary analysis suggested that performance on these tasks was related to participants' responses to the *Cognitive Failures Questionnaire (CFQ)* (Broadbent et al, 1982). However, the factor structure of this questionnaire is complex, as is the relation between *CFQ* responses and performance. For example, there are interactions between a fluid intelligence measure and *CFQ* responses, and these differ for different prospective memory tasks. This paper examines two ways of dealing with these problems: (a) a factor analysis of the *CFQ* is carried out and factors are retained which show significant relationships with prospective memory performance; (b) *CFQ* items that show significant relationships with prospective memory performance are identified and these are then factor-analysed.

Successful initiation of intentions requires capacity

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Are intentions retrieved automatically when a target event occurs? If so then there should be no impact on ongoing activities until the intention is retrieved and the action is being performed. Alternatively if capacity must be devoted to the prospective memory task in order to recognise a target as an opportunity for performing the action then there will be less capacity available for performing the background task and performance on the ongoing activity will suffer, even when the prospective memory task is not actually being performed. Two experiments provide evidence for a detrimental impact on the background task and for individual differences in monitoring and performance.

Neural bases of prospective memory

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Neuropsychological studies on prospective memory (PM) have been recently developed to identify the neural bases of remembering intentions. The present neuropsychological study focused on two forms of prospective remembering: remembering to remember and remembering contents. Patients with the ventromedial prefrontal cortex lesion (VMPFC), Korsakoff syndrome (KS), senile dementia of Alzheimer type (SDAT), and age-matched normal controls (eight participants each) were given two PM tasks: a self-initiated type and a cued-recall type, together with neuropsychological tests. Results showed that 1) in the self-initiated task, some VMPFC patients failed to remember to remember, though remembering contents were intact, and 2) in the cued-recall task, most of the KS patients failed to remember contents, though remembering to remember were relatively intact, and all of the SDAT patients failed to remember to remember as well as remembering contents. These findings suggest that there seems to be different neural bases of the two forms of prospective remembering.

Event-cued ProM Proper differences in old age

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A study with 114 adults, between 61 and 91 years-old, examined age-related changes in pro- and retrospective memory (ProM & RetM). In each of the two sessions, participants learned a list of 15 words, either related or unrelated, and then were engaged in a task that required making A/B decisions about stimuli displayed on a computer monitor. While making decisions, they were also shown a series of pictures of common objects, with one of these defined as the ProM cue. The cue-picture was displayed on about every 4th decision trial. Its display size increased across trials, until the subject responded to it by interrupting the decision task, and recalling the learned word list. The size of the cue when it was detected was used to index ProM performance. The results showed that both ProM and RetM declined with age, that age-declines in processing resources explained approximately equal proportions (~60%) of the decline in ProM and RetM, and that the study-list type (related vs. unrelated) affected RetM but not ProM performance.

Incidental reminding: The effects of direct and indirect cues on prospective memory

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Within prospective memory, recall of naturally occurring intentions can be triggered without the use of deliberately created reminders (such as external memory aids), but by reminders that occur incidentally. These incidental reminders can be classified as direct or indirect, depending on how explicitly they refer to a target event. Burkes et al. (1997) found enhanced prospective remembering using incidental indirect reminders on a conceptual task, whilst Guynn et al. (1998) found no benefits of incidental direct reminders using a perceptual task. We present a series of studies exploring the efficacy of incidental reminders embedded within an ongoing conceptual task. Participants had to press a key whenever they saw a target word appear in a general knowledge question. Only incidental direct reminders enhanced prospective remembering, relative to no reminders. The context, in which the reminders were presented, was thought to be an important variable when interpreting these results and previous studies.

Representation of plans: Activation in memory

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Representation of plans was explored by measuring reaction time in a priming paradigm. In this study, two experiments were conducted. There were two factors, one was the direction of the date from target to prime (i.e. earlier or later) and another was the distance of the date between prime and target (i.e. close or distant). In Experiment 1, 28 students were presented with plans of one month and were told to write them on a blank sheet of paper. The result for reaction time in the recognition test showed no influence of 2 factors. In Experiment 2, 28 students were told to write plans on a sheet of paper with calendar style. The result showed that the priming effect was observed when the date of prime was earlier before the date of target plan and the distance of the date between prime plan and target plan was close.

Neural correlates of prospective remembering

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We examine the neural correlates of prospective remembering using event-related brain potentials (ERPs). Participants performed a prospective memory (PM) task where they made semantic relatedness judgements (SJ) for pairs of words presented in lowercase letters. A prospective response was required when both words were presented in uppercase letters (PM cue). PM lures were also presented where one word was presented in uppercase letters and one in lowercase letters. This change was to be ignored. There were three ERP modulations that discriminated between the SJ, PM cue and PM lure conditions: 1) N320 differentiating PM cue and PM lure trials from SJ trials, reflecting detection of a possible PM target; 2) P500 differentiating PM cue trials from PM lure and SJ trials, reflecting disengagement from the on-going activity; and 3) LPC differentiating PM cue trials from PM lure and SJ trials, reflecting retrieval of the intention from memory.

Using multiple tasks to investigate the role of learning in retrospective and prospective memory.

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The aim of the experiment was threefold. Firstly, to compare the performance in retrospective and prospective memory over learning trials. Secondly, to evaluate prospective performance using multiple outcome measures. Thirdly, to examine the effects of event-task familiarity. Twenty participants were tested using a within subjects design. Sixteen event-task associations were presented, events being pictures, tasks being simple desk-top procedures (e.g. sharpening a pencil). Half the events were a close pictorial representation of a task component, half were entirely unrelated. There were three learning trials; the prospective memory task involved performing the tasks at the appropriate time; the retrospective memory task involved free recall of the pairings. The results show that prospective was superior to retrospective memory at all stages. Both were facilitated by event-task congruence. Multiple outcomes avoided floor and ceiling effects on the initial trial. Mixed support for Craik's processing theory of prospective memory is provided.

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