

Understanding, Assessing and Treating Prospective Memory: Some Recent Advances

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As clinicians, many readers of *Brain Impairment* would be familiar with the scenario of a patient not turning up for an appointment or turning up at the wrong time/ on the wrong day. While there are many potential reasons for failing to attend, a common one for patients with neurological disorders is a problem with prospective memory (PM). According to Kvavilashvili and Ellis (1996), PM 'is defined either as remembering to do something at a particular moment in the future or as the timely execution of a previously formed intention' (p. 25). This is in contrast to retrospective memory (RM), the ability to recall or recognise previously encountered or learned materials. PM is the topic of this special issue, which contains eight invited articles from four countries addressing the latest developments in PM research.

PM is not only a problem for individuals with neurological impairment. Most of us will relate to common experiences of PM failure; forgetting to attach a document to an e-mail, walking into a room and not remembering what for, or driving along a familiar route and forgetting to turn off to an intended but less familiar destination. In fact, some PM failures are so common (or their consequences so serious) that technologies have been developed to prevent their occurrence. For example, modern cars have sensors that alert the driver if he or she forgets to buckle the seatbelt or leaves the keys in the ignition. However, for individuals with brain injury, dementia, or other neurological conditions, PM failure has been found to be more frequent, to a point where it becomes a problem for successful function in society. Repeated lapses of PM can have serious consequences for job retention, independent living and relationships, not to mention being a cause of inconvenience, frustration and embarrassment.

Given the ecological validity of PM as a construct, it is not surprising that much interest and research effort has been generated around this topic in the last 15 to 20 years. While only 10 studies in this area were published by 1985, over 150 studies were published from 2001 to 2005 (McDaniel & Einstein, 2007). In addition, two international PM conferences have been held, in 2000 and 2005 respectively. The increased interest in PM is in part due to the fact that this type of problem is commonly found in many clinical populations. In reviewing the literature, Kliegel, Jäger, Altgassen and Shum (2008) found that PM impairment is common in patient groups such as individuals with localised frontal lesions, traumatic brain injury (TBI), dementia, Parkinson's disease, multiple sclerosis, HIV, herpes simplex encephalitis, alcohol and drug abuse, schizophrenia, depression and children with autism and ADHD.

Understanding PM and its presentation in various clinical populations has provided many challenges to researchers. PM is not a simple cognitive process, but rather a series of cognitive processes, involving attention, memory and executive functions, overlaid with motivational and emotional factors. It has been suggested that there are five stages of PM (Ellis, 1996). The first involves realising that an action needs to be carried out in the future and encoding what the action is and when to execute it. This is followed by the second stage where an individual stores the intended action while engaging in other activities. The third and fourth stages involve the initiation and execution of the intended action at the correct moment. Finally, the individual records and evaluates the outcome of the intended action. Three types of PM have been recognised and they are time-, event-, and activity-based (McDaniel &

Einstein, 2007). They involve carrying an intended action at a certain time (e.g., ringing someone at 3 p.m.), when a certain event occurs (e.g., passing a message to a friend upon seeing him or her), and at the end of an activity (e.g., switching off the iron after ironing) respectively.

While much is still to be understood about the nature of PM function, this has not deterred clinicians and researchers from pressing ahead with the development of assessments and rehabilitation approaches. As guest editors of this issue of *Brain Impairment*, we are pleased to present a series of articles that can be grouped around the three issues of PM assessment, its presentation in various clinical populations, and approaches to PM rehabilitation. These studies further advance our conceptual knowledge of PM in a number of ways.

The first four papers describe new ways to assess PM function. In the first article, Knight and Titov review the applicability of and evidence for virtual reality tasks as a means of assessing PM. They highlight the potential for virtual reality to provide a platform for simulating real-life prospective remembering requirements in real time including saliency, multitasking, and self-initiation; although at the present time more work is needed to establish the validity of this approach and to overcome a number of practical barriers. This theme is built upon in the second article by Rendell and Henry, which provides an example of a PM assessment task called the Virtual Week. Originally a board game, the Virtual Week has recently been computerised. Rendell and Henry describe its sensitivity to ageing and pathology including schizophrenia, multiple sclerosis and substance abuse.

The Memory for Intentions Screening Test (MIST), described by Raskin in the next article, is one of the few standardised psychometric tests of PM available. Its format allows for comparison on three conceptually important variables underlying PM performance (type of cue, type of response, & length of delay). Raskin summarises a series of studies with no less than 11 clinical groups using this test; these shed light on the components that may be differentially affected according to diagnosis. A third approach to PM assessment is the use of self-report questionnaires, and the article by Fleming, Kennedy, Fisher, Gill, Gullo and Shum describes one such questionnaire, the Comprehensive Assessment of Prospective Memory (CAPM) for use with individuals with brain injury. In a study of its concurrent and convergent validity, they demonstrate that significant others' ratings on the questionnaire were significantly correlated with outcome measures while self-ratings had more

questionable validity, illustrating the importance of awareness issues in PM rehabilitation in individuals with TBI.

The next three articles describe studies examining the presentation of PM impairment in different clinical populations. A controlled study by Kinsella, Ong and Tucker examines self-generated versus experimenter-generated PM cues in people with TBI using a video-based shopping task. Altgassen, Williams, Bölte, and Kliegel investigate time-based PM in children with autism spectrum disorder, the first of study of its kind in this population. This is followed by a study by Eschen, Martin, Gasser and Kliegel, which compares the PM and RM complaints reported by patients with mild cognitive impairment and mild Alzheimer's disease, as well as healthy older adults. These studies generate not only a better understanding of the presentation of PM impairment in these different groups of patients, but also contribute interesting insights into the relationships of PM to variables such as executive function and depressive affect.

Like all areas of study on brain impairment, the ultimate intention of PM research is to develop ways of improving the lives of people with neurological injury or illness. With this in mind it is fitting that, in the last article of the issue, Raskin and Sohlberg present an article on the rehabilitation of PM. A relatively new and under-researched field, PM rehabilitation is categorised into three main approaches, including behavioural (or compensatory), metacognitive, and restorative. These are reviewed descriptively and followed by a summary of an intervention study with individuals with TBI using a restorative approach that shows promise.

References

- Ellis, J. (1996). Prospective memory or the realization of delayed intentions: A conceptual framework for research. In M. Brandimonte, G. Einstein & M. McDaniel (Eds.), *Prospective memory: Theory and applications* (pp. 1–22). Hillsdale, NJ: Erlbaum.
- Kliegel, M., Jäger, T. Altgassen, M., & Shum, D. (2008). Clinical neuropsychology of prospective memory. In M. Kliegel, M. McDaniel & G. Einstein (Eds.), *Prospective memory: Cognitive, neuroscience, developmental, and applied perspective* (pp. 283–308). New York: Erlbaum.
- Kvavilashvili, L., & Ellis, J. (1996). Varieties of intentions: Some distinctions and classification. In M. Brandimonte, G. Einstein & M. McDaniel (Eds.), *Prospective memory: Theory and applications* (pp. 23–51). Hillsdale, NJ: Erlbaum.
- McDaniel, M. A., & Einstein, G. O. (2007). *Prospective memory: An overview and synthesis of an emerging field*. Los Angeles, CA: Sage.