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Does episodic future thinking improve prospective remembering?



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ABSTRACT

Extant findings suggest interesting avenues for the investigation of the potential relationship between EFT and PM. However, as they stand, they are inconclusive as to the causal role that EFT may play in aiding prospective remembering. In one Experiment, we showed that accuracy in a prospective memory (PM) task performed on the second day was significantly higher when participants, on the first day, had mentally simulated the sequence of events expected to occur on the second day, including the PM task, than when they had performed control tasks. These data extend previous findings on the functional benefit of future simulations in different domains by revealing a substantial facilitation effect of future-oriented thoughts on PM performance when the mentally simulated future task matched the actually executed task.

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1. Introduction

A remarkable feature of the human mind is its capacity to momentarily disengage from the present environment in order to contemplate extended, or “non-immediate” personal future (Suddendorf & Corballis, 1997; Wheeler, Stuss, & Tulving, 1997; Szpunar & Tulving, 2011). In 2007, Suddendorf and Corballis acknowledged that, in a dynamic world, predicting future situations can provide a selective advantage (see also Bar, 2009). People are indeed prone to use future simulations as a basis for predictions across a range of situations, such as planning, problem solving, decision making and related forms of goal directed processing (e.g.; D’Argebeau, Renaud, & Van Der Linden, 2011). Research in health psychology also showed that simulating positive hypothetical scenarios may temporarily release emotional tension associated to an upcoming stressful event (e.g., Brown, MacLeod, Tata, & Goddard, 2002). Besides, envisioning the process of working toward the achievement of a desired goal may aid goal-directed behavior by triggering people to develop an organizational structure that can be used to fine tune the behavior itself (see Taylor, Pham, Rivkin, & Armor, 1998, for a review). For example, Taylor et al. (1998) showed that goal completion in academic contexts (e.g., to pass upcoming midterm examinations) improves if students are trained to mentally simulate the scenarios (e.g., to imagine where and how long they would study) in which a future goal could be completed. Future simulations can also increase the likelihood of carrying out future intentions. Studies of implementation intentions (Gollwitzer, 1993) have extensively documented that using if-then plans (“If situation Y arises, then I will initiate behavior Z”) helps people translate their intentions into actual behavior (e.g., Gollwitzer & Sheeran, 2006). It is assumed that the effectiveness of implementation intentions relies on the creation of associations between the anticipated situation, which implies the selection of a likely future situation, and the relevant behavior (e.g., Gollwitzer, 1993;

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Webb & Sheeran, 2007). The effectiveness of implementation intentions on goal achievement has been demonstrated in a variety of domains (e.g., interpersonal, environmental, and health; Gollwitzer & Sheeran, 2006).

On the other hand, future simulations do not always play an adaptive function (Schacter, 2012). For instance, people tend to underestimate the resources they will need to complete a future task and overestimate the ease with which they will complete the task (see Buehler, Griffin, & Peetz, 2010, for a review). This phenomenon is known as planning fallacy and may trigger poor planning outcomes. Also, on balance, people are generally poor at predicting how they will feel after future events (affective forecasting; Kushlev & Dunn, 2011) and this may negatively affect decision making processes (e.g., Loewenstein, O'Donoghue, & Rabin, 2003).

Although the above mentioned lines of research have developed in parallel, altogether they provide important tips on the benefits and harm of future simulations. In the present study, we aimed at further empirically assessing the benefits that may arise from future simulation. Note that future simulation may take many forms, such as superficial thoughts, inner speech, vague images, or vivid and consuming scenarios (e.g., D'Argembeau et al., 2011). In the present study, we narrowed our interest on the episodic forms of future simulation, i.e. the mental simulation of specific future events, usually labeled as "episodic future thinking" (EFT; Atance & O'Neill, 2001). In the last decade, most research on EFT mainly focused on better understanding the cognitive and the neural processes involved in EFT. Converging evidence from cognitive (e.g., D'Argembeau & Demblon, 2012; Gamboz, Brandimonte, & de Vito, 2010), neuropsychological (e.g., Addis, Sacchetti, Ally, Budson, & Schacter, 2009; Gamboz, de Vito, Brandimonte et al., 2010; Gamboz et al., 2010; Hassabis, Kumaran, Vann, & Maguire, 2007; Klein, Loftus, & Kihlstrom, 2002; Race, Keane, & Verfaellie, 2011) and neuroimaging studies (e.g., Addis, Pan, Vu, Laiser, & Schacter, 2009; Okuda et al., 2003; Szpunar, Watson, & McDermott, 2007) indeed suggest that EFT and memory rely on common psychological and neural processes.¹

In the present study, we were interested in assessing whether EFT may improve prospective remembering. Prospective memory is defined as the ability to remember to carry out intended activities in the future (Brandimonte, Einstein, & McDaniel, 1996; Kliegel, McDaniel, & Einstein, 2008). The mechanisms and the characteristics of this ability have been widely explored in the last decade (Brandimonte & Ferrante, 2008; Brandimonte, Ferrante, Bianco, & Villani, 2010; Burgess, Quayle, & Frith, 2001; Cicogna, Nigro, Occhionero, & Esposito, 2005; Einstein, McDaniel, Marsh, & West, 2008; McDaniel & Einstein, 2007; Simons, Schölvinck, Gilbert, Frith, & Burgess, 2006). We hypothesized that EFT may serve as an encoding strategy able to enhance prospective remembering by linking the prospective action to the mental representation of a specific context that can later cue the action. An example illustrated by Atance and O'Neill (2001) seems useful to clarify the concept: "...suppose I must remember to take my medicine immediately upon returning home from work today. I might therefore decide before I leave the house in the morning to place my medicine bottle on the kitchen counter close to where the glasses are kept. To ensure the effectiveness of this mnemonic, however, it is important that I 'pre-experience' the events I am likely to engage in when I get home. If I fail to do this accurately, I might overlook, for example, the fact that, because today is Tuesday, when I get home I will probably go immediately into the living room to watch a favorite television program, going into the kitchen only when it is over. Thus, in this case, a more effective mnemonic would be for me to put my medicine on the coffee table in the living room rather than on the kitchen counter" (page. 533).

Partial support to the hypothetical beneficial effect of EFT on prospective remembering comes from at least three lines of research. First, there is evidence that imagery encoding may produce benefits in prospective memory performance above that found in typical encoding conditions. More precisely, Brewer, Knight, Meeks, and Marsh (2011) have shown that participants who imagined themselves performing an event-based prospective memory task (i.e., imagine seeing a c-animal, and then imagine performing the appropriate word-nonword response followed by pressing the "/" key) detected significantly more event-based cues than participants who received standard instructions (but McDaniel, Howar, & Butler, 2008, for different results). The authors suggested that these results demonstrate that the association formed at encoding between event-based prospective memory cues and the context in which they will ultimately occur is of great importance for successful cue detection. Results of this study, however, prevent any ultimate theorizing on the beneficial effect that EFT may have on prospective memory; in fact, participants were asked to imagine performing a simple, discrete action that lacks all those phenomenal, spatial, temporal, and emotional details that characterize more complex autobiographical events, such as those that characterize EFT. Furthermore, participants did not verbalize the content of the imagined scenario; it was therefore impossible to ensure that participants were actually envisioning the future rather than simply repeating the instructions.

Second, Leitz, Morgan, Bisby, Rendell, and Curran (2009) and Paraskevaides et al. (2010) found that prompting participants to mentally simulate an intended action at the moment of encoding significantly improved PM performance as compared to control conditions. Both these studies used the Virtual Week (Rendell & Craik, 2000), a computerized task designed to tap prospective remembering in everyday life. During each virtual day, represented by a board around which to move, participants are required to make decisions about their day and remember to carry out specific tasks (e.g., buy paper when out shopping). Leitz et al. (2009) and Paraskevaides et al. (2010) suggested that future event simulation induced participant to associate the intention with a specific visual-spatial context that, in turn, when reactivated, acted as a cue that prompted task completion. Although we agree indeed with the hypothesized process through which EFT may aid prospective remembering, we believe that results of Leitz et al. (2009) and of Paraskevaides et al. (2010) can hardly unmask such a process.

¹ It is however important to note that recent data suggest that other cognitive functions, other than episodic memory, are necessary prerequisites for imagining one's own future (e.g., de Vito, Gamboz, Brandimonte et al., 2012; de Vito et al., 2012; for recent reviews, see Klein, 2013; Schacter et al., 2012; Verfaellie, Race, & Keane, 2012).

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