



# On the alleged memory-undermining effects of daydreaming<sup>☆</sup>



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## ABSTRACT

In three experiments, we examined the memory-undermining effects of daydreaming for (un)related stimuli. In Experiments 1 and 2, we tested whether daydreaming fosters forgetting of semantically interrelated material and hence, catalyzes false memory production. In Experiment 3, we examined the memory effects of different daydreaming instructions. In Experiment 1, daydreaming did not undermine correct recall of semantically interrelated words, nor did it affect false memories. In Experiment 2, we again failed to find that daydreaming exerted memory-undermining effects. In Experiment 3, no memory effects were obtained using different daydreaming instructions. Together, our studies fail to show appreciable memory-undermining effects of daydreaming.

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## 1. Introduction

The vast majority of people engage in daydreaming on a daily basis (Singer, 1975). Klinger (2009) estimated that roughly half of all mental activities of humans involve some type of mind wandering. Thus, daydreaming appears to be a common phenomenon. Although daydreaming might have beneficial effects (e.g., Mooneyham & Schooler, 2013), it also has a negative side, including increased levels of aversive cognitive intrusions (Meyer, Otgaar, & Smeets, 2015). Of particular interest for the current investigation is the idea that daydreaming is linked to impaired memory functioning.

Recent experimentation suggests that daydreaming is related to various memory phenomena. For example, Rummel and Boywitt (2014) showed that higher working memory capacity results in people being better able to control their thoughts engendered by daydreaming. Risko and co-workers found that daydreaming during lectures impairs memory for the lecture material (Risko, Anderson, Sarwal, Engelhardt, & Kingstone, 2012). As another example, and most relevant for the current article, Delaney, Sahakyan, Kelley, and Zimmerman (2010) showed that daydreaming exerted memory-undermining effects. In two experiments, these authors instructed undergraduates to study two lists of 16 unrelated words. Between studying list 1 and list 2, the experimental groups were instructed to perform a task that mirrored the act of daydreaming. Thus, in the first study, the experimental group was instructed to think for 45 s about their parents' home, whereas control participants either read a text about psychology or were instructed to think for 45 s about their current home. Next groups were provided with a second list of words to study and performed a filler task. Finally, participants freely recalled words from list 1 and 2. Whereas the control and experimental groups did not differ with regard to the number of correctly recalled words from list

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2, the experimental group recollected fewer words from list 1 than either control group. In fact, the more distant in the past graduates had visited their parents' house, the stronger was the forgetting of list 1 words.

In the second experiment, [Delaney et al. \(2010\)](#) instructed their control participants either to perform a multiplication task or to think about a recent short distance trip, whereas the experimental group was instructed to think about a long distance trip. Again, there were no differences with regard to the recall of list 2 words. However, participants who had thought about a long distance trip recalled fewer list 1 words than did the control groups.

In explaining the memory-disrupting effects of thinking about your parents' house or about a long distance vacation, [Delaney et al. \(2010\)](#) argued that these activities induce diversionary thought, which equals daydreaming. Because daydreaming changes the mental context (i.e., during daydreaming, people imagine and think about other contexts than the current context), it has the potential to undermine subsequent attempts to recall items (see also [Masicampo & Sahakyan, 2014](#)). The authors wrote: "The more that one's mental context is changed by daydreaming, the more difficult it becomes to access what one has just experienced" ([Delaney et al., 2010](#); p. 1041).

[Sahakyan and Kelly \(2002\)](#) were the first to use this context-change procedure to explain the mechanisms underlying directed forgetting. Since then, many studies have confirmed that a shift in context results in robust forgetting rates (e.g., [Sahakyan, Delaney, & Waldum, 2008](#); [Sahakyan & Foster, 2009](#)). The paradigm used by [Delaney et al. \(2010\)](#) to study daydreaming effects on memory is another version of the context effect. However, [Delaney et al. \(2010\)](#) and other researchers using this paradigm have mainly examined the memory-impairing effect of daydreaming on *unrelated* material. Memory impairments such as amnesia, in contrast, are commonly characterized by deficits in recalling information that is not only unrelated but also episodically or semantically related ([Squire & Zola, 1998](#)). A more critical test of whether daydreaming propels other and clinically relevant variants of forgetting would therefore be to employ *semantically interrelated* material.

From a theoretical vantage point, this would be relevant given the following considerations. First, previous work on related forgetting effects, such as directed forgetting, have shown that when semantically interrelated words are used as stimuli, similar forgetting effects emerge as when unrelated words are used. However, using this material also catalyzes the production of false memories (i.e., memories for related, but not presented words; [Kimball & Bjork, 2002](#)). The explanation for this pattern is that the forgetting manipulation only affects the episodic traces of the stimuli, yet does not impact the semantic memory traces. Because of this, participants are unable to use episodic memory traces to decide that the related, but not presented, words are not part of the studied material. This leads then to elevated false memory levels. Following the idea that daydreaming is linked to directed forgetting ([Sahakyan & Kelly, 2002](#)), one might reason that daydreaming will also produce an increase in false memories and a decrease in memories of presented semantically interrelated words.

Second, there is much literature showing that memory for semantically interrelated words outperforms memory for unrelated words ([Brainerd, Reyna, & Ceci, 2008](#)). This finding could suggest that forgetting effects are less likely to occur because participants are likely to retrieve many correct semantically interrelated words, which would decrease the susceptibility to false memory formation. Hence, we conducted two experiments (Experiments 1 and 2) in which participants were exposed to lists of semantically interrelated words (i.e., Deese/Roediger–McDermott (DRM) wordlists; [Deese, 1959](#); [Roediger & McDermott, 1995](#)) and participated in the same procedure as [Delaney et al. \(2010\)](#). Because DRM lists have been shown to effectively induce semantically-induced false memories, we could simultaneously examine the impact of daydreaming on faulty recollections.

Furthermore, although Delaney and colleagues interpreted their effects in terms of daydreaming, it is unclear whether this shift in context is truly related to daydreaming or is affected by other factors such as, for example, dissociation. Indeed, daydreaming and memory impairments have been extensively discussed in the context of the literature on dissociative symptoms (e.g., [Holmes et al., 2005](#); [Lynn, Lilienfeld, Merckelbach, Giesbrecht, & van der Kloet, 2012](#)). These symptoms form a heterogeneous group of experiences, but the core feature they have in common is a disruption in the normal integration of consciousness, memory, emotion, and behavior (DSM-5; [American Psychiatric Association, 2013](#); p. 29). Absorption – a close cousin of daydreaming – and amnesia are usually considered dissociative experiences, although many authors assume that the first is a more benign manifestation of dissociation than the second ([Waller, Putnam, & Carlson, 1996](#)).

In the current set of experiments, our primary purpose was to replicate and extend research on the memory-undermining effect of daydreaming documented by [Delaney et al. \(2010\)](#) using different stimuli (related stimuli: Experiments 1 and 2) and different instructions (Experiment 3). More specifically, in Experiments 1 and 2, we tested whether this effect (1) can be obtained for semantically interrelated material, which would indicate that daydreaming might have memory-undermining effects beyond simple unrelated material ([Squire & Zola, 1998](#)); (2) is related to false memory, as one would predict on the basis of the discrepancy-detection principle ([Toussignant, Hall, & Loftus, 1986](#); [Van Bergen, Horselenberg, Merckelbach, Jelicic, & Beckers, 2010](#)), which implies that amnesic gaps make people vulnerable to false recollections; and (3) is related to individual differences in dissociativity. In Experiment 1, participants received only semantically interrelated words to encode, and we were interested in whether the memory disruptive effects of daydreaming would also obtain when using this material. In Experiment 2, we compared the memory effects of daydreaming on both unrelated and semantically interrelated material. If daydreaming, indeed, leads to forgetting, then one would expect to find similar forgetting rates in unrelated and semantically interrelated material.

In Experiment 3, we examined whether different types of daydreaming instructions would produce similar forgetting effects. By doing so, we could test whether the memory-undermining effects of daydreaming are restricted to the instruction

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