The Consequences of Multitasking on True and False Memory

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Abstract

Divided attention (DA) has been found to reduce false memory at encoding and increase it at retrieval (Knott & Dewhurst, 2007). The current study attempts to replicate this finding while testing a suggested variation (Joseph et al., 2012). Adapting the standard DRM paradigm for creating false memory (Roediger & McDermott, 1995), 60 undergraduates were randomly assigned to one of the following three conditions: Moderate DA, Extreme DA or Control. As expected, we did find that DA decreased veridical recall during both encoding and retrieval. Contrary to expectations, Moderate DA did not increase false recall at either encoding or retrieval. Partially supporting hypothesis three, Extreme DA marginally decreased false recall at encoding, but had no effect at retrieval. Results suggest that extreme distractions may decrease false memory by interfering with gist creation. Future research should attempt to find a level of distraction that is weak enough to allow gist creation at encoding, but interfere with discrimination at retrieval.

False Memory And Fuzzy Trace Theory

According to Fuzzy Trace Theory (FTT; Reyna & Lloyd, 1997), memory consists of both verbatim and gist traces which are encoded and stored separately. Critically, gist traces are more durable than verbatim traces, and less susceptible to interference effects. Thus FTT suggests that false memories result when gist traces predominate over verbatim traces and are incorrectly attributed to actual experience. To the extent this is true, processes that increase retention of gist traces relative to verbatim traces would be expected to increase false memory. For example, older adults, for whom retrieval of verbatim traces tends to be relatively impaired compared to retrieval of gist traces, demonstrate more false memory than younger adults, in whom verbatim retrieval is relatively preserved (Dennis, Kim, and Cabeza, 2007; Dodson, Bawa, and Slotnick , 2007).

Divided Attention

Naveh-Benjamin, Guez and Sorek (2007) found that DA reduced memory, while Spataro, Mulligan, and Rossi-Arnaud (2013) found that DA actually enhanced memory. Critically, the kind of memory that is enhanced by DA appears to be that which is relatively insensitive to elaborate encoding. This suggests that DA may impair memory for verbatim traces more than it impairs memory for gist traces, which are more durable and less vulnerable to interference effects.

Divided Attention and False Memory

Joseph, Sanchez, Sanker, Miranda and Fulton (2012) suggested that their sleep deprivation manipulation was not strong enough to degrade gist traces. If the effects of DA can be seen as similar to the effects of sleepiness, we might expect something like the following: moderate DA at encoding would increase false recall, as it would degrade verbatim traces more than gist, while severe DA at encoding would decrease false recall, as it would degrade both verbatim and gist traces. Knott and Dewhurst (2007) found DA reduced false memory at encoding and increased it at retrieval, but they did not modulate the intensity of their DA to evaluate Joseph et al.'s (2012) suggestion.

Hypotheses

1. Moderate and extreme DA will decrease veridical recall at both encoding and retrieval
2. Moderate DA will increase false recall at encoding
3. Moderate DA will decrease false recall at retrieval
4. Extreme DA will decrease false recall at encoding
5. Extreme DA will decrease false recall at retrieval.

Method

Participants
- 60 undergraduates

Materials
- Demographic questionnaire
- Eight, 12-word DRM lists (Roediger & McDermott, 1995)
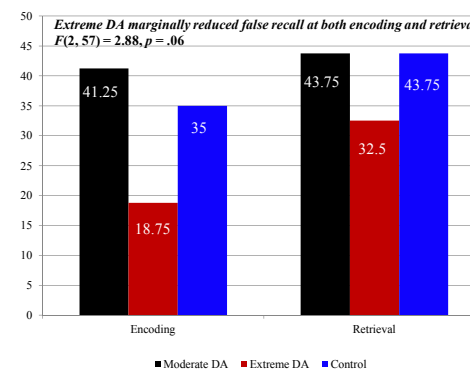- Free recall test

Procedure

Participants were randomly assigned to one of three conditions: control, moderate DA, or extreme DA. We adapted Peters et al. (2008) oddball procedure to manipulate DA. In the control condition participants were simply administered the eight DRM lists without distraction. In the moderate DA condition, participants were presented a series of red geometric shapes, one at a time, on a separate slide in random order. They were instructed to keep track of the number of red circles. In the extreme DA condition, participants were presented with a series of the same red geometric shapes, plus a series of digits between one and five, in the sequence: shape then digit. These participants were told to keep track of the number of red circles and the number of "5"s. Each participant in a DA condition was distracted during encoding for four of the eight DRM lists and during retrieval for the other four lists. The order of encoding and retrieval blocks was counterbalanced. All participants were given a free recall test after each list.

Effect of Divided Attention on Veridical Recall

$F_{(2, 57)} = 28.99$, $p < .001$

(Control: 63.88; Mild Divided Attention: 56.25; Extreme Divided Attention: 40.63)
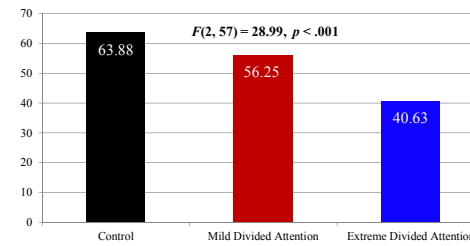
Comparison of False Recall at Encoding and Retrieval by Divided Attention Condition

Extreme DA marginally reduced false recall at both encoding and retrieval. $F_{(2, 57)} = 2.88$, $p = .06$

(Encoding — Moderate DA: 41.25, Extreme DA: 18.75, Control: 35; Retrieval — Moderate DA: 43.75, Extreme DA: 32.5, Control: 43.75)

■ Moderate DA ■ Extreme DA ■ Control

Discussion

Contrary to expectations, Moderate DA did not increase false recall at either encoding or retrieval. Partially supporting our hypothesis three, Extreme DA marginally decreased false recall at encoding, but had no effect at retrieval. Supporting our fourth and fifth hypotheses, extreme divided attention did decrease false recall at encoding and at retrieval.

Conclusions

Results suggest that multitasking and other extreme distractions may decrease false memory by interfering with gist creation. We anticipated that Moderate distraction would allow gist creation, but interfere with discrimination of list words from critical lures, thus increasing false memory. This did not happen, perhaps because our Moderate DA condition was not quite strong enough to interfere with discrimination at retrieval.

It appears that attempts to differentially impair verbatim memory processes while preserving gist memory processes at encoding have so far not been precise enough to find the expected results.

Our data do underline the negative effects for veridical memory of divided attention at both encoding and retrieval. Students preparing for academic exams are likely to significant impair their performance if they engage in so-called multitasking. These results do however suggest at least one silver living for students who engage in multitasking: they are less likely to create false memories.