Removing Seductive Details from Science Texts Facilitates Effective Retrieval Practice

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Abstract

In previous research, participants engaged in retrieval practice, or simply reread, texts containing seductive (interesting but irrelevant) details. Participants retained more information after retrieval practice, but only for seductive details, not important information. We conducted the same comparison after removing seductive details from the text. With no seductive details, participants retained significantly more important information after retrieval practice compared to rereading. Seductive details seem to affect processing during reading and in retrieval practice after reading.

Keywords: retrieval practice, scientific text comprehension, seductive details

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Readers who encounter interesting but irrelevant content in scientific texts demonstrate a *seductive details effect*, recalling less important content as compared to readers who read the same text without seductive details (Rey, 2012). In addition, readers generally recall significantly more seductive details compared to important, non-seductive content (Peshkam, et al., 2011). In the current line of research, we explored how seductive details may influence the *retrieval practice effect*, in which long-term retention of text material is facilitated by practice tests (Roediger & Butler, 2011).

Seductive details should have detrimental effects both during reading, and in follow-up tasks like retrieval practice. Seductive details disrupt online text comprehension processes, which may influence the quality of any attempts to retrieve important scientific information. Seductive details are also highly salient to readers, compared to other content. Thus, the use of retrieval practice for a seductive scientific text might only enhance long-term retention of seductive details, because the content is likely to be retrieved during practice tests, and fail to increase the retention of important content, because the encoding of this content is reduced prior to retrieval attempts.

In previous work (Mensink, et al., 2013), we demonstrated that seductive details do indeed cause problems for retrieval practice attempts. Free recall practice tests enhanced retention relative to rereading, but *only* for seductive details (see Figure 1). In a follow-up study, we compared retrieval practice using free recall vs. cued recall prompts to determine whether cued recall would focus participants on the more relevant scientific information during retrieval practice. While cued recall reduced retention of seductive details, we still identified no benefit for important scientific content (see Figure 2), suggesting that comprehension difficulties

associated with seductive details reduce participants' ability to take advantage of even cued recall tests.

In the current study, we explore two possible explanations for these previous findings. First, it is possible that seductive details disrupted comprehension processes and products in ways that prevented participants from experiencing the typical benefits of retrieval practice. Alternatively, the important scientific content may have been too complex or difficult for participants to effectively engage in retrieval practice, *regardless* of the inclusion of seductive details. Some have suggested that retrieval practice may be less effective for highly structured or complex materials (de Jonge, et al., 2015), at least without more elaborative instructions (Hinze et al., 2013). This may explain why the benefits were pronounced only for the more isolated seductive details, and not for the complex scientific explanations of weather formation.

In order to test these possibilities, we assessed the effects of retrieval practice (compared to rereading) for a version of the text without seductive details. If the seductive details were primarily responsible for the issues identified in the previous studies, then removing the seductive details should result in a retrieval practice benefit (a testing effect). However, if features of the scientific text content were responsible for these issues, then we would not expect a testing effect for these texts.

Method

Participants

Fifty-two undergraduates (32 female, $M_{age} = 20.27$, $SD_{age} = 4.53$) participated as fulfillment of a course requirement.

Materials

A scientific text on severe weather was presented on paper containing ten paragraphs related to lightning and tornado formation (987 words) as well as introductory and concluding paragraphs (145 words). This content was previously normed to ensure that the content was important and relevant to the scientific topic. All content previously identified as seductive details (rated high in interestingness, but low in importance) was excluded from this version of the text.

Procedure

On the first day of the experiment, participants were randomly assigned a *retrieval practice* or *reread* study packet (n = 26 in each group). All participants were given eight minutes to read the text, with the instruction that they were to study for a test on the material the following week. After reading, participants spent four minutes completing a math distractor task. Finally, participants spent an additional eight minutes freely recalling the text in the retrieval practice condition, or the same amount of time rereading the text. This procedure controlled total study time for participants across conditions. All participants returned to the classroom seven days later to complete an untimed free recall test.

Results and Discussion

Participants' final test recalls were parsed into idea units and coded by two raters. and subjected to a one-tailed t-test based on study condition (retrieval practice, reread). We observed a main effect of study condition, $t(50) = 2.38$, $p = .01$, $d = .66$. Participants recalled a higher proportion of idea units after a seven day delay in the retrieval practice condition ($M = .05$, $SD = .03$) compared to the reread condition ($M = .03$, $SD = .02$).

This finding replicates the typical benefit of retrieval practice on retention, sometimes referred to as the "testing effect" (Roediger & Butler, 2011). We note that this effect occurred

even under sub-optimal conditions: participants were given no instruction regarding effective retrieval strategies (Hinze et al., 2013), were given no opportunity to revisit the text after retrieval, and received no feedback (Butler, et al., 2013). However, it should also be noted that overall retention was low, indicating that adding any of these features could be desirable for learning these materials.

This retrieval practice effect stands in contrast to previous studies using a version of this text that included seductive details (see Figures 1 and 2). In those studies, retrieval practice attempts either selectively enhanced retention of seductive details (in the case of free recall) or had no observable effect on retention (in the case of cued recall). The results of the current study suggest that these previous findings were likely caused by the seductive details, and not due to issues with the scientific content.

Seductive details negatively affect comprehension processes and products (Rey, 2012). Readers have difficulty differentiating what instructors consider relevant or irrelevant information, and tend to focus on the interesting (but irrelevant) seductive details during reading. The results of the current line of research suggest that seductive details may also mitigate the benefits of some post-reading study tasks (like retrieval practice) even when those tasks would otherwise benefit retention. Simply removing seductive details may help participants establish a stronger mental representation of the relevant content, which may have downstream benefits for any retrieval practice attempts. However, given that it is not always possible to remove seductive details from a text, it may be wise to consider interventions before or during reading (see Rapp & McCrudden, 2018), in addition to post-reading study tasks like retrieval practice.

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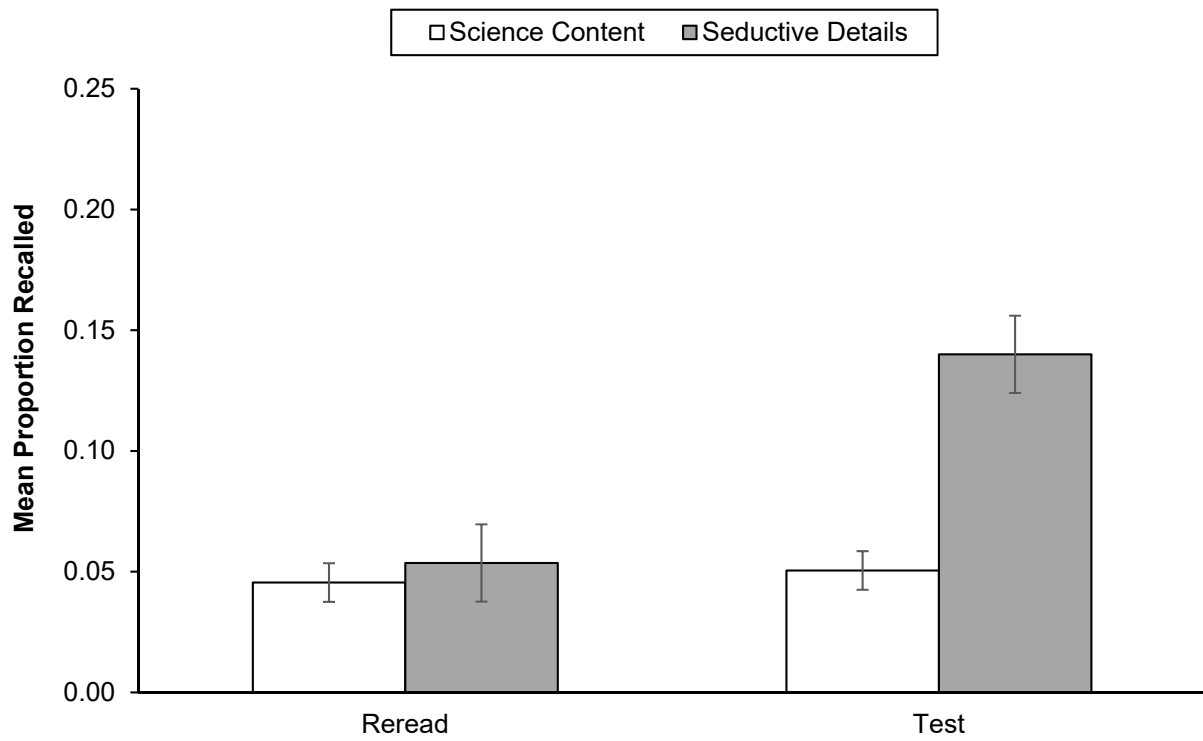
Figure 1. Results of previous experiment (Mensink, et al., 2013, Exp. 1) demonstrating effect of

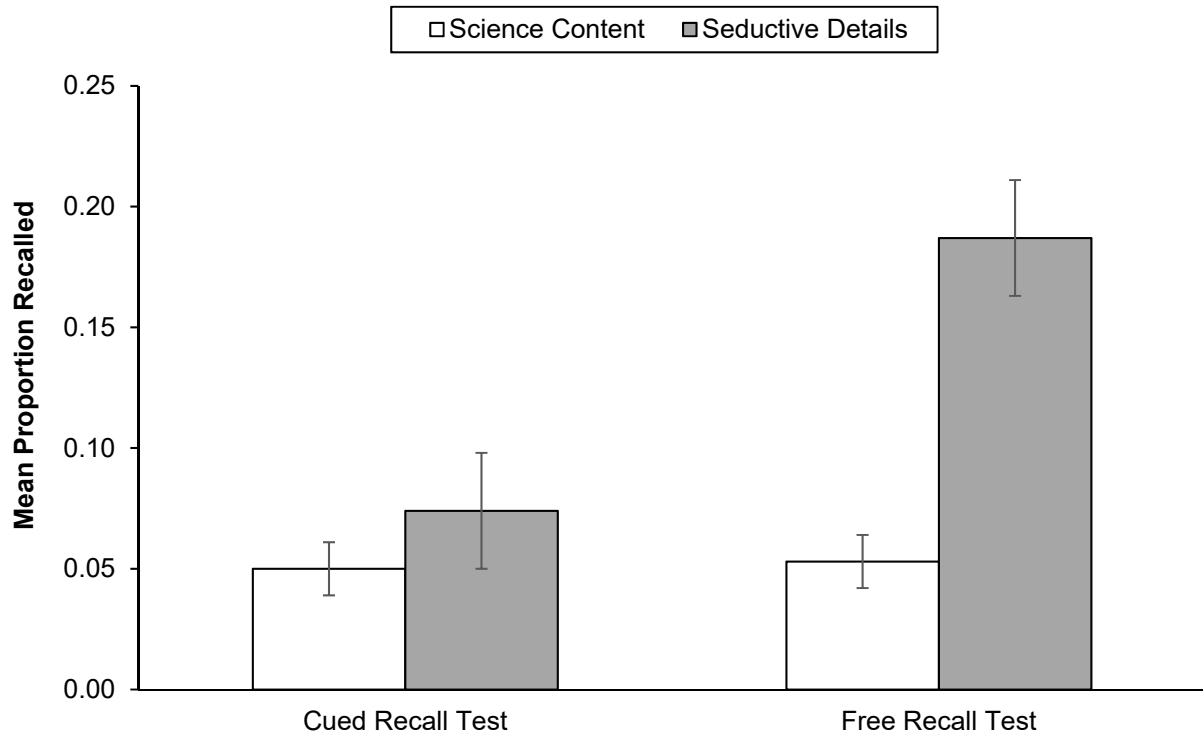retrieval practice using a seductive details text.

Figure 2. Results of previous experiment (Mensink, et al., 2013, exp. 2) demonstrating effects of different practice test types on retention of a seductive details text.