

## **Sketching, Summarizing, and Science: Reducing the Impact of Seductive Details**

Seductive details are highly interesting pieces of information within an expository text that are only tangentially related to the target concept (Garner et al., 1989). When the presence of this information results in reduced comprehension for readers compared to when the same text is presented without the seductive information, this is called the seductive details effect. Previous work has attempted, and often failed, to reduce the seductive details effect through: pre-reading instructions (Peshkam et al., 2011), moving the seductive details to the beginning or end of the passage, highlighting main ideas, and introducing learning objectives (Harp & Mayer, 1998). One avenue that has not been investigated as a tool for reducing the seductive details effect is having students generate sketches. A growing body of research suggests that sketching activities are beneficial for science learning, and moreover, that sketching can improve learning from science text (Ainsworth et al., 2011; Van Meter, 2001). More specifically, work on student generated sketching has shown that it is a promising tool for facilitating inferential reasoning (Gobert & Clement, 1999) and the consolidation of geoscience concepts (Johnson & Reynolds, 2005). The goal of the current study was to investigate the impact of sketching on seductive details compared to a verbal summary task.

### **Method**

#### **Participants**

In study 1 (N=104) and study 2 (N=104), undergraduates from a large Northeastern US university participated for course credits. Across both studies, students read a base text about tectonic plate interactions and for half of the students, the text also included seductive details. After reading each section of the text students either completed sketches, wrote summaries, or thought silently about what they had just read.

#### **Materials and Design**

All students were given the same textual information about plate tectonics, explaining three major types of plate interactions (convergent, divergent, and transform) and the types of geologic structures formed at these boundaries. In the seductive details condition, the text included 12 additional sentences describing incidences of death and destruction associated with volcanoes and earthquakes. Before reading, students were told that at different points in the text they would complete an activity related to what they read and that eventually they would be asked to recall as much as they could.

At five points in the text students were prompted to complete an activity (sketching, summarizing, or silent-think). In the sketching and summarizing conditions, students were asked to either create a sketch or write a summary about the plate interaction addressed in the previous text passage. In the silent-think condition, students were to think about what they had just read for two minutes. The only difference between study 1 and 2 was that in study 2 students received feedback on their sketches and summaries to support learning from those activities. Specifically, students in the sketching condition were shown an ideal sketch for each plate interaction and were asked to explain how their drawing differed from the ideal drawing. Similarly, students in the summary condition were shown an ideal summary and were asked to explain how their summary differed. Students in the silent-think condition were asked to explain what they thought about during the silent think activity.

After completing all reading and learning activities, students in both studies completed a test including a free recall portion and 10 multiple-choice items. Free recall was coded for the presence of seductive details (12 possible) and critical causal concepts (20 possible). Interrater reliability was high among coders ( $\alpha = .94$ ).

## Results

In study 1, a 2 (plain, seductive) x 3 (sketch, summary, think) between-subject ANOVA revealed a main effect for text condition - students recalled significantly more causal concepts when seductive details were not included in the text,  $F(1, 98)=5.86, p<.02$  (Figure 1). There was no main effect of activity condition and no interaction,  $F_s <1$ . A 2x3 ANOVA on comprehension accuracy revealed a marginal main effect of text condition,  $F(2, 98)=2.23, p=.13$ , no main effect of activity condition ( $F<1.21$ ), and a marginal interaction between activity condition and text condition,  $F(2, 98) = 2.68, p<.08$ . Additionally, a one-way ANOVA looking at seductive recall by activity condition in the seductive text condition was significant,  $F(2, 49)=4.58, p<.02$  (Figure 2); participants who sketched recalled significantly fewer seductive details than students who thought silently ( $p<.01$ ) and marginally fewer than students who wrote summaries ( $p=.06$ ).

For Study 2 conceptual recall, there was a main effect of text condition,  $F(1, 97)=10.23, p<.01$ , and a main effect of activity condition,  $F(2, 97)=3.07, p=.05$ , but no interaction ( $F<1$ ) (Figure 1). Follow-up analysis indicated that participants recalled more concepts in the summary condition than in the think condition ( $p=.03$ ), but there was no difference between sketching and think or summary. For comprehension test performance there was only a main effect of text condition,  $F(1, 97)=4.70, p<.03$ . There was also a significant effect of activity condition on seductive recall for participants in the seductive text condition,  $F(2, 49)=4.28, p<.02$ ; participants who thought silently recalled more seductive details than students who sketched ( $p=.015$ ) or wrote summaries ( $p=.014$ ), but sketch and summary did not differ (Figure 2).

Figure 1: Concept recall by text and activity condition; Study 1–left, Study 2–right

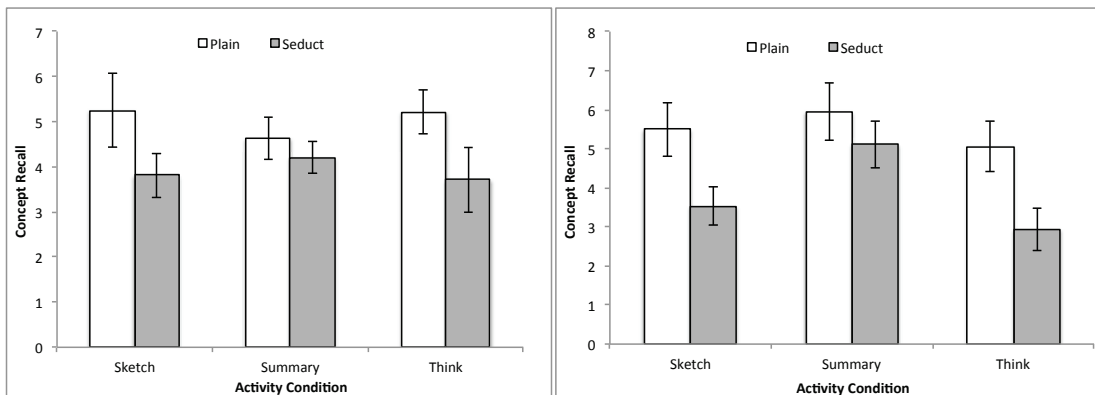
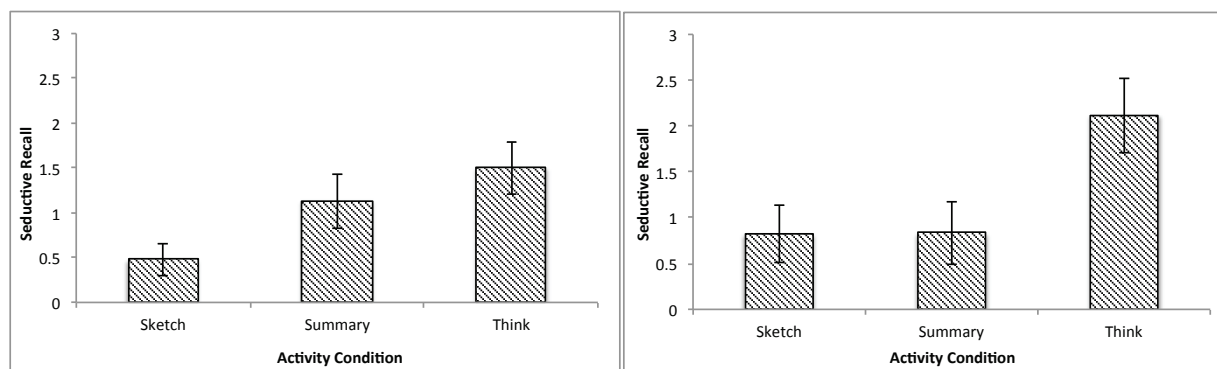


Figure 2: Seductive recall by activity condition; Study 1–left, Study 2–right



### Discussion

Two studies replicated the seductive details effect and demonstrated that generating sketches does not eliminate it. However, students in the summary condition in study 2 recalled the most core concepts. One possible explanation for the unique effect of summarizing is that many of the core concepts were not spatial in nature and could not be represented as well in drawings as in summaries. Follow-up analyses will be conducted to see if sketching facilitates the learning and recall of the spatial concepts that can be more readily depicted in drawings. Our results indicated that generating sketches and summaries with feedback reduced recall of seductive information, focusing attention to allow construction of more robust mental models. These findings inform the design of scaffolding to support learning from naturalistic science text with its distracting details.

### References

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