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Inserted adjuncts, working memory capacity, and L2 reading

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ABSTRACT

Empirical studies in first language (L1) research support the use of inserted adjunct questions to facilitate L1 reading comprehension. The status of this comprehension technique for second language (L2) readers, however, remains unclear. Given the possibility that adjunct questions augment the cognitive demands of the task, the current study investigated the relationship between working memory capacity (WMC) and text adjuncts, as well as the effect of inserted adjuncts on L2 reading comprehension. Seventy learners of intermediate Spanish read two texts that contained either targeted segment ("what") questions inserted into both passages, elaborative interrogation ("why") questions inserted into both passages, or no questions in either of the two passages. Participants were administered an L1 working memory (WM) test—the Reading Span—and three comprehension assessments. Although the "why" questions were slightly more facilitative than the "what" questions and no questions, results indicate no significant effect of adjunct condition. When interactions with WM surfaced as significant, the pattern was apparent: the greater the WMC, the more beneficial the adjunct questions were for L2 readers. These findings suggest that, for intermediate learners of Spanish, there is no advantage to including inserted adjuncts in L2 expository texts, but that WM may explain performance differences in some cases.

1. Introduction

The ability to comprehend text in a second language (L2) is an important skill for instructed learners of Spanish as a foreign language (Gracia, 2006), especially Spanish language majors. Given the importance of developing skills to comprehend upper-register texts, readers should be provided with L2 reading tools early in their stage of acquisition. Many lower-level L2 Spanish textbooks currently on the market (e.g., *Vistas*, *Conexiones*) offer sections on important reading strategies (such as recognizing cognates in the text or predicting content from the title) and include pre-reading questions, text-relevant information, or vocabulary-building tasks prior to the reading passage. Notably, though, there is an absence of other reading tools that have the potential to significantly aid comprehension. One such tool is the use of inserted adjuncts, which are questions that are inserted into a reading passage. The use of inserted adjuncts is prevalent in first language (L1) textbooks (e.g., Goldstein, 2008;

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Krugman & Wells, 2015) and has been strongly supported by L1 research (e.g., Anderson & Biddle, 1975; Peverly & Wood, 2001). However, there is a lack of consensus regarding the role of inserted adjunct questions in the L2 ambit.

A handful of studies have investigated the impact of adjunct questions in L2 reading with advanced learners (Brantmeier, Callender, & McDaniel, 2011; Brantmeier, Callender, Yu, & McDaniel, 2012) and intermediate learners (Callender, Medina, & Brantmeier, 2013), and thus far, inserted adjuncts have not been found to be widely effective in L2 contexts across these two stages of acquisition. A recent investigation posited that adjunct questions increase the cognitive load of the L2 reading task (Callender et al., 2013) and suggests an examination of whether working memory capacity could explain any differences between adjunct groups. The present study, therefore, advances the research on inserted adjuncts in L2 reading by utilizing learners from intermediate Spanish and examining working memory capacity as a factor in the equation.

2. Literature review

2.1. Inserted adjuncts and L1 reading

Researchers in L1 reading have investigated the effectiveness of inserted adjunct questions where readers pause to answer a query while reading. A number of experiments have yielded positive effects on memory and comprehension of questions interspersed within a reading passage (Callender & McDaniel, 2007; Hamaker, 1986). More specifically, when the inserted questions are similar or related to the final comprehension assessment questions, positive effects for both memory and comprehension have been found (Hamaker, 1986).

Researchers have also reported that low-ability readers benefit from adjunct questions that emphasize specific concepts in the reading (Callender & McDaniel, 2007). These types of probing questions [termed Targeted Segment (TS) questions because they require the reader to construct an answer from a specific segment of the text (McCrudden, Magliano, & Schraw, 2010)] help low-ability readers identify the most important information to glean from the text, and also help readers better understand the overall textual gist instead of focusing on secondary details. As a consequence, readers demonstrate a more coherent mental representation of the reading or situation model (Kintsch, 1988) that includes relevant information derived from the text, coupled with details and inferences drawn from their existing knowledge base.

Other text adjuncts such as elaborative interrogation (EI) questions, serve to activate prior knowledge and connect new information to information already existing in the reader's mind (e.g., Martin & Pressley, 1991). The studies incorporating EI questions showed marked improvement in the reader's ability to remember new information. See Table 1 for a summary of relevant features of select L1 inserted adjunct studies.

Seifert (1993) was the first to investigate the effects of EI on the comprehension of short prose, showing that "why" questions can facilitate comprehension and recall of text details that go beyond factual information. Callender and McDaniel (2007) utilized EI with longer, expository prose, and found enhanced comprehension among higher-ability readers but not among readers of lower-ability. Ozgungor and Guthrie (2004) also utilized longer prose with inserted EI and found better coherence with mental representations and improved memory. Ramsay, Sperling, and Dornisch's (2010) study contradicts prior positive effects for EI as they reported that the EI condition did not induce better results than a read-only control with a longer text; however, this may be because the EI questions were learner-generated rather than experimenter-generated, or perhaps because the nature of the passage, being a fact-dense, 62-paragraph history text, placed constraints on participants' working memory capacity. This was not investigated, but the cognitive-load issue will be taken up in the current study. In the most ecologically valid experiment to date, Smith, Holliday, and Austin (2010) had 294 participants enrolled in a biology class answer EI questions when reading a text used in the course. This text was lengthy (3212 words) and included 21 EI questions; students who answered the questions performed significantly better on the final test than those who did not. Thus, in more authentic settings, EI appears to be a valid reading tool.

The effectiveness of EI, however, may depend on the text type (Brantmeier et al., 2011), as different types of text are said to invite different types of processing (McDaniel & Einstein, 1989). For example, expository texts may promote more *proposition-specific* processing (i.e., processing that focuses on specific ideas, also termed individual-item processing) than narrative texts, which are said to invite *relational* processing (i.e., processing that focuses on the relationship among the ideas in the text, such as sequential, conceptual, and/or causal relationships; see Kintsch & Young, 1984). McDaniel and Einstein (1989), in their materials-appropriate difficulty (MAD) framework, suggest that the effectiveness of adjuncts hinges on the overlap between the processing induced by text adjuncts and the processing induced by the material (text). Only complementary processing, that is, processing not sufficiently induced by the text, will improve recall. Given that the type of text used may be key to the effectiveness of inserted adjuncts, the need to address two different types of texts is clearly warranted.

2.2. L2 reading theory and research: text adjuncts

While the impact of text adjuncts in the L1 realm has been generally positive, the benefits of inserted adjuncts among the L2 population remain unclear. Koda (2005), in an extensive review of L2 reading research, provides a conceptual basis for L2 reading that captures characteristics unique to the L2 reading process (e.g., sentence processing) in order to demonstrate how theories of L1 and L2 reading must be different. Koda provides strong evidence that what works for L1 reading may not work for L2 reading. She also notes that working memory may affect comprehension. The current experiment relies on prior theory and research to examine the role that working memory plays with the insertion of different types of textual adjuncts.