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The effects of persuasive and expository text on metacognitive monitoring and control ☆

Daniel L. Dinsmore [a,*], Sandra M. Loughlin [b], Meghan M. Parkinson [a], Patricia A. Alexander [b]

[a] Department of Foundations and Secondary Education, University of North Florida, United States
[b] Department of Human Development and Quantitative Methodology, University of Maryland, College Park, United States

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ABSTRACT

Although text types (e.g., persuasive and expository), think-aloud procedures, and expertise levels have been the focus of numerous studies, less is known about their effects on metacognitive monitoring and control. The purpose of this study was to investigate these issues during participants' text processing of government and politics texts using log files, think-aloud protocol, and individuals' calibration as data sources. Participants were undergraduates enrolled in human development (n = 38) and government/politics courses (n = 38) presumed to represent different levels of domain expertise. Participants read two passages on judicial review presented via computer while thinking aloud. Trace data on scrolling behaviors were collected during reading and confidence measures after reading. Think-aloud data were analyzed via non-parametric bootstrapping. Significant differences between text types were found for scrolling, calibration, and reading behavior. There was no significant difference for the think-aloud condition on scrolling or calibration. Only scrollback behavior was statistically different between levels of expertise. However, median differences revealed interesting trends between expertise groups in terms of calibration bias.

1. The effects of persuasive and expository text on metacognitive monitoring and control

Individuals' comprehension of expository text has been a focus of reading and psychological research for some time (Pearson & Hamm, 2005). Much of this research has demonstrated that individuals have difficulty comprehending expository text. The array of factors presumably contributing to that comprehension success or difficulty include whether or not individuals monitor their text comprehension (Dunlosky, Serra, Matvey, & Rawson, 2005), activate their relevant prior knowledge (Shapiro, 2008), set goals, or employ appropriate strategies (Aleven, McLaren, Roll, & Koedinger, 2006). Attempts to ameliorate these factors in expository text comprehension have been numerous, with many studies focusing on strategy use or strategy instruction (e.g., Duke, Pearson, Strachan, & Billman, 2011; Paris, Cross, & Lipson, 1984).

However, the relation between strategy use and performance is not always simple or straightforward. For example, Afflerbach (1990) examined the influence of learner characteristics (i.e., prior knowledge) and found that individuals with greater topic knowledge for the passage they were reading used strategies aimed at constructing the main idea of the passage, while those with less prior knowledge used strategies other than those to construct a main idea. In addition to individual differences, strategy use has been shown to differ depending on the text that is being read. For example, Alvermann, Hynd, and Qian (1995) found that students demonstrated different strategic behavior as a result of the text type (expository versus narrative) with students performing better after reading the expository text.

As the aforementioned studies suggest, strategy use may differ as a result of characteristics of the learner or the type of text. One explanation for these differences in performance may be the effects that individual difference factors and text factors have on individuals' metacognitive monitoring and control processes while reading. Pintrich (2002) argued for a more integrative approach to support reading comprehension when he discussed the importance of metacognitive knowledge (i.e., knowledge that guides mental operations; Flavell, 1979) along with strategy training. There is ample evidence that effective metacognitive monitoring and control of reading lead to better reading comprehension (e.g., Coiro & Dobler, 2007; Cross & Paris, 1988). However, there is less evidence on what conditions may encourage individuals to monitor or control their text processing.

Thus, the purpose of this study was to investigate the influences of text type and expertise level on students' metacognitive monitoring and metacognitive control using multiple measures of online mental processing (i.e., think-aloud protocol, log files, and calibration data)

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* Corresponding author at: Department of Foundations and Secondary Education, Suite 2300, 1 UNF Drive, Jacksonville, FL 32224, United States.
E-mail address: daniel.dinsmore@unf.edu (D.L. Dinsmore).

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during participants' reading of texts about government and politics. In the discussion that follows, we define metacognitive monitoring and control, and briefly examine the potential influences of expertise level and text characteristics on monitoring and control.

1.1. Metacognitive monitoring and control

Flavell's conception of metacognition was chosen as a framing for this study because of the focus on the reflective abstraction of internal mental processes while reading (Dinsmore, Alexander, & Loughlin, 2008). *Metacognition* has been defined as "thinking about thinking" (Miller, Kessel, & Flavell, 1970, p. 613), which encompasses four key components (Flavell, 1979): metacognitive knowledge, metacognitive experiences, cognitive goals, and the strategy activation. Metacognitive knowledge refers to knowledge or beliefs that guide the course of mental operations at either the person, task, or strategy level, while metacognitive experiences are the cognitive or affective experiences that pertain to a mental operation (Flavell, 1979). Cognitive goals refer to cognitive or metacognitive goals that direct cognitive or metacognitive activity (Flavell, 1979). Finally, strategies are cognitive actions that are evoked to monitor (metacognitive strategies) or make (cognitive strategies) progress toward a goal (Flavell, 1979).

As a measure of individuals' metacognitive judgment, calibration has received renewed attention in the literature recently (see Alexander, 2013). Calibration refers to the degree of association between an individual's confidence and their actual performance (Fischoff, Slavic, & Lichtenstein, 1977). While there are number of studies that have examined the difference between individuals' confidence and their performance with tasks involving the memorization of word pairs (e.g., Thiede & Dunlosky, 1994) and general knowledge questions (e.g., Dahl, Allwood, & Hagberg, 2009), far fewer studies considered how calibration might be affected by text characteristics. Further, studies of calibration that have examined text processing have focused primarily on expository texts such as Encarta passages (e.g., Moos & Azevedo, 2008).

We also investigated individuals' online processing. While there has been an increasing use of think-aloud methodology in the metacognition literature (Dinsmore et al., 2008), some still argue that the think-aloud procedure disrupts mental processing (e.g., Smagorinsky, 1989). In a think-aloud protocol, participants are asked to perform a task while continuously reporting thoughts that occur during a task (Ericsson & Simon, 1984). Further, Ericsson and Simon conjecture that these thoughts emanate from working memory. By positioning these concurrent verbalizations in working memory, think-aloud protocol should only elicit verbalizations about deliberately enacted strategies, not automated skills (e.g., decoding in reading). While we did investigate potential differences in the think aloud and no think-aloud conditions, those analyses are not presented in the current paper.

1.2. Expertise levels

The present research addresses how individual difference in the leaner may change their metacognitive monitoring and control processes. With a few notable exceptions, most studies of metacognition have not considered the effect of expertise on metacognitive processes (e.g., de Bruin, Rikers, & Schmidt, 2007). Rather, they have investigated single populations (i.e., readers who have similar levels of expertise relative to the content of the text) or have not addressed the issue of expertise at all (e.g., Rhodes & Castel, 2008). This research paradigm is problematic because the literature predicts differential processes for individuals at varying levels of expertise within a domain. For example, Alexander's Model of Domain Learning (MDL; Alexander, 1997) hypothesizes that levels of expertise (i.e., acclimation, competence, and proficiency) result from the differential confluence of knowledge, interest, and strategies; a confluence that likely has implications for metacognitive monitoring and control processes. For instance, it is probable that individuals at higher levels of expertise are more knowledgeable about and invested in issues relevant to their domain, and thus are more likely to manifest different patterns of metacognitive monitoring and control; differences that are reflected in their calibration judgments.

In the current study, the potential relation between expertise level (i.e., levels of knowledge and interest) and monitoring judgments (i.e., calibration) was addressed by sampling from those at varying levels of expertise for the target topic of judicial review. The first group was comprised of undergraduates in a human development course predicted to have low prior knowledge and interest in the domain (i.e., novice or acclimating learners). We also recruited undergraduates enrolled in a government and politics course who were expected to demonstrate moderate levels of prior knowledge and interest in government and politics (i.e., more competent learners). The prior knowledge and interest of each group was subsequently analyzed to provide confirmation of these initial expertise determinations.

1.3. Text characteristics

We elected to compare metacognitive monitoring and control for more or less expert groups across two text genres, exposition and persuasion. Expository text has been characterized as non-fiction reading material in which the intent is to inform or explain (Williams, Stafford, Lauer, Hall, & Pollini, 2009), while persuasive text is defined as text in which an author argues a point of view in order to change a reader's knowledge, beliefs, or interest (Kamalski, Sanders, & Lentz, 2008; Murphy, Long, Holleran, & Esterly, 2003). As noted, much of the prior work on metacognitive monitoring and control has emphasized expository text. Thus, by examining these two types of texts, we sought to extend current understanding of the interplay between text characteristics and metacognition.

Another reason for the decision to include persuasive text in the present investigation is the particular effects this genre may have on students' processing. For instance, persuasive text has been shown to be influential in sparking students' interest and deepening their knowledge (e.g., Buehl, Alexander, Murphy, & Sperl, 2001; Carrell & Connor, 1991). Additionally, there may be an interaction between the readers' expertise and the forms of arguments forwarded in text that affects their text processing, especially when those arguments run counter to the beliefs that these more knowledgeable and interested readers hold about the topic. This interaction may be more pronounced when the form of persuasive text is two-sided refutation (Allen, 1991), in which competing views on an issue are presented, although to the advantage of one view over the other. On the one hand, it is conceivable that encountering conflicting arguments or evidence could cause readers to heighten the attention and possibly monitoring of the text (e.g., Sadoski, Goetz, & Rodriguez, 2000). On the other hand, readers may elect to dismiss or overlook such evidence, resulting in decrease monitoring or control (e.g., Slater, 1997). The design of the current investigation allowed us to explore whether the genre of text (expository versus persuasion) translated into differential patterns in monitoring and control and how readers' level of expertise may have affected those outcomes.

1.4. Research questions

As stated, the primary purpose of the current study was to investigate the effects of different types of texts and the effects of the levels of expertise on individuals' metacognitive monitoring and control. Two specific questions guided this investigation.

1. What effects does text type (i.e., expository versus persuasive) have on readers' metacognitive monitoring and control?