Do reading and spelling share a lexicon?

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ABSTRACT

In the reading and spelling literature, an ongoing debate concerns whether reading and spelling share a single orthographic lexicon or rely upon independent lexica. Available evidence tends to support a single lexicon account over an independent lexica account, but evidence is mixed and open to alternative explanation. In the current work, we propose another, largely ignored account – separate-but-shared lexica – according to which reading and spelling have separate orthographic lexica, but information can be shared between them. We report three experiments designed to competitively evaluate these three theoretical accounts. In each experiment, participants learned new words via reading training and/or spelling training. The key manipulation concerned the amount of reading versus spelling practice a given item received. Following training, we assessed both response time and accuracy on final outcome measures of reading and spelling. According to the independent lexica account, final performance in one modality will not be influenced by the level of practice in the other modality. According to the single lexicon account, final performance will depend on the overall amount of practice regardless of modality. According to the separate-but-shared account, final performance will be influenced by the level of practice in both modalities but will benefit more from same-modality practice. Results support the separate-but-shared account, indicating that reading and spelling rely upon separate lexica, but information can be shared between them.

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1. Introduction

Since Chomsky (1959) introduced his account of language acquisition, the debate regarding the independence or overlap between the cognitive mechanisms used for language processing and other cognitive domains has continued (Frost, Armstrong, Siegelman, & Christiansen, 2015), with some suggesting that understanding the processes involved in language comprehension and production will shed light on more general issues related to perception and action (e.g., Hillis & Rapp, 2004; Rapp & Lipka, 2011). Similarly, in the language processing literature, there is no wide agreement as to whether the processes involved in language comprehension and language production rely upon shared or independent cognitive mechanisms (e.g., Caramazza, 1988; Coltheart & Funnell, 1987).

Open questions concerning the relative overlap or independence of cognitive processes are particularly prominent within the literature on lexical knowledge and learning. Indeed, "one of the most debated and most difficult questions in written language research" pertains to the extent of overlap or independence of the cognitive systems underlying skilled reading and spelling (Tainturier & Rapp, 2001, pg. 273). Some suggest reading and spelling share only an amodal semantic system, with all other processing relying on distinct mechanisms (e.g., Caramazza, 1988; Ellis, 1982). Alternatively, reading and spelling may largely rely upon the same cognitive mechanisms with only the exception of task-specific input and output components (e.g., Allport & Funnell, 1981; Coltheart & Funnell, 1987). Of particular interest in the present research, do reading and spelling rely upon a shared orthographic lexicon or upon separate input (reading) and output (spelling) orthographic lexica?

This important theoretical question currently awaits a clear empirical answer. Accordingly, the purpose of the current work was to investigate the acquisition and retrieval of orthographic knowledge used in reading and spelling. This work will inform theoretical models of reading, will inform theoretical models of spelling, and will also have implications for the broader debate concerning the relative overlap or independence of cognitive processes and representations within the written language processing system. Additionally, although focused on the theoretical question of the organization of orthographic lexical knowledge, the current study also has clear educational implications for training in multiple modalities to support lexical knowledge and learning.

To address the theoretical question of primary interest, we first describe how the dominant accounts of the organization of orthographic lexical information, the independent lexica and single lexicon accounts, are situated within cognitive architectures of reading and spelling. According to the independent lexica account, reading and spelling rely upon separate, independent orthographic lexica (e.g., Weekes & Coltheart, 1996). Alternatively, according to the single lexicon account, reading and spelling share a single orthographic lexicon; both tasks tap the same store of lexical information (e.g., Behrmann & Bubb, 1992). We then describe evidence pertaining to these two dominant accounts. We then describe a third alternative, a separate-but-shared lexica account. Although largely ignored in the extant literature, Monsell (1987) suggested a separate-but-shared lexica account which bridges the other two alternatives. According to this account, reading and spelling have separate orthographic lexica, but information can be shared between them. However, Monsell (1987) did not articulate a mechanism through which the separate orthographic lexica may share information; here, we propose an instantiation of that possible sharing. We then report three experiments designed to competitively evaluate the three alternatives: single lexicon, independent lexica, and our proposed instantiation of the separate-but-shared lexica account.

1.1. Cognitive architectures of reading and spelling and the dominant lexicon accounts

Most current models of reading and spelling posit dual-route architectures consisting of lexical and sublexical processes (see Coltheart, Rastle, Perry, Ziegler, & Langdon, 2001; Miceli & Capasso, 2006; Tainturier & Rapp, 2001, for reviews). The sublexical processing route in reading assembles a phonological code based on the orthographic information presented. Similarly, the sublexical processing route in spelling assembles an orthographic code when phonological information is presented. Of greater interest for present purposes are the lexical processing routes in reading and spelling, which