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Individual differences in Kindergarten through Grade 2 fluency relations☆

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ABSTRACT

Despite long-standing interest in reading fluency, little has been documented about the specific factors that developmentally contribute to individual differences. Consequently, precursory relations were longitudinally examined for students grouped at the end of Grade 2 as low, average, or high fluency readers to describe early alphabetic and word fluency contributions to later passage reading fluency outcomes.

Using structural equation modeling, we modeled Kindergarten letter sounds, Grade 1 word reading, and Grade 2 passage reading fluency with 2302 students to identify early fluency differences in the emergence and growth of beginning reading skills for each fluency group. We compared initial level and growth slope estimates, and reported cross-year developmental fluency relation patterns by group. In general, our findings point to the importance of building letter sound fluency in kindergarten, and shed light on the disruptive impact of delayed skill progress on reinforcing relations during reading skills development.

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1. Introduction

What contributes to individual differences in reading fluency? Despite decades of reading research and ongoing debate, this question remains partly unanswered due to a lack of agreement about the definition of reading fluency (e.g., Adlof, Catts, & Little, 2006; Dougherty & Johnston, 1996; Kuhn, Schwanenflugel, & Meisinger, 2010; LaBerge & Samuels, 1974; Norton & Wolf, 2012; Stanovich, 1980). In general, the field has tended to narrowly equate the concept of reading fluency with passage reading fluency measurement (Kuhn et al., 2010), predominantly emphasizing accurate reading rate, and reinforcing a focus on fluency once children begin to read, which may be limiting its contribution for understanding individual differences across reading development. Some researchers, however, have argued for an expanded view of reading fluency that considers the developmental role of precursor reading skills, such as phonemic and alphabetic skill components, that may contribute to individual differences in reading fluency *prior* to the onset of reading ability (Fuchs & Fuchs, 2004; Good, Kaminski, Simmons, & Kame'enui, 2001; Kame'enui & Simmons, 2001; Lyon & Moats, 1997; Ritchey & Speece, 2006). Such a view of reading fluency would enable a broader role for fluency impact across the development of related reading skills.

A widening of fluency's potential role in the emergence of reading development individual differences requires a shift in thinking, away from the current emphasis on automatic word recognition, toward greater examination of its impact on the process of skills development more extensively, and potentially earlier in the course of skill building, than current perspectives typically allow (Kuhn et al., 2010). In this study, fluency is considered a state of general skill acquisition that, with increasing proficiency gained from practice, improves in performance rate over time (e.g., Ackerman, 1987; Binder, 1996; Logan, 1992). Varying fluency performance rate levels and growth found for different reading skills are, therefore, assumed to indicate disparities in the efficiency of skill development that contribute to later individual differences in passage reading fluency. As such, *fluency* is not considered a separate reading component (Adlof et al., 2006), but rather, a fluid state of skill performance that is the product of built expertise resulting from intentional practice (Ericsson & Lehmann, 1996). For example, performance on the way to becoming fluent differs from performance during initial acquisition that is slow and deliberate, and also from performance near mastery that is automatic and effortless (Anderson, 1982). Although the importance of fluency for any particular skill may be clear, the extent to which fluency differences have a far-reaching effect on development across different reading skills is not well understood. On the one hand, it may be that that insufficient fluency in one skill disadvantages subsequent progress in another because of their co-dependency, creating a negatively cascading effect across the

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reading development trajectory (Stanovich, 1986). Alternatively, it may be that, depending on the particular reading skill, sufficient fluency is only needed for subsequent skill emergence, with no long-lasting impact on reading development, thereby having only a transitory individual differences effect (Paris, 2005).

An examination of the extent to which developmental relations across fluency measures reflect reading theory is needed to better clarify its contribution for understanding individual differences in reading (Potter & Wamre, 1990). For example, a clear role for fluency growth over the course of reading development does not yet exist to explain how fluency (or a lack thereof) contributes to early individual differences and risk for reading disabilities (RD). This study attempts to address this shortcoming by examining reading skill relations using progress indicators of reading development outlined in the seminal "Comprehensive CBM Framework", which has applications in both research and practice (Fuchs & Fuchs, 2004). Employing archived school data, we examined fluency relations across different (but developmentally linked) beginning reading skills for students who, by second grade, demonstrated distinct patterns of low, average, or high oral passage reading fluency. Our purpose was to model and compare initial fluency levels and yearly growth among readers, and to trace backwards where (i.e., for which skills) important between-group differences emerged using fluency data collected in practice.

We used scores from curriculum-based fluency measures (CBMs) because they indicate students' levels of (and change in) fluency performance over time for beginning reading skills, such as letter name and sound recognition, phoneme segmenting, word and passage reading (Alonzo, Tindal, Ulmer, & Glasgow, 2006; Good, Simmons, & Kame'enui, 2001). In addition, as part of increasingly typical school practice for preventing RD in the United States (Fuchs & Fuchs, 2004), fluency was repeatedly assessed three times a year, providing multiple measurement occasions for examining skill growth within each grade. Undoubtedly, reading development comprises overlapping skill contributions over time; however, in practice, the quantity and type of fluency indicators used to track and evaluate reading development progress can vary widely. Consequently, for this study, we used single, well-known "key" CBM framework indicators that correspond with grade-level instructional goals, to parsimoniously model and explore fluency's role in beginning reading skills development between kindergarten and second grade.

1.1. Word reading development and fluency implications

Word reading development is complex, entailing multiple processes that must be committed to memory (Chall, 1983; Ehri, 2005; Perfetti, 1992). It requires that beginning readers use the mental resources available to them, which are limited in capacity (Barrouillet, Gavens, Vergauwe, Gaillard, & Camos, 2009). Fluency can benefit performance on many different literacy tasks because it enables greater efficiency, freeing up cognitive resources needed for processing (Dougherty & Johnston, 1996; LaBerge & Samuels, 1974). It most likely plays a role in the acquisition of skills that are constrained in scope, in which progress can be clearly monitored, and the rate of learning matters for efficient reading development (Paris, 2005). In other words, fluency is not likely to be critical for understanding the development of pre-reading skills such as print awareness and oral language acquired during the initial stage of reading development (Chall, 1983), but it *is* vital to the development of skillful word recognition in English, which depends upon the efficient building of constrained precursor alphabetic skills.

According to Chall's (1983) second stage of reading development, competent word recognition requires that English readers efficiently memorize (in order to recognize) alphabetic letters and their sounds for identifying printed words. This stage poses a critical juncture in reading development because how well children come to represent words influences how well they can interact with print (Perfetti, 1992): Children do not read to learn new words, but rather, to connect with print what they already know. To facilitate this understanding, reading instruction during this stage typically emphasizes the connection between letters and their sounds as word parts (e.g., "the letter b in bat sounds like *buh*"), with letter-sound connections becoming more quickly accessible, accurate, and less mentally demanding the more times the same relations are encountered (Ehri, 2005). This learning supports early decoding because children must retrieve from memory the letter sounds associated with printed alphabetic letters, and then combine this information with other letters and sounds that may comprise a written word. The ability to mentally identify and integrate alphabetic knowledge for reading words is not immediate, and is learned over time as children gain beginning consonant sound awareness, followed by more complete letter-sound correspondence within syllables (Morris, Bloodgood, Lomax, & Perney, 2003).

Therefore, the extent to which letter sound retrieval becomes fluent (i.e., more efficiently accurate) plays an important role in children's emerging decoding facility, and may represent an early point at which individual differences appear in response to reading instruction. For example, in first grade, letter sound fluency reliably predicts passage reading fluency (Speece & Ritchey, 2005), and Ritchey and Speece (2006) reported significantly different kindergarten intercept and growth patterns in early letter sound fluency across beginning word readers. We note that, in some cases, "sight" words may be memorized as whole units rather than deciphered phonologically through decoding (Ehri, 2005); however, the benefit of gaining fluent alphabetic knowledge for beginning word identification is similarly anticipated because of its general memory support for word recognition (i.e., whole words in English cannot be recognized without some knowledge of alphabetic letters and the sounds they make).

In the third phase of reading development (Chall, 1983), children gain fluency and flexibility in their word recognition skills. The number and strength of mentally accessible lexical representations improves (Perfetti, 1992), increasing the ease with which children can identify words. This period reflects enhanced word reading growth, which typically occurs between first and third grade as children actively engage in practice to solidify their proficiency (Kuhn & Stahl, 2006; Verhoeven & van Leeuwe, 2009).

By this point in reading development, distinct growth trajectories between different reader groups may be already apparent (Torrpa et al., 2007), although not necessarily fixed (Phillips, Norris, Osmond, & Maynard, 2002). Researchers have described two types of growth patterns when examining individual differences among beginning readers, referred to as *cumulative* and *compensatory* models (Leppänen, Niemi, Aunola, & Nurmi, 2004; Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005). Cumulative models reflect stable individual differences, increasing variance among learner groups, and positive associations between initial skill levels and subsequent growth (Leppänen et al., 2004). In contrast, compensatory models reflect diminishing individual differences over time because skill acquisition slows for learners with initially strong skills and accelerated growth may be observed for learners with initially low performance, as indicated by negative associations between initial skill levels and subsequent growth (Parrila et al., 2005). Inconsistent findings across different measures have impeded a conclusive understanding about whether skills grow in a cumulative or compensatory manner, but what is clear from emerging growth modeling research in reading is that improvements in skill growth may not always follow the simple assumption that more is always better (e.g., as shown in compensatory models, high achieving initial performance is likely to render less – but increasingly refined – growth). Greater awareness of the specific impact of growth nuances on reading development and the immutability of individual differences is still needed.

Previous study of reading risk using fluency measures has shown that first graders at-risk for RD read less than half as many words per minute than their typically developing peers (Speece & Ritchey, 2005). Thus, already by the second year of schooling, some students experience