Aligning Theory and Assessment of Reading Fluency: Automaticity, Prosody, and Definitions of Fluency

Melanie R. Kuhn
Boston University

Paula J. Schwanenflugel
The University of Georgia

Elizabeth B. Meisinger
The University of Memphis

ABSTRACT

Over the past decade, fluent reading has come to be seen as a central component of skilled reading and a driving force in the literacy curriculum. However, much of this focus has centered on a relatively narrow definition of reading fluency, one that emphasizes automatic word recognition. This article attempts to expand this understanding by synthesizing several key aspects of research on reading fluency, including theoretical perspectives surrounding automaticity and prosody. It examines four major definitions of reading fluency and their relationship to accuracy, automaticity, and prosody. A proposed definition is presented. Finally, the implications of these definitions for current assessment and instruction are considered along with suggestions for reenvisioning fluency's role within the literacy curriculum.

Over the past decade, the field of literacy education has seen a major shift in fluency's role in the literacy curriculum, moving from a rarely encountered instructional component to one that is often responsible for driving major instructional decisions (e.g., Riedel, 2007; Schilling, Carlisle, Scott, & Zeng, 2007). This shift is due, in part, to the identification of fluency as one of the areas reviewed by the National Reading Panel (National Institute of Child Health and Human Development [NICHD], 2000). It also results from a broader reconsideration of the role of oral reading in the development of skilled reading (e.g., Rasinski, 2006; Reutzel, Fawson, & Smith, 2008). The recognition of the importance of fluency that has emerged as part of our developing understanding of the construct has led to a corresponding emphasis on fluency assessment and instruction within the literacy curriculum (e.g., Pikulski & Chard, 2005).

Most literacy educators consider fluency to be a critical component of reading development (e.g., Rasinski, Blachowicz, & Lems, 2006; Samuels & Farstrup, 2006). However, the current implementation of fluency instruction in many classrooms is often driven by assessments that build upon an incomplete conceptualization of the construct and can lead to both inappropriate instruction and a serious misconception of this essential characteristic of skilled reading. Further, despite the significant amount of attention the construct of reading fluency has received recently, there are still a number of questions surrounding our understanding of what constitutes fluency, its role in the reading process, and how its assessment and instruction fit into the literacy

curriculum. We plan to use the opportunity presented in this article to synthesize several key aspects of the research surrounding reading fluency, from theoretical perspectives to the role evaluation plays in determining practice, with an emphasis on the work that has occurred since the National Reading Panel's (NICHD, 2000) report.

Although there are a number of definitions of reading fluency, each of which places varying emphasis on its components, there seems to be a growing consensus that accuracy, automaticity, and prosody all make a contribution to the construct (e.g., Hudson, Pullen, Lane, & Torgesen, 2009; Rasinski, Reutzel, Chard, & Linan-Thompson, in press). Yet the way in which these components are conceptualized, their role in reading development, and their function in reading comprehension all have significant influence on how they are taught and assessed. In particular, we plan to consider automaticity and prosody in greater detail. And, while we do not focus on the development of accurate word recognition, per se, we address accuracy as part of the broader discussion of both automaticity and fluency assessment. This decision was made in part to move away from the view that reading fluency results from an improvement in the ability of students to recognize words and their component elements with increasing rapidity. Instead, we refer the reader to elegant discussions of the development of reading accuracy by Chall (1996), Ehri (1995), and Perfetti (1992).

Our discussion is divided into several parts; the first provides theoretical perspectives on reading fluency, particularly the role of automaticity and prosody in fluency. We then consider four definitions of fluent reading; each definition places differing emphasis on fluency's component parts as well as on the role fluency plays in the reading curriculum. As part of these definitions, we also present our own conception of what constitutes fluent reading. Next, we explore the relationship between certain conceptualizations of reading fluency, dominant assessments, and current practice. Finally, we consider the implications of these definitions for assessment and instruction and make suggestions for incorporating a broader understanding of the goals and purposes of reading fluency within a reenvisioned literacy curriculum.

Theoretical Perspectives on Reading Fluency

Automaticity

Automatic word recognition is central to the construct of fluency and fluency's role in the comprehension of text (e.g., Samuels, 2004, 2006). But what are the qualities that make for automaticity as it relates to reading fluency? According to Logan (1997; see also Moors and DeHouwer, 2006), processes are considered to be automatic when they possess four properties: speed, effortlessness, autonomy, and lack of conscious awareness. These properties can be considered together or separately when determining whether a skill is automatized (Moors & DeHouwer, 2006).

The first of these properties is speed, which is thought to emerge concurrently with accuracy as learners engage in practice (Logan, 1988). As automaticity develops, whether in terms of reading, perceptual-motor activities, or another skilled task, the learner's performance not only becomes accurate, it gets faster. However, this increase in speed is not limitless. Rather, the learning curve for these tasks follows what is known as the *power law*; this "states that reaction time decreases as a function of practice until some irreducible limit is reached. Speed increases throughout practice, but the gains are largest early on and diminish with further practice" (Logan, 1997, p. 123).

In terms of connected text, the power law can be seen in Hasbrouck and Tindal's (2006) oral reading fluency norms; for example, between winter and spring of the first-grade year students at the 50th percentile increase their reading rate approximately 30 correct words per minute, whereas their peers in the eighth grade gain only 18 correct words per minute over the entire school year and the gains for adult skilled readers, who have reached asymptote, are infinitesimal.

The second attribute of automaticity is effortlessness (Logan, 1997). This refers to the sense of ease with which a task is performed and to the ability to carry out a second task while carrying out the first, automatic one. If a person is able to accomplish two tasks at once, then at least one of those tasks is, by necessity, automatic. In terms of fluency, effortlessness can be seen in two ways. First, fluent readers lack a sense of struggle in recognizing most of the words they encounter in text. This effortlessness in word recognition is derived, in part, from unitization, a process that involves collapsing some of the sequential steps used to identify words (Cunningham, Healy, Kanengiser, Chizzick, & Willitts, 1988). Slow, algorithmic sequential word identification processes are seemingly replaced by a shift toward direct single-step retrieval of larger units (such as words and phrases) in long-term memory. These retrieved skills essentially outpace the slower algorithmic word identification processes and can be completed more quickly (Logan, 1988). Second, most fluent readers not only decode text, but also simultaneously comprehend what they are reading. Inefficient word recognition hampers comprehension and takes up precious cognitive resources that should be used for understanding. With automatization of lower level processes, readers

can shift their attention from lower level skills to higher level, integrative aspects of reading such as reading fluently with comprehension. Disfluent readers, on the other hand, are unable to integrate these lower level skills with higher level ones, primarily because of the effort they need to expend on word recognition (e.g., LaBerge & Samuels, 1974; Samuels, 2006).

In addition to rate and effortlessness, automatic processes are also autonomous; that is, they occur without intention, beginning and running to completion independent of the direction or intent of the person undertaking the act (Logan, 1997). In contrast, a nonautonomous process is deliberate, allowing an individual to maintain control over the act and deciding whether it occurs. In the case of reading, fluent readers have little choice but to recognize words as they encounter them whereas beginning readers do not find reading to be an obligatory act. For example, fluent readers often find themselves inadvertently reading the text that runs along the bottom of a news program, although they are eventually able to use their available cognitive resources to inhibit it. Disfluent readers, on the other hand, are either unable to process the text at all or may find their attentional resources excessively preoccupied by it (Schwanenflugel & Ruston, 2008). However, autonomous processing of words comes early in the development of reading, perhaps even before children are truly fluent readers (Schwanenflugel, Morris, Kuhn, Strauss, & Sieczko, 2008; Stanovich, Cunningham, & West, 1981). Indeed, continued lack of autonomy of lexical processing is an indicator that the child (or adult) is not yet a fluent reader (Protopapas, Archonti, & Skaloumbakas, 2007; Schwanenflugel et al., 2006).

The final characteristic of automaticity is a lack of conscious awareness (Logan, 1997). Once lower level word recognition skills become automatic, the conscious awareness of the subskills that comprise them disappears. This lack of conscious awareness in word recognition differentiates fluent from disfluent readers. Disfluent readers tend to be keenly aware of the steps they need to undertake to determine the words in a text and find the process to be slow and deliberate (e.g., Chall, 1996). However, because word recognition has become automatic for fluent readers, they are able to identify nearly every word they encounter without conscious effort.

Although each of these four properties can be applied to automatic word recognition, it is important to remember that these attributes develop on a continuum, as well as at different rates, so that readers who have had "an intermediate amount of practice may be somewhat fast, somewhat effortful, somewhat autonomous, and partially unconscious" (Logan, 1997, p. 128). Further, as readers gain skill and are exposed to more texts, automaticity may expand not just at the sublexical (i.e., phoneme and rime level) and word level, but also at the phrasal and perhaps even the sentence level.

Developing Automatic Word Recognition

Although the aforementioned discussion indicates the complexities of automaticity, the issues surrounding the development of automatic word recognition are still critical to reading fluency and therefore deserving of our attention. So how does automatic word recognition develop? The basic answer is that it occurs through consistent practice (Logan, 1997; Samuels, 2004). However, what that practice consists of and what it results in are central determinants in our current understanding of both reading fluency and its implementation in the classroom.

When discussing word recognition automaticity, we are talking about comparatively instantaneous identification. Such rapid word recognition is important because readers need to integrate information from multiple sources—phonemic, semantic, phrasal, textual, and so on. However, because of the cognitive resources used by word recognition, beginning readers must switch between these multiple sources rather than process them in a unified manner. To move beyond this serial processing and toward the autonomous word recognition entailed by fluent reading, learners require the opportunity for extensive practice in the reading of connected text (Kuhn et al., 2006; Schwanenflugel et al., 2009).

According to Logan (1997), every encounter with a task lays down a trace, or instance representation, in memory. As the number of encounters, or instances, increase, learners begin to build their knowledge base. When individuals first encounter a representation, their performance is based on an algorithmic computation that involves thinking or reasoning. However, as their encounters with a particular task increase, their knowledge base becomes more extensive and their retrievals begin to be based on past instances, or memories of past solutions, rather than on the need to formulate a solution based on slow algorithmic processes (see also Rawson, 2007; Rawson & Middleton, 2009). When this knowledge base is substantial enough, learners' performance can be based entirely on memory retrieval. However, although it is most likely that automaticity will occur after numerous exposures to a task, it is conceivable that it could occur after only one encounter. And, adding one trace to the initial encounter, or even the first 10 encounters, will have greater impact on the reader's ability to retrieve that trace quickly, or from memory, than does adding one trace to the one-hundredth encounter (Logan, 1992; Logan, Taylor, & Etherton, 1999). This notion has important implications for reading practice.

When reading, learners encounter letters, words, and phrases and construct higher order propositional

structures; and each reading leaves a trace at each level of representation (Logan, 1997). Although it is true that the number of times individuals encounter instances at these different levels of representation varies fairly dramatically, for example, readers encounter letters and even high-frequency words far more often than they do a particular higher order structure, there will still be some benefit for readers from each encounter at every level.

We contend that this argument has important implications for practice. To begin with, readers can benefit from both repetition (e.g., Levy, 2001; Logan, 1997; Samuels, 2006) and the wide reading of texts (e.g., Schwanenflugel & Ruston, 2008; Stanovich, 1986). Repetition of text allows for the kind of consistent practice that is important to readers. And, drawing from both the Samuels and the Logan theories of automaticity, repetition allows for the deepening of traces (Logan, 1997) and the freeing up of attention (Samuels, 2006). Further, Logan pointed out that, in addition to developing automatic word recognition, repeated readings allow learners to establish prosody, identify appropriate phrasing, and determine meaning. Thus difficulties encountered in a text can be successfully solved as the text is read repeatedly and, as a result, similar difficulties are likely to be more readily solved when encountered in another text.

Another important implication concerns the power law. Because most of the gains made with repeated readings, both in terms of accuracy and automaticity, occur between the third and the fifth repetition (e.g., O'Shea, Sindelar, & O'Shea, 1987; Reutzel, 2003; Rawson & Middleton, 2009), the power law mentioned earlier provides a reasonable explanation for decreasing gains across continued repetitions. Indeed, after some minimal amount of practice, readers seem to rely on direct retrieval of text meanings rather than on slow algorithmic processing of each word (Rawson & Middleton, 2009).

However, it is important to note that Logan (1997) also argued that some variability in practice can benefit learners: "Automaticity transfers to similar stimuli, so there should be some benefit in exposing readers to different materials" (p. 139). Wide reading provides opportunities for just such transfer, and research conducted on students who were asked to read a wide variety of materials with adequate support (e.g., Kuhn, 2005; Kuhn et al., 2006; Schwanenflugel et al., 2009; Schwebel, 2007) indicates that their automaticity does improve. Because there is a great deal of word overlap in the materials used for beginning readers (e.g., Adams, 1990), it seems likely that seeing words in multiple contexts improves students' recognition of those words (Mostow & Beck, 2005; Rashotte & Torgesen, 1985). However, the exact degree of similar versus unique words needs to be determined (e.g., Allington, 2009; Hiebert, 2006).

In addition to the sheer number of words that occur in multiple contexts, it might also help to have students read across themes, so that when a new word is encountered, there is a greater likelihood of it being seen within a different but supportive context (e.g., Logan, 1997). In this way, students are more likely to build upon and have the opportunity to expand their conceptual, as well as their orthographic, knowledge. We consider this understanding to be a complement to the arguments presented by Stanovich (1986) in his article describing the Matthew Effect in reading and demonstrated in research we recently conducted with several colleagues (Kuhn et al., 2006; Schwanenflugel et al., 2009). Not only do readers who read widely have more accurate and automatic word recognition, but they also have a more extensive vocabulary and encounter a broader range of concepts than do their peers who read in a more limited way (Stanovich, 1986). Continued practice on the same words, or same texts, beyond a certain point may not only be redundant, it may have the perverse effect of fixing students' attentional focus on the lower level aspects of text rather than shifting their focus toward practicing the integration of higher level skills. Practice through wide reading would translate into greater fluency, leading to further increases in readers' ease and comfort with texts.

We wish to conclude this discussion with a reiteration of what we consider to be a central tenet of automaticity; it is important to stress that, whether developed through repetition or the wide reading of texts, automaticity occurs on multiple levels and connects to comprehension in multiple ways (e.g., Samuels, 2004; Logan, 1997). We also want to stress that it is this interaction, occurring between various levels of processing, rather than simple speeded word recognition, which is central to a reader's construction of meaning from text (Bredekamp & Pikulski, 2008; Fuchs, Fuchs, Hosp, & Jenkins, 2001; Hudson et al., 2009; Wolf & Katzir-Cohn, 2001).

Prosody

Although automaticity is central to children's development as fluent readers, it does not account for all aspects of the construct. A second critical component of reading fluency is the ability to read with prosody; that is, with appropriate expression or intonation coupled with phrasing that allows for the maintenance of meaning (Cowie, Douglas-Cowie, & Wichmann, 2002; Miller & Schwanenflugel, 2006, 2008; Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004).

However, the import of developing expressiveness in reading, as children proceed from reading in a staccato, flat, word-by-word manner to something that

sounds more or less like everyday speech, is not entirely clear. Is expressiveness merely an epiphenomenon which proceeds of its own accord with little impact on other aspects of reading, or is it some essential ingredient that benefits (or perhaps enables) other reading processes? Our question is the following: If the development of expressiveness is important, what about it is important and what is it important for? If it is essential to reading, we may, indeed, wish to prioritize prosody in our instruction. If it is inessential or emerges without instruction, then we might decide not to. In recent years, the evaluation of expressiveness in fluent reading has become the focus of empirical research to address these questions. In what we present here, we equate reading with expression with reading prosody.

Prosody is the music of language. Indeed, some anthropologists have claimed that speech prosody served as the protolinguistic base from which music itself may have emerged (Simpson, Oliver, & Fragaszy, 2008). Prosody captures the rise and falls of pitch, rhythm, and stress—the pausing, lengthening, and elision surrounding certain words and phrases that is found in the pull of linguistic communication (Hirschberg, 2002). However, there are clear developments in children's understanding and use of prosody in their own speech that are ongoing during the period in which they are learning to read.

In this section, we begin by considering the spectrographic features measured to discern the qualities of prosody and their import in the development of reading prosody. We outline the psycholinguistic functions of prosody. We consider the costs and benefits of various ways of measuring prosody for reading fluency. We then describe what we know about where prosody fits in our conceptions of the development of reading skill.

Prosody Features

The first of these features is fundamental frequency (F_o) or, more simply, pitch. Pitch needs to be considered relative to a speaker's voice range and native language. For example, young children with their high-pitched voices may not have prosodic "room" to regulate pitch. Language features such as tones in tone-bearing languages such as Chinese will affect measured pitch.

Declarative sentences or statements are usually signaled by an initial rising and then falling pitch (called pitch declination or, simply, declination). As sentences become longer, there is a general flattening out of pitch (Ladd, 1984), so we can expect children to display smaller sentence-final declinations as they read complex texts (Benjamin, Schwanenflugel, & Kuhn, 2009). Yes–no questions are usually marked by sustained rising pitch, but this rising pitch is not obligatory for all question types (Miller & Schwanenflugel, 2006). Further, children's understanding of declarative question prosody (e.g., *He ate a bologna sandwich?*) is still under development until around age 11 (Patel & Grigos, 2006). Consequently, we should not tell children to use ascending pitch at each and every question mark as is sometimes the advice given to teachers (Hudson, Lane, & Pullen, 2005).

Pitch can convey pragmatic information as well. A plateau contour can convey a sense of boredom or recitation effect. A continuation rise can indicate continuation or uncertainty (Hirschberg, 2002). Neither pattern in children's readings should necessarily be taken as indicating a lack of fluency. As children learn to read with good prosody, they come to display an intonational pitch contour increasingly similar to the one used by adults when they read. In our studies, this has been a very consistent pattern associated with good fluency (Schwanenflugel et al., 2004; Miller & Schwanenflugel, 2006, 2008).

Another prosodic feature is duration. Vowels in stressed words are usually longer than in unstressed words (Temperley, 2009) and even longer in phrase-final position. Stressed syllables tend to also have greater intensity, or volume (Cooper & Paccia-Cooper, 1980). Duration has to be taken in context with the speaker's overall speaking rate. Thus, faster readers will have shorter segment durations than slower readers. However, syllable duration will become shorter as speakers proceed over long sentences (Ladd, 1984). This means that a child who has been told to read quickly will show less evidence of stress marking and phrase-final lengthening. Children will not be able to read both very quickly and with proper prosody, so directing them to read passages quickly and accurately will have the perverse effect of having them read less expressively.

Stress is a property in speaking that "makes one syllable in a word more prominent than its neighbors" (Himmelmann & Ladd, 2008, p. 248). Knowledge of a word's stress seems to be retrieved automatically when a word is read (Gutiérrez-Palma & Palma-Reyes, 2008). Function or "closed class" words tend to be unstressed. However, English favors a regular distribution of stressed and unstressed syllables, and this will cause English speakers to add or move stress to keep up a regular stress pattern (e.g., I gave it *to* the postman) and to avoid stress clashes (e.g., She turned thir*teen* versus *thir*teen donuts; Temperley, 2009). Stress can be used to distinguish grammatical form class in English (e.g., *per*mit [noun] versus per*mit* [verb]) with nouns being more likely to be stressed on the first syllable than are verbs (Kelly & Bock, 1988). Each language, however, follows its own rhythmic pattern. Sensitivity to stress patterns is related to the development of skilled reading (de Bree, Wijnen, & Zonneveld, 2006; Goswami et al., 2002; Jarmulowicz, Taran, & Hay, 2007; Orsolini,

Fanari, Tosi, de Nigris, & Carrier, 2006; Thomson, Fryer, Maltby, & Goswami, 2006; Whalley & Hansen, 2006; Wood, 2006). So, in monitoring for prosody in children's reading, we should look for the familiar stress patterns associated with the language that the readers speak, keeping in mind that nonnative speakers are unlikely to show nativelike use of stress (Guion, Harada, & Clark, 2004).

Pausing is noted by a spectrographic silence in oral reading beyond that invoked by some consonant combinations. Slow speakers make more pauses, and people differ considerably as to whether they make sentence-internal pauses in speech (Eisler, 1968; Krivokapić, 2007). Regardless, intrasentential pauses tend to be shorter than intersentential ones (Cooper & Paccia-Cooper, 1980). Pauses tend to be larger both preceeding and following syntactically complex phrases and as information load increases (Cooper & Paccia-Cooper, 1980; Ferreira, 1991; Zvonik & Cummins, 2003). Still, we should not expect readers to pause midsentence simply because they have completed a complex noun phrase. Neither should we consider a pause in midsentence a reading error in long, complex sentences. Our work has suggested that most midsentence pauses among young readers are related to decoding abilities (Miller & Schwanenflugel, 2008).

What Are the Psycholinguistic Functions of Prosody?

Prosody provides a variety of natural breakpoints in continuous speech. These intonational units provide distributional "edges" that allow the listener, including children, to break up continuous speech for parsing (Ramus, Hauser, Miller, Morris, & Mehler, 2000). Words at the right edges of these units are likely to possess boundary tones that indicate the end of the particular unit, typically word-final lengthening, declination, or pausing. If speech has these boundary markers inserted incorrectly, it is difficult both to understand and to parse (Sanderman & Collier, 1997; Shukla, Nespor, & Mehler, 2007); it is possible that the intermittent pausing found in the disfluent reading of young children may have this effect also, but this has yet to be determined.

As indicated by Wheeldon and Lahiri (1997), "prosodic constituents are derived from syntactic constituents but are not necessarily isomorphic to them (p. 357)." Thus, syntactic bracketing (e.g., $[[[\text{The girl}]_{NP}\ [[\text{I}]_{NP}\ [[\text{danced with}]_{V}\ [\text{at the party}]_{PP}\ ]_{VP}]_{S}]_{NP}[\text{tripped}]_{VP}]_{S}$) is considerably richer than the bracketing that prosody imposes. So one cannot assume that the positive effects of syntactic bracketing of text and greater syntactic awareness on readers' comprehension (e.g., Mokhtari & Thompson, 2006; Young & Bowers, 1995) will be the same as those found for reading prosody.

One of the essential functions of prosody is to provide a basic cognitive skeleton that allows one to hold an auditory sequence in working memory (Frazier, Carlson, & Clifton, 2006; Swets, Desmet, Hambrick, & Ferreira, 2007). By cognitively bracketing key informational units such as phrases, prosody assists in maintaining an utterance in working memory until a more complete semantic analysis can be carried out (Koriat, Greenberg, & Kreiner, 2002). Although there is no evidence currently that the development of appropriate reading prosody allows this to occur, it has been shown that people have better memory for poetic versions of texts that have enhanced prosodic features (Goldman, Meyerson, & Coté, 2006). It is possible that the construction of a good prosodic reading (compared with an inappropriate rendering) might improve comprehension.

Prosody can also serve to disambiguate semantically and syntactically ambiguous sentences. Because speakers rarely recognize their own ambiguity, they don't use prosody reliably to disambiguate their own utterances (Allbritton, McKoon, & Ratcliff, 1996; Beach, 1991; Snedeker & Trueswell, 2003), but listeners use it when it's available (Snedeker & Trueswell, 2003). Children have a fragile awareness of how prosody relates to disambiguation (Snedeker & Yuan, 2008). Consequently, we should not expect children to use this type of disambiguating prosody in their oral readings.

Prosody carries more than just syntactic phrasing, however. Different prosodic patterns convey different emotions (Banse & Scherer, 1996; Juslin & Laukka, 2003). For example, happiness is characterized by fast speech rate, high, rising pitch and variability, and fast voice onsets; and sadness nearly the opposite. Uncertainty is signaled by a sustained rise in pitch (Hirschberg, 2002). However, during the period where children are developing fluency, their concomitant understanding of emotional prosody is still not fully adultlike (Fujiki, Spackman, Brinton, & Illig, 2008; Wells & Peppe, 2003), so we should not expect them to convey these attitudes fully in their readings.

Prosody also carries discourse information. Higher, more variable pitch tones and longer pauses are typically seen at higher levels in the discourse hierarchy, for example, at topic shifts and the initial position in a paragraph (Noordman, Dassen, Swerts, & Terken, 1999; Smith, 2004). High pitch tones are used to introduce new topics and low pitch tones are used to indicate that the topical anaphor is in short-term memory (Wennerstrom, 2001). Pitch and punctuated stress is also used to dictate informational focus and contrast (Carlson, Dickey, Frazier, & Clifton, 2009; Couper-Kuhlen & Selting, 1996). Informationally related

utterances are distinguished by short pause durations between them and faster rates (den Ouden, Noordman, & Terken, 2009). However, again, children do not have full understanding of the import of these discourse elements of prosody possibly until they are adolescents (Chen, 1998; Wells & Peppe, 2003), so it is unclear whether they will know to convey this information in their oral readings. To date, discourse features have been largely ignored in the study of the development of reading prosody. We currently do not know whether or when children come to use these features in their oral readings as they become fluent readers.

In sum, we see that a tremendous amount of information is available for communication in the prosody of sophisticated readers. However, during the same period when children are learning to read fluently they are also developing a general understanding of the various uses of prosody. At this point, research is unclear on which attributes could serve as valid, reliable assessments of children's ability to read fluently. Further, most of the studies described in this article regarding prosody focus on English speakers. (Only 26% of the studies used languages other than English and most of these were Germanic languages.) Prosody is not identical across languages, so it is important to understand the limitations of current research with regard to linguistic diversity, including bilingual children.

Measuring Prosody: Direct Measures Versus Ratings

The *sine qua non* of reading fluency is that children read in a manner that approximates speech. Yet reading prosody is not identical to speech prosody. Even in fluent readers, reading prosody has fewer end-of-sentence rises, fewer very low pitch ranges (as for parenthetical speech), and possesses generally less variability than spontaneous speech (Esser & Polomski, 1988). Overall, adults pause less in read speech, show more consistent stress placement and generally cleaner speech (Howell & Kadi-Hanifi, 1991) than in spontaneous speech. Minor syntactic boundaries are less likely to be marked in read speech than spontaneous speech (Blaauw, 1994). Indeed, it may be that only professionals, such as television newscasters, truly read in a way that approximates speech (Esser & Polomski, 1988); so this expectation is likely a bar set too high for determining the achievement of reading fluency. However, where to set the bar and how to set it empirically is the issue in question.

There are two basic ways to measure reading prosody: rating scales and spectrographic measures. In the classroom, rating scales are relied upon for evaluation, and the NAEP Oral Reading Fluency Scale is the most common measure (Pinnell et al., 1995). This 4-point scale distinguishes reading that sounds primarily word-by-word from reading that occurs in "larger, meaningful phrase groups" (Pinnell et al., 1995, p. 15). Another popular rating scale that focuses more on the prosodic characteristics of oral reading is the Multidimensional Fluency Scale (Rasinski, Rikli, & Johnston, 2009; Zutell & Rasinski, 1991). This scale consists of four separate 4-point subscales that distinguish phrasing and expression, smoothness and accuracy, and pacing. These scales are then summed to represent children's overall ratings of fluency. Rasinski et al. (2009) have reported inter-rater agreement within 2 points to be 86%. More recently, however, Klauda and Guthrie (2008) added to this scale by including a 4-point rating scale that distinguished passage-level expressiveness with a 1 indicating that the child read with no mood or tone to a 4 indicating that the child read the "whole or nearly the whole passage in an expressive manner that created a mood or tone that seemed in accord with the author's intention" (p. 314).

Unfortunately, even after collapsing two points on the scale, the researchers were only able to achieve 79% agreement so it is unclear whether this revised scale will have sufficient reliability to add a degree of precision to fluency ratings. Whether rating scales will ever have the precision necessary for them to add meaningfully to our measurement of reading fluency beyond text reading speed and accuracy (see also Fuchs et al., 2001) is a concern, but it is an avenue that needs to be pursued. Still, we believe that these more complex scales are the general direction in which rating scales of prosody need to go.

In our own work on reading prosody, we have always employed spectrographic measures. We do recognize that the technical skills related to spectrographic measurement will be beyond the needs of most teachers, and perhaps reading specialists, although we note that these tools are becoming increasingly easy to use. What is needed right now is research that allows us to relate spectrographic measures directly to various rating schemes so that informationally valid and reliable ratings of reading prosody having curricular utility can be created. We are certain that these measures will need to include some notation of the complexity of the text being read (Benjamin et al., 2009) as well as their general discourse features because it is tempting to assign a child a NAEP rating of 4, say, on a simple passage while the same child might receive only a 1 on a more complex one. Benjamin and Schwanenflugel (2009) have shown that prosody measured from simple passages is simply less predictive of reading skill than is prosody measured from passages that press the upward limits of children's skills. We are also encouraged that the need to revise prosody rating scales might be preempted by recent advances in artificial intelligence tools

that may allow us to automate the process of identifying the adultlike extent of children's reading expressiveness (Mostow & Duong, 2009).

Where Does Reading Prosody Fit in Our Conceptions of Development of Reading Skill?

Prosody is at the heart of the development of reading skill. Prosody is likely another aspect of the fundamental phonological representations that drive much of the development of early reading skill (de Bree et al., 2006; Goswami et al., 2002; Surányi et al., 2009). However, because there are distinct prosody features at lexical, phrasal, sentence, and discourse levels, these may only be partially related to phonological codes that connect to basic phonological (segmental) awareness (Whalley & Hansen, 2006).

Prosody is most certainly related to the development of reading fluency. As children become more fluent readers, they also make shorter and less variable intersentential pauses, shorter and less frequent intrasentential pauses, and larger pitch declinations and display a more adultlike intonation contour (Clay & Imlach, 1971; Cowie et al., 2002; Miller & Schwanenflugel, 2006, 2008). These changes in reading prosody between first and second grade are predictive longitudinally of later reading fluency, beyond measures of word reading efficiency and text reading rate (Miller & Schwanenflugel, 2008). Pauses seem to be more connected to word reading skill than fluency itself, but as children read more complex passages, pauses in fluent readers will more systematically mark the greater syntactic complexity and sheer length of the sentences that accompany such texts (Benjamin et al., 2009).

Reading prosody also seems to be related to reading comprehension. Our own work has found varying patterns regarding the relationship between reading prosody and reading comprehension, some of which seem to be attributable to passage characteristics. Measurements of prosody from simple texts (relative to the absolute levels of reading skills of the children) do not seem to contribute much to our ability to predict reading comprehension skill (Schwanenflugel et al., 2004). Measurements of prosody from more complex texts do predict reading comprehension skills beyond those accounted for by word reading efficiency or text reading rate measures (Benjamin et al., 2009; Klauda & Guthrie, 2008; Miller & Schwanenflugel, 2006). Indeed, we have found that the reading prosody of simple texts in first grade predicts children's reading comprehension skills of more complex texts two years later (Miller & Schwanenflugel, 2008). Thus, it appears that having appropriate reading prosody is independently related to good reading comprehension.

At present we do not know the directionality of this relationship. That is, does reading with good prosody help the reader comprehend what is being read or does comprehending while reading simply promote good reading prosody? Or is the relationship between reading prosody and reading comprehension reciprocal? Currently, we know of two studies that have addressed the directionality issue, and they have come to different conclusions using different methods. Using second and third graders as participants, Schwanenflugel et al. (2004) evaluated two structural equation models implying different directionality. In one, reading prosody served as a partial mediator with word reading efficiency to predict reading comprehension score outcomes. In the other, reading comprehension and word reading efficiency predicted reading prosody as outcomes. In that study, only the first model (i.e., that reading prosody predicted reading comprehension) fit the data. Klauda and Guthrie (2008) examined the issue of whether changes in ratings of syntactic prosody were reciprocally related to changes in reading comprehension longitudinally beyond word reading speed over the course of the fifth-grade year. They found evidence for reciprocity. Whether the differences in outcomes between these studies could be attributed to differences to the age of the children or the particulars of the methods is not clear. Directionality and causality between reading prosody and comprehension remain to be determined.

Finally, we hypothesize that the development of oral reading prosody will be related to the movement toward what psycholinguists have called "implicit prosody" (Fodor, 2002), which may develop as children make the transition from oral reading to silent reading (McCallum, Sharp, Bell, & George, 2004; Prior & Welling, 2001). According to Fodor (2002), a default prosodic contour is projected onto the reading materials during silent reading. Several findings support the existence of this implicit prosody during silent reading. Among them, in silent reading, adults read words with multiple stressed syllables more slowly than words with a single stressed syllable, even though syllable structure is not actually needed (Ashby, 2006; Ashby & Clifton, 2005). Further, adult readers appear to dwell on commas during silent reading (Hirotani, Frazier, & Rayner, 2006), particularly when they are needed to disambiguate syntactically ambiguous sentences (Kerkhofs, Vonk, Schriefers, & Chwilla, 2008). Event-related brain potentials seem to be linked to focus during silent reading in adults (Stolterfoht, Friederici, Alter, & Steube, 2007). Whether there will be a one-to-one relationship between implicit prosody and all the various features found in oral reading prosody remains to be seen.

We can already identify some places where there may be differences between skilled and novice oral readers. Among them, most adults do not pause on each

and every comma when they read aloud (Chafe, 1988); pausing on commas is a feature of younger, less generally skilled readers (Miller & Schwanenflugel, 2006). Further, we need to ensure that our theories regarding the development of implicit prosody do not exceed what we know about the developing status of children's understanding of prosody, particularly during the period that they are learning to read, which for some features extends until age 18 or so (Plante, Holland, & Schmithorst, 2006).

Still, the implicit prosody hypothesis is an intriguing one that needs further research. Moreover, it will be important to understand more about how prosodic reading is acquired so we can determine how it may promote, or perhaps enable, the development of implicit prosody in the silent reading prosody of children. One study is particularly intriguing with respect to this. Kleiman, Winograd, and Humphrey (1979) showed that below-average fourth-grade readers had difficulty marking phrase boundaries in silent reading compared with sentences that were presented in both spoken and written form. This is suggestive, at least, that poor readers may be having difficulties generating implicit prosody during silent reading to support their comprehension. Of course, this is not the only explanation for these findings, but they fit the pattern anticipated by this view. Similarly, Rasinski et al. (2009) have found that oral reading prosody ratings using the multidimensional fluency scoring rubric bear a substantial relationship to silent reading comprehension scores.

In the beginning of our discussion of prosody, we asked what the role of reading prosody was in the development of reading fluency. We asked whether expressiveness is merely an epiphenomenon which proceeds with little impact on other aspects of reading and, if not, then for what is prosody used. We believe we can say rather conclusively at this point that good reading prosody emerges as children develop efficient word and text oral reading skills. To connect to our earlier discussion regarding automaticity, we can say that children who develop efficient word and text reading skills seem to use the newly freed up resources gained from these automated skills and shift their attention to the integration of speech prosody with integrative reading skills. Thus, prosody seems to be related to the development of good oral reading fluency and, indeed, may be a marker of it. If so, prosody should be measured whenever reading fluency is measured.

We also suggested that good reading prosody may support reading comprehension, but the directionality of this has yet to be determined. The directionality issue is important so that we can determine whether a particular instructional emphasis on prosody is necessary. If acquiring good reading prosody supports improved comprehension (as we think evidence is beginning to support), then we should emphasize prosody in our instruction along with these other skills. If, instead, acquiring good reading prosody is a reflection of efficient decoding and comprehension skills alone, it may not make much sense to focus children's attention instructionally on developing newscaster-like oral reading because this by itself would have limited utility. Once we are certain that developing good reading prosody has causal value for improved reading comprehension, then we should shift our research to considering better (and worse) ways of integrating such instruction in our literacy practice.

Definitions

Having discussed the automaticity and prosody constructs surrounding reading fluency, we turn to the multiple ways in which fluency is defined. This is not an exclusively theoretical issue or simply a matter of semantics. Because classroom instruction develops around teachers' perceived understanding of a construct, the way in which they view certain aspects of the reading process has a decisive role in their teaching and assessment of those aspects. Further, these conceptualizations strongly affect learners' understanding of what reading is as well as what it means to be a reader. It is also important to highlight the commonalities and differences in these definitions while working toward a more cohesive understanding of what fluency is, as well as of what it is not. So, while many definitions of fluency highlight the importance of accuracy, automaticity, and prosody in relation to the comprehension of text, (e.g., Fuchs et al., 2001; NICHD, 2000; Rasinski et al., in press; Samuels, 2006; Torgesen & Hudson, 2006), which of these elements they emphasize and the roles they are assigned in the development of skilled reading vary widely.

Fluency as Accuracy and Automaticity

The first definition emphasizes accurate and automatic word recognition and those components, such as phonemic awareness and letter–sound correspondences, which allow students to rapidly, and correctly, identify words (Fletcher, Lyon, Fuchs, & Barnes, 2007; Good, Kaminski, Simmons, & Kame'enui, 2001). As can be seen in the earlier discussion of automaticity, there is little dispute that accurate, automatic word recognition is a critical component of fluent reading, or that phonemic awareness, letter naming, or other components contribute to the development and consolidation of students' word recognition (e.g., Ehri, 1995; NICHD, 2000). In fact, most fluency researchers (e.g., Rasinski et al., 2006; Samuels & Farstrup, 2006) agree that accurate and automatic word identification plays a central

role in fluent reading, and that components, such as phonemic awareness and letter naming, are important in the process of developing accuracy and automaticity in their turn (e.g., Chall, 1996; Ehri, 1995).

What needs to be challenged, however, is the emphasis that is placed on accuracy and automaticity, to some extent, simply because they are the most quantifiable elements of fluency (Paris, 2008; Torgesen & Hudson, 2006) and often at the expense of other aspects of fluent reading, such as phrasing, appropriate pacing, stress, and emphasis (e.g., Kuhn & Stahl, 2003). Although these elements are central to fluent reading, they are by no means the only elements critical to the process. By focusing on these elements over the past decade, to a large extent through the dominance of Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002), and similar assessments such as AIMSweb (Shinn & Shinn, 2002) and curriculum-based measurements (CBMs; Deno, 1985) in the classroom, rate measures such as the DIBELS Oral Reading Fluency have become privileged, driving the literacy curriculum (e.g., Riedel, 2007; Samuels, 2007). Given that this perspective presents a limited view of fluency, it is essential that reading educators consider a broader definition of the construct, one that places weight on its less quantifiable elements.

Fluency as Prosody

The National Assessment of Educational Progress (NAEP; Daane, Campbell, Grigg, Goodman, & Oranje, 2005; Pinnell et al., 1995), on the other hand, views oral reading performance as an important indicator of skilled reading. However, while it includes measurements of accuracy and rate as part of its evaluation, it parcels out fluency as a distinct component, defining it as "phrasing, adherence to the author's syntax, and expressiveness" (Daane et al., 2005, p. v). The result of this wording is that fluency becomes equated with most working definitions of prosody (e.g., Kuhn & Stahl, 2003; Schreiber, 1991; Torgesen & Hudson, 2006).

At first, it was unclear why the authors of the NAEP assessment would make this distinction, but an explanation may be found in the historical context surrounding the measure. The 1992 NAEP was one of the first large-scale evaluations of oral reading performance, undertaken at a time when fluency was largely a neglected component in the reading process (e.g., Allington, 1983; Dowhower, 1991). In those few cases where fluency was considered, it was primarily in terms of rate and accuracy and was generally measured as the number of correct words read in a minute (e.g., Kuhn & Stahl, 2003). One of the goals of the original NAEP evaluation of oral reading performance was "to describe those aspects of oral reading that go beyond accuracy and rate" which the authors felt "may have wide applicability for reading educators" (Pinnell et al., 1995, p. 2). By designing the Oral Reading Fluency Scale, the authors' hoped to counterbalance some of the overemphasis on rate and accuracy and to integrate oral language elements into the discussions that surround oral reading performance.

What is interesting is that, when looking across a range of discussions that have taken place around the construct of fluency, both before the initial NAEP publication (Pinnell et al., 1995) and increasingly since (e.g., Kuhn & Stahl, 2003; Zutell & Rasinski, 1991), it becomes apparent that there is a recognition of the importance of prosodic elements in most definitions of fluency (e.g., Hudson et al., 2009; NICHD, 2000). Whether that acknowledgment is as robust as we might want is something we are attempting to address here. However, we would argue that a definition that separates rate and accuracy from prosody reinforces the position that correct words per minute can be treated as an isolated measure of oral reading performance. As a result, we consider it important to keep an integrated definition that includes accuracy, speed, and prosody.

Fluency as Skilled Reading

A third definition of reading fluency equates it with skilled reading. According to Samuels (2006), "the most important characteristic of the fluent reader is the ability to decode and to comprehend the text at the same time" (p. 9) and "other characteristics of fluency such as accuracy of word recognition, speed of reading, and the ability to read orally with expression" (p. 9) simply serve as indicators that fluency has been achieved. This definition initially holds great appeal; by including text comprehension within the definition of fluent reading, it becomes possible to differentiate two groups of students; word callers, who simply read words, or "bark" at print (Samuels, 2007), without attending to the meaning, and fluent readers who construct meaning from the text as they read. Although word callers are not ubiquitous (Meisinger, Bradley, Schwanenflugel, Kuhn, & Morris, 2009; Meisinger, Bradley, Schwanenflugel, & Kuhn, in press), their numbers do increase across the elementary grades. As such, it seems reasonable to presuppose that instruction that focuses on speed and accuracy of word identification with little or no regard to understanding will further serve to inflate their numbers (Applegate, Applegate, & Modla, 2009; Pressley, Hilden, & Shankland, 2006).

However, this broad definition of fluency gives us pause. Skilled reading is a complicated act that requires the coordination of input from multiple sources, including syntactic knowledge, background knowledge, vocabulary knowledge, orthographic knowledge, and affective factors, among others (e.g., McKenna & Stahl, 2003; RAND Reading Study Group, 2002), that allows the reader to construct meaning from text. Rather

than defining fluency as simultaneously decoding and comprehending (Samuels, 2007), it can be argued that fluent reading merely allows comprehension to occur (e.g., Levy, 2001). Just as readers' fluency can vary with various texts (e.g., Allington, 2009; Hiebert, 2006), that is, readers may be able to read independent level texts with good fluency yet be disfluent when reading texts that are challenging in terms of vocabulary or content, it is also possible for readers' comprehension of difficult texts to vary despite their reading of these texts with adequate fluency.

For example, let's consider what happens when you read a complicated text, such as a theoretical paper. As a reader with a strong background in the subject, you are likely to read that text fluently, that is accurately, at a good rate, and with appropriate parsing and cadence. But it is also likely that you will have only surface-level comprehension on the initial reading. However, by rereading that text and grappling with its meaning, you will deepen your understanding of the material (Pressley, 2000). Similarly, even with relatively easy texts, say C.S. Lewis's *The Lion, the Witch and the Wardrobe*, you and another reader with similar levels of fluency may develop highly differing interpretations of the text depending on your varying background knowledge. At the same time, we do agree that "fluent" reading without any concomitant comprehension would be merely word calling. So how do we rectify these potentially disparate understandings? Although it is reasonable to expect a basic level of comprehension before considering an individual's reading fluent, if only to prevent the term from being equated with surface-level features (accuracy, speed, and expression), it is critical not to confound the two constructs given the complexities of both.

Fluency as a Bridge to Comprehension

The final definition we consider here views fluency as a bridge between decoding and comprehension (Chard, Pikulski, & McDonagh, 2006; Pikulski & Chard, 2005). This position indicates that fluency likely has a reciprocal relationship with comprehension, both contributing to and possibly resulting from readers' understanding of text (e.g., Klauda & Guthrie, 2008; Stecker, Roser, & Martinez, 1998). It also accounts for the theoretical discussions surrounding automaticity and prosody, indicating that both aspects of the construct facilitate, and benefit from, comprehension. Further, this definition moves away from what the authors call a surface conceptualization of fluency; such an understanding sees the construct primarily as an oral reading phenomenon and, as a result, has a tendency to stress its more concrete elements of accuracy, rate, and prosody through both assessment and instruction (Chard et al., 2006; Pikulski & Chard, 2005). Given most reading is silent, rather than oral, this insight is particularly important. Indeed, children are thought to make the transition to predominantly silent reading during late elementary school (Prior & Welling, 2001), generally around fourth grade.

Our Definition

Having reviewed multiple ways of conceptualizing reading fluency, we propose the following definition to synthesize the information presented thus far:

> Fluency combines accuracy, automaticity, and oral reading prosody, which, taken together, facilitate the reader's construction of meaning. It is demonstrated during oral reading through ease of word recognition, appropriate pacing, phrasing, and intonation. It is a factor in both oral and silent reading that can limit or support comprehension.

Although this definition is clearly influenced by those presented elsewhere (e.g., Harris & Hodges, 1995; Pikulski & Chard, 2005; Reutzel, 1996), it attempts to incorporate several critical points. First, it highlights the relationship between fluency and comprehension. Next, it emphasizes prosody along with accurate and automatic word recognition without privileging any of these components. Third, it begins to address the understanding that fluency plays a role in silent as well as oral reading. Finally, it attempts to reconceptualize two aspects of the construct that have the potential to be problematic when taken in isolation from the rest of the components: rate and expression. We also recognize that there may be a reciprocal relationship between fluency and comprehension; however, this issue requires further research. As such, we have chosen not to include reciprocity in our definition.

When discussing oral reading fluency in terms of assessment and instruction (e.g., Mathson, Allington, & Solic, 2006; Samuels, 2007), there has been a tendency to focus on decoding speed at the expense of prosody. This results in students being encouraged to read as fast as possible rather than at a rate that replicates oral language; the hope is that the use of the term *appropriate pacing* over *rate* has the potential to begin addressing this misconception. The second aspect that can lead to problems of interpretation is the use of the term *expressive reading* as an equivalent of prosody. Although expression is an accurate term for many types of texts (e.g., narratives, plays, poetry), it has been argued that it is inappropriate for informational text. However, these texts have their own prosodic indicators (e.g., Carlson et al., 2009; den Ouden et al., 2009), so it may be that the term *intonation* is more precise than is *expression* for describing the suprasegmental features that occur as part of the reading of informational text. It may be that the use of these alternative terms to describe fluent

reading will help to counter certain misunderstandings that have developed around the construct.

Current Assessment of Fluency

Given the aforementioned review, it is important to expand the discussion to the assessment—and practice—of fluency as it is currently being implemented in many school districts across the United States (e.g., Riedel, 2007). Since the introduction of No Child Left Behind and Reading First (government mandated educational reforms), the instructional landscape in the United States has undergone a major shift (e.g., Cervetti, Jaynes, & Hiebert, 2009; Garcia & Bauer, 2009). There has been an attempt to refocus literacy education on five areas of literacy development reviewed by the National Reading Panel (NICHD, 2000): phonemic awareness, phonics, fluency, vocabulary, and comprehension. This has been coupled with a new emphasis on regular assessment and scientifically based reading research. Our goal here is not to critique Reading First, per se (see Connor, Jakobsons, Crowe, & Meadows, 2009; Dubin, 2008; Gamse, Bloom, Kemple, & Jacob, 2008; Teale, Paciga, & Hoffman, 2007 among others for discussions of the impact of Reading First), but to instead look at the ways in which fluency assessment and instruction have been affected by conceptualizations that have dominated educational practice since the inception of this legislation.

While Reading First focused on five areas of reading as critical to skilled reading development, two of those five, vocabulary and comprehension, are significantly more complex and, therefore, more difficult to measure. As a result, designing assessments that readily demonstrate student growth in these areas has been somewhat problematic (e.g., McKenna & Stahl, 2003; Paris, 2008). One result of this difficulty has been a greater emphasis on those areas that are easy to measure (Duffy, 2007; Paris, 2008): phonological awareness, the alphabetic principle, and oral reading fluency, or what have been referred to as the "big ideas" (Good et al., 2001, p. 7) of beginning reading. In fact, when discussing these concepts, Good and his colleagues title the section of their paper that focuses on these components "Measuring what's important: The foundational skills of beginning reading" (p. 6).

Although these factors are among the critical understandings that students must establish if they are to become successful readers, this list needs to be purposefully expanded to provide a better sense of the complexities of beginning reading; as such, factors that emphasize oral language, motivation, extensive opportunities to read and interact with connected text, and a range of other skills that contribute to vocabulary and comprehension development should also be included as part of a balanced reading curriculum (Bredekamp & Pikulski, 2008; Pikulski, 2005; Schwanenflugel et al., in press; Shanahan, 2005).

So is the reason for the emphasis on three of the five components simply the result of their ease of assessment? In our opinion, to some degree, yes. According to Paris (2005, 2008), reading skills can be classified along a continuum of constrained and unconstrained skills. Constrained skills develop over a relatively brief period of time, incorporate a limited set of knowledge and skills, can be taught directly, and can be readily assessed quantitatively. Further, these skills are important because they enable the development of unconstrained skills to occur in relation to text. When placing skills along this continuum, Paris (2008) argued that phonological awareness, phonics, and oral reading fluency are constrained, or in the case of oral reading fluency somewhat constrained, and that vocabulary and comprehension are unconstrained. And it is also the case that the testing of constrained skills is both uncomplicated and inexpensive, allowing students to show significant gains over short periods of time. As a result, it is easy for them to become the focus of attention.

However, ease of measurement is only one reason that the "big ideas" (Good et al., 2001, p. 7) of beginning reading have gained dominance in many schools' reading curriculum. A more fundamental reason is that a number of researchers (e.g., Fletcher et al., 2007; Kame'enui, Simmons, Good, & Harn, 2001) consider these skills to be integral to later reading success. In this line of thought, if learners encounter difficulties with these skills early on, they are increasing their likelihood of developing later reading difficulties dramatically. According to Good and his colleagues (2001), "differences in developmental reading trajectories can be explained, in part, by a predictable and consequential series of reading-related activities that begin with difficulty in foundational skills" (p. 6). To circumvent this problem, it is important to identify any weaknesses that students are experiencing with these skills early and provide intensive instruction in the corresponding areas. And the best way to determine whether students are making appropriate progress is through regular assessments. CBM (Deno, 1985), along with its commercially available variants (e.g., DIBELS [Good & Kaminski, 2002], AIMSweb [Shinn & Shinn, 2002]), have come to the fore as a means of accomplishing this goal. Further, these measures have become highly influential in informing early reading instruction in general and fluency instruction in particular.

Curriculum-Based Measurements (CBMs)

CBM was originally designed to evaluate students' general reading progress by measuring the number of

correct—and incorrect—words read aloud in one minute (e.g., Deno & Marston, 2006; Madelaine & Wheldall, 1999, 2004; Samuels, 2007). However, they have since been adapted for use as a measure of oral reading fluency as well. The initial drive behind these assessments was to provide teachers with a quick alternative to norm-referenced standardized tests (Madelaine & Wheldall, 1999). A number of reasons have been cited for this decision, including standardized measures' lack of technical adequacy (e.g., issues surrounding content validity), their insensitivity to small changes in learners' development, their inappropriateness as a means of tracking students' progress or as a basis for instructional decision making, and a tendency toward the misuse of the data that norm-referenced standardized tests provide.

CBMs, on the other hand, are meant as an alternative that incorporates standardized procedures, but provides teachers with information that is "reliable and valid, quick and easy to administer repeatedly, inexpensive, unobtrusive, sensitive to small changes in progress, and able to be used to make instructional decisions" (Madelaine & Wheldall, 1999, p. 74). Studies have indicated that the use of these measures as a means of tracking learners' reading development can lead to improvements in reading achievement (Deno, 2003; Fuchs, Deno, & Mirkin, 1984; Stecker & Fuchs, 2000; Wayman, Wallace, Wiley, Tichdt, & Espin, 2007), and there is evidence that they correlate highly with standardized tests of reading comprehension as well (e.g., Deno & Marston, 2006; Fuchs, Fuchs, & Maxwell, 1988).

Initially, CBMs were developed as a means of evaluating learners' progress on passages drawn directly from their curriculum, a procedure that allowed teachers direct insight into their students' ability with the material they were using in the classroom (Deno & Marston, 2006). While researchers note clear advantages to this approach, they discuss disadvantages as well, including the amount of time required to identify reading passages and the variability in difficulty across, and even within, texts. To rectify these issues, passages identified at a given reading level but selected from material outside the curriculum have been used for these measures as well (Powell-Smith & Bradley-Klug, 2001). This shift away from specific, classroom-based literacy curricula also laid the groundwork for commercial versions of oral reading fluency assessments, the best known of which is DIBELS (Good & Kaminski, 2002).

Dynamic Indicators of Basic Early Literacy Skills (DIBELS)

As with CBMs, the DIBELS oral reading fluency measures the number of correct words students can read in one minute. According to the DIBELS website (dibels.uoregon.edu/samples/index.php), the oral reading fluency measure, along with other measures that are part of the DIBELS data system (Good & Kaminski, 2002), is in use at over 15,000 schools, making it likely the most frequently used single assessment of connected-text reading fluency in the United States today. The DIBELS tests provide a developmental timeline and corresponding benchmarks for skills acquisition that allows teachers to determine a developmental trajectory for each student. The measures include initial-sound fluency, letter-naming fluency, phoneme segmentation fluency, nonsense word fluency, oral reading fluency, retell fluency, and word use fluency. Taken together, these assessments are meant to be easy and inexpensive to administer, effective at identifying students who are likely to experience later reading difficulty based on their progress on a series of constrained skills, and designed to provide data that can serve as the basis for instructional decision making.

At this point, it is useful to note that the authors of DIBELS (Kame'enui et al., 2001) define fluency differently from the way we have discussed it thus far. Rather than employ what they term a traditional definition of fluency, that of proficient word recognition in the reading of connected text, they modify the definition to include "fluency in the component skills and lower-level processes" (p. 308). This understanding translates into automaticity in phonemic awareness, letter recognition, and decoding and accounts for the term being used in connection with all the DIBELS measures, not just oral reading fluency of connected text. However, this understanding of fluency as automaticity is also integral to the DIBELS oral reading fluency, which is described as a measure of the accuracy and fluency of connected-text reading. This results in the DIBELS actually narrowing, rather than expanding, the understanding of fluency so that the term becomes a synonym for automaticity, even as it is applied to a broader range of concepts than connected-text reading. As Hudson and her colleagues (2009) succinctly argued, "the concept of automaticity actually implies more about a response than does the concept of fluency"; accordingly, they retain the term automaticity, rather than fluency, to describe a response that "requires few processing resources, is obligatory, and outside of conscious control" (p. 9).

The Use of CBMs and DIBELS in Practice

A key premise of both CBMs and the DIBELS oral reading fluency is that students' reading rate and accuracy are effective proxies for general reading ability (e.g., Deno & Marston, 2006; Fuchs et al., 2001; Samuels, 2007). As such, they are seen as a means of tracking students' reading development and as the basis for determining whether students are receiving effective

instruction. In addition, the DIBELS oral reading fluency, along with other versions of CBMs, is seen as an indicator of connected-text fluency (Good et al. 2001). These scales have established benchmarks designed to determine learners' risk level in relation to reading development (Good & Kaminski, 2002; Shapiro, 2004). And the use of these measures is seen as a valuable means of helping students avoid later reading difficulties and the negative cycle that develops as a result of unsuccessful early experiences with print. As Good and his colleagues (2001) stated, "few would argue with the concept of prevention and the need for formative assessment to inform instruction" (p. 9).

Indeed, there is little arguing with the desire to prevent reading difficulties (Snow, Burns, & Griffin, 1998) or of the importance of using appropriate assessments to inform instruction (Duffy, 2007). Nor is there any doubt that ensuring students have extensive experiences with text and appropriate forms of instruction, some of which focus on the development of constrained skills, will prevent many students from experiencing later reading difficulties (e.g., Cunningham & Stanovich, 1998; Shanahan, 2005). However, whether the assessments discussed earlier are the best means for helping learners meet these goals is significantly more problematic. The answer depends, to a large extent, on how the assessments measure and define fluency and on forms of instruction that are used as a result. So, for example, if the emphasis is on automaticity (e.g., Kame'enui et al., 2001) or "rapid decoding" (Shinn et al., 1992 cited in Madelaine & Wheldall, 1999, p. 76), either as part of fluency's working definition (e.g., oral reading fluency or "the oral translation of text with speed and accuracy" Fuchs et al., 2001, p. 239) or as part of its measurement (e.g., Fletcher et al., 2007; Torgesen & Hudson, 2006), there is, almost inevitably, a corresponding privileging of speeded decoding in its instruction (Applegate et al., 2009; Pressley et al., 2006). Further, the importance that administrators, teachers, and other constituents currently assign to these measures, coupled with their repeated use over the course of the elementary school years, has intensified these issues (Paris, 2005, 2008). This excessive focus on rate can lead to fast, staccato reading rather than reading with appropriate pacing and may actually interfere with, rather than promote, comprehension (Samuels, 2007).

Because excessive rate impedes comprehension, either by shifting the focus away from understanding or by actually interfering with the construction of meaning, most researchers (e.g., Fletcher et al., 2007; Hudson et al., 2009; Rasinski et al., in press) consider appropriate or conversational pacing, along with other prosodic features, as central to their definition of fluency. So why does this understanding not translate to assessment? It appears that measuring prosody is considered to be somewhat problematic (e.g., Fuchs et al., 2001). Three primary concerns underlie this perception (Torgesen & Hudson, 2006). The first involves prosody's ambiguous relationship with comprehension; estimates of prosody's contribution to comprehension beyond that accounted for by rate measures have ranged from small to moderate (Schwanenflugel et al., 2004; Miller & Schwanenflugel, 2006, 2008). Second, those measures of prosody that are readily implemented in classrooms, such as the NAEP fluency scale (Pinnell et al., 1995) or the multidimensional fluency scale (Rasinski et al., 2009), are far less precise than are measures of correct words per minute. This means the results from these measures are less sensitive to small, ongoing changes in fluency (e.g., Klauda & Guthrie, 2008). Finally, measures of prosody have the highest levels of reliability when they include a measure of reading rate as well, making their implementation somewhat redundant (Torgesen & Hudson, 2006).

Despite their shortcomings, compelling arguments can be made for the use of fluency scales. According to the NAEP analysis of oral reading (Daane et al., 2005; Pinnell et al., 1995), all three elements of fluency—accuracy, rate, and prosody—are related not only to one another, but also to overall reading comprehension. That is, students with higher NAEP ratings (levels 3 or 4 on the NAEP oral reading fluency scale) not only tended to read texts with a higher degree of accuracy and at a faster rate, but they also had a higher score in terms of their overall reading proficiency. Their peers with lower NAEP ratings (levels 1 or 2 on the NAEP oral reading fluency scale), on the other hand, read fewer words per minute, had a higher percentage of miscues, and had a lower overall reading proficiency score. In addition, the appropriate use of prosodic elements appears to reflect a reader's comprehension of a text (Mathson et al., 2006). And, although fluency scales do involve qualitative judgments, several researchers (e.g., Kuhn, 2005; McKenna & Stahl, 2003) found high levels of inter-rater reliability after brief training on these measures; in fact, they have established levels as high as 100% using the NAEP scale, perhaps because the NAEP has the broadest descriptive categories, increasing the likelihood of agreement. Although current fluency scales are not as precise as we might wish, they do provide additional insight into students' reading development.

Ultimately, it is essential to expand the way fluency is measured so that it encompasses more than rate and accuracy. According to Deno and Marston (2006) the definition of fluency should not be limited to correct words per minute, because this understanding leaves out important features of the construct, such as prosody. We would argue that such an emphasis leaves children in danger of focusing on speed at the expense of comprehension (see also Samuels, 2007; Wixson &

Lipson, 2009). In fact, Samuels (2007) correctly argued that curriculum-based measures were conceived of as a means of monitoring students' reading progress, broadly considered, and that their use as a fluency measure leads to an overemphasis on "speed at the expense of understanding" (p. 565). Wixson and Lipson (2009) concurred, arguing that it is the use of these assessments as both screening and progress monitoring measures that leads to such an instructional focus.

Further, Deno and Marston (2006) found the notion of benchmarks for reading rates to be highly problematic because it relies on an oversimplification of the relationship between word recognition and comprehension and implies there is a point beyond which text comprehension is guaranteed. In fact, Hudson and her colleagues (2009) noted that there are times when a slower reading rate is necessary to ensure the construction of meaning. While it is true that exceedingly slow word recognition hinders comprehension and that skilled readers' word recognition is automatic, it is also the case that skilled readers vary their reading pace depending upon the difficulty of the text and the complexity of the ideas they are encountering. Given this, if learners are to become skilled readers, it is important that they learn to be flexible, rather than simply fast, oral readers. By including measures of prosody as part of the evaluation process, the likelihood that learners develop the mistaken notion that fluent reading and fast reading are one and the same decreases. As such, it seems the positives of including measures of prosody along with a measure of rate and accuracy outweigh the negatives.

Implications for Assessment and Instruction

Implications for Assessment

Given what we know about fluency assessment and what we hope to see in fluency instruction, what do we propose? First, it is essential that fluency be seen as more than simply correct words per minute. Without the addition of some measure of prosody, there continues to be too high a risk that oral reading fluency will be seen only as a measure of quickly decoding a passage (e.g., Samuels, 2007) and that instruction will continue to follow suit (Wixson & Lipson, 2009). For now, prosodic measures such as the NAEP oral reading fluency scale (Pinnell et al., 1995) or the multidimensional fluency scoring guide (Rasinski et al. 2009; Zutell & Rasinski, 1991) can serve as a rough gauge of how well students are integrating the suprasegmental features of language into their oral reading. We further think that improvements will be made in such rating measures as we gain a more specific understanding of the linkages between identifiable spectrographic elements of prosody and comprehension. We believe that research should go in the direction of creating prosody rating schemes that preserve the ease and general utility of ratings with the refinement of spectrographic measures.

Second, it remains critical that students are not focusing on rate at the expense of meaning; to prevent overemphasizing rapid decoding, a measure of comprehension should be used in conjunction with any evaluation of reading fluency (Samuels, 2006). This can be undertaken in several ways, from brief discussions of the passage being read to answering a range of questions, from factual to inferential, which are related to the material to student retellings of the text (McKenna & Stahl, 2003). However, although there are a range of possibilities available for evaluating comprehension, simply asking students to reiterate as many words as they can remember after the oral reading of a passage fails to reflect any evidence of the processes they may be using to construct meaning (e.g., Pressley et al., 2006; Samuels, 2007). As such, it is important to encourage the use of a comprehension measure that allows learners to demonstrate understanding rather than simply recite words.

Third, although it is important to evaluate students' oral reading (e.g., Daane et al., 2005; McKenna & Stahl, 2003), this is only one piece of information in a reader's profile. Despite evidence that there are often high correlations between fluency measures and standardized comprehension measures (Daane et al., 2005; Deno & Marston, 2006; Fuchs et al., 2001; Madelaine &Wheldall, 1999, 2004), the correlations are not perfect. In fact, looking at research conducted across a range of populations and a variety of standardized comprehension assessments, we noted correlations ranging from a low of 0.61 (Sibley, Biwer, & Hesch, 2001) to a high of 0.91 (Fuchs et al., 1988) for curriculum-based measures and from 0.45 (Pressley et al., 2006) to 0.80 (Riedel, 2007) for DIBELS. This can cause a number of students to be misidentified, either as having reading difficulties when they do not or as making sufficient progress in their reading development when, in fact, they are struggling (e.g., Riedel, 2007).

To decrease the likelihood of misidentifying student achievement levels, students' fluency results should be considered as part of a broader range of assessments (e.g., McKenna & Stahl, 2003) and classroom-based data (Afflerbach, 2004; Glasswell & Teale, 2007). It also makes sense to look at these measures more qualitatively; that is, what types of miscues are the readers making and in what context (e.g., McKenna & Picard, 2006), how does the readers' rate vary with the type of text and its instructional level (Kuhn, 2007), and how appropriate is their prosody for the text they are reading (Rasinski, 2004)?

Implications for Instruction

In line with our suggestions that assessment of reading fluency should be multifaceted, we present alternatives to lessons that stress automaticity as the end goal of fluent reading (e.g., Mathson et al., 2006; Wixson & Lipson, 2009). This article began by highlighting the shift that has taken place around fluency and its role within the literacy curriculum over the past decade. During this period, fluency, seen primarily in terms of rate measures, has become a driving force in reading instruction. Although fluent reading is critical to later reading success (Kuhn & Stahl, 2003; Rasinski et al., in press), it is only one component of literacy learning. Effective instructional approaches for fluency development such as fluency-oriented reading instruction (FORI; Stahl, Heubach, & Holcomb, 2005), wide fluency-oriented reading instruction (Wide FORI or Wide Reading; Kuhn et al., 2006) and the fluency development lesson (FDL; Rasinski, Padak, Linek, & Sturtevant, 1994) view the comprehension of texts, rather than an increase in reading rate, as the primary goal. These approaches all recognize that the development of automaticity, prosody, and reading comprehension occur through the scaffolded reading of a range of texts. It is the various forms of supported reading (for example, echo, choral, partner, and repeated reading) that allow learners to engage with and learn from the material they are reading.

The types of supported reading that comprise effective fluency practices, such as FORI, Wide FORI, and FDL, also integrate and further develop the component skills that lead to automatic word recognition (e.g., Kuhn et al., 2006; Samuels, 2006). Although instruction in constrained skills, such as phonemic awareness and word recognition, provide a critical base on which to develop automaticity (e.g., Bear & Templeton, 1998; Levy, 2001; Paris, 2008), the practice with connected text provided by these approaches allows learners to consolidate these components. Further, there is evidence that an overemphasis on word instruction in isolation (Allington, 1983, 2009; Chomsky, 1976) can actually work against students' development as skilled readers. It is equally critical to remember that the relation between children's basic reading skills (e.g., word reading and reading fluency) and reading comprehension diminishes as children age (Meisinger et al., 2009; Schwanenflugel et al., 2006; Vellutino, Fletcher, Snowling, & Scanlon, 2004). As young readers develop automatic word reading skills, attentional resources are freed for comprehension processes (LaBerge & Samuels, 1974; Perfetti, 1985). However, at some point the issue shifts from managing freed resources to using content knowledge, accessing the meanings of sophisticated vocabulary, drawing appropriate inferences, and monitoring comprehension progress (Chall, 1996; Sweet & Snow, 2003).

Finally, it is essential that students read substantial amounts of connected text if they are going to become fluent readers (Logan, 1997; Stanovich, 1986). Although an effective literacy curriculum will include a wide range of materials, including poetry and other relatively brief texts, if these are the only texts that students are reading, they will not provide learners with sufficient practice to develop their fluency, regardless of how repeatedly they are read (Schwanenflugel, Kuhn et al., 2008). Nor is it sufficient to read a single longer text, say a narrative or expository trade book or a selection from a basal reader or literature anthology designed for second or third graders, if that text is read only once over the course of a school week (Hiebert, 2004). And although independent reading is central to developing reading fluency, students who are averse to reading are unlikely to benefit from DEAR or SSSR (Hasbrouck, 2006) unless they are provided with a range of options such as scaffolded silent reading (Reutzel, Fawson, & Smith, 2008), partner reading (Meisinger & Bradley, 2008), reading-while-listening (Chomsky, 1976; Pluck, 2006) or other forms of assisted reading along with traditional independent silent reading (for a more comprehensive review of fluency instruction, see Rasinski et al., in press). What is critical here is that learners are provided with extensive opportunities to engage with connected texts, whether they are reading repeatedly or widely, and that sufficient support is provided to allow students to succeed given the level of challenge that is presented by various texts.

Conclusions

The title of this article implies that we need to align our assessment practices with our theories of reading fluency. At the basic level, we know that fluency incorporates automaticity and prosody (e.g., Erekson, 2003; Logan, 1997; Samuels, 2004). We also know that fluent reading facilitates comprehension and that comprehension may mediate aspects of fluency such as pacing (e.g., Hudson et al., 2009; Rasinski et al., in press). And although there is much research and theory to describe the multiple ways in which automaticity contributes to comprehension, our concepts regarding the exact relationship between prosody and comprehension are still under development (e.g., Schwanenflugel et al., 2004).

We have suggested throughout this article that the way fluency is defined, and which elements of the construct are emphasized in these definitions, influences how it is both assessed and taught (e.g., Mathson et al., 2006). We have further argued that, by looking at students' fluency as part of their overall reading

development, instead of as a proxy for it, educators are likely to develop the kind of nuanced understanding of learners' reading ability that will make effective literacy instruction possible. It is critical that we establish assessments, and instruction, that assist learners in becoming truly fluent readers rather than just fast ones.

References

Adams, M.J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.

Afflerbach, P. (2004). *High stakes testing and reading assessment: National Reading Conference brief*. Retrieved November 30, 2009, from www.nrconline.org/publications/HighStakesTestingandReadingAssessment.pdf

Allbritton, D.W., McKoon, G., & Ratcliff, R. (1996). Reliability of prosodic codes for resolving syntactic ambiguity. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, *22*(3), 714–735. doi:10.1037/0278-7393.22.3.714

Allington, R.L. (1983). Fluency: The neglected reading goal. *The Reading Teacher*, *36*(6), 556–561.

Allington, R.L. (2009, February). *New challenges for literacy researchers*. Keynote address given at the annual International Reading Association Reading Research Conference, Phoenix, AZ.

Applegate, M.D., Applegate, A.J., & Modla, V.B. (2009). "She's my best reader; she just can't comprehend": Studying the relationship between fluency and comprehension. *The Reading Teacher*, *62*(6), 512–521. doi:10.1598/RT.62.6.5

Ashby, J. (2006). Prosody in skilled silent reading: Evidence from eye movements. *Journal of Research in Reading*, *29*(3), 318–333. doi:10.1111/j.1467-9817.2006.00311.x

Ashby, J., & Clifton, C. (2005). The prosodic property of lexical stress affects eye movements during silent reading. *Cognition*, *96*(3), B89–B100. doi:10.1016/j.cognition.2004.12.006

Banse, R., & Scherer, K.R. (1996). Acoustic profiles in vocal emotion expression. *Journal of Personality and Social Psychology*, *70*(3), 614–636. doi:10.1037/0022-3514.70.3.614

Beach, C.M. (1991). The interpretation of prosodic patterns at points of syntactic structure ambiguity: Evidence for cue trading relations. *Journal of Memory and Language*, *30*(6), 644–663. doi:10.1016/0749-596X(91)90030-N

Bear, D.R., & Templeton, S. (1998). Explorations in developmental spelling: Foundations for learning and teaching phonics, spelling, and vocabulary. *The Reading Teacher*, *52*(3), 222–242.

Benjamin, R., & Schwanenflugel, P.J. (2009). Text complexity and oral reading prosody in young readers. Unpublished manuscript, University of Georgia, Athens.

Benjamin, R., Schwanenflugel, P.J., & Kuhn, M.R. (2009, May). *The predictive value of prosody: Differences between simple and difficult texts in the reading of 2nd graders*. Presentation to the College of Education Research Conference, University of Georgia, Athens.

Blaauw, E. (1994). The contribution of prosodic boundary markers to the perceptual difference between read and spontaneous speech. *Speech Communication*, *14*(4), 359–375. doi:10.1016/0167-6393(94)90028-0

Bredekamp, S., & Pikulski, J. (2008). *Preventing reading difficulties in young children: Cognitive factors*. Keynote address presented at the International Reading Association Preconference Institute #8, Atlanta, GA.

Carlson, K., Dickey, M.W., Frazier, L., & Clifton, C., Jr. (2009). Information structure expectations in sentence comprehension. *Quarterly Journal of Experimental Psychology*, *62*(1), 114–139. doi:10.1080/17470210701880171

Cervetti, G.N., Jaynes, C.A., & Hiebert, E.H. (2009). Increasing opportunities to acquire knowledge through reading. In E.H. Hiebert (Ed.), *Reading more, reading better* (pp. 79–100). New York: Guilford.

Chafe, W. (1988). Punctuation and the prosody of written language. *Written Communication*, *5*(4), 395–426. doi:10.1177/0741088388005004001

Chall, J.S. (1996). *Stages of reading development* (2nd ed.). Fort Worth, TX: Harcourt-Brace.

Chard, D.J., Pikulski, J.J., & McDonagh, S.H. (2006). Fluency: The link between decoding and comprehension for struggling readers. In T.V. Rasinski, C. Blachowicz, & K. Lems, (Eds.). *Fluency instruction: Research-based best practices* (pp. 39–61). New York: Guilford

Chen, S.-H.E. (1998). Surface cues and the development of given/new interpretation. *Applied Psycholinguistics*, *19*(4), 553–582. doi:10.1017/S0142716400010365

Chomsky, C. (1976). After decoding: What? *Language Arts*, *53*(3), 288–296, 314.

Clay, M.M., & Imlach, R.H. (1971). Juncture, pitch, and stress as reading behavior variables. *Journal of Verbal Learning and Verbal Behavior*, *10*(2), 133–139. doi:10.1016/S0022-5371(71)80004-X

Connor, C.M., Jakobsons, L.J., Crowe, E.C., & Meadows, J.G. (2009). Instruction, student engagement, and reading skill growth in reading first classrooms. *The Elementary School Journal*, *109*(3), 221–250. doi:10.1086/592305

Cooper, W.E., & Paccia-Cooper, J. (1980). *Syntax and speech*. Cambridge, MA: Harvard University Press.

Couper-Kuhlen, E., & Selting, M. (1996). Towards an interactional perspective on prosody and a prosodic perspective on interaction. In E. Couper-Kuhlen & M. Selting (Eds.), *Prosody in conversation: Interactional studies* (pp. 11–56). Cambridge, England: Cambridge University Press.

Cowie, R., Douglas-Cowie, E., & Wichmann, A. (2002). Prosodic characteristics of skilled reading: Fluency and expressiveness in 8–10-year-old readers. *Language and Speech*, *45*(1), 47–82. doi:10.1177/00238309020450010301

Cunningham, A.E., & Stanovich, K.E. (1998). What reading does for the mind. *American Educator*, *22*(1–2), 8–15.

Cunningham, T.F., Healy, A.F., Kanengiser, N., Chizzick, L., & Willitts, R.L. (1988). Investigating the boundaries of reading units across ages and reading levels. *Journal of Experimental Child Psychology*, *45*(2), 175–208. doi:10.1016/0022-0965(88)90029-X

Daane, M.C., Campbell, J.R., Grigg, W.S., Goodman, M.J., & Oranje, A. (2005). *Fourth-grade students reading aloud: NAEP 2002 special study of oral reading. The nation's report card* (NCES 2006-469). Washington, DC: U.S. Department of Education, Institute of Education Sciences.

de Bree, E., Wijnen, F., & Zonneveld, W. (2006). Word stress production in 3-year-old children at risk for dyslexia. *Journal of Research in Reading*, *29*(3), 304–317. doi:10.1111/j.1467-9817.2006.00310.x

den Ouden, H., Noordman, L., & Terken, J. (2009). Prosodic realizations of global and local structure and rhetorical relations in read aloud news reports. *Speech Communication*, *51*(2), 116–129. doi:10.1016/j.specom.2008.06.003

Deno, S.L. (1985). Curriculum-based measurement: The emerging alternative. *Exceptional Children*, *52*(3), 219–232.

Deno, S.L. (2003). Developments in curriculum-based measurement. *Remedial and Special Education*, *37*(3), 184–192.

Deno, S.L., & Marston, D. (2006). Curriculum-based measurement of oral reading: An indicator of growth in fluency. In S.J. Samuels & A.E. Farstrup (Eds.), *What research has to say about fluency instruction* (pp. 179–203). Newark, DE: International Reading Association.

Dowhower, S.L. (1991). Speaking of prosody: Fluency's unattended bedfellow. *Theory Into Practice*, *30*(3), 165–175. doi:10.1080/00405849109543497

Dubin, J. (2008). Reading Richmond: How scientifically based reading instruction is dramatically increasing achievement. *American Educator*, *32*(3), 28–34, 36.

Duffy, G.G. (2007). Thriving in a high-stakes testing environment. *Journal of Curriculum and Instruction*, *1*(1), 7–13. doi:10.3776/joci.2007.v1n1p7-13

Ehri, L.C. (1995). Phases of development in learning to read words by sight. *Journal of Research in Reading*, *18*(2), 116–125. doi:10.1111/j.1467-9817.1995.tb00077.x

Eisler, F.G. (1968). *Psycholinguistics: Experiments in spontaneous speech*. New York: Academic.

Erekson, J. (2003, May). *Prosody: The problem of expression in fluency*. Paper presented at the annual meeting of the International Reading Association, Orlando, FL.

Esser, J., & Polomski, A. (1988). *Comparing reading and speaking intonation*. Amsterdam: Rodopi.

Ferreira, F. (1991). Effects of length and syntactic complexity on initiation times for prepared utterances. *Journal of Memory and Language*, *30*(2), 210–233. doi:10.1016/0749-596X(91)90004-4

Fletcher, J.M., Lyon, G.R., Fuchs, L.S., & Barnes, M.A. (2007). *Learning disabilities: From identification to intervention*. New York: Guilford.

Fodor, J.D. (2002, April). Psycholinguistics cannot escape prosody. Speech Prosody 2002 International Conference, Aix-en-Provence, France.

Frazier, L., Carlson, K., & Clifton, C. (2006). Prosodic phrasing is central to language comprehension. *Trends in Cognitive Sciences*, *10*(6), 244–249. doi:10.1016/j.tics.2006.04.002

Fuchs, L.S., Deno, S.L., & Mirkin, P. (1984). Effects of frequent curriculum-based measurement and evaluation on pedagogy, student achievement, and student awareness of learning. *American Educational Research Journal*, *21*(2), 449–460.

Fuchs, L.S., Fuchs, D., Hosp, M.K., & Jenkins, J.R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading*, *5*(3), 239–256. doi:10.1207/S1532799XSSR0503_3

Fuchs, L.S., Fuchs, D., & Maxwell, L. (1988). The validity of informal reading comprehension measures. *Remedial and Special Education*, *9*(2), 20–28. doi:10.1177/074193258800900206

Fujiki, M., Spackman, M.P., Brinton, B., & Illig, T. (2008). Ability of children with language impairment to understand emotion conveyed by prosody in a narrative passage. *International Journal of Language & Communication Disorders*, *43*(3), 330–345. doi:10.1080/13682820701507377

Gamse, B.C., Bloom, H.S., Kemple, J.J., & Jacob, R.T. (2008). *Reading First impact study: Interim report* (NCEE 2008-4016). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Garcia, G.E., & Bauer, E.B. (2009). Assessing student progress in the time of No Child Left Behind. In L.M. Morrow, R. Rueda, & D. Lapp (Eds.), *Handbook of research on literacy and diversity* (pp. 233–253). New York: Guilford.

Glasswell, K., & Teale, W.H. (2007). Authentic assessment of authentic student work in urban classrooms. In J.R. Paratore & R.L. McCormack (Eds.), *Classroom literacy assessment: Making sense of what students know and do* (pp. 262–279). New York: Guilford.

Goldman, S.R., Meyerson, P.M., & Coté, N. (2006). Poetry as a mnemonic prompt in children's stories. *Reading Psychology*, *27*(4), 345–376. doi:10.1080/02702710600846894

Good, R.H., III, & Kaminski, R.A. (2002). *Dynamic Indicators of Basic Early Literacy Skills* (6th ed.). Eugene, OR: Institute for the Development of Educational Achievement. Retrieved November 30, 2009, from dibels.uoregon.edu

Good, R.H., III, Kaminski, R.A., Simmons, D., & Kame'enui, E.J. (2001). Using Dynamic Indicators of Basic Early Literacy Skills (DIBELS) in an outcomes-driven model: Steps to reading outcomes. *Oregon School Study Council*, *44*(1), 6–24.

Goswami, U., Thomson, J., Richardson, U., Stainthorp, R., Hughes, D., Rosen, S., et al. (2002). Amplitude envelope onsets and development dyslexia: A new hypothesis. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(16), 10911–10916. doi:10.1073/pnas.122368599

Guion, S.G., Harada, T., & Clark, J.J. (2004). Early and late Spanish–English bilinguals' acquisition of English word stress patterns. *Bilingualism: Language and Cognition*, *7*(3), 207–226. doi:10.1017/S1366728904001592

Gutiérrez-Palma, N., & Palma-Reyes, A. (2008). On the use of lexical stress in reading Spanish. *Reading and Writing*, *21*(6), 645–660. doi:10.1007/s11145-007-9082-x

Harris, T.L., & Hodges, R.E. (Eds.). (1995). *The literacy dictionary: The vocabulary of reading and writing*. Newark, DE: International Reading Association.

Hasbrouck, J. (2006, Summer). Drop everything and read—but how? *American Educator*. Retrieved November 30, 2009, from www.aft.org/pubs-reports/american_educator/issues/summer06/fluency.htm

Hasbrouck, J., & Tindal, G.A. (2006). Oral reading fluency norms: A valuable assessment tool for reading teachers. *The Reading Teacher*, *59*(7), 636–644. doi:10.1598/RT.59.7.3

Hiebert, E.H. (2004, April). *Teaching children to become fluent readers—Year 2*. Presented at the meeting of the American Educational Research Association, San Diego, CA.

Hiebert, E.H. (2006). Becoming fluent: Repeated reading with scaffolded texts. In S.J. Samuels & A.E. Farstrup (Eds.), *What research has to say about fluency instruction* (pp. 204–226). Newark, DE: International Reading Association.

Himmelmann, N.P., & Ladd, D.R. (2008). Prosodic description: An introduction for field workers. *Language Documentation & Conservation*, *2*(2), 244–274.

Hirotani, M., Frazier, L., & Rayner, K. (2006). Punctuation and intonation effects on clause and sentence wrap-up: Evidence from eye movements. *Journal of Memory and Language*, *54*(3), 425–443. doi:10.1016/j.jml.2005.12.001

Hirschberg, J. (2002). Communication and prosody: Functional aspects of prosody. *Speech Communication*, *36*(1–2), 31–43. doi:10.1016/S0167-6393(01)00024-3

Howell, P., & Kadi-Hanifi, K. (1991). Comparison of prosodic properties between read and spontaneous speech material. *Speech Communication*, *10*(2), 163–169. doi:10.1016/0167-6393(91)90039-V

Hudson, R.F., Lane, H.B., & Pullen, P.C. (2005). Reading fluency assessment and instruction: What, why, and how? *The Reading Teacher*, *58*(8), 702–714. doi:10.1598/RT.58.8.1

Hudson, R.F., Pullen, P.C., Lane, H.B., & Torgesen, J.K. (2009). The complex nature of reading fluency: A multidimensional view. *Reading & Writing Quarterly*, *25*(1), 4–32. doi:10.1080/10573560802491208

Jarmulowicz, L., Taran, V.L., & Hay, S.E. (2007). Third graders' metalinguistic skills, reading skills, and stress production in derived English words. *Journal of Speech, Language, and Hearing Research*, *50*(6), 1593–1605. doi:10.1044/1092-4388(2007/107)

Juslin, P.N., & Laukka, P. (2003). Communication of emotions in vocal expression and music performance: Different channels, same code? *Psychological Bulletin*, *129*(5), 770–814. doi:10.1037/0033-2909.129.5.770

Kame'enui, E.J., Simmons, D.C., Good, R.H., III, & Harn, B.A. (2001). The use of fluency-based measures in early identification and evaluation of intervention efficacy in schools. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 307–331). Timonium, MD: York.

Kelly, M.H., & Bock, J.K. (1988). Stress in time. *Journal of Experimental Psychology. Human Perception and Performance*, *14*(3), 389–403. doi:10.1037/0096-1523.14.3.389

Kerkhofs, R., Vonk, W., Schriefers, H., & Chwilla, D.J. (2008). Sentence processing in the visual and auditory modality: Do comma and prosodic break have parallel functions? *Brain Research*, *1224*, 102–118. doi:10.1016/j.brainres.2008.05.034

Klauda, S.L., & Guthrie, J.T. (2008). Relationships of three components of reading fluency to reading comprehension. *Journal of Educational Psychology*, *100*(2), 310–321. doi:10.1037/0022-0663.100.2.310

Kleiman, G.M., Winograd, P.N., & Humphrey, M.M. (1979). *Prosody and children's parsing of sentences* (Tech. Rep. No. 123). Champaign, IL: Center for the Study of Reading.

Koriat, A., Greenberg, S.N., & Kreiner, H. (2002). The extraction of structure during reading: Evidence from reading prosody. *Memory & Cognition*, *30*(2), 270–280.

Krivokapić, J. (2007). Prosodic planning: Effects of phrasal length and complexity on pause duration. *Journal of Phonetics*, *35*(2), 162–179. doi:10.1016/j.wocn.2006.04.001

Kuhn, M.R. (2005). A comparative study of small group fluency instruction. *Reading Psychology*, *26*(2), 127–146. doi:10.1080/02702710590930492

Kuhn, M.R. (2007). Effective oral reading assessment (or why round robin reading doesn't cut it). In J.R. Paratore & R.L. McCormack (Eds.), *Classroom literacy assessment: Making sense of what students know and do* (pp. 101–112). New York: Guilford.

Kuhn, M.R., Schwanenflugel, P.J., Morris, R.D., Morrow, L.M., Woo, D., Meisinger, B., et al. (2006). Teaching children to become fluent and automatic readers. *Journal of Literacy Research*, *38*(4), 357–387. doi:10.1207/s15548430jlr3804_1

Kuhn, M.R., & Stahl, S.A. (2003). Fluency: A review of developmental and remedial practices. *Journal of Educational Psychology*, *95*(1), 3–21. doi:10.1037/0022-0663.95.1.3

LaBerge, D., & Samuels, S.J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology*, *6*(2), 293–323. doi:10.1016/0010-0285(74)90015-2

Ladd, D.R. (1984). Declination: A review and some hypotheses. *Phonology Yearbook*, *1*, 53–74. doi:10.1017/S0952675700000294

Levy, B.A. (2001). Moving the bottom: Improving reading fluency. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 357–379). Timonium, MD: York.

Logan, G.D. (1988). Toward an instance theory of automatization. *Psychological Review*, *95*(4), 492–527. doi:10.1037/0033-295X.95.4.492

Logan, G.D. (1992). Shapes of reaction-time distributions and shapes of learning curves: A test of the instance theory of automaticity. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, *18*(5), 883–914. doi:10.1037/0278-7393.18.5.883

Logan, G.D. (1997). Automaticity and reading: Perspectives from the instance theory of automatization. *Reading & Writing Quarterly*, *13*(2), 123–146. doi:10.1080/1057356970130203

Logan, G.D., Taylor, S.E., & Etherton, J.L. (1999). Attention and automaticity: Toward a theoretical integration. *Psychological Research*, *62*(2–3), 165–181. doi:10.1007/s004260050049

Madelaine, A., & Wheldall, K. (1999). Curriculum-based measurement of reading: A critical review. *International Journal of Disability, Development and Education*, *46*(1), 71–85. doi:10.1080/103491299100731

Madelaine, A., & Wheldall, K. (2004). Curriculum-based measurement of reading: Recent advances. *International Journal of Disability Development and Education*, *51*(1), 57–82. doi:10.1080/1034912042000182201

Mathson, D.V., Allington, R.L., & Solic, K.L. (2006). Hijacking fluency and instructionally informative assessments. In T. Rasinski, C. Blachowicz, & K. Lems (Eds.), *Fluency instruction: Research-based best practices* (pp. 106–119). New York: Guilford.

McCallum, R.S., Sharp, S., Bell, S.M., & George, T. (2004). Silent versus oral reading comprehension and efficiency. *Psychology in the Schools*, *41*(2), 241–246. doi:10.1002/pits.10152

McKenna, M.C., & Picard, M.C. (2006). Revisiting the role of miscue analysis in effective teaching. *The Reading Teacher*, *60*(4), 378–380. doi:10.1598/RT.60.4.8

McKenna, M.C., & Stahl, S.A. (2003). *Assessment for reading instruction*. New York: Guilford.

Meisinger, E.B., & Bradley, B.A. (2008). Classroom practices for supporting fluency development. In M.R. Kuhn & P.J. Schwanenflugel (Eds.), *Fluency in the classroom* (pp. 36–54). New York: Guilford.

Meisinger, E.B., Bradley, B.A., Schwanenflugel, P.J., & Kuhn, M. (in press). Teachers' perceptions of word callers and related literacy concepts. *School Psychology Review*.

Meisinger, E.B., Bradley, B.A., Schwanenflugel, P.J., Kuhn, M., & Morris, R. (2009). Myth and reality of the word caller: The relationship between teacher nominations and prevalence among elementary school children. *School Psychology Quarterly*, *24*, 147–159.

Miller, J., & Schwanenflugel, P.J. (2006). Prosody of syntactically complex sentences in the oral reading of young children. *Journal of Educational Psychology*, *98*(4), 839–853. doi:10.1037/0022-0663.98.4.839

Miller, J., & Schwanenflugel, P.J. (2008). A longitudinal study of the development of reading prosody as a dimension of oral reading fluency in early elementary school children. *Reading Research Quarterly*, *43*(4), 336–354. doi:10.1598/RRQ.43.4.2

Mokhtari, K., & Thompson, H.B. (2006). How problems of reading fluency and comprehension are related to difficulties in syntactic awareness skills among fifth graders. *Reading Research and Instruction*, *46*(1), 73–94.

Mostow, J., & Beck, J. (2005, June). *Micro-analysis of fluency gains in a reading tutor that listens*. Paper presented at the Society for the Scientific Study of Reading, Toronto, Canada.

Mostow, J., & Duong, M. (2009, July). *Automated assessment of oral reading expressiveness*. Proceedings of the 14th International Conference on Artificial Intelligence in Education, Brighton, England.

National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Noordman, L., Dassen, I., Swerts, M., & Terken, J. (1999). Prosodic markers of text structure. In K. van Hoek, A. Kibrik, & L. Noordman (Eds.), *Discourse studies in cognitive linguistics: Selected papers from the 5th International Cognitive Linguistics Conference* (pp. 133–148). Amsterdam: John Benjamins.

O'Shea, L.J., Sindelar, P.T., & O'Shea, D. (1987). The effects of repeated readings and attentional cues on the reading fluency and comprehension of learning disabled readers. *Learning Disabilities Research*, *2*(2), 103–109.

Orsolini, M., Fanari, R., Tosi, V., de Nigris, B., & Carrier, R. (2006). From phonological recoding to lexical reading: A longitudinal study on reading development in Italian. *Language and Cognitive Processes*, *21*(5), 576–607. doi:10.1080/01690960500139355

Paris, S.G. (2005). Reinterpreting the development of reading skills. *Reading Research Quarterly*, *40*(2), 184–202. doi:10.1598/RRQ.40.2.3

Paris, S.G. (2008, December). *Constrained skills—so what?* Oscar Causey address presented at the National Reading Conference, Orlando, FL.

Patel, R., & Grigos, M.I. (2006). Acoustic characterization of the question-statement contrast in 4, 7, and 11 year-old children. *Speech Communication*, *48*(10), 1308–1318. doi:10.1016/j.specom.2006.06.007

Perfetti, C.A. (1985). *Reading ability*. New York: Oxford University Press.

Perfetti, C.A. (1992). The representation problem in reading acquisition. In P.B. Gough, L.C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 145–174). Hillsdale, NJ: Erlbaum.

Pikulski, J. (2005, May). *The critical nature of building vocabulary in early literacy*. Keynote presented at the International Reading Association Preconference Institute #8, San Antonio, TX.

Pikulski, J.J., & Chard, D.J. (2005). Fluency: Bridge between decoding and reading comprehension. *The Reading Teacher*, *58*(6), 510–519. doi:10.1598/RT.58.6.2

Pinnell, G.S., Pikulski, J.J., Wixson, K.K., Campbell, J.R., Gough, P.B., & Beatty, A.S. (1995). *Listening to children read aloud: Data from NAEP's integrated reading performance record (IRPR) at Grade 4. The Nation's Report Card*. Report No. 23-FR-04. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Plante, E., Holland, S.K., & Schmithorst, V.J. (2006). Prosodic processing by children: An fMRI study. *Brain and Language*, *97*(3), 332–342. doi:10.1016/j.bandl.2005.12.004

Pluck, M. (2006). "Jonathon is 11 but reads like a struggling 7-year old": Providing assistance for struggling readers with a tape-assisted reading program. In T. Rasinski, C. Blachowicz, & K. Lems (Eds.), *Fluency instruction: Research-based best practices* (pp. 192–208). New York: Guilford.

Powell-Smith, K.A., & Bradley-Klug, K.L. (2001). Another look at the "C" in CBM: Does it really matter if curriculum-based measurement reading probes are curriculum-based? *Psychology in the Schools*, *38*(4), 299–312. doi:10.1002/pits.1020

Pressley, M. (2000). What should comprehension instruction be the instruction of? In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 545–561). Mahwah, NJ: Erlbaum.

Pressley, M., Hilden, K.R., & Shankland, R.K. (2006). *An evaluation of end-grade-3 Dynamic Indicators of Basic Early Literacy Skills (DIBELS): Speed reading without comprehension, predicting little*. East Lansing, MI: State University College of Education, Literacy Achievement Research Center (LARC).

Prior, S.M., & Welling, K.A. (2001). "Read in your head": A Vygotskian analysis of the transition from oral to silent reading. *Reading Psychology*, *22*(1), 1–15. doi:10.1080/02702710151130172

Protopapas, A., Archonti, A., & Skaloumbakas, C. (2007). Reading ability is negatively related to Stroop interference. *Cognitive Psychology*, *54*(3), 251–282. doi:10.1016/j.cogpsych.2006.07.003

Ramus, F., Hauser, M., Miller, C., Morris, P., & Mehler, J. (2000). Language discrimination by human newborns and by cotton-top tamarin monkeys. *Science*, *288*(5464), 349–351. doi:10.1126/science.288.5464.349

RAND Reading Study Group. (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. Santa Monica, CA: RAND Corporation.

Rashotte, C.A., & Torgesen, J.K. (1985). Repeated reading and reading fluency in learning disabled children. *Reading Research Quarterly*, *20*(2), 180–188. doi:10.1598/RRQ.20.2.4

Rasinski, T.V. (2004). *Assessing reading fluency*. Honolulu, HI: Pacific Resources for Education and Learning.

Rasinski, T.V. (2006). A brief history of reading fluency. In S.J. Samuels & A.E. Farstrup (Eds.), *What research has to say about fluency instruction* (pp. 4–23). Newark, DE: International Reading Association.

Rasinski, T.V, Blachowicz, C., & Lems, K. (Eds.). (2006). *Fluency instruction: Research-based best practices*. New York: Guilford.

Rasinski, T.V., Padak, N.D., Linek, W.L., & Sturtevant, E. (1994). Effects of fluency development on urban second-grade readers. *Journal of Educational Research*, *87*(3), 158–165.

Rasinski, T.V., Reutzel, R., Chard, D., & Linan-Thompson, S. (in press). Reading fluency. In M.L. Kamil, P.D. Pearson, E.B. Moje, & P. Afflerbach (Eds.), *Handbook of reading research* (Vol. 4). Mahwah, NJ: Erlbaum.

Rasinski, T.V., Rikli, A., & Johnston, S. (2009). Reading fluency: More than automaticity? More than a concern for the primary grades? *Literacy Research and Instruction*, *48*(4), 350–361. doi:10.1080/19388070802468715

Rawson, K.A. (2007). Testing the shared resource assumption in theories of text processing. *Cognitive Psychology*, *54*(2), 155–183.

Rawson, K.A., & Middleton, E.L. (2009). Memory-based processing as a mechanism of automaticity in text comprehension. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, *35*(2), 353–369. doi:10.1037/a0014733

Reutzel, D.R. (1996). Developing at-risk readers' oral reading fluency. In L.R. Putnam (Ed.), *How to become a better reading teacher: Strategies for assessment and intervention*. (pp. 241–254). Englewood Cliffs, NJ: Merrill.

Reutzel, D.R. (2003, May). *Fluency: What is it? How to assess it? How to develop it!* Paper presented at Reading Research 2003, Orlando, FL.

Reutzel, D.R., Fawson, P.C., & Smith, J.A. (2008). Reconsidering silent sustained reading: An exploratory study of scaffolded silent reading. *Journal of Educational Research*, *102*(1), 37–50. doi:10.3200/JOER.102.1.37-50

Riedel, B.W. (2007). The relation between DIBELS, reading comprehension, and vocabulary in urban first-grade students. *Reading Research Quarterly*, *42*(4), 546–567. doi:10.1598/RRQ.42.4.5

Samuels, S.J. (2004). Toward a theory of automatic information processing in reading, revisited. In R.B. Ruddell & N.J. Unrau (Eds.), *Theoretical models and processes* (pp. 1127–1148). Newark, DE: International Reading Association.

Samuels, S.J. (2006). Reading fluency: Its past, present, and future. In T. Rasinski, C. Blachowicz, & K. Lems (Eds.), *Fluency instruction: Research-based best practices* (pp. 7–20). New York: Guilford.

Samuels, S.J. (2007). The DIBELS tests: Is speed of barking at print what we mean by reading fluency? *Reading Research Quarterly*, *42*(4), 563–566.

Samuels, S.J., & Farstrup, A.E. (Eds.). (2006). *What research has to say about fluency instruction*. Newark, DE: International Reading Association.

Sanderman, A.A., & Collier, R. (1997). Prosodic phrasing and comprehension. *Language and Speech*, *40*(44), 391–409.

Schilling, S.G., Carlisle, J.F., Scott, S.E., & Zeng, J. (2007). Are fluency measures accurate predictors of reading achievement? *The Elementary School Journal*, *107*(5), 429–448. doi:10.1086/518622

Schreiber, P.A. (1991). Understanding prosody's role in reading acquisition. *Theory Into Practice*, *30*(3), 158–164. doi:10.1080/00405849109543496

Schwanenflugel, P.J., Hamilton, A.M., Kuhn, M.R., Wisenbaker, J.M., & Stahl, S.A. (2004). Becoming a fluent reader: Reading skill and prosodic features in the oral reading of young readers. *Journal of Educational Psychology*, *96*(1), 119–129. doi:10.1037/0022-0663.96.1.119

Schwanenflugel, P.J., Hamilton, C.E., Neuharth-Pritchett, S., Restrepo, M.A., Bradley, B.A., & Webb, M.-Y. (in press). PAVEd for success: An Evaluation of a comprehensive literacy program for 4-year-old children. *Journal of Literacy Research*.

Schwanenflugel, P.J., Kuhn, M.R., Meisinger, E.B., & Morris, R.D., Foels, P., Woo, D.G., et al. (2008, March). *A longitudinal study of the development of reading fluency and comprehension in the early elementary school years*. Poster session presented at the annual

meeting of the American Education Research Association, New York, NY.
Schwanenflugel, P.J., Kuhn, M.R., Morris, R.D., Morrow, L.M., Meisinger, E.B., Woo, D.G., et al. (2009). Insights into fluency instruction: Short- and long-term effects of two reading programs. *Literacy Research and Instruction*, *48*(4), 318–336. doi:10.1080/19388070802422415
Schwanenflugel, P.J., Meisinger, E., Wisenbaker, J.M., Kuhn, M.R., Strauss, G.P., & Morris, R.D. (2006). Becoming a fluent and automatic reader in the early elementary school years. *Reading Research Quarterly*, *41*(4), 496–522. doi:10.1598/RRQ.41.4.4
Schwanenflugel, P.J., Morris, R.K., Kuhn, M.R., Strauss, G.P., & Sieczko, J.M. (2008). The influence of word unit size on the development of Stroop interference in early word decoding. *Reading and Writing: An Interdisciplinary Journal*, *21*(3), 177–203. doi:10.1007/s11145-007-9061-2
Schwanenflugel, P.J., & Ruston, H.P. (2008). Becoming a fluent reader: From theory to practice. In M.R. Kuhn & P.J. Schwanenflugel (Eds.), *Fluency in the classroom* (pp. 1–16). New York: Guilford.
Schwebel, E.A. (2007). *A comparative study of small group fluency instruction—A replication and extension of Kuhn's (2005) study*. Unpublished master's thesis, Kean University, Union, NJ.
Shanahan, T. (2005, May). *Improving instruction for young children: Making sense of the National Literacy Panel*. Paper presented at the International Reading Association Preconference Institute #8, San Antonio, TX.
Shapiro, E.S. (2004). *Academic skills problems: Direct assessment and intervention* (3rd ed.). New York: Guilford.
Shinn, M.R., & Shinn, M.M. (2002). *AIMSweb training workbook: Administration and scoring of reading maze for use in general outcome measurement*. Eden Prairie, MN: Edformation.
Shukla, M., Nespor, M., & Mehler, J. (2007). An interaction between prosody and statistics in the segmentation of fluent speech. *Cognitive Psychology*, *54*(1), 1–32. doi:10.1016/j.cogpsych.2006.04.002
Sibley, D., Biwer, D., & Hesch, A. (2001). *Establishing curriculum-based measurement oral reading fluency performance standards to predict success on local and state tests of reading achievement*. (ERIC Document Reproduction Service No. ED453527)
Simpson, E.A., Oliver, W.T., & Fragaszy, D. (2008). Super-expressive voices: Music to my ears? *Behavioral and Brain Sciences*, *31*(5), 596–597.
Smith, C.L. (2004). Topic transitions and durational prosody in reading aloud: Production and modeling. *Speech Communication*, *42*(3–4), 247–270. doi:10.1016/j.specom.2003.09.004
Snedeker, J., & Trueswell, J. (2003). Using prosody to avoid ambiguity: Effects of speaker awareness and referential context. *Journal of Memory and Language*, *48*(1), 103–130. doi:10.1016/S0749-596X(02)00519-3
Snedeker, J., & Yuan, S. (2008). Effects of prosodic and lexical constraints on parsing in young children (and adults). *Journal of Memory and Language*, *58*(2), 574–608. doi:10.1016/j.jml.2007.08.001
Snow, C.E., Burns, M.S., & Griffin, P. (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.
Stahl, S.A., & Heubach, K., & Holcomb, A. (2005). Fluency-oriented reading instruction. *Journal of Literacy Research*, *37*(1), 25–60. doi:10.1207/s15548430jlr3701_2
Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, *21*(4), 360–407. doi:10.1598/RRQ.21.4.1
Stanovich, K.E., Cunningham, A.E., & West, R.F. (1981). A longitudinal study of the development of automatic recognition skills in first graders. *Journal of Reading Behavior*, *13*(1), 57–74.
Stecker, P.M., & Fuchs, L.S. (2000). Effecting superior achievement using curriculum-based measurement: The importance of individual progress monitoring. *Learning Disabilities Research & Practice*, *15*(3), 128–135. doi:10.1207/SLDRP1503_2
Stecker, S.K., Roser, N.L., & Martinez, M.G. (1998). Understanding oral reading fluency. In T. Shanahan & F.V. Rodriguez-Brown (Eds.), *47th yearbook of the National Reading Conference* (pp. 295–310). Chicago: National Reading Conference.
Stolterfoht, B., Friederici, A.D., Alter, K., & Steube, A. (2007). Processing focus structure and implicit prosody during silent reading: Differential ERP effects. *Cognition*, *104*(3), 565–590. doi:10.1016/j.cognition.2006.08.001
Surányi, Z., Csépe, V., Richardson, U., Thompson, J.M., Honbolygó, F., & Goswami, U. (2009). Sensitivity to rhythmic parameters in dyslexic children: A comparison of Hungarian & English. *Reading and Writing*, *22*(1), 41–56. doi:10.1007/s11145-007-9102-x
Sweet, A.P., & Snow, C.E. (Eds.). (2003). *Rethinking reading comprehension*. New York: Guilford.
Swets, B., Desmet, T., Hambrick, D.Z., & Ferreira, F. (2007). The role of working memory in syntactic ambiguity resolution: A psychometric approach. *Journal of Experimental Psychology. General*, *136*(1), 64–81. doi:10.1037/0096-3445.136.1.64
Teale, W.H., Paciga, K.A., & Hoffman, J.L. (2007). Beginning reading instruction in urban schools: The curriculum gap ensures a continuing achievement gap. *The Reading Teacher*, *61*(4), 344–348. doi:10.1598/RT.61.4.8
Temperley, D. (2009). Distributional stress regularity: A corpus study. *Journal of Psycholinguistic Research*, *38*(1), 75–92. doi:10.1007/s10936-008-9084-0
Thomson, J.M., Fryer, B., Maltby, J., & Goswami, U. (2006). Auditory and motor rhythm awareness in adults with dyslexia. *Journal of Research in Reading*, *29*(3), 334–348. doi:10.1111/j.1467-9817.2006.00312.x
Torgesen, J.K., & Hudson, R.F. (2006). Reading fluency: Critical issues for struggling readers. In S.J. Samuels & A.E. Farstrup (Eds.), *What research has to say about fluency instruction* (pp. 130–158). Newark, DE: International Reading Association.
Vellutino, F.R., Fletcher, J.M., Snowling, M.J., & Scanlon, D.M. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades? *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *45*(1), 2–40. doi:10.1046/j.0021-9630.2003.00305.x
Wayman, M.M., Wallace, T., Wiley, H.I., Tichdt, R., & Espin, C.A. (2007). Literature synthesis on curriculum-based measurement in reading. *The Journal of Special Education*, *41*(2), 85–120. doi:10.1177/00224669070410020401
Wells, B., & Peppe, S. (2003). Intonation abilities of children with speech and language impairments. *Journal of Speech, Language, and Hearing Research*, *46*(1), 5–20. doi:10.1044/1092-4388(2003/001)
Wennerstrom, A. (2001). *The music of everyday speech: Prosody and discourse analysis*. London: Oxford University Press.
Whalley, K., & Hansen, J. (2006). The role of prosodic sensitivity in children's reading development. *Journal of Research in Reading*, *29*(3), 288–303. doi:10.1111/j.1467-9817.2006.00309.x
Wheeldon, L., & Lahiri, A. (1997). Prosodic units in speech production. *Journal of Memory and Language*, *37*(3), 356–381. doi:10.1006/jmla.1997.2517
Wixson, K.K., & Lipson, M.Y. (2009, May). *Response to intervention: Promises, possibilities, and potential problems for reading professionals*. Paper presented at the Reading Research Conference, Minneapolis, MN.
Wolf, M., & Katzir-Cohn, T. (2001). Reading fluency and its intervention. *Scientific Studies of Reading*, *5*(3), 211–229. doi:10.1207/S1532799XSSR0503_2
Wood, C. (2006). Metrical stress sensitivity in young children and its relationship to phonological awareness and reading.

Journal of Research in Reading, *29*(3), 270–287. doi:10.1111/j.1467-9817.2006.00308.x

Young, A., & Bowers, P.G. (1995). Individual difference and text difficulty determinants of reading fluency and expressiveness. *Journal of Experimental Child Psychology*, *60*(3), 428–454.

Zutell, J., & Rasinski, T.V. (1991). Training teachers to attend to their students' oral reading fluency. *Theory Into Practice*, *30*(3), 211–217. doi:10.1080/00405849109543502

Zvonik, E., & Cummins, F. (2003). The effect of surrounding phrase lengths on pause duration. Retrieved December 16, 2009, from www.isca-speech.org/archive/eurospeech_2003/e03_0777.html

Melanie R. Kuhn is an associate professor in literacy education at Boston University, Massachusetts, USA; e-mail melaniek@bu.edu.

Paula J. Schwanenflugel is a professor of educational psychology, psychology, linguistics, and cognitive science at The University of Georgia, Athens, USA; e-mail pschwan@uga.edu.

Elizabeth B. Meisinger is an assistant professor of school psychology at The University of Memphis, Tennessee, USA; e-mail bmsinger@memphis.edu.