Reading Fluency: A Brief History, the Importance of Supporting Processes, and the Role of Assessment

Dr. David D. Paige

Northern Illinois University

July 30, 2020

While reading fluency has been extensively studied as an independent reading process, it is better thought of as an outcome of multiple, lower-level reading skills that when functioning in a synchronous and efficient manner, results in smooth, expressive reading that's critical to understanding text. This review begins by defining reading fluency, and then provides a brief history of how the conceptualization of reading fluency has changed over the past two centuries. It then discusses the important reading processes that are responsible for fluent reading before reviewing several studies that emphasize the importance of reading fluency to making meaning of text. The review concludes with a rationale for why reading fluency, and the foundational processes that lead to fluent reading, must be regularly assessed in students.

Defining Fluency

Reading fluency has been through multiple conceptualizations. These include the rapid reading of individual words, reading words correctly, the speed at which one can read connected text, and reading with expression. Fluent reading is now conceptualized by reading scholars as a construct composed of three facets, or *indicators*. These include 1) the rate of one's reading, 2) the accuracy at which words are pronounced, and 3) the prosody (meaning expression) in one's voice that brings a text to life[1]. While the indicators are individually identified, they work interactively to produce fluent reading. For example, the rate or pace with which one reads often simulates, to a loose extent, the pace of spoken language. Correctly pronouncing individual words is important to maintaining a smooth rate, otherwise the reader must stop to analyze and determine how to say the word which breaks the smoothness of the reading. As in speech, prosody is important to understanding the various interpretational nuances of the text, as it is in a conversation. Imagine speaking with someone

Reading fluency is defined by reading rate, word identification accuracy, and prosody (expression).

who talks in a flat, monotone voice. Much interpretation would be lost and frankly, interest in the conversation would quickly wane. So while fluency can be defined as three distinct indicators, they work interactively with each other to produce smooth reading that is both pleasant to listen to and as with speech, aids understanding.

Fluency has most often been interpreted by researchers as a measurement metric called words-correct-per-minute (WCPM) or correct-words-per-minute (CWPM) which is calculated as the total number of words read (reading rate) minus reading miscues (mispronounced words, words not read, words inserted, and skipped words) over the course of one minute. The problem with this definition is the exclusion of prosody, the third indicator of reading. To facilitate clear understanding among the reading community, particularly teachers, the term *accumaticity* has

been recently introduced to refer to the measurement metric of words-correct-per-minute[2] while fluency refers to all three indicators.

Because reading fluency has experienced a variety of interpretations as to its role and importance in reading that continues to evolve today, a brief overview of how fluency has been viewed will provide perspective.

A Brief History

Reading instruction in early America emphasized the oral reading of text[4]. Several book series, such as the McGuffey's Eclectic Reading Series (1853)[3], were popular as resources for learning to read. The following quotation from the fifth edition positions the role of articulation within fluent reading:

> The first step to be taken by one who desires to become a good reader or speaker, is to acquire a habit of distinct articulation. Without this, the finest voice, the utmost propriety of inflection, and all the graces of articulation, fail to please. (p. 13).
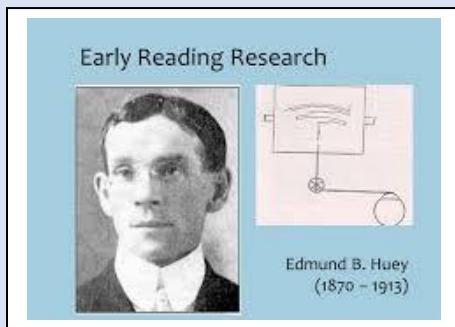
Articulation, as used in McGuffey's, refers to the clear accentuation of words by the reader. Oftentimes, oral reading occurred in public spaces (churches, lecture halls, etc.) without the aid of amplifying devices, necessitating understandable, fluent reading. The McGuffey's reader goes on to mention what would be considered the qualities of reading fluency today – a reading rate that loosely simulated oral conversation, accurate word pronunciation, and the appropriate use of prosody, all meant to keep listeners engaged in the reading.

By the early twentieth century an increasing number of children were enrolled in formal education. As reading was now more likely to occur silently, the emphasis on oral reading

Early Reading Research

Edmund B. Huey
(1870 – 1913)

declined, although it was still used as a way to assess a student's reading progress[4]. About this time the psychologist Edmund B. Huey (1908)[5] published *The Psychology and Pedagogy of Reading*, the first book to review the science of reading. In the late nineteenth century psychologists had invented the first machines to track one's eyes while reading that provided a gateway into the cognitive processing of text. Research in this field led to new insights about reading, some of which resulted in faulty conclusions (e.g., that all readers read words as a single "whole") while others remain basically correct today. These early psychologists discovered that even good readers do not smoothly move their eyes across the text, but rather, eyes move both left and right as the reader advances across a sentence.

The middle of the twentieth century brought additional changes to reading instruction. A prominent textbook on the teaching of reading had been authored by Emmett Betts (1950)[6], a professor of reading at Temple University and formerly Pennsylvania State College. Reading was now conceptualized as a facet of language, an idea that is fundamental to today's view of literacy[7]. While Betts acknowledged that most reading occurred silently, oral reading was perceived as having an important place in the reading program. Critical thinking was encouraged

in students as a way to evaluate the author's message in light of the student's background knowledge. Based on insights from a dissertation conducted by Killgallon (1942)[8], Betts recommended what is still considered today, the *golden rule for instructional text*. Although Killgallon did not construct text complexity guidelines, Betts deemed any text where the student could not correctly pronounce at least 90% of the words as too difficult to read and to be avoided (frustration level). Texts were considered instructionally appropriate (to be read in conjunction with a teacher) if the words were read with 95% accuracy, while texts where word identification accuracy equaled 99% or better were judged appropriate for independent reading. Shanahan[9] researched Killgallon's dissertation and found no empirical evidence to support these recommendations. None the less, these percentages are perhaps the most enduring rules (74 years running to date) in reading education despite research debunking them[10,11, 12]. The instructional problem with Betts' rule is that many teachers are leery of allowing students to read text that is above their *instructional level*. Such decisions ignore the power of student interest and motivation and artificially constrain the scaffolding of text complexity that limits the reader's experience with the texts needed to develop college- and career-ready reading skills. Also, at risk is the reader's growth of core or global knowledge that is important to comprehension.

Validation of Fluency Interventions

In the late 1970's and early 80's, fluent reading as an instructional goal had become largely ignored. In a seminal article in 1983, Allington[13] noted that while students often lacked fluent reading, it was rarely addressed with *fluency instruction*, rather, teachers tended to focus on improvement of word automaticity. While word automaticity is important to fluent reading, students must still learn to read words in connected text and become familiar with syntax that tends to become increasingly sophisticated as text complexity increases across grades.

Reading fluency has been largely neglected.
Richard Allington, 1983

To unbundle the interaction between word automaticity and fluency, Dahl and Samuels[14] conducted a study in 1973 to improve reading fluency where one group of students practiced automaticity at the word level while the other engaged in reading fluency practice with connected text. Students in the fluency development group showed significant improvement beyond those who worked solely on word automaticity. Two seminal studies, one by Chomsky[15] in 1978 and a second by Samuels[16] in 1983, examined the efficacy of repeated readings to improve reading fluency. In a repeated reading strategy, students read a short text of 100 to 200 words four times or so over several days. Readings are conducted in the company of a teacher or more knowledgeable reader to assist with difficult word pronunciations. The two studies established that practice using repeated readings decreased word mispronunciations and improved reading rate, resulting in improved reading fluency. Additionally, comprehension improved as students focused less of their attention on word decoding and more on creating meaning from the text. The significance of these and other studies is that when sufficient underlying reading skills are in place, reading fluency can be improved through assisted reading practice. For example, Lee and Yoon[17] conducted a meta-analysis of 34 studies where repeated

reading was used as an instructional strategy for students with reading disabilities. The authors found that the strategy resulted in significant fluency improvement with a moderate effect size = 0.59, the interpretation of which would equate to a nearly 9-point increase on a standardized test. In an earlier study, Therrien[18] analyzed 16 studies and computed effect sizes of 0.50 for reading fluency (moderate) and 0.25 (small) for comprehension. In 2000, the National Reading Panel[19] identified 98 studies that used repeated reading as a method to improve oral reading fluency. The study found an overall effect size of 0.41 (moderate size), providing the empirical evidence for the Panel to recommend repeated reading as an effective fluency improvement strategy.

In 1986, Stanovich[20] further raised the profile of reading fluency by showing that the extent to which a student was a fluent reader was related to the volume of words the student read. The idea was that students who acquired reading fluency engaged in significantly more reading that produced efficacious, educational results. Using estimates of reading volume from Nagy[21], Stanovich argued that while a struggling middle school reader may read only 100,000 words in a year, an average reader is likely to read 10 times that many. The difference in reading volume leads to large differences in vocabulary exposure and in the construction of global knowledge, both key to understanding text[22]. In a study of middle school students by Paige and Smith[23], the authors found that reading rate mediates the relationship between vocabulary and comprehension. The authors found that a reading rate of 127 words-per-minute differentiated students into low- and high-rate groups with mean reading rates of 104.6 and 156.5 respectively. Students in the low-rate group knew 32% fewer words on a measure of academic vocabulary and had lower reading comprehension than those with rates exceeding 127.

The words a student learns is affected by how much they read and hence, their reading fluency.

Unfortunately, disfluent readers are more likely to attribute their poor reading to poor ability, and are less likely to exhibit the task persistence that leads to improved academic results. The rationale becomes that since I'm not good at this, why should I put in much effort? In short, the academic proposition that hard work will result in desirable outcomes becomes increasingly untenable for many students who struggle with fluent reading.

Oddly, despite the recommendations of the National Reading Panel fluency instruction at the start of the 21st century had failed to become a staple of classroom instruction across the country. While the reasons for this are likely several, it is thought among some that poor teacher knowledge of the nature and role of reading fluency is to blame. Also, and perhaps more importantly, the emphasis on improving state-wide reading scores has turned the focus of reading instruction away from the foundational skills that result in fluent reading. In place of the understanding that reading comprehension stands on the shoulders of fluent reading, instruction in many schools has focused on raising test scores. Predictably, these efforts have not been successful as NAEP scores continue to show stagnant to very slow improvement[24].

From Fluency to Comprehension

Whether reading aloud or silently, fluent reading is important as it allows the reader to focus their mental *attention* on understanding the text rather than on pronouncing the words[25,26,27]. Reading theorists have suggested that fluency occurs when the numerous reading processes work smoothly in a synchronized manner[28,29]. For decades, empirical studies have shown a moderate correlation between reading fluency and comprehension, however, several recent studies suggest a causal connection[30,31,32,33]. While many of these authors have found reading rate to be the strongest predictor of comprehension, research has emerged showing prosody to independently predict reading comprehension that is either in lieu of, or in addition to, that of rate[34,35,36,37]. While some evidence exists that reading prosody lags decoding in development[38], reading prosody appears to improve comprehension because it allows the reader to imbue text with speech-like characteristics that increases its understandability. Fluent reading is generally thought to account for one-quarter to one-half or more of the differences in reading comprehension. For readers who struggle with fluent reading, about half of the difference is attributable to reading fluency while it is near one-quarter for those with adequate fluency.

Fluency accounts for 25% to over 50% of the difference in reading comprehension.

To summarize, fluent reading is dependent on efficient, integrated, lower-level reading processes including phonemic awareness and knowledge of letter-sound correspondences that resulst, through practice, in automatic word recognition. When these processes are in place students have a much greater likelihood of possessing the decoding skills necessary to bootstrap their word reading that facilitates fluent reading[39].

Foundational Skills and State Reading Achievement

In 2018 Paige and colleagues[40] published the first study linking foundational skills (decoding and fluent reading) to reading achievement on standardized, state reading assessments. The authors gathered measures on 1,064 end-of-third-grade students attending 73 schools in a metropolitan school district. Students were measured on letter-sound understanding (phonics) and grade-level reading fluency. These measures were equally weighted and then aggregated into a reading composite score. Students were then coded as scoring proficient or not on the composite measure. Results showed that students attaining proficient status on the reading composite had a 70% chance of scoring proficient or better on the state reading assessment while those who were less-than-proficient on the composite had a 20% chance of state proficiency.

70% or 20%?
Students with grade-appropriate foundational reading skills had a 70% chance of scoring proficient on the state reading achievement test while those without had a 20% chance.

This study shows clearly that for third-grade students, attainment of grade-level, foundational reading skills is critical to attaining state reading proficiency.

A recent study by Wang and colleagues[41] of 10,000, fifth- to tenth-grade students found that to gain understanding from text, minimum text decoding skills must be in place, a finding consistent with the results

from previous authors. However, the authors also found that students not meeting a minimum decoding threshold experienced comprehension levels that were one-sixth that of students above the threshold. Additionally, this same condition persisted across all grades meaning students with poor decoding skills never experienced improved reading comprehension. This study, and that from Paige et al., highlight the importance of the reading processes necessary for fluent reading, which we now discuss.

<div align="center">**Reading Processes Necessary for Fluent Reading**</div>

Phonemic Awareness and Orthographic Mapping

Phonological awareness refers to the ability to hear and manipulate the sounds of language at the word, syllable, and phoneme level. A phoneme is the smallest speech sound in a language of which English has 44. While it is not necessary to have phonemic awareness to acquire speech, it is necessary for learning to connect letters to speech sounds[42,43]. This fundamental process leads to the eventual learning of thousands of words recognized on sight that forms the foundation of fluent reading[43].

Ehri's orthographic mapping theory[43] explains how students come to instantly recognize the tens of thousands of words that are critical to reading fluency. The word *orthographic* simply refers to the spelling of a word. The orthographic mapping theory hypothesizes that early readers use their knowledge of the *sounds* associated with written words and word-parts to anchor word spellings in memory. While phonemes are associated with speech, an alphabetic language such as English represents those phonemes using individual letters and letter combinations. Of course, humans began speaking long before the invention of writing systems meaning such systems were fitted to represent speech, a remarkable innovation. While some English letters such as /t/ represent a single phoneme, other letters such as /a/ represent two (a long or short /a/), while still other phonemes are made with letter combinations (such as /th/ in the word /the/). Some letter combinations can represent more than one phoneme depending

Words are anchored in long-term memory by their sounds (phonemes).

on neighboring letters or sometimes even surrounding words (e.g., /ea/ in neat or near). As is evident from these examples, there often is not a one-to-one correspondence between a letter name and a phoneme (think of the phonemes in /w/!). Additionally, when young children learn to speak, they have no need for knowledge of the phonemes within words as they learn to pronounce the word in its entirety. However, the challenge in learning to decode printed words is that children must learn to connect the constituent phonemes to letters and their combinations, what is called sound-to-letter correspondence. In other words, they must develop phonological analysis skills at the phoneme level. Students without effective phonemic awareness will likely not possess the necessary analysis skills to adequately decode words and are more likely to struggle with proficient reading as they progress through school[44,45]. In a study of middle school students, Paige[46] found that differences in phonemic awareness accounted for moderate to large decoding and word reading differences in students that were attributable to poor reading fluency and comprehension.

In sum, the orthographic mapping theory evolved from much research finding that good readers do not visually recall words from memory based on their spelling. Rather, they recall the spelling of words *based on the sounds* represented by their spelling. If readers did in fact visually memorize word pronunciations based on spelling, it would require the typical college reader to have memorized some 50,000 words. Although it is not completely adequate, this reinforces the need to ensure that young readers develop the requisite phonemic awareness skills necessary for word learning.

Letter-Sound Understanding

Developing the ability to hear and isolate phonemes within words, while critical, is also insufficient for fast and accurate word recognition [47]. To become a successful reader, the student must also gain understanding of the pronunciations of the letter-sound combinations within words, what is called letter-sound correspondence. For many children, explicit instruction is necessary to learn the dozens of letter-sound correspondences necessary to unlock word pronunciations[48,49,50,51]. The seminal work of Read[52] was the first to show that letter-sound learning unfolds in a predictable manner and is reflected in the way a child connects sounds and letters to spell words. Later studies identified that sound-to-spelling development takes place across four letter-features stages based on the learner's letter, phonemic awareness, and letter-sound development[53,54,55,56]. While letter-sound understanding is important to reading acquisition and eventual reading achievement, Bear[57,58] found that a student's developmental letter-feature stage is strongly associated with the complexity of text that can be read fluently. This means that for children with letter-sound understanding that has stalled or is insufficiently developed, the prospect of becoming a proficient reader is unlikely as the Wang et al.[41] study revealed.

Word Automaticity

Fluent reading is largely dependent on the number of words a student can instantly pronounce upon sight[59,60,61]. In 1974, LaBerge and Samuels[62] published their seminal theory of automaticity in reading. A word is considered to be automatic when it can be read while the reader's attention is directed to something else. In other words, rather than using one's mental attention to purposively decode (pronounce) a word, the word has been learned to the point that access occurs in a single-step, unitary process on a nearly instant basis (about 25 milliseconds). Any word that is instantly recognizable by memory is considered a sight-word. The authors hypothesize that through repeated encounters with a non-automatic word, neurological connections in the brain *strengthen* to the point where the word is finally recognized instantly by the reader.

Logan (1988)[63] on the other hand, conceptualizes automaticity not as a strengthening process, but as a memory phenomenon. He argues that an encounter with a word lays down a memory trace in the brain. Each successive encounter with the word results in a subsequent trace, each faster than the one before. Automaticity occurs when the reader can correctly pronounce the word before they can consciously apply

Students with an inadequate inventory of words recognized automatically are unlikely to become fluent readers.

decoding strategies. The implication of both theories is that automaticity occurs on a word-by-word basis. Additionally, it is successful word recognition that unlocks in the reader's lexical memory any *meaning* associated with a word. This is an important implication that should be noted. Although a reader may know the meaning of a word when used in conversation, the meaning remains inaccessible if its textual representation cannot be pronounced. Stated more simply, if the written word is not correctly pronounced its' meaning remains unknown. A typical literate individual is likely able to read, spell, and write 50,000 to 70,000 words[21]. Memorizing the pronunciation of this many written words is an untenable proposition.

Fluency Assessment

Because of its importance to academic success, fluency assessment should take place across the elementary and middle school grades to be certain students are attaining the ability to read the increasingly complex texts necessary for college- and career-ready reading achievement. As mentioned at the beginning of this overview, fluent reading reflects the extent to which a student has acquired the reading processes that underpin fluent reading. This means, for

Fluency Assessment should occur 3 times per year across first-third grade; it should continue 2 times/year through middle school.

example, that an assessment of the reading fluency of a fifth-grade student may determine it to be less than adequate. While the identification of the student as disfluent is important, it does not determine *why* the student is struggling. To get to the root cause, additional assessments involving phonemic awareness, letter-sound correspondence, and word- and pseudoword reading are necessary. This brings us to the idea that reading across K-12 reflects growth in reading processes that occurs across a developmental trajectory. This has important ramifications for reading assessment and ensuring that the processes critical to fluent reading are in place.

Kindergarten Through Third-Grade

To ensure fluent reading growth, assessment of the following reading processes must take place: 1) letter naming; 2) phonological/phonemic awareness; 3) letter-sound correspondence; 4) word reading; and 5) reading fluency.

Letter Naming:

By the middle of kindergarten students must have instant recognition of the 26 letters of the alphabet in both upper- and lower-case. Letter recognition assessment allows the teacher to know which letters have been learned and which required additional, focused instruction.

Phonological/Phonemic Awareness:

Students must be able to hear and manipulate syllables, distinguish onsets and rimes, and recognize and be able to manipulate phonemes. By the end of first-grade, phonemic awareness skills should enable students to form new words through the identification (isolation) and replacement of a phoneme to form a new word. At the end of second-grade some students will have fully developed phonemic awareness skills that have become automatic. An example is asking what word is made when the /k/ sound at the end of *pack* is replaced with the /th/ sound? A student with automatic skills will answer *path* within 2 seconds. While automaticity of

phonemic awareness is rarely assessed, not accounting for its presence can result in false-positive results showing that a student possesses skills that are in fact, not present.

Letter-Sound Correspondence:

Letter features are acquired in a predictable sequence that is easily assessed using a developmental spelling approach. Additionally, letter-sound correspondence and phonemic awareness have been shown to co-develop where growth in one aids the development of the other. For many children, letter-sound correspondence skills require explicit instruction. Children also quickly diverge from each other in their acquisition of letter feature knowledge. For a teacher to be certain that students are showing appropriate growth in this skill, assessment is critical. Without this knowledge teachers are unable to reliably know how a student is progressing, and whether or not they require additional, focused instruction.

Word Reading:

As the theory of orthographic mapping suggests, word reading growth is dependent upon development of phonemic awareness, letter-sound correspondence, and practice reading connected text. Sight- and pseudo-word reading reveal whether a child is acquiring sight-words at a sufficient pace and whether or not they are becoming automatic and adequately transferring letter-feature knowledge to word reading. For example, a developmental spelling assessment may show the student is adequately progressing, however, a pseudo-word test may suggest less-than-expected development in light of their decoding knowledge. In this instance the student should engage in more reading practice with connected text. However, in the absence of a letter-sound correspondence assessment, a poor pseudo-word reading assessment would suggest the student is not engaging in sufficient reading practice. However, a developmental spelling assessment may show that the student is lagging in the critical letter-sound knowledge necessary for decoding words and does not possess the letter-sound knowledge that is prerequisite for automatic decoding.

Reading Fluency:

Students should regularly progress in their ability to read increasingly complex text, as measured by Lexile. As children begin reading connected text in late kindergarten or early first-grade, regular assessment of fluency should begin no later the middle of first-grade. Because reading should develop quickly through third-grade, fluency assessment with prosody should occur three times per year. In the later elementary grades through middle school, fluency should be assessed twice a year for students who exhibits normal reading development and more frequently if they are struggling.

<p align="center">**In Conclusion**</p>

Reading research strongly supports fluent reading as necessary for adequate reading achievement across the K-12 continuum. A fluent reader is more likely to benefit from both the vocabulary acquisition that occurs through reading and the growth in global knowledge that is one of the foundations of reading comprehension. In this article I have made a case that fluent reading is an outcome of the efficient reading processes that lead to fast acquisition of thousands of words that are recognized instantly on sight. I have also argued that regular assessment of

these processes is necessary until they have become adequately developed in students so as to support word learning and fluent reading. In order to engage in the volume of reading that is necessary to build both fluent reading and the global knowledge that undergirds comprehension, students must be motivated to read. Acquisition of the reading processes that support and then blossoms into fluent reading is critical in developing students motivated to engage in reading for pleasure and learning.

References

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

[2]Paige, D. D., & Magpuri-Lavell, T. (2014). Reading fluency in the middle and secondary grades. *International Electronic Journal of Elementary Education, 7*(1), 83-96. https://iejee.com/index.php/IEJEE/issue/view/11

[3]McGuffey's Newly Revised Rhetorical Guide or Fifth Reader of The Eclectic Series (1853). Winthrop B. Smith & Co.

[4]Monaghan, J. E., & Barry, L. A. (1999). *Writing the past: Teaching reading in colonial America and the United States, 1640 – 1940*. International Reading Association: Newark, DE.

[5]Huey, E. B. (1908). *The psychology and pedagogy of reading*. MIT Press.

[6]Betts, E. A. (1950). *Foundations of reading instruction*. New York: American Book Company.

[7]Moats, L. (2009). Knowledge foundations for teaching reading and spelling. *Reading & Writing, 22,* 379-399. https://doi.org/10.1007/s11145-009-9162-1

[8]Killgallon, P. A. (1942). *A study of relationships among certain pupil adjustments in reading situations*. [Unpublished doctoral dissertation]. Pennsylvania State College.

[9]Shanahan, T. (1983). The informal reading inventory and the instructional level: The study that never took place. In L. Gentile, M. L., Kamil, & J. Blanchard (Eds.), *Reading research revisited,* (pp. 577-580). Columbus, OH: Merrill.

[10]Shanahan, T. (2011). *Rejecting instructional level theory*. https://shanahanonliteracy.com/blog/rejecting-instructional-level-theory

[11]Powell, W. R., & Dunkeld, C. G. (1971). Validity of the IRI reading levels. *Elementary English, 48*(6), 637-642.

[12]Brown, L. T., Mohr, K. A. J., Bradley, R. W., & Barrett, T. S. (2017). The effects of dyad reading and text difficulty on third-graders' reading development. *The Journal of Educational Research, 111*(5), 541-553. https://doi.org/10.1080/00220671.2017.1310711

[13]Allington, R. L. (1983). Fluency: The neglected reading goal. *The Reading Teacher, 36*(6), 556-561. https://www.jstor.org/stable/20198272

[14]Dahl, P. R., & Samuels, S. J. (1973). *A mastery based experimental program for teaching poor readers high speed word recognition skills*. Unpublished paper. University of Minnesota.

[15]Chomsky, C. (2002). "When You Still Can't Read in Third Grade: After Decoding, What? In S. J. Samuels (Ed.), *What Research Has to Say about Reading Instruction*, (pp. 13-30). Newark, Del.: International Reading Association.

[16]Samuels, S. Jay. (1979). The Method of Repeated Readings. *The Reading Teacher, 32*(4), 403-408. https://www.jstor.org/stable/20194790

[17]Lee, J., & Yoon, S. Y. (2017). The effects of repeated reading on reading fluency for students with reading disabilities: A meta-analysis. *Journal of Learning Disabilities, 50*(2), 213-224. https://doi.org/10.1177%2F0022219415605194

[18]Therrien, W. J. (2004). Fluency and comprehension gains as a result of repeated reading. *Remedial and Special Education, 25*(4), 252-261. https://doi.org/10.1177%2F07419325040250040801

[19]National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, DC: National Institute of Child Health and Human Development.

[20]Stanovich, K. E. (1986). Matthew effects in reading: Some consequences in individual differences in the acquisition of literacy. *Reading Research Quarterly, 21,* 36-407. https://doi.org/10.1177%2F0022057409189001-204

[21]Nagy, W.E., & Anderson, R.C. (1984). How many words are there in printed school English? *Reading Research Quarterly, 19*, 304-330. https://www.jstor.org/stable/747823

[22]Hirsch, Jr., E. D. (2003). Reading comprehension requires knowledge – of words and the world: Scientific insights into the fourth-grade slump and the nation's stagnant comprehension scores. *American Educator, Spring,* 10-29.

[23]Paige, D. D., & Smith, G. S. (2018). Academic vocabulary and reading fluency: Unlikely bedfellows in the quest for textual meaning. *Education Sciences, 8*(4)*, 165.* https://doi.org/10.3390/educsci8040165

[24]NAEP (2019). National Assessment of Educational Progress. (2019). *National assessment of educational progress reading assessment*. Washington, DC: National Center for Education Statistics, U.S. Department of Education. Retrieved from https://nces.ed.gov/nationsreportcard/

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

[26]Perfetti, C. A. (1988). Verbal efficiency in reading ability. In M. Daneman, G. E., Mackinnon, & T. G. Waller (Eds.), *Reading research: Advances in theory and practice* (pp. 109–143). New York, NY: Academic Press.

[27]Pikulski, J. T., & Chard, D. J. (2005). Fluency: Bridge between decoding and comprehension. *The Reading Teacher, 58*(6), 510-519. https://doi.org/10.1598/RT.58.6.2

[28]Breznitz, Z. (2006). *Fluency in reading: Synchronization of processes*. Mahwah, NJ: Erlbaum.

[29]Perfetti, C. (2007). Reading Ability: Lexical Quality to Comprehension*, Scientific Studies of Reading, 11*(4), 357-383. https://doi.org/10.1080/10888430701530730

[30]Dohower, S. L. (1987). Effects of repeated reading on second-grade transitional readers' fluency and comprehension. *Reading Research Quarterly, 22*(4), 389-406. https://www.jstor.org/stable/747699

[31]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*, 239-256. https://doi.org/10.1207/S1532799XSSR0503_3

[32]Kim, Y., Wagner, R. K., & Foster. (2011). Relations among oral reading fluency, silent reading fluency, and reading comprehension: A latent variable study of first-grade readers. *Scientific Studies of Reading, 15*(4), 338-362. https://doi.org/10.1080/10888438.2010.493964

[33]Swanson, H. L., & O'Connor, R. (2009). The role of working memory and fluency practice on the reading comprehension of students who are dysfluent readers. *Journal of Learning Disabilities*, *42*(6), 548-575. https://doi.org/10.1177%2F0022219409338742

[34]Whalley, K., & Hansen, J. (2006). The role of prosodic sensitivity in children's reading development. *Journal of Research in Reading*, *29*, 288-303. https://doi.org/10.1111/j.1467-9817.2006.00309.x

[35]Valencia, S. W., Smith, A., Reece, A. M., Li, M., Wixson, K. K., & Newman, H. (2010). Oral reading fluency assessment: Issues of construct, criterion, and consequent validity. *Reading Research Quarterly*, *45*, 270-291. https://doi.org/10.1598/RRQ.45.3.1

[36]Klauda, S. L., & Guthrie, J. T. (2008). Relationships of three components of reading fluency to reading comprehension. *Journal of Educational Psychology*, *100*, 310-321. https://psycnet.apa.org/doi/10.1037/0022-0663.100.2.310

[37]Paige, D. D., Rasinski, T., Magpuri-Lavell, T., & Smith, G. S. (2014). Interpreting the relationships among prosody, automaticity, accuracy and silent reading comprehension in secondary students. *Journal of Literacy Research, 46*(2), 123-156. https://doi.org/10.1177%2F1086296X14535170

[38]Paige, D. D., Rupley, W. H., Smith, G. S., Rasinski, T. V., Nichols, W., & Magpuri-Lavell, T. (2017). Is prosodic reading a strategy for comprehension? *Journal for Educational Research Online, 9*(2), 245-275. https://www.pedocs.de/frontdoor.php?source_opus=14951

[39]Share, D. L. (1995). Phonological recoding and self-teaching: Sine qua non of reading acquisition. *Cognition*, *55*(2), 151–218. doi:10.1016/0010-0277(94)00645-2

[40]Paige, D. D., Smith, G. S., Rasinski, T. V., Rupley, W. H., Magpuri-Lavell, T., & Nichols, W. D. (2018). A path analytic model linking foundational skills to Grade 3 state reading achievement. *Journal of Educational Research*, *112*(1), 110-120. https://doi.org/10.1080/00220671.2018.1445609

[41]Wang, Z., Sabitini, J., O'Reilly, T., & Weeks, J. (2018). Decoding and reading comprehension: A test of the decoding threshold hypothesis. *Journal of Educational Psychology, 111*(3), 387-401. https://psycnet.apa.org/doi/10.1037/edu0000302

[42]Hulme, C., Bowyer-Crane, C., Carroll, J., Duff, F., & Snowling, M. (2012). The causal role of phoneme awareness and letter-sound knowledge in learning to read: Combining intervention studies with mediation analyses. *Psychological Science*, *23*, 572–577. https://doi.org/10.1177%2F0956797611435921

[43]Fox, B. & Routh, D. K. (1976). Phonemic analysis and synthesis as word-attack skills. *Journal of Educational Psychology, 68*, 70-74. https://psycnet.apa.org/doi/10.1037/0022-0663.68.1.70

[44]Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading, 18*(1), 5-21. DOI: 1080/10888438.2013.819356

[45]Foorman, B. R., Francis, D. J., Shaywitz, S. E., Shaywitz, B. A., & Fletcher, J. M. (1997). The case for early reading intervention. In B. A. Blachman (Ed.), *Foundations of reading acquisition and dyslexia: Implications for early intervention* (p. 243–264). Lawrence Erlbaum Associates Publishers.

[46]Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., Furgeson, J., Hayes, L., Henke, J., Justice, L., Keating, B., Lewis, W., Sattar, S., Streke, A., Wagner, R., & Wissel, S. (2016). *Foundational skills to support reading for understanding in kindergarten through 3rd grade* (NCEE 2016-4008). Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, U.S. Department of Education. Retrieved from the NCEE website: http://whatworks.ed.gov.

[47]Paige, D. D. (2020). *Advanced Phonemic Awareness: Does it Matter in Adolescent Students*? [Manuscript submitted for publication]. School of Education, Northern Illinois University.

[48]Barron, R. (1986). Word recognition in early reading: A review of the direct and indirect access hypothesis. *Cognition, 24*, 93-119. https://doi.org/10.1016/0010-0277(86)90006-5

[49]Ehri, L. C. (1992). Reconceptualizing the development of sight word reading and its relationship to recoding. In P. B. Gough, L. C. Ehri, & R. Trieman (Eds.), *Reading acquisition* (pp. 107-143). Hillsdale, NJ: Lawrence Erlbanm Associates, Inc.

[50]Share, D. L., & Stanovich, K. E. (1995). Cognitive processes in early reading development: A model of acquisition and individual differences. *Issues in Education: Contributions from Educational Psychology, 1,* 1-35.

[51]Vellutino, F. (1991). Introduction to three studies on reading acquisition: convergent findings on theoretical foundations of code-oriented versus whole language approaches to reading instruction. *Journal of Educational Psychology, 83*(4), 437-443. https://psycnet.apa.org/doi/10.1037/0022-0663.83.4.437

[52]Read, C. (1975). Children's categorization of speech sounds in English. NCTE Committee on Research Report No. 17. ERIC Clearinghouse on Language and Linguistics, Arlington, VA. https://files.eric.ed.gov/fulltext/ED112426.pdf

[53] Bear, D., & Templeton, S. (1998). Explorations in developmental spelling: Foundations for learning and teaching phonics, spelling, and vocabulary. *Reading Teacher, 52*(3), 222–243.

[54]Gentry, J. R. (1982). An analysis of developmental spelling in "GNYS AT WRK." *The Reading Teacher, 36*(2), 192-200.

[55]Worthy, J., & Viise, N. M. (1996). Morphological, phonological, and orthographic differences in between the spelling of normally achieving and children and basic literacy adults. *Reading and Writing, 8*(2), 139-159.

[56]Henderson, H. H., & Templeton, S. (1986). A developmental perspective of formal spelling instruction through alphabet, pattern, and meaning. *The Elementary School Journal*, *86*(3), 304-316. https://doi.org/10.1086/461451

[57]Bear, D.R. (1989). Why beginning reading must be word-by-word. *Visible Language, 23*, 353–367.

[58]Bear, D. (1992). The prosody of oral reading and stage of word knowledge. In S. Templeton & D.R. Bear (Eds), *Development of orthographic knowledge and the foundations*

of literacy: A memorial Festschrift for Edmund H. Henderson (pp. 137–189). Hillsdale, NJ: Erlbaum.

[59]Ehri, L. C. (2002). Phases of acquisition in learning to read words and implications for teaching. In R. Stainthorp and P. Tomlinson (Eds.) *Learning and teaching reading.* London: *British Journal of Educational Psychology Monograph Series II.*

[60]Ziegler, J. C., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin, 131*(1), 3-29. http://dx.doi.org/10.1037/0033-2909.131.1.3

[61]Duff, F. J., & Hulme, C. (2012). The role of children's phonological and semantic knowledge in learning to read words. *Scientific Studies of Reading, 16*(6), 504-525. https://doi.org/10.1080/10888438.2011.598199

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

[63]Logan, G. D. (1988). Toward an instance theory of automatization. *Psychological Review, 95(4)*, 492-527. https://psycnet.apa.org/doi/10.1037/0033-295X.95.4.492