Do Children Selected for Reading Recovery® Exhibit Weaknesses in Phonological Awareness and Rapid Automatic Naming?

Deborah Litt
Trinity University

ABSTRACT

The purpose of this study was to determine whether children considered to be at high risk for developing reading difficulties due to weaknesses in either phonological awareness or rapid automatic naming (RAN)—two skills linked to reading difficulties in many studies—were being captured for early intervention with Reading Recovery using the standard Reading Recovery screening and selection process. Measures of phonological awareness and RAN were administered to 62 children selected for Reading Recovery in the fall of 2001 within the first 2 weeks of their programs. The results demonstrate that children with notable weaknesses in both phonological awareness and RAN are captured by the standard Reading Recovery selection process. Only one of the 62 children selected for intervention in the fall fell within the normal range (37th percentile or above) in both areas; 71.4% of the children performed at the 16th percentile or lower in phonological awareness, and 50.6% performed at the 16th percentile or lower in rapid naming.

To be useful, an early literacy intervention ought to serve the children who, but for the intervention, would have the most difficulty learning to read and write. Indeed, providing high-quality intensive instruction to disrupt the low-progress path of the lowest-performing children after 1 year of formal schooling is the mission of the Reading Recovery early intervention:

> The goal of Reading Recovery is to dramatically reduce the number of first-grade students who have extreme difficulty learning to read and write and to reduce the cost of these learners to educational systems. (Reading Recovery Council of North America, 2010)

With its goal of providing supplementary instruction to all of the lowest performing children, selection for the Reading Recovery intervention clearly intends to capture those children most likely to experience serious difficulty learning to read, including those individuals who, without intensive assistance, would go on to develop what is often called dyslexia. (Although some members of the educational community are uncomfortable with the term dyslexia, it is widely used to refer to those individuals who experience severe difficulty learning to read and write, exactly the children Reading Recovery aims to reach.)[1]

Clay developed the six measures of *An Observation Survey of Early Literacy Achievement* used for screening children for early intervention with Reading Recovery, in the years between 1963 and 1978 (Clay, 2002). Subsequently, researchers seeking to discern underlying cognitive causes of severe reading difficulties have produced a large body of work linking weaknesses in two areas—phonological awareness and rapid automatic naming (RAN)—to serious difficulties in reading acquisition (Bradley & Bryant, 1983; Felton & Brown, 1990; Lovett, Steinbach, & Fritjers, 2000; Meyer, Wood, Hart, & Felton, 1998a, 1998b; Morris et al., 1998; Scarborough, 1998a, 1998b; Vellutino et al., 1996; Wagner et al., 1997; Wolf, Bally, & Morris, 1986). Neither of these areas, often called core skills, are directly measured with the Observation Survey. Consequently, there is doubt among some researchers as to whether the children most likely to develop serious difficulty learning to read are selected for early intervention with Reading Recovery.

During the 2001–2002 school year, while collecting data for a study of the double deficit hypothesis of reading difficulty (Wolf & Bowers, 1999) the author collected phonological awareness and RAN data on 62 children selected for Reading Recovery using the standard Reading Recovery protocol: (a) teacher ranking of children on early literacy skills, (b) screening

---

1 The definition of dyslexia adopted by the National Institute of Child Health and Human Development (NICHD) and the International Dyslexia Association (IDA) in 2003 states in part that, "[d]yslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities" (Lyon et al., 2003).

with the Observation Survey (Clay, 1993) of the lowest 20–40% of the children on the ranked list depending upon the number of Reading Recovery teachers in the building, and (c) selection within a building of the lowest performers on the Observation Survey. Analysis of these data enables us to determine whether children believed to be at risk for severe reading difficulty due to weaknesses in phonological awareness or rapid naming are captured with the current Reading Recovery selection process.

In the next section I will review the research delineating the connection between phonological awareness and rapid naming, and reading difficulties. Then I will describe the study methodology, present the results, and end with a summary and discussion of future avenues of research.

CORE SKILLS RELATED TO READING DIFFICULTIES

Phonological Awareness

Phonological awareness refers to the ability to perceive and manipulate the sublexical sounds in words. Phonological awareness includes such skills as rhyme recognition, syllable counting, recognition of alliteration; blending of onsets and rimes; blending of phonemes (individual speech sounds) into words; and deletion of a syllable, rime, onset, or individual phoneme within a word. Many longitudinal-correlational studies have shown correlations between early levels of phonological awareness and later reading skill (Bishop & League, 2006; Bradley & Bryant, 1983; Felton & Brown, 1990; Kirby, Parilla, & Pfeiffer, 2001; Lovett et al., 2000; Morris et al., 1998; Parrilla, Kirby, & McQuarrie, 2004; Scarborough, 1998a; Wagner et al., 1997). However, it is worth noting that in a careful analysis of 27 samples found in 24 studies, Scarborough found that the power of the correlations derives from the children with strong early phonological awareness. These children rarely developed reading problems, but only some of the children with weak early phonological awareness went on to develop reading difficulties. For children learning to read in more orthographically transparent languages, early levels of phonological awareness are not strong predictors of later reading difficulties. (De Jong & Van der Leij, 1999; Wimmer, Mayringer, & Landerl, 2000).

Additional evidence linking difficulty with phonological awareness to reading difficulties derives from cognitive profiles research. In these studies, researchers seek to determine the physical or cognitive characteristics that distinguish individuals who make normal reading progress from individuals who experience serious reading difficulties. Over the years, a number of candidate characteristics have been tested including, but not limited to, short-term memory, verbal IQ, processing speed, muscle tone, articulation speed, visual-spatial skill, phonological awareness, and rapid automatic naming. In a highly regarded

study of this type, Morris et al. (1998) used cluster analysis to identify patterns of differences that distinguished poor readers from normally progressing readers. Six of the seven identified subtypes manifested weakness in phonological awareness either alone or in conjunction with weaknesses in other skills. In Lovett et al.'s (2000) intervention study, 76% of the 166 severely reading disabled children ages 7-13 (reading disability was defined as performance at the 20th percentile or lower on four out of five standardized reading achievement measures) scored 1 SD or lower on an average of three phonological awareness measures. Finally, Bruck (1992) found persistent deficits in phonological awareness among what he termed "compensated adult dyslexics."

The evidence linking weaknesses in phonological awareness to reading difficulties is sufficiently powerful that the most-recent definition of dyslexia used both by the NICHD and the IDA attributes dyslexia to "*a deficit in the phonological component of language* [emphasis added] that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction" (Lyon et al., 2003). The authors go on to explain that "a deficit in phonology represents the most robust and specific (Morris et al., 1998) correlate of reading disability." Consequently, it is now common for early literacy screening programs seeking to identify children at risk for reading failure to include measures of phonological awareness. Virginia's screening program is actually called Phonological Awareness and Literacy Screening (PALS) (Virginia Department of Education, 2010).

Rapid Automatic Naming

Rapid automatic naming (RAN) consists of the ability to quickly name a limited set of familiar objects presented in random order. Letters, digits, colors, and pictures of familiar objects are typically used for this task. RAN calls upon many of the subskills or processes involved in reading—coordinating eye movements left to right and return sweep, perceiving an image, retrieving the verbal label for the image (its name), producing the label, inhibiting the label and moving to the next image to begin again—but, without demanding actual word recognition or comprehension. Suboptimal performance in any of these lower-level skills of tracking, associating an image with its verbal label, retrieving the label, inhibiting a current response to move on to the next image, as well as the coordination of all of these processes can result in poor (slow) performance on the task. Weaknesses in any of these individual processes or their overall coordination would also interfere with reading connected text. Thus, RAN tasks tap processes used during actual reading, but can identify children who might experience difficulty before they can read or would be expected to read.

RAN is not as well known as phonological awareness, perhaps because of its typically high correlation with phonological awareness and an ongoing argument among researchers concerning whether RAN should be considered one

member of the family of phonological processing skills along with phonological awareness, verbal short-term memory, and articulation rate (Parrila et al., 2004; Wagner et al., 1997) or distinct from phonological processing (Wolf & Bowers, 1999). Many researchers—including those who believe RAN to be a member of the phonological family (Wagner et al., 1997, for example)—have found that naming speed measured in kindergarten or first grade adds additional unique variance to predictions of later reading skill, both word recognition and comprehension (Badian, 1994; Bishop & League, 2006; Kirby et al., 2001; Manis & Freidman, 2001; Manis, Seidenberg, & Doi, 1999; Meyer et al., 1998a; Parrila et al., 2004; Wagner et al., 1997; Wolf & Bowers, 1999). In 2006, Bishop and League concluded that the most accurate yet parsimonious set of assessments for early prediction of reading difficulties consisted of letter recognition, RAN, and phonological awareness.

RAN is not only a predictor of future reading difficulty, but also appears to distinguish normal readers from individuals who experience reading difficulties. In the Morris et al. (1998) study described above, three of the seven subtypes of poor readers identified through the cluster analysis manifested weaknesses in RAN along with other characteristics. Wolff, Michel, and Ovrut (1990) found naming speed deficits in remediated adult dyslexics, another indication of RAN skill differences being a marker for reading difficulty. Meyer et al. (1998b) found that children who overcame early reading difficulties exhibited normal RAN speed in the early years, whereas those children who remained poor readers in the eighth grade performed poorly on RAN tasks in the early years; "in brief, phonological skill was the best predictor or descriptor of who was an early poor reader, but rapid naming skill was the best predictor of which poor reader would improve" (p. 113). In a first-grade intervention study, Allor, Fuchs, and Mathes (2001) also found a stronger response to intervention among children with normal naming speed (called *lexical retrieval* in their research) than children with equivalent in early literacy development and levels of phonological awareness, but who had weak naming speed.

CORE SKILLS AND THE READING RECOVERY SELECTION PROCESS

In the U.S., children are screened for possible early intervention in Reading Recovery with the Observation Survey at the beginning of first grade, after they have experienced 1 year of formal schooling. After classroom teachers rank their students in literacy proficiency, the lowest 20–40% of the children are assessed with the six measures of the Observation Survey. The results of the assessments for each child tested are compared and the overall lowest-performing children are selected for the intervention.

The six assessments included in the Observation Survey consist of a Letter Identification (LI) in which all the lowercase and uppercase forms are pre-

sented; the Ohio Word Test (WT), a short word recognition task in which the children are asked to read real words in isolation; the Concepts About Print (CAP) measuring early print concepts; Writing Vocabulary (WV) in which the children write all the words they can within a 10-minute limit; Hearing and Recording Sounds in Words (HRSIW), a dictation task scored for the number of speech sounds represented with appropriate letters; and Text Reading (TR) which consists of reading connected text in little books to establish an appropriate level of difficulty for instruction.

Clay developed the measures included in the Observation Survey before the large body of work linking weaknesses in phonological awareness and naming speed to reading difficulties had been produced. There is no RAN task among the six measures in the Observation Survey. The HRSIW task captures phonological awareness at the phoneme level, but requires letter-sound knowledge to perform. Thus, it is not a pure measure of phonological awareness. Conceivably, a child might be able to perform tasks orally, but would be unfamiliar with the letters representing sounds. In that case, the task would underestimate her level of phonological awareness. Conversely the HSRW task can overestimate the phonological awareness of children who write some of the words correctly by rote (*stop* or *the* for example) without performing a sound-to-letter analysis.

As the school year progresses, entry into the program proceeds in the fashion of rolling admissions. When one child completes the program, space becomes available for whomever qualifies as the "lowest" student based upon the classroom teacher nominations of their weakest readers and a new screening with the Observation Survey. Through this ongoing review and selection it would seem that all children likely to experience serious difficulty learning to read would be noticed during their first-grade year. Nevertheless, because the assessments used for selecting children for Reading Recovery intervention do not contain a pure measure of phonological awareness nor any measure of rapid naming, it is prudent to ascertain whether children deemed at-risk for severe reading difficulties due to weaknesses in either or both phonological awareness and RAN are captured when the Observation Survey is the instrument used to identify the children most at risk for reading difficulty.

METHOD

Participants

The study was conducted during the 2001–2002 school year in a large majority African American (77%) urban/suburban school district in the mid Atlantic region of the United States. High teacher turnover as well as high student mobility (19.2% entering/15.8% withdrawing) is characteristic of the district. During the year data was collected, 53% of all the students in the district quali-

fied for free or reduced-price lunch. According to school system data for 1998–99, the most-recent year for which these data are available, 81% of the children who received Reading Recovery instruction were African American, 8% were White, 9% were Hispanic, 1% were Asian, 1% were classified "Other," and 69% of the Reading Recovery children qualified for free or reduced-price lunch. Ethnic breakdowns and information on school lunch qualification were not available for Reading Recovery children for the 2001–02 school year, but can be presumed to be similar to the demographic characteristics for 1998–99.

Teacher participants

The author recruited teachers through telephone calls and a letter during the summer of 2001 just prior to when data collection was scheduled to begin. When these efforts did not produce a sufficient number of teachers, she made an announcement at the Reading Recovery professional development meeting held during the week before school opening for students. Teacher participants in the study had to meet three requirements: (a) completion of a minimum of 2 years as Reading Recovery teachers including their training year; (b) attendance at a training session, and (c) willingness to complete additional paperwork associated with the study protocols. The 19 participating teachers worked in 18 separate buildings. The schools comprised a representative range of communities within this large district. During the time data was being collected, all but one of the participating teachers taught four Reading Recovery children daily as part of her teaching assignment. One participating teacher taught eight Reading Recovery students daily, divided between two schools. Ten of the 18 buildings had one Reading Recovery teacher; the others had two or three. The percent of Reading Recovery children within a building who participated varied widely depending upon how many of the teachers volunteered, how many children were English language learners (ELLs), and whether or not parents returned consent forms, although lack of consent forms eliminated only a handful of children.

Child participants

The child participants in this study consisted of first-grade children selected for Reading Recovery at the beginning of the 2001–02 school year, by Reading Recovery teachers who had volunteered to assist with the study on the double deficit hypothesis. The children had to meet two conditions: they spoke English as their primary language, and their parents granted written permission for participation in the study. English language learners were excluded from the study (but not from Reading Recovery intervention) due to a potential language confound on the RAN task; RAN was tested in English and requires rapid access to verbal labels for the items used. English language learners might take longer to name the items due to lack of familiarity with the English words rather than a true weakness in naming speed.

Measures

Intervention selection measures

The selection measures consisted of the 6 subtests of Clay's Observation Survey (1993) used in Reading Recovery: Letter Identification (LI), Ohio Word Test (WT), Concepts About Print (CAP), Writing Vocabulary (WV), Hearing and Recording Sounds in Words (HRSIW), and Text Reading (TR). Although a newer edition is now available, at the time this study was conducted the 1993 version was used.

Other early predictors

Three subtests of the Comprehensive Test of Phonological Awareness (CTOPP) (Wagner, Torgesen, & Rashotte, 1999) were used to measure the levels of the two core skills— phonological awareness and rapid naming—that have been shown to be strong early predictors of later reading difficulties in numerous studies (Bradley & Bryant, 1983; Felton & Brown, 1990; Meyer et al., 1998b; Morris et al., 1998; Vellutino et al., 1996; Wagner et al., 1997; Wolf et al. 1986). CTOPP Blending and Elision (Deletion) were used to measure phonological awareness. In the blending task, word parts are presented on an audiotape recording and the children are asked to say the word "these sounds make." The presentation begins with two-syllable words such as *summer*, progresses to onset rime divisions, phonemes in one-syllable words, and finally to individual phonemes in multisyllable words. The assessment begins with practice items in which the tester provides feedback to ensure that the children understand the task. In the elision task, the children are asked to delete part of a word. The test begins with two-syllable compound words such as *cowboy* and progresses in difficulty from deleting a syllable in two-syllable noncompound words, to initial consonant deletion, deletion in the middle of words, and, finally, deletion of a consonant within a cluster. This assessment also begins with practice items and feedback.

In a RAN task, subjects name a limited set of highly familiar items such as letters, digits, colors, or very familiar pictured objects (such as *ball*, *star*, and *chair*) arranged randomly on an array. The raw score on this task consists of the number of seconds required to name all of the items. The subject moves across rows and names them in a manner that incorporates many of the processes involved in reading (moving left to right across a row, visual perception of a symbol, retrieving the name for the symbol, inhibiting one response and moving to the next item, and so forth), but without the need to decode words or construct meaning. Because many of the children in this school district were learning their colors in kindergarten, and letters and numbers in first grade, rapid object naming was selected as the task most likely to obtain a true measure of *automatic* naming. When tested on rapid naming at the end of kinder-

garten (comparable to testing during the first few weeks of school in first grade) both Felton and Brown (1990) and Wolf et al. (1986) found all forms of naming correlated with each other and all were significant predictors of reading. As with the elision and blending tasks, this test also provided practice items. If a child was not familiar with the pictured objects, testing would be stopped. No children were eliminated due to lack of familiarity with the pictured objects.

Procedure

Data collection

Reading Recovery teachers assessed children on the Observation Survey measures for possible participation in Reading Recovery within the first 2 weeks of school. Reading Recovery instruction began within the first 4 weeks of school; the precise starting dates varied among the schools within the district. The Reading Recovery teachers administered the CTOPP Blending, Elision, and Rapid Automatic Object Naming tests during the first 2 weeks of Reading Recovery lessons during the initial period of instruction — when Reading Recovery intervention teachers do not intentionally teach new skills, but focus on establishing rapport with their students and getting to know in depth what their students already know. The teachers were encouraged to administer these assessments as early as possible to procure a pure baseline level (any instruction could conceivably change the children's tested levels on any of the assessments), but were allowed to use their own judgment on the precise timing because building a strong, positive relationship with their students was their primary goal during the first 2 weeks of the intervention.

Analysis

Using the tables provided by the test publisher, each child's raw score was transformed to a percentile rank. Raw scores were not used as a basis of comparison because they are age dependent. SPSS software was used to generate descriptive statistics and the mean percentile ranks. Following the procedure used by Wolf, one of the prime researchers into phonological awareness and rapid naming deficits as markers of severe reading difficulty, children manifesting difficulty on either the blending or elision tasks were considered to have serious weaknesses in phonological awareness (A. Goldberg-O'Rourke, personal communication, March 17, 2002) because both elision and blending are necessary for reading.

RESULTS

Only one child out of the initial 62 children selected for Reading Recovery intervention in the fall scored in the normal range (37th percentile or above)

on both measures of phonological awareness and the rapid naming measure. All but seven (11.3%) of the children in the sample scored at a level of 1 SD or lower on at least one of the three measures of core skills—phonological awareness (elision or blending), or RAN. Prior to receiving Reading Recovery instruction, 77.4% of the children performed at the 16th percentile (equivalent to 1 SD below the norm) or lower on at least one of the phonological awareness tasks, and half (51.6%) performed at 16th percentile or lower in rapid naming task. Accordingly, the mean national percentile scores for this sample of Reading Recovery students was low: Elision, 15.3; Blending Words, 17.7; Rapid Object Naming, 25.8. Just over two-thirds of the children (67.8%) selected for Reading Recovery intervention in the fall performed at the 16th percentile level or below on both rapid naming and phonological awareness.

The data clearly show that the existing Reading Recovery selection process captures children with weaknesses in phonological awareness and/or RAN. Children with these weaknesses are captured for early intervention when the Observation Survey is used as the screening device, even though the Observation Survey does not include a direct measure of phonological awareness or any measure of RAN. If children who perform poorly on phonological awareness and/or RAN tasks are those most at risk for severe reading difficulty, then these highly at-risk children are selected for early intervention with the existing Reading Recovery selection procedure.

SUMMARY AND FUTURE DIRECTIONS

In a sample of 62 children selected for Reading Recovery in fall 2001, all but one child manifested serious weaknesses in either phonological awareness, RAN, or in both skills. The overall mean percentile for the children in this sample on both skills was a full SD below the norm for the phonological awareness tasks and at the 25.8th percentile level for the rapid naming task. These results demonstrate that the standard Reading Recovery selection process is capturing children with major weaknesses in these two areas, both strong predictors of future reading difficulties in many studies, despite the lack of any direct measures of these skills in the Observation Survey.

Because the Hearing and Recording Sounds in Words dictation task requires phonemic awareness, it is not surprising that the existing Reading Recovery selection system captures children who manifest difficulties with phonological awareness. Even if a small percentage of children exist who would be able to perform oral phonological manipulation tasks independent of sound-letter knowledge, the existing procedure captures many children who are as yet unable to consistently isolate phonemes. However, accounting for the suppressed performance of this sample in the RAN task is more difficult since none of the Reading Recovery selection measures require speed. Multiple

explanations have been posited for slow naming speed in the literature. One proposed explanation is that weak automatic naming represents a manifestation of an underlying learning deficit for arbitrary associations (Manis et al., 1999; Vellutino, Scanlon, & Spearing, 1995), in at least some portion of the population with slow automatic naming. A child experiencing general difficulty with learning arbitrary associations would not learn letters easily. Thus, one explanation for the large percentage of Reading Recovery children with RAN weaknesses could be that the letter identification assessment is a vehicle for capturing RAN weaknesses. However, F. R. Manis (personal communication, June 15, 2003) suggested that the high percentage of children coming from low socioeconomic levels could also account for the high incidence of weak RAN in this sample. To test the latter hypothesis, RAN data would need to be collected from a large sample of children who were selected for Reading Recovery from a range of socioeconomic levels.

Many questions remain for future research. Can children with poorly developed phonological awareness and/or weak rapid naming nevertheless develop the emergent literacy skills captured by the Observation Survey? If so, these children would not be identified for intervention in the fall testing window, although they might be selected later in the school year if they made little progress and fell behind their classmates. Furthermore, if such a population exists, do such children inevitably go on to develop reading difficulties, or does strength in the areas of early literacy development measured by the Observation Survey compensate for the poor phonological awareness or slow naming speed? A longitudinal study in which all of the children in a cohort were tested on phonological awareness and rapid naming in addition to the Observation Survey measures, is needed to determine whether the survey alone identifies all of the children at risk for severe reading difficulties, and whether the additional assessments would identify other children not identified with the Observation Survey alone. In conducting such a study, it would be desirable to include an early orthographic awareness task. In a study examining the accuracy and sensitivity of early predictors, Badian (1994) found that an orthographic matching task administered in preschool made a substantial contribution to the prediction of first-grade reading skills.

The data presented here demonstrate that children with early poor phonological awareness and weak naming speed are captured for early intervention through Reading Recovery with the existing selection procedure despite no measure of RAN, nor a purely oral measure of phonological awareness. Indeed, only one child in the sample scored in the normal range in both areas. However, the question of whether *all* children likely to experience difficulty with reading acquisition are selected for intervention with Reading Recovery with the existing procedure will remain unresolved until a longitudinal study such as the one described above is conducted.

REFERENCES

Allor, J. H., Fuchs, D., & Mathes, P. G. (2001). Do students with and without lexical retrieval weaknesses respond differently to instruction? *Journal of Learning Disabilities, 34*(3), 264–275.

Badian, N. A. (1994). Preschool prediction: Orthographic and phonological skills, and reading. *Annals of Dyslexia, 44*, 3–25.

Bishop, A. G., & League, M. B. (2006). Identifying a multivariate screening model to predict reading difficulties at the onset of kindergarten: A longitudinal analysis. *Learning Disabilities Quarterly, 29*, 235–252.

Bradley, L. L., & Bryant, P. E. (1983). Categorizing sounds and learning to read--a causal connection. *Nature, 301*, 419–421.

Bruck, M. (1992). Persistence of dyslexic's phonological awareness deficits. *Developmental Psychology, 28*, 874–886.

Clay, M. M. (1993). *An observation survey of early literacy achievement*. Portsmouth, NH: Heinemann.

Clay, M. M. (2002). *An observation survey of early literacy achievement* (2nd ed.). Portsmouth, NH: Heinemann.

De Jong, P. F., & Van der Leij, A. (1999). Specific contributions of phonological abilities to early reading acquisition: Results from a Dutch latent variable longitudinal study. *Journal of Educational Psychology, 91*(3), 450–476.

Felton, R. H., & Brown, I. S. (1990). Phonological processes as predictors of specific reading skills in children at risk for reading failure. *Reading and Writing: An Interdisciplinary Journal, 2*, 39–59.

Kirby, J. R., Parrila, R. K., & Pfeiffer, S. L. (2001, June). *Naming speed and phonological awareness as predictors of reading development*. Paper presented at the Society for the Scientific Study of Reading, Boulder, CO.

Lovett, M. W., Steinbach, K. A., & Fritjers, J. C. (2000). Remediating the core deficits of developmental reading disability: A double deficit perspective. *Journal of Learning Disabilities, 33*(4), 334–358.

Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. (2003). A definition of dyslexia. *Annals of Dyslexia, 53*, 1–14.

Manis, F. R., & Freidman, L. (2001). The relationship of naming speed to multiple reading measures in disabled and normal readers. In M. Wolf (Ed.), *Dyslexia, fluency, and the brain* (pp. 65–92). Timonium, MD: York Press.

Manis, F. R., Seidenberg, M. S., & Doi, L. M. (1999). See Dick RAN: Rapid naming and the longitudinal prediction of reading subskills in first and second graders. *Scientific Studies of Reading, 3*(2), 129–157.

Meyer, M. S., Wood, F. B., Hart, L. A., & Felton, R. H. (1998a). Longitudinal course of rapid naming in disabled and nondisabled readers. *Annals of Dyslexia, 48*, 91–114.

Meyer, M. S., Wood, F. B., Hart, L. A., & Felton, R. H. (1998b). Selective predictive value of rapid autonomized naming in poor readers. *Journal of Learning Disabilities, 31*(2), 106–117.

Morris, R. D., Stuebing, K. K., Fletcher, J. M., Shaywitz, S. E., Lyon, G. R., Shankweiler, D. P., Katz, L., Francis, D. J., & Shaywitz, B. (1998). Subtypes of reading disability variability around a phonological core. *Journal of Educational Psychology, 90*(3), 347–373.

Parrila, R., Kirby, J. R., & Mcquarrie, L. (2004). Articulation rate, naming speed, verbal short-term memory, and phonological awareness: Longitudinal predictors of early reading development? *Scientific Studies of Reading, 8*(1), 3–26.

Reading Recovery Council of North America (2010). Retrieved January 4, 2010, from http://www.readingrecovery.org/reading_recovery/facts/index.asp

Scarborough, H. (1998a). Early identification of children at risk for reading disabilities. In B. K. Shapiro, P. J. Accardo & A. J. Capute (Eds.), *Specific reading disability: A view of the spectrum* (pp. 75–119). Timonium, MD: York Press.

Scarborough, H. (1998b). Predicting the future achievement of second graders with reading disabilities: Contributions of phonemic awareness, verbal memory, rapid naming, and IQ. *Annals of Dyslexia, 48*, 115–136.

Vellutino, F. R., Scanlon, D. M., Sipay, E. R., Small, S. G., Pratt, A. C., Chen, R., & Denckla, M. (1996). Cognitive profiles of difficulty-to-remediate and readily remediated poor readers: Early intervention as a vehicle for distinguishing between cognitive and experiential deficits as basic causes of specific reading disability. *Journal of Educational Psychology, 88*, 601–638.

Vellutino, F. R., Scanlon, D. M., & Spearing, D. (1995). Semantic and phonological coding in poor and normal readers. *Journal of Experimental Child Psychology, 59*, 79–123.

Virginia Department of Education (2010). *Phonological awareness literacy screening (PALS)*. Retrieved January 4, 2010, from http://pals.virginia.edu/

Wagner, R. K., Torgesen, J. K., & Rashotte, C. (1999). *Examiner's manual: The comprehensive test of phonological processing*. Austin, TX: Pro-Ed.

Wagner, R. K., Torgesen, J. K., Rashotte, C., Hecht, S. A., Barker, T. A., Burgess, S. R., Donahue, J., & Garon, T. (1997). Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. *Developmental Psychology, 33*(3), 468–479.

Wimmer, H., Mayringer, H., & Landerl, K. (2000). The double-deficit hypothesis and difficulties in learning to read a regular orthography. *Journal of Educational Psychology, 92*(4), 668–680.

Wolf, M., Bally, H., & Morris, R. (1986). Automaticity, retrieval processes, and reading: A longitudinal study in average and impaired readers. *Child Development, 57*, 988–1000.

Wolf, M., & Bowers, P. G. (1999). The double-deficit hypothesis for the developmental dyslexias. *Journal of Educational Psychology, 91*(3), 415–438.

Wolff, P. H., Michel, G. F., & Ovrut, M. (1990). Rate variables and automatized naming in developmental dyslexia. *Brain and Language, 39*, 556–575.