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Revisiting the "Simple View of Reading" in a Group of Children With Poor Reading Comprehension

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According to Gough and Tunmer's Simple View of Reading, Reading Comprehension = Decoding (D) × Listening Comprehension (C). The purpose of this study was to evaluate the model with a sample of First Nations children, known to have average decoding and listening comprehension but poor reading comprehension. In addition, the authors examined the contribution of naming speed and phonological awareness to reading comprehension beyond the effects of D and C. Consistent with the findings of previous studies, the children exhibited poor reading comprehension despite average performance in decoding and listening comprehension, a finding that challenges the simple view of reading. The results also revealed that an additive model (D + C) fitted the data equally well as a product model (D × C). Neither naming speed nor phonological awareness accounted for unique variance.

Keywords: *reading comprehension; simple view; phonological processing*

Approximately two decades ago Gough and Tunmer (1986) proposed the Simple View of Reading (SVR) according to which reading comprehension (RC) is equal to the product of two separate components: decoding (D) and linguistic comprehension (C), thus RC = D × C. Decoding refers to the ability to read printed nonwords by applying the grapheme-phoneme correspondence rules, and linguistic comprehension refers to the ability to interpret sentences and discourses presented orally. Most studies have estimated the latter ability using listening comprehension tasks, in which participants listen to passages and answer comprehension questions. Since 1986, the SVR has received considerable empirical support (e.g., Hoover & Gough, 1990; Joshi & Aaron, 2000; Savage, 2001; Tunmer & Hoover, 1992) and, in turn, has influenced the fields of psychology and education.

Research has shown that decoding and listening comprehension account for a large proportion of variance in reading comprehension (Dreyer & Katz, 1992; Gough, Hoover, & Peterson, 1996; Hoover & Gough, 1990; Johnston & Kirby, 2006; Savage, 2006). Furthermore, the relative contribution of these components to SVR is subject to changes over time (e.g., Adlof, Catts, & Little, 2006; Francis, Fletcher, Catts, & Tomblin, 2005; Gough et al., 1996). In the early grades, reading comprehension is mostly explained by word reading skills. As students move to more complicated reading materials in later grades, the contribution of listening comprehension increases, whereas the contribution of word reading decreases.

Despite our improved understanding of SVR, there are still two unresolved issues. First, there is ambiguity as to whether reading comprehension is the product of multiplication (RC = D × C), addition (RC = D + C), or addition-plus-multiplication (RC = D + C + (D × C)). Second, there is ambiguity on what other cognitive processes can be added to the model that may account for some of the variance not accounted for by decoding and listening comprehension. In the rest of the introduction we elaborate on the aforementioned controversial issues to build the rationale for our study.

The first controversial issue regarding the SVR model was how decoding and listening comprehension could be combined to predict reading comprehension. Gough and Tunmer (1986) theorized that a product model (D × C) best describes SVR. Simply put, if decoding is high but listening comprehension is low, the child will be a poor reader. Likewise, if listening comprehension is high but decoding is low, the child will again be a poor reader. Hoover and Gough (1990) examined the best fitting model of reading comprehension with 254 children between

Grades 1 and 4. They predicted that reading comprehension would be the product rather than the sum of decoding and listening comprehension and that among poor readers, decoding and listening comprehension would be negatively correlated. The results supported both of their predictions.

However, more recent studies have questioned Hoover and Gough's (1990) findings (e.g., Chen & Vellutino, 1997; Savage, 2006). For example, Chen and Vellutino (1997) tested a model in which the product term (D × C) was added in the regression equation after D and C (RC = D + C + (D × C)). They found that the product term did not explain any unique variance in reading comprehension beyond the effects of the additive terms. Similarly, Savage (2006), working with a group of 15-year-old poor readers, showed that an additive model (D + C) fitted the data well. These findings suggest that decoding and listening comprehension are sufficient, but not necessary, for reading comprehension and perhaps either one of these component skills can be bypassed in successful reading comprehension. This implication is particularly interesting as recent research findings suggest that high-functioning adult dyslexics (also referred sometimes as adult compensated dyslexics) have adequate reading comprehension despite having deficits in decoding, phonological awareness, and naming speed (e.g., Birch & Chase, 2004; Parrila, Georgiou, & Corkett, 2007; Wilson & Lesaux, 2001)

Recently, Savage and Wolforth (2007) added a new perspective to this debate. Working with a group of 60 university students (19 of which were graduate students), Savage and Wolforth found that the product model was not accounting for any unique variance in reading comprehension once the effects of the additive model were controlled. However, there was also no additional effect for the additive model once the effects of the product model were controlled. Savage and Wolforth concluded that "the two models have equal explanatory power for reading comprehension" (p. 261). Taken together, these findings suggest that further examination of the nature of the SVR model is warranted.

A second issue concerns those cognitive-processing skills that may account for variance in reading comprehension that is not explained by either decoding or listening comprehension. Several researchers have suggested that reading fluency may be a candidate (e.g., Adlof et al., 2006; Kirby, 2006; Pikulski, 2006; Wolf & Katzir-Cohen, 2001). In support of this argument, several studies have found a strong relationship between reading fluency and reading comprehension (e.g., Fuchs, Fuchs, Hosp, & Jenkins, 2001; Katzir et al., 2006; Savage & Frederickson, 2005; Schwanenflugel et al., 2006; Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997). Nevertheless, Adlof and her colleagues (2006) demonstrated in a study with second, fourth, and eight graders that reading fluency, operationalized with a test of word-reading efficiency and a test of efficient phonemic decoding, was not accounting for unique variance in reading comprehension once the effects of decoding and listening comprehension were taken into account. In addition, Adlof et al. showed that there were very few individuals with problems in reading fluency but with average word recognition accuracy and listening comprehension.

Recently, Johnston and Kirby (2006) found that naming speed, operationalized with an Object Naming task, was accounting for a small (2–3%), but still significant, amount of variance in reading comprehension after the effects word decoding and listening comprehension were controlled. Similarly, Joshi and Aaron (2000) reported that naming speed, operationalized with a Letter Naming task, was accounting for an additional 10% of the variance in reading comprehension, beyond the effects of decoding and listening comprehension. Compared to Johnston and Kirby, the large proportion of variance accounted for in Joshi and Aaron's study may reflect the fact that alphanumeric naming speed (Digits and Letters) is more strongly related to reading than nonalphanumeric naming speed (Objects and Colors; e.g., Bowey, McGuigan, & Ruschena, 2005; Compton, 2003; Savage & Frederickson, 2005; Wolf, Bally, & Morris, 1986). To examine if the contribution of naming speed to reading comprehension is subject to the type of naming speed tasks used, we included both alphanumeric and nonalphanumeric naming speed tasks in our study.

Beyond the effects of decoding and listening comprehension, phonological awareness may also contribute to reading comprehension, directly or indirectly through the effects of decoding (e.g., Caravolas, Vólin, & Hulme, 2005; Kirby, Parrila, & Pfeiffer, 2003; Manis, Doi, & Bhadha, 2000; Nation & Snowling, 2004; Parrila, Kirby, & McQuarrie, 2004; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). The studies that examined the contribution of phonological awareness within the SVR framework provided contradictory findings. On one hand, Savage and Wolforth (2007) found that phonological awareness was not significantly correlated to reading comprehension and, thus, was not considered for the regression analyses. On the other hand, Johnston and Kirby (2006) found that phonological awareness was accounting for 2 to 4% of unique variance in reading comprehension, when entered after the product term (D × C) and 1 to 3% of unique variance, when entered after the product term (D × C) and naming speed. Thus, further research on the contribution of phonological awareness to reading comprehension is warranted.

Overview of This Study

In their influential article, Gough and Tunmer (1986) argued that if we were to find a group of individuals who can both decode and listen, but cannot comprehend, or a group of individuals who can do one but not the other (i.e., decode or listen) and still comprehend, this would falsify the SVR model. Although finding a group of individuals to match these characteristics is quite challenging, previous studies with unselected samples of First Nations (FN; also called Canadian Native Indian) children have suggested that these children have average decoding skills (e.g., Das, Janzen, & Georgiou, 2007; Janzen, 2000) and average listening comprehension but nevertheless experience reading comprehension problems (Hayward, Das, & Janzen, 2007). To our knowledge, none of the previous studies with FN children evaluated the SVR model, despite the apparent importance of this rare combination of ability levels. In addition, there is lack of research examining what other factors may brings about poor reading comprehension in this group of children.

Thus, the purpose of this study was twofold: (a) to examine the best way to combine decoding and listening comprehension to predict reading comprehension, and (b) to examine the role that naming speed and phonological awareness plays in SVR model, in particular, and in poor reading comprehension, in general. Based on the findings of previous studies, we hypothesized the following:

1. Reading comprehension will not be the product of decoding and listening comprehension.
2. Naming speed and phonological awareness will explain a unique amount of variance in reading comprehension beyond the effects of decoding and listening comprehension.

Method

Participants

Fifty English-speaking Canadian FN children attending Grades 3 and 4 (26 boys and 24 girls, ages 8 years 10 months to 10 years 7 months; $M = 9.27$, $SD = 0.67$) participated in this study. The children resided on a reservation and were coming from predominantly low-socioeconomic families. English was the language of instruction at school and the primary language used at home. However, some instruction in Cree was also provided at school. None of the children had an official diagnosis for any reading or behavioral problems, and none of them was receiving any special education services. However, it should be mentioned that such diagnosis is often rare and not available in this school jurisdiction. Parental consent was obtained prior testing.

Measures

Phonological awareness. The Phoneme Elision task from the *Comprehensive Test of Phonological Processes* (CTOPP; Wagner, Torgesen, & Rashotte, 1999) was used as a measure of phonological awareness. This task measures the extent to which an individual can say a word and then say what is left after dropping out designated sounds. The task consists of 20 items. For the first 2 items, the examiner says compound words and asks the examinee to say the word and then say the word that remains after dropping one of the compound words. For the remaining items, the individual listens to a word and repeats the word and then is asked to say the word without a specific sound. Participant's score is the number of correct responses. Wagner et al. (1999) reported test-retest reliability of .79 for Phoneme Elision for ages 8 to 17.

Rapid naming speed. Rapid naming speed was measured with the Object, Color, Digit, and Letter Naming tasks adopted from the CTOPP (Wagner et al., 1999). Participants were asked to name as quickly as possible the names of six objects (pencil, boat, star, key, chair, fish), six colors (blue, red, green, black, yellow, and brown), six digits (4, 7, 8, 5, 2, 3), or six letters (a, n, s, t, k, c) arranged randomly in four rows with 9 symbols in each row. Prior to beginning the timed naming, each participant was asked to name the objects, colors, digits, or letters to ensure familiarity. The individual's score was the total time to name all 36 stimuli on a single page. Wagner et al. (1999) reported test-retest reliability of .93, .89, .80, and .72 for Object, Color, Digit, and Letter Naming, respectively, for ages 8 to 17.

Decoding. The *Woodcock-Johnson Tests of Achievement* (WJIII; Woodcock, McGrew, & Mather, 2001) was used to assess nonword reading ability. The Word Attack task requires the participants to read nonwords. Testing was discontinued after six consecutive errors. The individual's score was calculated using the accompanying computer scoring program. Woodcock et al. (2001) reported split-half reliability of .89 for children 9 years old.

Listening comprehension. The WJIII (Woodcock et al., 2001) was used to assess listening comprehension. The *Oral Comprehension* subtest requires the participants to listen to short audio-recorded passages and use syntactic and semantic cues provided in the passage to supply a missing word. Testing was discontinued after six consecutive errors. The individual's score was calculated using the accompanying computer scoring program. Woodcock et al. (2001) reported split-half reliability of .80 for children 9 years old.

Reading comprehension. The WJIII (Woodcock et al., 2001) was used to assess reading comprehension. The *Passage Comprehension* subtest uses a cloze procedure that requires the subject to read sentences missing a word that is important to the meaning of the sentence or passage. The participants must supply the word that fits the meaning of each sentence or passage. Testing was discontinued after six consecutive errors. The individual's score was calculated using the accompanying computer scoring program. Woodcock et al. (2001) reported split-half reliability of .91 for children 9 years old.

Procedure

This study involved individually administered tests. Assessment was carried out by graduate-level students who were trained in individual psychological test administration. All testers were thoroughly trained by the third author who also supervised the testing. Testing took place in a quiet and semiprivate room within the school and lasted approximately 45 minutes. All instructions were given in English as that was the primary language of the children. The order of test administration was counterbalanced.

Results

Preliminary Data Analysis

Table 1 presents the descriptive statistics for all the measures used in the study. Consistent with previous studies (e.g., Das et al., 2007; Janzen, 2000), the participants performed below grade level in reading comprehension (Grade Equivalent = 2.5, *M* standard score = 87.86, *SD* = 8.29), but within grade level in decoding (Grade Equivalent = 3.9, *M* standard score = 98.16, *SD* = 8.29) and listening comprehension (Grade Equivalent = 3.9, *M* standard score = 100.62, *SD* = 7.99). If both decoding and listening comprehension are within grade level, then their product (D × C) should be within grade level. However, reading comprehension was well below grade level.

Table 1
Descriptive Statistics for All the Measures Used in the Study

Measures	*M*	*SD*	Range
Phoneme Elision	10.28	4.28	3–18
RAN Digits[a]	43.38	12.70	21–103
RAN Letters[a]	48.76	17.78	26–143
RAN Colors[a]	84.24	27.68	44–177
RAN Objects[a]	87.24	24.25	46–164
Decoding	16.98	6.61	3–28
Listening Comprehension	17.62	2.39	11–23
Reading Comprehension	21.76	3.67	11–30

Note: $N = 50$. The descriptive statistics are for the raw, untransformed scores. RAN = rapid automatized naming.
a. Measured in seconds.

To simplify further analysis, we created two composite rapid automatized naming (RAN) scores, one composite score by averaging the *z* scores of RAN Digits and RAN Letters and one composite score by averaging the *z* scores of RAN Colors and RAN Objects. The former will be called alphanumeric RAN and the latter nonalphanumeric RAN. In addition, to standardize the scores of the SVR product predictor variables, *z* scores were calculated for Decoding and Listening Comprehension tasks. Following the suggestion of Johnston and Kirby (2006), the problem of negative *z* scores was eliminated by adding a constant of 10 to each *z* score ($M = 10.0$, $SD = 1.0$). A product term was created based on the transformed *z* scores just calculated by multiplying the Decoding *z* scores by the Listening Comprehension *z* scores.

Before running any regression analyses, correlations between the different measures used in the study were calculated. Table 2 presents the correlations. Controlling for the effects of age did not influence the correlations, and for this reason we decided to run all subsequent analyses without controlling for age. The results of the correlational analysis suggest that there is a positive, but nonsignificant, relationship between decoding and listening comprehension, a finding that is similar to the one reported by Savage (2006) and in contrast to the one reported by Hoover and Tunmer (1990). Listening comprehension was significantly related only to Phoneme Elision and reading comprehension. Decoding was strongly correlated to Phoneme Elision and reading comprehension and moderately correlated to RAN. Finally, alphanumeric RAN, but not nonalphanumeric RAN, correlated significantly to reading comprehension.

Table 2
Correlations Between All the Measures Used in the Study

Measures	1.	2.	3.	4.	5.	6.
1. Phoneme Elision		–.22	–.04	.69**	.31*	.42**
2. Alphanumeric RAN	–.21		.60**	–.49**	–.00	–.35*
3. Non-Alphanumeric RAN	–.00	.60**		–.29*	–.06	–.26
4. Decoding	.67**	–.49**	–.25		.23	.61**
5. Listening Comprehension	.34*	–.01	–.04	.21		.44**
6. Reading Comprehension	.38**	–.34*	–.23	.56**	.43**	

Note: Zero-order correlations are above the diagonal and partial (for age) correlations are below the diagonal. RAN = rapid automatized naming.
*$p < .05$. **$p < .01$.

Is Reading Comprehension the Product of Multiplication or Addition?

Next, we examined if reading comprehension is better described as the product of multiplication or addition of decoding and listening comprehension. Decoding and listening comprehension were entered separately in the first two steps of the regression as the additive model would suggest ($RC = b_0 + b_1D + b_2C$). In the third step, the product term of D and C was entered ($RC = b_0 + b_1D + b_2C + b_3D \times C$). The results depicted in Model A of Table 3 reveal that when C was entered at Step 2 after D (entered at Step 1), it accounted for unique variance in reading comprehension. However, no significant additional variance was explained by the (D × C) product model, when entered at Step 3.

In addition, we examined whether an additive model added to the prediction of reading comprehension once the effects of the product model were controlled. The product term (D × C) was entered at Step 1 of the regression analysis followed by D and C, which were entered at Steps 2 and 3, respectively ($RC = b_0 + b_1D \times C + b_2D + b_3C$). The results of this analysis depicted in Model B of Table 3 reveal that when D and C were entered at Steps 2 and 3, respectively, after (D × C) (entered at Step 1), did not account for any unique variance beyond the effects of the product model.

The analysis in Models A and B was also repeated with only the participants that met the criterion for poor reading comprehension (standard score < 90). Twenty-nine participants (58% of the whole sample) scored at or below 90 and were used in the analysis. The results, presented also in Table 3, remained essentially the same as the ones observed for the whole sample.

What Is the Role of Naming Speed and Phonological Awareness in SVR?

To examine the contribution of naming speed and phonological awareness to SVR, we ran two sets of hierarchical regression analyses. In Model A, alphanumeric RAN and phonological awareness were entered interchangeably in the regression equation at Step 3, following D (entered at Step 1) and C (entered at Step 2). In Model B, alphanumeric RAN and phonological awareness were entered interchangeably in the regression equation at Step 2, following (D × C). Nonalphanumeric RAN was not used in the regression analysis, because it was not significantly correlated to reading comprehension. The results presented in Table 4 suggest that neither alphanumeric RAN nor Phoneme Elision had a unique contribution to reading comprehension once the effects of decoding and listening comprehension were controlled.

Next, we repeated the analysis in Models A and B for the smaller sample of children with poor reading comprehension (n = 29). The results, presented also in

Table 3
Hierarchical Regression Analyses Predicting Reading Comprehension

		RC			
		Full Sample[a]		Poor RC[b]	
Step	Independent Variable	β	ΔR^2	β	ΔR^2
Model A					
1.	D	0.607	.37***	0.541	.29**
2.	C	0.320	.10**	0.405	.16**
3.	D × C	1.170	.00	1.080	.00
Model B					
1.	D × C	0.674	.45***	0.673	.45***
2.	D	0.202	.02	0.086	.00
3.	C	–0.418	.00	–0.320	.00

Note: RC = Reading Comprehension; D = Decoding; C = Listening Comprehension.
a. n = 50.
b. n = 29.
**$p < .01$. ***$p < .001$.

Table 4
Hierarchical Regression Analyses Examining the Contribution of Naming Speed on Reading Comprehension

		RC			
		Full Sample[a]		Poor RC[b]	
Step	Independent Variable	β	ΔR^2	β	ΔR^2
Model A					
1.	D	.607***	.37***	.541	.29**
2.	C	.320***	.10**	.405	.16**
3.	Alphanumeric RAN	–.119	.01	–.092	.01
4.	Phoneme Elision	–.087	.00	–.067	.00
Model B					
1.	D × C	.674***	.45***	.673	.45***
2.	Alphanumeric RAN	–.149	.02	–.093	.01
3.	Phoneme Elision	–.015	.00	–.025	.00

Note: RC = Reading Comprehension; D = Decoding; C = Listening Comprehension; RAN = rapid automatized naming.
a. $n = 50$.
b. $n = 29$.
$^{**}p < .01$. $^{***}p < .001$.

Table 4, are essentially the same as the ones observed for the whole sample.

Given that both alphanumeric RAN and Phoneme Elision correlated significantly with reading comprehension (see Table 2), we further examined whether their effects were mediated by the effects of the product model or the additive model on reading comprehension. Sobel's *z* statistic was used (Preacher & Leonardelli, 2003). The results showed that both effects were mediated by either the product model or the additive model (Sobel's *z*s > 2.12, $p < .05$).

Discussion

The primary objective of this study was to examine what would be the best way to combine decoding (measured with Word Attack) and listening comprehension to predict reading comprehension with a group of FN children with poor reading comprehension. According to Gough and Tunmer (1986), poor reading comprehension is the product of poor decoding and average listening comprehension, poor decoding and poor listening comprehension, or average decoding and poor listening comprehension. The FN children in this study performed within average levels in both decoding and listening comprehension. However, they exhibited poor reading comprehension, a finding to suggest that SVR cannot be the product of decoding and listening comprehension.

In addition, the results of the regression analyses indicated that once the effects of decoding and listening comprehension were controlled, the product model (D × C) was not explaining any unique variance in reading comprehension. However, neither did the additive model (D + C) account for unique variance in reading comprehension once the effects of the product model were controlled. This finding replicates Savage and Wolforth's (2007) recent findings with a sample of university students and suggests that both models have equal explanatory power in reading comprehension.

Decoding and listening comprehension accounted for a large proportion of variance in reading comprehension in our study (45–47%). However, there was also an equally large proportion of unexplained variance. Thus, the second objective of this study was to examine if naming speed or phonological awareness could account for some of the unexplained variance in reading comprehension. In contrast to our hypothesis, neither alphanumeric RAN nor Phoneme Elision contributed uniquely to reading comprehension. The findings were the same irrespective of what model (multiplicative or additive) was entered first in the regression equation and also irrespective of whether the analysis was performed with the children who were poor reading comprehenders.

Our findings are also in contrast to Johnston and Kirby's (2006) findings that both naming speed and phonological awareness were accounting for unique variance in reading comprehension after controlling for the product model. Although no correlations are provided in Johnston and Kirby's study, the discrepancies may be attributed to the strong relationship (perhaps unusually strong) between phonological awareness and naming speed with pseudoword reading in our study. Of interest, previous studies found that naming speed was only weakly, and in most occasions nonsignificantly, related to pseudoword reading in children of the same age as the participants in this study (e.g., Bowers & Swanson, 1991; McBride-Chang & Manis, 1996).

It has been repeatedly pointed out that theories and models of reading development should be tested across languages before any generalizations are made (e.g., Goswami, 1999; Goulandris, 2003; Harris & Hatano, 1999). Applying a cross-linguistic perspective in SVR may also help in understanding its limitations. For example, there is a plethora of studies showing that children learning to read in orthographically transparent languages, such as German, Greek, or Finnish, master decoding relatively quickly after formal reading instruction (e.g., Aro & Wimmer, 2003; Ellis et al., 2004; Seymour, Aro, & Erskine, 2003) and that even disabled readers in these languages show high levels of reading accuracy (Wimmer & Goswami, 1994; Wimmer, Landerl, & Frith, 1999). These findings lead to specific predictions pertinent to SVR. First, if decoding across individuals in orthographically transparent languages shows little or no variation, then listening comprehension should be perfectly correlated with reading comprehension; that is, once decoding is perfected, the reader's level of reading comprehension should be equal to his or her level of listening comprehension. Second, children learning to read in an orthographically transparent language should score higher on reading comprehension than children learning to read in an orthographically opaque language, given comparable levels across languages on listening comprehension. This prediction follows from the fact that one of the components of the SVR equation (decoding) will always be higher in transparent orthographies than in opaque orthographies.

Several pieces of evidence argue against these predictions. First, Diakidou, Stilianou, Karefillidou, and Papageorgiou (2005) found in a study with Greek-speaking children attending Grades 2, 4, and 6 that listening comprehension was only weakly correlated with reading comprehension in each one of the grades and that the unique amount of variance in reading comprehension accounted for by listening comprehension declined over time. Müller and Brady (2001) reported similar findings for Finnish-speaking children. Second, international studies on literacy (PIRLS, PISA) have shown that English-speaking children from England, Canada, or the United States outperformed Italian, German, Greek, or Turkish children whose orthography is more transparent than English.

Some limitations of this study are worth mentioning. First, the sample size was relatively small. Although it was adequate for the type of analyses used in the study, future studies should attempt to replicate these findings with a larger sample size. Second, we used single measures for decoding, listening comprehension, reading comprehension, and phonological awareness. Certainly, our findings would have been much stronger if latent variables based on multiple measures of the predictors were used. Third, we used pseudoword reading to represent the decoding term. Although previous studies have also used word identification tasks for the decoding term (e.g., Adlof et al., 2006; Johnston & Kirby, 2006), our decision was based on the fact that FN children have average pseudoword reading but poor reading comprehension skills (Das et al., 2007) and this, in turn, combined with average listening comprehension would challenge the SVR model. Finally, we used only measures of naming speed and phonological awareness to account for the unexplained variance in reading comprehension. Although both naming speed and phonological awareness correlate significantly with reading comprehension, they also share their predictive variance with decoding. Future studies should attempt to examine the effects of processing skills that are predictive of reading comprehension but do not share any variance with either decoding or listening comprehension. Vocabulary and working memory may be good candidates to start with.

References

Adlof, S. M., Catts, H., & Little, T. D. (2006). Should the simple view of reading include a fluency component? *Reading and Writing: An Interdisciplinary Journal, 19*, 933–958.

Aro, M., & Wimmer, H. (2003). Learning to read: English in comparison to six more regular orthographies. *Applied Psycholinguistics, 24*, 621–635.

Birch, S., & Chase, C. (2004). Visual and language processing deficits in compensated and uncompensated college students with dyslexia. *Journal of Learning Disabilities, 37,* 389–410.

Bowers, P. G., & Swanson, L. B. (1991). Naming speed deficits in reading disability. *Journal of Experimental Child Psychology, 51*, 195–219.

Bowey, J. A., McGuigan, M., & Ruschena, A. (2005). On the association between serial naming speed for letters and digits and word-reading skill: Towards a developmental account. *Journal of Research in Reading, 28*, 400–422.

Caravolas, M., Vólin, J., & Hulme, C. (2005). Phoneme awareness is a key component of alphabetic literacy skills in consistent and inconsistent orthographies: Evidence from Czech and English children. *Journal of Experimental Child Psychology, 92*, 107–139.

Chen, R., & Vellutino, F. R. (1997). Prediction of reading ability: A cross-validation study of the simple view of reading. *Journal of Literacy Research, 29*, 1–24.

Compton, D. L. (2003). Modeling the relationship between growth in rapid naming speed and growth in decoding skill in first-grade children. *Journal of Educational Psychology, 95*, 225–239.

Das, J. P., Janzen, T., & Georgiou, G. (2007). Correlates of Canadian native children's reading performance: From cognitive styles to cognitive processes. *Journal of School Psychology, 45*, 589–602.

Diakidou, I. N., Stilianou, P., Karefillidou, C., & Papageorgiou, P. (2005). The relationship between listening and reading comprehension of different types of text at increasing grade levels. *Reading Psychology, 26*, 55–80.

Dreyer, L. G., & Katz, L. (1992). An examination of the "simple view of reading." *National Reading Conference Yearbook, 41*, 169–175.

Ellis, N., Natsume, M., Stavropoulou, K., Hoxhallari, L., van Daal, V., Polyzoe, N., et al. (2004). The effects of orthographic depth on learning to read alphabetic, syllabic, and logographic scripts. *Reading Research Quarterly, 39*, 438–468.

Francis, D. J., Fletcher, J. M., Catts, H., & Tomblin, J. B. (2005). Dimensions affecting the assessment of reading comprehension. In S. G. Paris & S. A. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 35–49). Mahwah, NJ: Erlbaum.

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.

Goswami, U. (1999). The relationship between phonological awareness and orthographic representation in different orthographies. In M. Harris & G. Hatano (Eds.), *Learning to read and write: A cross-linguistic perspective* (pp. 134–156). Cambridge, UK: Cambridge University Press.

Gough, P. B., Hoover, W. A., & Peterson, C. L. (1996). Some observations on a simple view of reading. In C. Cornoldi & J. Oakhill (Eds.), *Reading comprehension difficulties: Processes and intervention* (pp. 1–14). Mahwah, NJ: Erlbaum.

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*, 6–10.

Goulandris, N. (Ed.). (2003). *Dyslexia in different languages: Cross-linguistic comparisons*. London: Whurr.

Harris, M., & Hatano, G. (Eds.). (1999). *Learning to read and write: A cross-linguistic perspective*. Cambridge, UK: Cambridge University Press.

Hayward, D., Das, J. P., & Janzen, T. (2007). Evidence for innovative programmes for improvement in reading: Two studies of Canadian children of First Nations. *Journal of Learning Disabilities, 40*, 443–457.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127–160.

Janzen, T. (2000). *PASS assessment/remediation with natives.* Unpublished doctoral dissertation, University of Alberta, Edmonton, Canada.

Johnston, T. C., & Kirby, J. R. (2006). The contribution of naming speed the the simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 19*, 339–361.

Joshi, R. M., & Aaron, P. G. (2000). The component model of reading: Simple view of reading made a little more complex. *Reading Psychology, 21*, 85–97.

Katzir, T., Kim, Y., Wolf, M., O'Brien, B. K., Lovett, M., & Morris, R. (2006). Reading fluency: The whole is more than the parts. *Annals of Dyslexia, 56*, 51–82.

Kirby, J. (2006, July). *Naming speed and fluency in learning to read: Evaluation in terms of Simple View of reading*. Paper presented at the 13th annual meeting of the Society for the Scientific Studies of Reading, Vancouver, Canada.

Kirby, J., Parrila, R., & Pfeiffer, S. (2003). Naming speed and phonological awareness as predictors of reading development. *Journal of Educational Psychology, 95*, 453–464.

Manis, F. R., Doi, L. M., & Bhadha, B. (2000). Naming speed, phonological awareness, and orthographic knowledge in second graders. *Journal of Learning Disabilities, 33*, 325–333.

McBride-Chang, C., & Manis, F. R. (1996). Structural invariance in the associations of naming speed, phonological awareness, and verbal reasoning in good and poor readers: A test of the double-deficit hypothesis. *Reading and Writing: An Interdisciplinary Journal, 8*, 323–339.

Müller, K., & Brady, S. (2001). Correlates of early reading performance in a transparent orthography. *Reading and Writing: An Interdisciplinary Journal, 14*, 757–799.

Nation, K., & Snowling, M. (2004). Beyond phonological skills: Broader language skills contribute to the development of reading. *Journal of Research in Reading, 27*, 342–356.

Parrila, R., Georgiou, G., & Corkett, J. (2007). University students with a significant history of reading difficulties: What is and is not compensated? *Exceptionality Education Canada, 17,* 195–220.

Parrila, R. K., 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 in Reading, 8*, 3–26.

Pikulski, J. J. (2006). Fluency: A developmental and language perspective. In S. J. Samuels & A. E. Farstrup (Eds.), *What research has to say about fluency instruction* (pp. 70–93). Newark, DE: International Reading Association.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36,* 717–731.

Savage, R. (2001). The "simple view" of reading: Some evidence and possible implications. *Educational Psychology in Practice, 17*, 17–33.

Savage, R. (2006). Reading comprehension is not always the product of nonsense word decoding and linguistic comprehension: Evidence from teenagers who are extremely poor readers. *Scientific Studies of Reading, 10*, 143–164.

Savage, R., & Frederickson, N. (2005). Evidence of a highly specific relationship between rapid automatic naming of digits and text-reading speed. *Brain and Language, 93*, 152–159.

Savage, R., & Wolforth, J. (2007). An additive simple view of reading describes the performance of good and poor readers in higher education. *Exceptionality Education Canada, 17*, 243–268.

Schatschneider, C., Fletcher, J. M., Francis, D. J., Carlson, C. D., & Foorman, B. R. (2004). Kindergarten prediction of reading skills: A longitudinal comparative analysis. *Journal of Educational Psychology, 96*, 265–282.

Schwanenflugel, P. J., Meisinger, E. B., 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*, 496–522.

Seymour, P. H., Aro, M., & Erskine, J. M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology, 94,* 143–174.

Torgesen, J. K., Wagner, R. K., Rashotte, C. A., Burgess, S., & Hecht, S. (1997). Contributions of phonological awareness and rapid automatized naming ability to growth of word-reading skills in second- to fifth-grade children. *Scientific Studies of Reading, 1*, 161–185.

Tunmer, W. E., & Hoover, W. A. (1992). Cognitive and linguistic factors in learning to read. In P. E. Gough, L. C. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 175–214). Hillsdale, NJ: Erlbaum.

Wagner, R., Torgesen, J., & Rashotte, C., A. (1999). *CTOPP: Comprehensive Test of Phonological Processing.* Austin, TX: PRO-ED.

Wilson, A. M., & Lesaux, N. K. (2001). Persistence of phonological processing deficits in college students with dyslexia who have age-appropriate reading skills. *Journal of Learning Disabilities, 34,* 394–400.

Wimmer, H., & Goswami, U. (1994). The influence of orthographic consistency on reading development: Word recognition, in English and German children. *Cognition, 51*, 91–103.

Wimmer, H., Landerl, C., & Frith, U. (1999). Learning to read German: Normal and impaired acquisition. In M. Harris & G. Hatano (Eds.), *Learning to read and write: A cross-linguistic perspective* (pp. 34–50). Cambridge, UK: Cambridge University Press.

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

Wolf, M., & Katzir-Cohen, T. (2001). Reading fluency and its intervention. *Scientific Studies of Reading, 5*, 211–239.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson Tests of Achievement (WJIII)*. Itasca, IL: Riverside.

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