The Relationship of Phonological Awareness, Rapid Naming, and Verbal Memory to Severe Reading and Spelling Disability

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The present study examined the relationship of phonological awareness, naming speed, and verbal memory to the scores obtained from five tests assessing word attack, word identification, reading comprehension, and spelling skills in 54 children with severe reading disabilities (48 boys and 6 girls; M age = 9 years, 7 months). Multiple regression analyses indicated that the best predictor of achievement across the five academic tests was the Verbal Comprehension factor from the Wechsler Intelligence Scale for Children–Revised. Age, socioeconomic status (SES), and externalizing behavior problems were also significant predictors of achievement, depending on the academic measure. After controlling for age, SES, behavior problems, and intelligence, the phonological awareness task added significantly to the prediction of word attack, spelling, and reading comprehension scores; rapid letter naming added significantly to the prediction of word identification and prose passage speed and accuracy scores; and a word-list memory task added significantly to the prediction of word recognition scores. These results suggest that several independent processes interact to determine the extent and severity of reading problems.

A wide variety of deficits have been reported to occur in children with specific reading disabilities. For instance, impaired ability to use phonological information to process oral and written language is often reported in the literature. A number of researchers, such as Mann (1986) and Fox and Routh (1983), have reported that children in early elementary grades who obtained low scores on tasks assessing phonological analysis skills (such as segmenting and blending the sounds within words) obtained significantly lower reading scores at follow-up. Phonological analysis tasks have been proposed to reflect the ease with which youngsters learn sound–symbol relationships, which in turn, allows them to identify and spell unfamiliar words (Clark, 1988; Mann, 1986).

Lenchner, Gerber, and Routh (1990) compared correlations obtained among six tasks of phonological sophistication and five academic tasks. They reported that a phonemic deletion task (e.g., say "gate" without /g/), such as found in Rosner and Simon's (1971) Auditory Analysis Test, was highly correlated with performance across the academic tests.

Students with reading disabilities are also slower at naming series of familiar stimuli, such as digits, numbers, letters, and objects (Denckla & Rudel, 1976). This type of task distinguishes normally achieving students from students with reading difficulties, as well as from students with language delays. Continuous naming tasks, such as Denckla and Rudel's (1976) Rapid Automatized Naming test, are better predictors of reading ability than single-item naming tasks (Stanovich, 1986a). Rapid naming tasks have been proposed to reflect the ease with which the child can access the sound and meaning of a written word (Clark, 1988). Thus, rapid naming may also be important in the development of reading speed and fluency.

Differences between disabled and proficient readers are consistently reported on tasks asking for the retention of verbal information, and in particular, the recall of lists of digits, letters, or words (Mann, 1986). It has been proposed that short-term verbal memory is crucial for phonological processing of written information (Liberman, Shankweiler, Liberman, & Fowler, 1977). A variety of measures have been used to assess verbal short-term memory skills, including digit span, sentence memory, and word-list memory tasks. Although these measures are highly related to word identification skills when groups are matched on age and IQ (Siegel & Linder, 1984), they show almost no relationship to these academic skills when verbal IQ is statistically controlled (Ackerman, Dykman, & Gardner, 1990; Bowers, Steffy, & Tate, 1988). Torgesen (1985) suggested that this may be due to the fact that matching for IQ does not eliminate the effects of IQ on achievement.

Fletcher (1985), using Buschke's (1973) verbal selective reminding

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procedure, reported significant differences between skilled and disabled readers, as well as among types of learning disabilities, that were not attributable to differences in IQ. Buschke's selective reminding procedure consists of a 12-item list-learning task. The list is read to the child, who is asked to repeat the words in any order. On seven subsequent trials, only the words that the child has not recalled are repeated. The child is then asked to recall all the words from the list. A major advantage of this procedure is that separate measures of storage and retrieval of rote verbal information are available.

Concerns have been raised that phonological analysis, rapid naming, and working memory are interrelated processes that may, in fact, be different aspects of an overall phonological ability (Wagner & Torgesen, 1987). A small number of studies have looked at these interrelationships and the combined predictive ability of these processing variables, while statistically controlling for the confounding effects of verbal IQ. Mann and Liberman (1984) obtained scores on syllable counting and word-string memory tests from 62 kindergarten children. After adjusting for age and Peabody Picture Vocabulary Test scores, 24% of the variance in Grade 1 word attack and word identification scores (from the Woodcock Reading Mastery Tests) was accounted for by these measures.

Torgesen, Wagner, Simmons, and Laughon (1990) presented partial correlations (controlling for Vocabulary scores from the Stanford Binet-IV) among auditory and visual memory span tasks, response time in naming individual digits and letters, speed of naming a series of 36 letters or digits, and scores on the Word Identification subtest of the Woodcock Reading Mastery Tests obtained from 79 second-grade students. Only the serial naming speed tasks were significantly correlated with Word Identification scores after partialling out verbal ability.

Bowers et al. (1988) examined the relative contributions of the Verbal Comprehension factor from the Wechsler Intelligence Scale for Children-Revised (WISC-R), sentence memory, digit span memory, and color and digit naming speed to Word Identification and Word Attack subtest scores from the Woodcock Tests of Educational Achievement. Subjects were 48 children with WISC-R Full Scale IQ scores of 85 or more. The authors reported that, after accounting for age and the Verbal factor, only digit naming speed added significantly to the variance in Word Identification or Word Attack skills.

Ackerman et al. (1990) examined the contributions of counting speed, alternating letter and number naming speed, auditory digit span, and phonological sensitivity using a sound categorization task to the reading and spelling skills of 20 reading disabled children with WISC-R Full Scale IQs of 90 or more. Using a stepwise regression, controlling for age and Verbal IQ, letter/number naming speed and counting speed accounted for a significant percentage of the variance in word identification and spelling skills from the Wide Range Achievement Test-Revised (WRAT-R). Verbal IQ was the only significant predictor of prose reading speed and accuracy on the Gray Oral Reading Test-Revised (GORT-R). Verbal IQ and counting speed were the only significant predictors of reading comprehension on the GORT-R.

These studies suggest that, after controlling for verbal intelligence, tasks requiring rapid naming predict word identification and spelling skills. Memory skills do not seem to be related to reading achievement after partialling out the influence of verbal intelligence and naming abilities. Inconsistent support has been given to the predictive abilities of phonological sophistication, when it is examined in combination with intelligence and other processing variables.

Complicating research and assessment in the reading disabilities field are the data indicating that socioeconomic status (SES) and externalizing behavior problems influence the development of reading skills and the severity of reading disabilities. Schonhaut and Satz (1983) reviewed 18 follow-up studies examining long-term outcomes for youngsters with reading disabilities. They reported that SES was strongly related to the probability of developing a reading disorder, as well as to the level of academic achievement attained by a youngster diagnosed with reading difficulties. Telzrow (1987) reported that high SES may attenuate the long-term academic difficulties of youngsters with learning disabilities with or without educational intervention. Schonhaut and Satz advised researchers who are examining the variables that influence reading achievement to carefully control for the confounding effects of SES.

Externalizing behavior problems, such as aggression, antisocial behavior, inattention, overactivity, and delinquency, are also highly associated with significant academic underachievement. Berger, Yule, and Rutter (1975) reported epidemiological findings indicating that children with reading disabilities were twice as likely to have high antisocial scores when compared to normally achieving peers. The exact nature of the relationship between reading and behavior problems is not known, and it is possible that externalizing behavior problems are also highly associated with deficits in phonological processing, rapid naming, and memory skills. However, studies looking at the relationship of these abilities to the development of reading disorders have not controlled for the presence of significant behavioral difficulties.

The present study was designed to examine the contributions of phonological awareness, rapid naming, and verbal memory to the reading and spelling skills of children with severe reading disabilities. It was predicted that the results would indicate unique contributions of phonological awareness and rapid naming to reading and spelling achievement, after controlling for age, SES, behavior problems, and

verbal IQ. Performance on memory tasks was not expected to add to the prediction of academic achievement, once the influence of background variables and verbal IQ had been controlled. It was also predicted that the contribution of these processing variables would differ depending on the academic task. For this reason, five academic tasks, assessing word attack, word identification, spelling, prose passage speed and accuracy, and reading comprehension, are examined.

Method

Subjects

Subjects were 54 Caucasian children (6 girls, 48 boys) aged 7-5 to 12-3 years ($M = 9$ years, 7 months) who were referred for assessment of learning disabilities. To be selected for the study, each subject was required to have average intelligence (defined as a WISC-R Full Scale IQ of 90 or more) and a Standard Score on the Wide Range Achievement Test–Revised (WRAT-R) (Jastak & Wilkinson, 1984) Reading subtest that was at least 16 points lower than his or her Full Scale IQ. This discrepancy constitutes significant underachievement at the $p < .05$ level (Woodcock, 1987).

Table 1 presents specific characteristics of the sample and their test scores. SES was computed from the Blishen and McRoberts (1976) scale for Canadian occupations. This scale provides scores ranging from 20 to 80. The mean SES for the present sample ($M = 46.8$) is within the average range. The subjects had average intelligence, with average Verbal and Performance Scale scores, and very impaired academic achievement, with the mean academic scores being at least 2 standard deviations from the mean Full Scale IQ.

The externalizing T score from the Child Behavior Checklist (Achenbach & Edelbrock, 1983), which is a composite of items assessing aggressive, attentional, and delinquent behaviors, was computed for analyses. The mean score obtained on the externalizing behavior problems measure ($M = 57.8$) was higher than that of the "normal" sample ($M = 51.0$) collected by Achenbach and Edelbrock. However, the sample in the present study had lower T scores than reported in other studies of youngsters with learning disabilities (e.g., McConaughy & Ritter, 1986, $M = 65$). A score of 70 or higher on this measure is considered to be in the clinical range (Achenbach & Edelbrock, 1983).

Tests

Each subject was given the following tests: (1) the WISC-R (Wechsler, 1974), including the Digit Span subtest (a test of short-term memory for digits); (2) the WRAT-R Reading and Spelling subtests, which require identifying individual words and spelling individual words; (3) the GORT-R (Wiederholt & Bryant, 1986), which assesses reading comprehension and oral prose reading speed and accuracy; (4) the Word Attack subtest of the Woodcock Reading Mastery Test–Revised (Woodcock, 1987), which asks the child to decode phonetically regular nonwords; and (5) the Child Behavior Checklist (Achenbach & Edelbrock, 1983). Standard scores were calculated for statistical analyses following the instructions in the corresponding test manuals.

Four other normed measures were employed: (1) the Sentence Memory Test (Knights & Norwood, 1980), which asks the child to repeat sentences of increasing length; (2) the Verbal Selective Reminding Test (Buschke, 1973; Gates et al., 1985), for which the child is asked to consistently remember a list of 12 words repeated many times; (3) the Rapid Automatized Naming Tests (Denckla & Rudel, 1976; Wolf, Bally, & Morris, 1986), which ask the child to name a series of letters or colors as quickly as possible; and (4) the Rosner Auditory Analysis Test (Rosner & Simon, 1971), a phonemic deletion and blending task. These tests have published norms based on the mean raw score and standard deviation at different age levels. For purposes of statistical analyses, raw scores were transformed to z scores based on the normative sample.

TABLE 1
Means and Standard Deviations for All Measures ($N = 54$)

Measure	Mean	*SD*
Age (in years)	9.6	1.3
SES	46.8	16.0
Externalizing[a]	115.6	15.6
WISC-R IQ		
Full Scale	104.0	11.2
Verbal	102.8	11.7
Performance	104.6	12.1
Academic		
Word Attack	65.5	18.8
WRAT-R Reading	66.9	12.1
WRAT-R Spelling	72.0	10.1
GORT-R Passage[a]	71.5	12.0
GORT-R Comprehension[a]	86.0	15.5
WISC-R Factor[a]		
Verbal Comprehension	109.0	10.0
Perceptual Organization	112.8	8.8
Freedom From Distractibility	84.0	8.3
Memory[a]		
Sentence Memory	94.0	12.9
Verbal Selective Reminding	69.1	29.4
Naming Speed[a]		
Colors	85.0	24.9
Letters	53.2	32.9
Phonics[a]		
Auditory Analysis	71.2	12.8

Note. SES is socioeconomic status; WRAT-R is Wide Range Achievement Test–Revised; GORT-R is Gray Oral Reading Tests–Revised; WISC-R is Wechsler Intelligence Scale for Children–Revised. [a]In order to aid interpretation, the means and standard deviations have been transformed to standard scores from corresponding T scores, scaled scores, and z-scores.

Statistical Analyses

For the correlational and regression analyses, age was computed as number of months, SES was computed from the Blishen and McRoberts scale for Canadian occupations, and the externalizing T score was computed from the Child Behavior Checklist. From the WISC-R, factor scores for Verbal Comprehension (Information, Similarities, Vocabulary, and Comprehension subtests), Perceptual Organi-

zation (Picture Completion, Picture Arrangement, Block Design, and Object Assembly), and Freedom From Distractibility (Arithmetic, Coding, and Digit Span) were derived for regression analyses (Kaufman, 1979). Standard scores were obtained from the Word Attack subtest of the Woodcock Reading Mastery Tests, WRAT-R Reading and Spelling subtests, and GORT-R Reading Comprehension and Passage scores. Z scores were computed for the Sentence Memory Test, Verbal Selective Reminding Test–Memory Storage subtest, Rapid Automatized Naming subtests (Letters and Colors), and the Rosner Auditory Analysis Test.

Multiple regression analyses were conducted as follows: Age, SES, and externalizing problems were entered at Steps 1, 2, and 3, because these variables were viewed as stable background variables. The Verbal Comprehension and Freedom From Distractibility factor scores from the WISC-R were entered next, at Step 4, as the second-most stable set of variables. The Perceptual Organization factor was not included, because it was not significantly correlated with any academic measure. The processing variables were entered last, at Step 5. Color naming speed was not included, because it was not significantly correlated with any academic task.

Results

Table 1 lists the means and standard deviations for all measures employed in this study. As can be seen from the table, subjects showed impaired performance on the Verbal Selective Reminding Test, Rosner Auditory Analysis Test, and Rapid Automatized letter naming speed; low-average scores on Freedom From Distractibility and color naming speed; and average to high-average scores on the Verbal Comprehension and Perceptual Organization factors, and on the Sentence Memory Test.

Table 2 shows the correlations among the variables used in the present study. In general, the background, WISC-R factor scores, and processing variables were highly correlated with the academic tasks. However, the Perceptual Organization factor and color naming speed were not significantly correlated with the academic tasks.

Table 3 presents the beta weights (standardized regression coefficients) and multiple correlation coefficients from the regression analyses. Examining Table 3, the dependent variables accounted for 62% of the variance of the subjects' Word Attack scores ($p < .01$), 67% of the variance in identifying individual words (WRAT-R Reading subtest, $p < .01$), 58% of the variance in spelling individual words (WRAT-R Spelling subtest, $p < .01$), 36% of the variance in prose passage speed and accuracy (GORT-R Passage scores, $p < .01$), and 54% of the variance in reading comprehension (GORT-R Comprehension scores, $P < .01$).

Looking at individual variables, the results indicated that the Verbal Comprehension factor was generally the most useful predictor of academic achievement. After partialling out the effects of age, SES, and externalizing behavior problems, the Verbal Comprehension factor accounted for 12% of the variance in Word Attack scores, 21% of the variance in WRAT-R Reading scores, 19% of the variance in

TABLE 2
Correlations Among the Background, Cognitive, Processing, and Academic Variables[a]

	1	2	3	4	5	6	7	8	9	10	11	12	13
Age	−.22	−.21	−.34	−.04	−.02	−.31	−.23	−.39	−.31	−.30	−.11	.17	.24
SES	.32	.05	.20	.15	.08	.30	.11	.24	.43	.43	.38	.27	.13
EXT	−.13	.06	−.22	−.24	−.13	−.06	−.17	−.19	−.33	−.23	−.34	−.07	−.12
1. Verbal	—	.38	.42	.00	.25	.35	.25	.27	.55	.63	.58	.39	.45
2. Perceptual		—	.33	.05	.09	.10	.02	.18	.10	.19	.12	.15	.20
3. Distractibility			—	.19	.19	.33	.26	.38	.37	.45	.38	.24	.33
4. Color Naming				—	.56	.12	.29	.14	.08	.19	.02	.08	.09
5. Letter Naming					—	.35	.18	.21	.41	.49	.37	.35	.31
6. Auditory Analysis						—	.23	.25	.57	.45	.49	.22	.36
7. Sentence Memory							—	.06	.34	.14	.18	.00	.11
8. Verbal Selective Reminding								—	.35	.49	.37	.22	.26
9. Word Attack									—	.69	.63	.39	.44
10. WRAT-R Reading										—	.77	.60	.65
11. WRAT-R Spelling											—	.58	.69
12. GORT-R Passage												—	.83
13. GORT-R Comprehension													—

Note. SES is socioeconomic status; EXT is Externalizing score; Verbal, Perceptual, and Distractibility are the three factors derived from the WISC-R; WRAT-R is the Wide Range Achievement Test–Revised; and GORT-R is the Gray Oral Reading Tests–Revised.
[a]Correlations greater than .27 are significant at $p < .05$.

WRAT-R Spelling scores, 18% of the variance in GORT-R reading comprehension scores, and 16% of the variance in GORT-R prose passage speed and accuracy scores. These percentages are significant at the $p < .01$ level.

With reference to the background variables, age was a significant predictor of achievement on both the GORT-R reading comprehension and prose passage speed and accuracy scores. The older the child, the higher the scores on these measures. SES was a significant predictor of scores on the word attack and reading recognition subtests. There was a trend ($p < .10$) for SES to be related to spelling scores. Externalizing behavior problems were predictive of word attack and spelling scores. As behavior problem scores went up, word attack and spelling scores went down.

In general, the Freedom From Distractibility factor was not a significant predictor of academic achievement, although there was a trend for scores on this measure to predict reading comprehension scores from the GORT-R ($p < .10$). This suggests that the distractibility factor may add some additional information in predicting reading comprehension.

With reference to the processing variables, scores on the phonological awareness task were significant predictors of word attack scores ($p < .01$), spelling scores ($p < .01$), and reading comprehension scores ($p < .05$). Letter naming speed was significantly related to word recognition ($p < .01$) and prose passage speed and accuracy ($p < .05$). There was a trend for letter naming speed to predict word attack scores ($p < .10$). Scores from the Verbal Selective Reminding Test were related to word recognition on the WRAT-R ($p < .05$), and there was a trend for this test to predict reading comprehension scores ($p < .10$). The Sentence Memory Test was not a significant predictor of academic achievement.

These results suggest that, when controlling for age, SES, externalizing problems, and intelligence, performance on tests of phonological processing, rapid naming, and word-list memory added a unique share of the variance in the academic achievement in children with severe reading disabilities. The contribution of the processing variables differed, depending on the academic measure.

Discussion

The subjects in this study were children referred for assessment of reading disability, and they had very impaired reading and spelling skills. Different relationships among the dependent variables may be present in the general population. Because the range of scores was restricted in this study, using the same measures with a school-based sample may reveal higher multiple correlations (Roscoe, 1975).

The dependent measures accounted for 36% to 67% of the variance in academic achievement, depending on the task. Possible sources of unaccounted

TABLE 3
Beta Weights and Multiple Correlation Coefficients for Background, Cognitive, and Processing Variables

		Academic measure				
Variable	Order of Entry	Word Attack Beta	WRAT-R Reading Beta	WRAT-S Spelling Beta	GORT-R Passage Beta	GORT-R Comprehension Beta
Background variables						
Age	1	−.08	−.03	.13	.30**	.50***
SES	2	.23**	.23**	.20*	.04	.13
EXT	3	−.28***	−.11	−.28**	.00	−.05
WISC-R factors						
VC	4	.30***	.40***	.39***	.37***	.31**
FFD	4	.00	.09	.08	.17	.24*
Processing variables						
SMT	5	.11	−.09	−.04	−.09	.00
VSRT	5	.05	.23**	.17	.21	.23*
AAT	5	.35***	.08	.32***	.09	.28**
Let	5	.18*	.31***	.15	.30**	.18
Multiple *R*		.79	.82	.76	.60	.73
Multiple R^2		.62	.67	.58	.36	.54

Note. WRAT-R is Wide Range Achievement Test–Revised; GORT-R is Gray Oral Reading Tests–Revised; SES is socioeconomic status; EXT is Externalizing *T* score; VC is Verbal Comprehension; FFD is Freedom From Distractibility; SMT is Sentence Memory Test; VSRT is Verbal Selective Reminding Test; AAT is Auditory Analysis Test; Let is letter naming speed; WISC-R is Wechsler Intelligence Scale for Children–Revised.
*$p < .10$. **$p < .05$. ***$p < .01$.

variance include listening comprehension skills (Stanovich, 1986a), measurement error of the tasks, heterogeneous educational experiences, and the interrelatedness of academic measures. It is possible that some skills, such as spelling or reading comprehension, are more highly related to word recognition skills than to any other available measure (Stanovich, 1986a).

Verbal intelligence was the best indicator of academic achievement, and SES was a significant predictor of word attack and word identification scores. These results are consistent with Telzrow's (1987) review indicating that intelligence and SES were highly predictive of the long-term educational achievement for youngsters with reading disabilities.

Externalizing behavior problems accounted for a significant share of the variance in spelling and word attack achievement, but they were not significantly correlated with IQ, phonological awareness, letter naming speed, or verbal memory skills. Other factors necessary for academic achievement, such as task persistence, compliance with homework demands, and class participation, may be responsible for the influence that behavior problems have on achievement.

Age was highly associated with performance on the prose passage speed and accuracy and reading comprehension subtests of the GORT-R, even though standard scores were used in the analyses. Thus, the psychometric properties of the test may be suspect. On the other hand, as intelligent youngsters with reading disabilities mature, they may develop compensatory strategies that allow prose reading skills to progress at a faster rate than word identification skills.

After partialling out the effects of verbal IQ, age, SES, and externalizing behavior problems, three of the four processing measures that were employed in the present study were significantly related to the scores on the academic tasks. The phonological analysis task added significantly to the variance in word attack, spelling, and reading comprehension scores. These findings support the assumption that phonological analysis tasks reflect the ease with which youngsters learn sound–symbol relationships and, subsequently, the ease with which they can identify and spell words. With reference to the role of phonological analysis in reading comprehension, current research suggests that the more intact the child's phonological abilities, the more cognitive capacity that is left over for processing the meaning of text (Stanovich, 1986b).

These results contrast with those of Ackerman et al. (1990), who reported no significant influence of a phonological sensitivity task on word identification, spelling, prose passage reading, or reading comprehension scores after partialling out the effects of age and verbal IQ. One reason for the discrepancy may be the differences between the phonological tasks chosen: Ackerman et al. used a procedure that asked the child to pick the one word out of four that did not share a similar sound, whereas the present study used a phonemic deletion task. A rhyming procedure may not be as sensitive to differences in reading ability in the older elementary-school child.

The letter naming task added significantly to the variance in word identification and prose passage speed and accuracy. These results extend the work of Bowers et al. (1988) and Torgesen et al. (1990), who reported that letter naming speed was significantly correlated with word identification after partialling out verbal abilities. The results of the present study also support the contention that rapid retrieval is related to reading speed and fluency.

The lack of influence of the Sentence Memory Test on the academic test scores is consistent with previous reports indicating little or no effect of short-term verbal memory once verbal abilities have been partialled out (Bowers et al., 1988; Torgesen et al., 1990). On the other hand, the scores obtained on the memory task that assessed ability to consistently remember a word list (Verbal Selective Reminding Test) added a unique share of the variance in word identification skills. The Verbal Selective Reminding Test may reflect the child's ability to consistently identify whole words.

Taken together, the results of the present study indicated that phonological awareness, rapid naming, and list learning skills were related to a wide variety of reading subskills in 9-year-old children with reading disabilities. According to developmental models of reading acquisition, phonological awareness enables the youngster to discover and exploit the alphabetic principle, thereby becoming able to determine individual words that she or he has not seen before (Stanovich, 1986b). This ability typically develops from ages 6 to 8 (Clark, 1988). In the general school population, there is a developmental shift at ages 8 to 10 from a phonologically mediated word recognition process to rapid recognition of words; this shift promotes reading speed and fluency (Clark, 1988). A child's ability to rapidly identify individual words is a skill critical to prose reading, in addition to his or her phonological analysis skills. Verbal rote memory skills and rapid retrieval of information, reflected by performance on list-learning and rapid naming tasks, may affect the ease with which youngsters are able to develop automaticity in word recognition. List-learning skills may also be influential prior to the development of phonetic knowledge, for memorizing and recalling the letters of the alphabet.

In the present study, evidence on the importance of these three abilities was found in 9-year-old children. The results suggest that these abilities may represent unique aspects of the reading process, as opposed to an overall phonological processing ability. Longitudinal research examining the course of reading development, while assessing family background variables, intelligence, memory, phonological awareness, and naming speed at the same points in time, would help determine the relative importance of each

ability across the child's educational development.

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