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## CHILDREN'S RETENTION OF WORD SPELLINGS IN RELATION TO READING ABILITY

**Lois G. Dreyer**

*Southern Connecticut State University and Haskins Laboratories*

**Donald Shankweiler**

*University of Connecticut and Haskins Laboratories*

**Stephen D. Luke**

*Boston University*

Even in schools where formal spelling instruction is offered and a generous amount of time is devoted to practicing spelling words, classrooms teachers sometimes notice that children learn to spell words for weekly spelling tests but do not consistently apply that knowledge in their written work. Indeed, some children appear to forget the spellings of words that seem to have been mastered earlier.

Spelling is of interest because it affords objective evidence of the level of mastery of the orthography, and because analysis of attempted spellings may also give insight into the development of decoding processes in reading. Word reading and spelling abilities tend to remain highly correlated, even beyond the early grades. Their close association is to be expected, given that both abilities draw on a common knowledge base.

In as much as alphabetic writing is keyed to the phonological structure of language, it is relevant to note that phonological awareness is important both for learning to read and learning to spell (Bradley & Bryant, 1983; Rohl & Turner, 1988). In addition to the ability to analyze spoken words phonemically, mastery of reading and spelling requires knowledge of grapheme-phoneme correspondences and retention in long-term memory of the spellings of specific words (Ehri, 1989; Tierney, Caplan, Ehri, Healy, & Hurdlow, 1989). As Stanovich (1992) suggests, individual differences in the ability to form and store accurate orthographic representations may account for the significant individual differences in reading (and we would add spelling) over and above those accounted for by phonological segmentation ability alone.

Why might some children be less proficient at developing stable orthographic representations? One likely possibility is that poorer readers and spellers seem not to fully apprehend either the regularities or the idiosyncrasies in the spellings of printed words, and accordingly do not benefit as much as better readers from exposure to those words in reading. For example, the word recognition errors of beginning and older readers frequently reflect guesses based mainly on word beginnings, with little regard for the internal letters (Fowler, Liberman, & Shankweiler, 1977)

This suggestion might be tested by examining children's acquisition of word spellings in classrooms where formal instruction in written spelling is offered. The requirement to practice the spelling of a word encourages the learner to focus on all of its component letters. We had the opportunity to examine children's spelling performance in just such classrooms. Because we were interested to see if early word reading and spelling performance had implications for long-term achievement, we examined children's ability to retain spellings of a small sample of words for a relatively short period of time to find out if observed differences would presage performance over the long term. Thus we checked their progress in reading and spelling four years later.

The retention rate for spelling words taught in spelling lessons has not often been studied, yet it would seem to have genuine implications for understanding the conditions that promote both spelling and reading mastery. In the present study these questions were addressed: Is the ability to learn and retain spellings related to word reading ability? Can word reading and spelling achievement in Grade 7 be predicted from differences in short- and long-term learning in Grade 3?

## METHOD

### Subjects

Subjects were 72 children in four third-grade classes in a relatively affluent suburban school district in the Northeast. Two classes in each of two elementary schools participated. In this school district formal spelling instruction was initiated at the start of the second-grade year. Many opportunities for spontaneous writing were offered and children were encouraged to attempt spellings by "sounding out" the target words. Although the two schools employed different commercially published spelling programs, both programs tended to group words by spelling patterns and rules. In each school the spelling curriculum was designed to complement the code-emphasis reading program, which was fairly uniform throughout the school district.

Typically, the children spent 1 week studying each unit in the spelling workbook. A sample unit consisted of words containing the *-ee* (as in *sweet*) or *-ea* (as in *dream*) spelling patterns. Although most of the words included in the workbook had regular spellings, some additional words which incorporated irregular spelling patterns were taught as exceptions (e.g., *busy*).

### Materials and Procedure

The children were initially tested on word reading and spelling in October of their third-grade year. The *word reading test* consisted of 60 single-syllable, low-frequency real words not present in either the basal reading series or the spelling series used in the first and second grades. In contrast, the spelling test items were selected to measure retention of words which had been studied as part of the spelling curriculum. The *first spelling review test* included 40 words taught in both spelling series as part of the second-grade curriculum (half were phonetically regular and half were exception words). Comprehension test scores were also available to us. Scores

from the *reading comprehension* and *listening comprehension* subtests of the Educational Records Bureau Comprehensive Testing Program II were obtained from school records. These tests had also been administered throughout the school district in October.

The children participated in the second phase of this study in June of their third-grade year, by which time they were highly familiar with the weekly classroom spelling assessment procedure. They received their usual *end-of-week spelling test* administered by the classroom teacher, which required production of written spellings of dictated words. Teachers graded the tests and circled misspelled words. The teacher then wrote the standard spelling above each misspelled word, thereby providing corrective feedback. Since the number of items on the teacher's end-of-week test varied by classroom and spelling program (from 11 to 14), scores used in this analysis were converted to percentages. The children were retested 1 week later on the words that they had studied. They were not informed in advance that they would be tested again on previously studied words. A second supplementary 40-item test, given last, sampled words studied throughout the third-grade year (the *second spelling review test*). Thus, data from two spelling review tests (converted to percentage scores)—one at the beginning of the year, and one at the end of the year—were available on the third graders, in addition to the end-of-week spelling test and retest results.

Each of the supplementary tests was administered as follows: a word was pronounced, repeated in a sentence and then pronounced a third time. The child's task was to write the target word. Children were encouraged to write as much of the word as they could and to attempt every word.

The final phase of the study was conducted at the end of the subjects' seventh-grade year. At that time, 63 of the original 72 subjects were still enrolled in the school system. They received measures of *real word identification* and *nonword decoding* using subtests of the Woodcock-Johnson Psychoeducational Battery-Revised (Woodcock & Johnson, 1989) and *spelling* using the Wide Range Achievement Test-Revised (Jastak & Jastak, 1984).

## RESULTS AND DISCUSSION

Intercorrelations among the measures are shown in Table 1. As can be seen, listening comprehension is conspicuous for its low, mainly nonsignificant correlations with the reading and spelling measures. It emerges here, as in other studies, as an ability that is largely separate from spelling and decoding skills in reading (Dreyer & Katz, 1992; Hoover & Gough, 1990). In contrast, the *reading comprehension* measure is significantly correlated with word reading and spelling, as are most of the word reading and spelling measures with each other. The consistent, robust correlations among measures of reading ability and spelling ability are in agreement with the findings of others (e.g., Perfetti, 1985). Thus, the data of the present study provide strong confirmation of the interconnectedness of the processes underlying word reading and spelling. There was a small but significant correlation between the retest on the end-of-week spelling list and spelling performance in the seventh grade. Not surprisingly, considering the small sample of words on the end-of-week test, this correla-

Table 1

## Intercorrelations Among Measures

Measure	1	2	3	4	5	6	7	8	9	10
<i>Third Grade</i>										
1. Word Reading		.21	.62**	.65**	.59**	.65**	.71**	.72**	.64**	.61**
2. Listening Comprehension			.24*	.02	.13	.08	.02	.26*	.08	.03
3. Reading Comprehension				.45**	.43**	.47**	.51**	.58**	.52**	.57**
4. Spelling Review Test 1					.38**	.47**	.73**	.38**	.50**	.64**
5. End-of-week Spelling Test						.77**	.67**	.09	.09	.13
6. Retest on End-of-week List							.17	.19	.23	.34*
7. Spelling Review Test 2								.42**	.46**	.67**
<i>Seventh Grade Follow-up</i>										
8. W-J Reading Real Words									.63**	.69**
9. W-J Nonword Decoding										.67**
10. WRAT-R Spelling										

\* $p < .05$ , \*\* $p < .01$ .

tion is modest in comparison to the correlations based on the review tests.

It is noteworthy that the other time-span correlations in this data set are virtually as high as the correlations among concurrent measures. In addition, it seems that we can predict later spelling achievement from earlier reading—approximately as well as we can from earlier spelling—thus the spelling and reading measures are almost interchangeable for predictive purposes.

The data set was further examined in several ways. First, in order to explore differences in spelling ability between children who were relatively skilled at word reading and those who were relatively less skilled, children who performed at one-half standard deviation or more above the mean and one-half standard deviation or more below the mean for the entire subject population on third-grade word reading measure were designated as above-average and below-average word readers.

As can be seen in Table 2, the above-average and below-average word readers differed significantly on all spelling measures and other reading measures. However, they did not differ on listening comprehension, indicating that the groups were well matched in general language ability. With regard to the end-of-week spelling test it will be noted that the two groups differed significantly in accuracy on that test,  $t(42) = 2.89, p < .01$ . The below-average word readers initially spelled 18% fewer words correctly. Both groups showed a decline in accuracy after 1 week's time. Although the below-average readers' loss was greater, the difference in amount of forgetting was not significant.

To examine the precursors of spelling ability in these children at seventh-grade level, the sample was again divided into two groups, including all subjects whose performance was above and below the mean on the WRAT-R spelling test to form above-average and below-average speller groups. (This criterion was selected to ensure that there would be enough subjects for longitudinal comparison.) Given the interrelatedness of the processes being studied, it is not surprising that there was

Table 2

## Means (and Standard Deviations) of Groups Divided by Third-Grade Word Reading Scores

Measure	Above-average Decoders	Below-average Decoders	<i>t</i>	<i>p</i>
<i>Third Grade, October</i>				
	<i>n</i> =26	<i>n</i> =26		
Word Reading* (Max.=60)	57.96 (1.45)	41.68 (6.68)	11.90	.0001
Listening Comprehension (Max.=40)	28.65 (4.28)	26.88 (5.42)	1.29	.203
Reading Comprehension (Max.=40)	32.73 (3.87)	22.92 (8.07)	5.50	.0001
Spelling Review Test 1	86.73 (10.6)	63.27 (13.9)	6.86	.0001
<i>Third Grade, June</i>				
End-of-week Spelling Test	92.75 (10.3)	74.20 (28.3)	2.89	.008
Retest on End-of-week List	88.64 (12.3)	67.79 (22.9)	3.76	.001
Spelling Review Test 2	90.83 (7.90)	68.55 (16.3)	5.33	.0001
<i>Seventh-Grade Follow-up</i>				
	<i>n</i> =19	<i>n</i> =20		
W-J Reading Real Words (Max.=57)	52.42 (2.31)	48.00 (2.23)	5.98	.0001
W-J Nonword Decoding (Max.=30)	26.15 (2.75)	20.73 (2.49)	6.36	.0001
WRAT-R Spelling (Max.=46)	32.73 (5.10)	24.56 (4.71)	5.07	.0001

\*The basis for subgroup formation.

considerable overlap, but the makeup of the two spelling groups was not identical to that of the groups separated on word reading ability.

Seventeen of the 26 above-average readers at third-grade level were also above-average spellers when they were in the seventh grade, whereas only 3 of the third-grade below-average readers were categorized as above average in spelling in seventh grade. Of the 26 below-average readers at third grade, 12 were also in the seventh-grade below-average spelling sample. Five additional subjects in this seventh-grade below-average speller group were drawn from the group that were above-average in reading words at third grade, so we find evidence of a partial dissociation in these abilities as Frith (1980) did. Others (whose performance was near the mean on the word reading measure) had not been included in either group in the previous analysis. Thus, although word reading and spelling abilities are highly related, they are not identical. Each presents its own special problems (Shankweiler & Lundquist, 1993).

The profile of performance of seventh-grade good and poor spellers on the full set of measures is very similar to that of the groups separated on third-grade word read-

ing ability. However, we observe that accuracy on the end-of-week spelling test did not differ significantly, whereas accuracy on the retest 1 week later showed a significant advantage to the good spellers,  $t(44)=2.41, p<.05$  (see Table 3). A Difference Score (end-of-week test score minus the retest score) was also significant,  $t(44)=-2.63, p<.05$ . Thus it is noteworthy that the measure reflecting retention, not the initial performance level, was predictive of long-term mastery.

A measure of retention of about a dozen words for 1 week is insufficient to form a basis for long-term prediction, but a trend is present: Those students who performed best at retest also seemed to be those who best incorporated spelling patterns as part of their permanent knowledge. We are now pursuing this lead with larger samples of spelling words and larger groups of children.

In summary, the observed differences in learning word spellings are related not only to later spelling achievement but also to later reading ability. The better spellers tend also to be the better word readers, that is, they are more facile with the alphabetic code and they also seem to acquire word-specific knowledge more readily. Even though

Table 3

*Follow-up Scores: Means (and Standard Deviations) of Groups Divided by Seventh-Grade Spelling Achievement*

Measure	Above-average Decoders n=30	Below-average Decoders n=26	t	p
<i>Third Grade, October</i>				
Word Reading* (Max.=60)	55.43 (4.46)	49.73 (6.10)	4.03	.0001
Listening Comprehension (Max.=40)	27.66 (4.82)	27.69 (3.83)	.02	.983
Reading Comprehension (Max.=40)	31.26 (5.34)	24.46 (6.45)	4.32	.0001
Spelling Review Test 1	87.00 (.08)	69.81 (16.8)	4.77	.0001
<i>Third Grade, June</i>				
End-of-week Spelling Test	89.16 (11.2)	87.74 (12.1)	.41	.681
Retest on End-of-week List	87.54 (11.2)	77.96 (15.4)	2.41	.020
Spelling Review Test 2	90.35 (9.39)	75.29 (14.8)	3.79	.001
<i>Seventh-Grade Follow-up</i>				
W-J Reading Real Words (Max.=57)	51.81 (2.04)	48.92 (2.60)	4.39	.0001
W-J Nonword Decoding (Max.=30)	25.73 (2.36)	21.87 (3.58)	4.53	.0001
WRAT-R Spelling* (Max.=46)	33.80 (3.40)	24.08 (3.65)	10.31	.0001

\*The basis for subgroup formation.

both are strongly related, word reading and spelling do not make identical demands upon the learner. Although phonological awareness is necessary for both reading and spelling, producing the written form of a word requires that a particular spelling be generated, not just a plausible one. The abilities that distinguish good and poor spellers are yet to be completely identified; on the whole, general measures of visual memory have not proven to be useful predictors (Fischer, Shankweiler, & Liberman, 1985).

The findings of this study have implications for instruction. The most general implication is the following: it makes sense to teach reading and spelling in a coordinated way, so that students have a full opportunity to see the relationships between these two activities. The fact that in this study the less successful achievers in third grade also tend to be the less successful achievers on both abilities in seventh grade emphasizes the importance of providing early assistance. Stanovich (1986) has eloquently documented the cascading consequences of early failure to acquire basic orthographic skills.

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