Young Children Use Letter Names in Learning to Read Words

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Research Article

YOUNG CHILDREN USE LETTER NAMES IN LEARNING TO READ WORDS

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Abstract—*Most theories of reading development claim that young children are logographic, or prealphabetic, readers, unable to take advantage of the systematic links between spellings and sounds that exist in an alphabetic writing system. To test this view, we taught preschool and kindergarten children to pronounce three types of made-up spellings. In the name condition, the name of the word's first letter was heard in the spoken word (e.g., BT for "beet"). In the sound condition, letter-sound cues were present but letter-name cues were not (e.g., BT for "bait"). Neither type of cue was available in the visual condition (e.g., BT for "ham"). Even children who were unable to read any simple words performed better in the name condition than the other two conditions. Thus, children are able to benefit from links between spellings and sounds when these links involve the names of letters.*

The prevailing view of reading acquisition is that children start out as logographic, or prealphabetic, readers (e.g., Ehri, 1998; Frith, 1985; Gough & Hillinger, 1980). Unable to take advantage of the systematic relations between spellings and sounds that exist in an alphabetic writing system, young children treat printed words as if they were arbitrary symbols, or logographs. Prealphabetic readers do not relate the letters in a word's printed form to the sounds in its spoken form. They choose some salient visual characteristic of the printed word—the golden arches in the McDonald's logo, for example—and link that to the word's pronunciation or meaning.

Views differ on just when children begin to break away from logographic reading. According to Gough and Hillinger (1980), children learn to read their first 40 or so words by means of visual cues. In contrast, the results of Ehri and Wilce (1985) and Rack, Hulme, Snowling, and Wightman (1994) suggest that children who can read only a few words have already entered what Ehri (1998) calls the partial alphabetic phase. Such children are able to relate at least some of the letters in a word to their sounds. Despite the areas of disagreement, most investigators concur that there is a stage early in the development of reading during which children are not able to take advantage of systematic relationships between spellings and sounds. By default, these children resort to a nonalphabetic strategy.

Support for the view of early reading as nonalphabetic comes from the results of Ehri and Wilce (1985). These investigators taught children to read a set of phonetic spellings, such as MSK for "mask," and a set of visual spellings, such as UHE for "comb." Children who could not read any simple words learned the visual spellings more readily than the phonetic spellings. These children presumably remembered the visual spellings more easily because they looked distinctive, with the letters of each word varying in size and each word having a unique contour. In contrast, children who could already read some real words learned the phonetic spellings more easily than the visual spellings.

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In the present study, we asked whether prereaders are indeed restricted to a logographic approach in their initial learning attempts. We suspected, given previous research, that even prereaders would benefit from certain kinds of relations between print and speech—specifically, those based on the names of letters. Consider the word "beet." The /bi/ at the beginning of the spoken word corresponds to the name of the letter *b*, and so it makes sense that the printed word starts with *b*. With "bait," in contrast, /b/ appears at the beginning of the spoken word, but the entire letter name is not present. The spelling of this word may thus be more difficult for a young child to grasp. In a previous study (Treiman, Tincoff, & Richmond-Welty, 1996), children performed better on words like "beet" than words like "bait" in a simple spelling task in which they were asked to orally provide the first letter of a spoken word. This and other findings on the importance of letter names for young children (e.g., Ehri, 1983; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998) led us to suspect that letter names may play a role in early reading.

We assessed the use of letter names and sounds in learning to read by adapting the word learning task of Ehri and Wilce (1985). Each child learned to pronounce three types of made-up spellings. In the name condition, the printed stimulus BT was pronounced as "beet." The initial letter provided both a letter-name cue (the spoken word begins with /bi/) and a letter-sound cue (the spoken word begins with /b/). Only letter-sound cues were available in the sound condition, as when BT was taught as the spelling of "bait." Neither type of cue was present in the visual condition, in which the shapes of the printed stimuli were more distinctive but the pronunciations were essentially arbitrary (e.g., BT for "ham").

METHOD

Participants

Thirty-six preschoolers with a mean age of 4 years, 10 months (range: 4 years, 1 month–5 years, 7 months) completed the experiment. Another 12 preschoolers started the experiment but did not finish it, 6 because of scheduling or attendance problems and 6 because they did not wish to continue. There were 38 kindergartners with a mean age of 5 years, 9 months (range: 5 years, 0 months–6 years, 5 months). One additional kindergartner did not complete the experiment. All children were native speakers of English. The children attended one of several schools and day-care centers in middle-class suburbs of Detroit, Michigan.

Stimuli

Table 1 shows the visual stimuli and their pronunciations. There were three sets of stimuli (A, B, and C), with five items in each set. In the name and sound conditions, the stimuli were printed in uppercase letters 2.6 cm high. In the visual condition, the heights of the letters ranged from 2.0 cm to 3.1 cm, with some letters as much as 1.5 cm above the line and other letters as much as 0.8 cm below it.

Table 1. *Visual stimuli and pronunciations*

	Condition		
Set	Name	Sound	Visual
A	BT – beet	BT – bait	$_{B}$T – ham
	TR – tear	TR – tore	T$_{R}$ – fin
	PL – peel	PL – pole	$_{P}$L – robe
	CD – seed	CD – sad	C$_{D}$ – wife
	KN – cane	KN – cone	^{K}N – goal
B	BD – bead	BD – bud	B$_{D}$ – wine
	TS – tease	TS – ties	$_{T}$S – rich
	JL – jail	JL – jewel	$_{J}$L – hid
	KP – cape	KP – coop	K$_{P}$ – yell
	DR – dear	DR – door	^{D}R – chop
C	BN – bean	BN – bone	B$_{N}$ – loaf
	TM – team	TM – tame	$_{T}$M – wide
	DL – deal	DL – dial	$_{D}$L – hem
	KS – case	KS – cuss	K$_{S}$ – mice
	PK – peek	PK – pack	P^{K} – shut

None of the stimuli or responses within a set shared an initial letter or phoneme, and none shared a final letter or phoneme. Within each set, there was one letter-phoneme that occurred in the initial position of one stimulus and the final position of another. The pronunciations assigned to the items were similar across conditions in their frequencies in kindergartners' spoken vocabularies (Kolson, 1961) and their frequencies in printed materials designed for children (Carroll, Davies, & Richman, 1971; Zeno, Ivenz, Millard, & Duvvuri, 1995). The words' conventional printed forms are typically introduced in second grade or later (Harris & Jacobson, 1972), making it unlikely that the children knew the words' conventional spellings.

A word and picture reading task was included to assess the children's reading skills. For this task, we chose the 22 words that Ehri and Wilce (1985) found to be easiest for novice readers. Examples are "no," "stop," and "the." The words were printed in uppercase letters 2.6 cm high. Eleven 14-cm × 21.5-cm cards were prepared, each containing two words and one easily identifiable color picture.

To assess the children's knowledge of letter names and letter sounds, we prepared 26 cards (each 10.0 cm by 15.3 cm). An uppercase letter 5.3 cm high was printed on each card.

Procedure

Each child took part in all three conditions of the word learning task—name, sound, and visual—in separate sessions. A different stimulus set (A, B, or C) was used for each condition. The order of conditions was balanced across children at each age level, as was the assignment of stimulus sets to conditions. Sessions 1, 2, and 3 were each devoted to one condition of the word learning task. The word and picture reading task was given at the end of Session 3. Children's knowledge of letter names and letter sounds was tested in Session 4. The sessions were an average of 5 to 6 days apart. Sessions 3 and 4 were combined into a single session for 3 children to accommodate their schedules.

Word learning task

Each condition of the word learning task consisted of a demonstration phase followed by up to eight test trials. The experimenter began the demonstration phase by saying that the child would learn to read some "made-up words." The experimenter then showed the child one of the cards. She told the child what the "word" said, running her fingers under its letters. The experimenter used the word in a short descriptive sentence and then asked the child to repeat the word. The experimenter again pointed to the printed stimulus and pronounced it twice. This procedure was repeated for all five stimuli, their order randomly chosen for each child. For the first test trial, the experimenter showed the child one of the cards and asked whether he or she remembered what it said. If the child responded incorrectly or did not know, the experimenter provided the answer. The experimenter praised the child if he or she answered correctly. The trial continued with the same procedure being repeated for all five stimuli in a randomly chosen order.

The procedure for the remaining test trials was the same as for the first test trial. The criterion for success was two consecutive test trials on which the child responded correctly to all five items. If the child reached this criterion, no further test trials were given in that condition.

Word and picture reading task

The experimenter showed the child the cards with two words and a picture, one at a time, and asked the child to identify any items that he or she knew. If the child did not identify all three items, the experimenter pointed to each one in turn and asked the child if he or she knew it. Liberal praise was given for naming the pictures, a task that the children found quite easy. The order of the cards was randomized for each child.

Letter-name and letter-sound tasks

For the letter-name task, the child was shown the letter cards in a random order and was asked to say the name of each letter. If the response was incorrect, the child was given two choices. For *h*, for example, the experimenter asked, "Is that *h* or *i*?" The same cards were used for the sound task, but in this case the child was asked to provide the sound of each letter. If the child did not respond correctly in the free-choice task, two alternatives were provided. The order of the letter-name and letter-sound tasks was balanced across children.

The letter-name and letter-sound tasks were scored in two ways. By the strict system, children were counted as correct only if they responded correctly in the free-choice situation. By the lenient system, children were scored as correct if they responded correctly on either the free-choice or the two-choice task.

RESULTS AND DISCUSSION

The children were divided into two groups based on their reading ability. The 36 prereaders could read none of the 22 simple words that were tested. The 38 novice readers could read at least 1 word. Information about the children in the two groups is provided in Table 2. Note that both groups of children were more knowledgeable about letter names than about letter sounds, consistent with previous findings with children from the United States (e.g., Treiman et al., 1998). The prereaders and novices in the present study were similar in both age and reading performance to the prereaders and novices, respectively, in Ehri and Wilce's (1985) study. However, the present prereaders performed somewhat

Table 2. *Characteristics and mean performances of prereaders and novice readers*

Measure	Prereaders (n = 36)	Novice readers (n = 38)
Number of preschoolers	23 (15 female, 8 male)	13 (5 female, 8 male)
Number of kindergartners	13 (6 female, 7 male)	25 (10 female, 15 male)
Mean age in months	60.1 (6.8)	65.7 (6.4)
Number of words read correctly (of 22)	0.0 (0.0)	4.6 (5.1)
Number correct on letter-name test		
Strict criterion (of 26)	15.5 (7.9)	25.3 (1.6)
Lenient criterion (of 26)	23.4 (3.2)	26.0 (0.0)
Number correct on letter-sound test		
Strict criterion (of 26)	5.5 (5.7)	15.3 (4.9)
Lenient criterion (of 26)	18.1 (4.2)	24.1 (2.3)

Note. Standard deviations are in parentheses. The age difference between prereaders and novice readers was significant, $p = .002$. The two groups differed reliably on all of the reported measures of performance, $p < .001$.

more poorly in the letter-name and letter-sound tasks. Ehri and Wilce's study also contained a group of more advanced readers. However, only 3 children in the present study would have fit into this group.

To compare the children's ability to learn the different types of spellings, we analyzed the number of correct responses on the word learning task using the within-subjects factors of condition (name vs. sound vs. visual) and trial (1 to 8) and the between-subjects factors of age group (preschool vs. kindergarten) and reading ability (prereader vs. novice). There was a main effect of condition, $F(2, 140) = 25.88$, $p < .001$, which was modified by an interaction with reading ability, $F(2, 140) = 6.82$, $p = .001$. As Figure 1 shows, the novice readers performed better in the name condition than the sound condition, $F(1, 36) = 4.36$, $p = .044$. They also showed a substantial superiority for the sound condition over the visual condition, $F(1, 36) = 31.92$, $p < .001$. Thus, novice readers did particularly well when letter-name cues were present, but were also able to use letter sounds. The prereaders showed a different pattern of performance. For this group, performance in the name condition was reliably better than performance in the sound and visual conditions, $F(1, 34) = 7.37$, $p = .01$, which were statistically indistinguishable from one another. Thus, the prereaders benefited from letter-name cues but were unable to take advantage of letter sounds.

As Figure 1 shows, the overall level of performance was lower for prereaders than for novice readers. Statistically, this difference emerged as a main effect of reading ability, $F(1, 70) = 55.78$, $p < .001$. There was also a main effect of age group, $F(1, 70) = 4.26$, $p = .043$. This effect, not shown in Figure 1, arose because kindergartners outperformed preschoolers at each level of reading ability. However, the pattern of performance across conditions did not differ for the two age groups ($F < 1$ for the interaction between condition and age group).

The analysis of variance further revealed a main effect of trial, $F(7, 490) = 155.36$, $p < .001$, and an interaction of trial and reading ability, $F(7, 490) = 8.50$, $p < .001$. The interaction arose because the rate of improvement across trials fell off more for the novice readers, a number of whom had reached criterion by the later trials, than it did for the prereaders.

It is also of interest to examine the proportion of children who reached the criterion of two consecutive correct trials. As Figure 2 shows, the novice readers were much more likely to reach criterion than the prereaders, $F(1, 70) = 39.44$, $p < .001$. There was no main effect of age group, however ($F < 1$). There was a main effect of condition, $F(2, 140) = 9.61$, $p < .001$, as well as an interaction of condition and reading ability, $F(2, 140) = 8.49$, $p < .001$. Novice readers were more likely to reach criterion in the name and the sound conditions (which were statistically indistinguishable from one another on this measure) than the visual condition. For prereaders, the main effect of condition was not significant in a separate analysis of variance, but

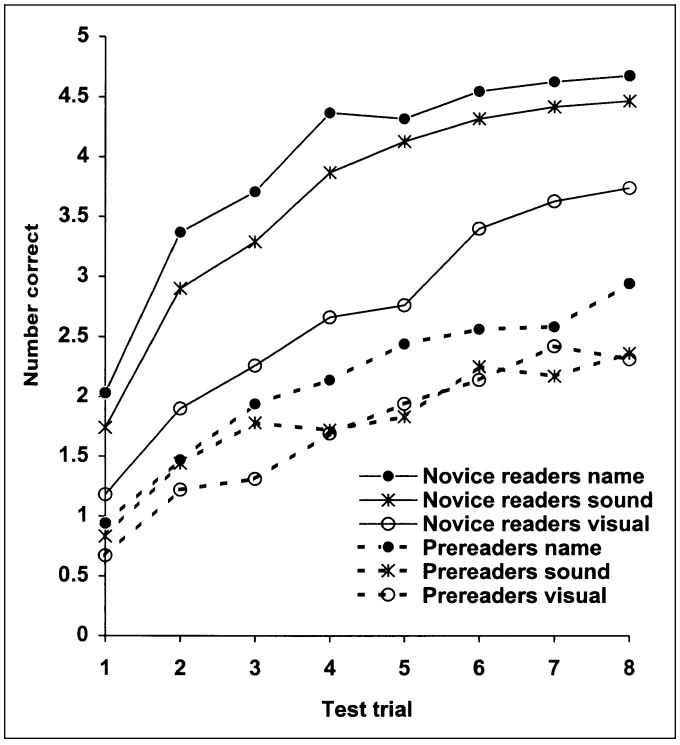

Fig. 1. Number of correct responses in the word learning task as a function of reading level, trial, and condition.

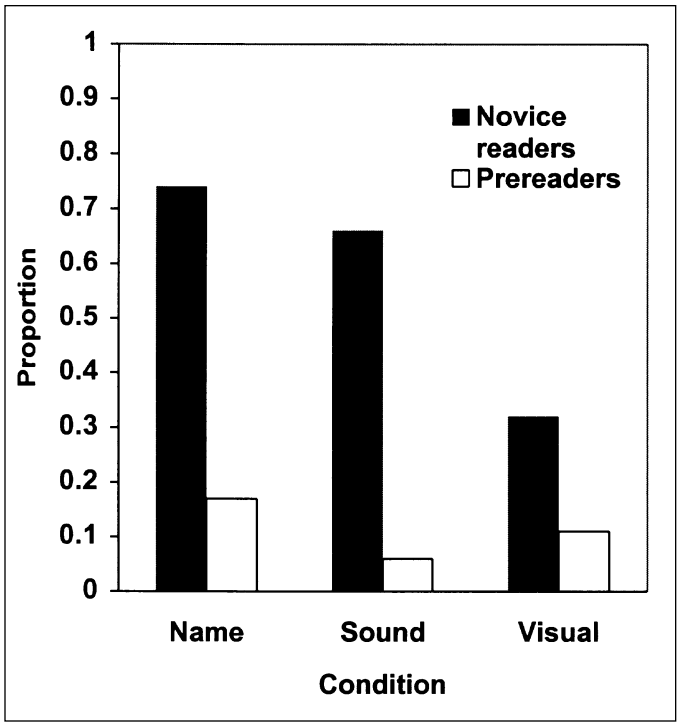

Fig. 2. Proportion of children reaching criterion in the word learning task.

a planned comparison showed that performance in the name condition was reliably better than performance in the sound condition.

We also analyzed the types of errors that the children made in learning to read the novel words. An error was counted as a *list error* if it was a correct response to another item in the same set. A *phonological error* was a response that was not in the current list (or the list learned in the previous session) and that included at least one phoneme corresponding to a letter in the same position of the stimulus. For example, "came" for KP was counted as a phonological error. *No-response* errors were those in which children did not provide a response. A few errors did not fall into any of these categories and were not analyzed. Table 3 shows the proportions of errors of each type.

For each type of error, analyses were carried out using the factors of condition, reading ability, and age group. In the case of list errors, there was a main effect of condition, $F(2, 138) = 5.21$, $p = .007$, and an interaction of condition and reading ability, $F(2, 138) = 5.04$, $p = .008$. List errors did not differ across the three conditions for prereaders. However, novice readers made more list errors in the visual condition than in the other two conditions, which were statistically indistinguishable from one another. Apparently, the children were more likely to rely on rote memorization in the visual condition than in the other conditions, leading to many within-set confusions in the visual case.

For phonological errors, there was a main effect of condition, $F(2, 138) = 12.64$, $p < .001$, and an interaction of condition and reading ability, $F(2, 138) = 6.29$, $p = .002$. Prereaders made few phonological errors. Novice readers made most such errors in the sound condition, significantly fewer in the name condition, and significantly fewest in the visual condition. Phonological errors may have been most prevalent in the sound condition because the spellings of the stimuli did not specify their exact pronunciations (e.g., KP could have been "coop" or "cup," among other possibilities).

Finally, no-response errors showed an effect of condition, $F(2, 138) = 4.19$, $p = .017$, and an interaction of condition and reading ability, $F(2, 138) = 3.33$, $p = .039$. Prereaders made a large number of no-response errors in all three conditions. Novice readers made most such errors in the name condition, in which the preceding types of errors were less common.

To summarize, children found it easier to learn a novel word when the name of the first letter could be heard in the spoken word (e.g., BT for "beet") than when only the letter's sound was present (e.g., BT for "bait"). This was true not only for children who could already read, but also for children who could not yet read. These results show that both prereaders and novice readers use the names of letters when learning to connect printed and spoken words. The novice readers also took advantage of letter-sound cues, performing significantly better on pairs such as BT-"bait" than pairs such as BT-"ham." Interestingly, this developing appreciation of the alphabetic principle did not immediately cause children to abandon their use of letter names, for the novice readers continued to perform better in the name condition than the sound condition. The prereaders seemed unable to use letter sounds, performing no better in the sound condition than the visual condition.

Our results are consistent with other findings suggesting that young children who are knowledgeable about letter names can use this infor-

Table 3. *Mean proportions of errors of various types*

		Condition		
Error type	Reading ability	Name	Sound	Visual
List	Prereader	.34 (.28)	.33 (.27)	.34 (.28)
	Novice reader	.24 (.27)	.26 (.31)	.44 (.31)
Phonological	Prereader	.01 (.03)	.03 (.07)	.00 (.01)
	Novice reader	.07 (.14)	.20 (.28)	.01 (.03)
No response	Prereader	.60 (.30)	.59 (.28)	.59 (.29)
	Novice reader	.66 (.31)	.51 (.34)	.48 (.32)

Note. Standard deviations are in parentheses. Proportions do not sum to 1.0 because some errors did not fall into any of the three categories.

mation in connecting print and speech (de Abreu & Cardoso-Martins, 1998; Scott & Ehri, 1990). However, our study is the first to provide unambiguous evidence for this claim by comparing children's ability to learn spellings based on letter names with their ability to learn spellings based on letter sounds. The prereaders in this study—who, like many prereaders in the United States, knew a number of letter names—were able to take advantage of this knowledge in learning to read words when the letter-name information was sufficiently transparent in the words.

One difference between our findings and previous findings is that the present prereaders did not perform significantly better in the visual condition than the sound condition, whereas the prereaders studied by Ehri and Wilce (1985) did. This difference occurred even though the present prereaders were somewhat less advanced, in terms of letter-name and letter-sound knowledge, than those of Ehri and Wilce. One possible explanation for the discrepant results is that all of the printed stimuli in our study were two letters long. Even when one of the letters differed from the other in size, position, or both, the items may not have appeared very distinctive. The printed stimuli used by Ehri and Wilce varied in length from two to four letters and so may have been more visually distinctive. Ehri and Wilce's stimuli were more distinctive phonologically as well, ranging in length from one to three syllables. Our stimuli were generally monosyllabic words with consonant-vowel-consonant structure. This similarity may have made it difficult for the children to learn the print-sound associations on the basis of rote memorization, and therefore may have encouraged the use of other strategies.

In this study, we examined the processes involved in learning printed words. We did not examine just the end product, as has been done in many previous studies of reading. Our results show that young children are not necessarily rote learners. Rather than memorizing printed words as arbitrary visual patterns (Ehri, 1998; Frith, 1985; Gough & Hillinger, 1980), children search for systematic relations between print and speech from an early age. Our results further show which types of relations are easiest for children to find. Links that involve letter names, at least when they appear at the beginning of a short word, can be appreciated even by nonreaders who have some knowledge about letter names, as many U.S. preschoolers do. When spellings make sense on the basis of letter names—as with our invented words such as BT for "beet" and with real words such as *Jane, deep,* and *eel*—even young children can begin to grasp them. Thus, our results suggest that a child actively seeks to make sense of the writing system using the knowledge at his or her disposal. Our findings do not support the idea that a child memorizes printed words as if they were arbitrary symbols.

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