

INTRODUCTION

Stage theories of reading development characterize young children as logographic readers. In this view, children cannot form systematic links between printed and spoken words. Children focus instead on the salient graphic features of printed words, treating each new word as a distinctive visual pattern. In the present study, we asked whether this description is accurate. Are young children limited to a logographic strategy? If not, when and how can they go beyond it? Do children switch from one approach to another in the way predicted by stage theories, with more advanced strategies superseding less advanced ones, or does development occur more gradually?

Different types of relationships between the spellings and spoken forms of words exist in English.

- Letter sounds: b - a - t = "bat"
- Letter names: OK = "okay"
- Arbitrary pairs: "lb" = "pound"

Do young children make use of any of these types of relationships when first learning to connect printed and spoken words?

PREVIOUS RESEARCH

EHRI & WILCOE (1985)

PHONETIC vs. VISUALLY distinctive spellings

JRF = GIRAFFE X_ES_T = DIAPER

Prereaders: VISUAL > PHONETIC

Novice readers: PHONETIC > VISUAL

TREIMAN & RODRIGUEZ (1999)

Initial NAME vs. Initial SOUND vs. VISUAL

BN = BEAN BN = BONE B_N = LOAF

Prereaders: NAME > SOUND and VISUAL

Novice readers: NAME > SOUND, and SOUND > VISUAL

BOWMAN & TREIMAN (SUBMITTED)

Final NAME vs. Final SOUND vs. VISUAL

TL = TELL TL = TALL T_L = SIZE

Reading

Prereaders: NAME = SOUND = VISUAL

Novice readers: NAME = SOUND, both NAME and SOUND > VISUAL

Spelling

Prereaders: NAME = SOUND = VISUAL

Novice readers: NAME = SOUND, both NAME and SOUND > VISUAL

CURRENT STUDY

Comparisons across studies suggest that letter names at the beginnings of words have a special status for prereaders learning to read and spell words. However, different children participated in the various studies and different letters were used in the word-initial study (Treiman & Rodriguez used primarily letters with CV names) and the word-final study (Bowman & Treiman used primarily letters with VC names).

The current study looked at how the same children performed in word-initial and word-final conditions using the same target letters. Experiment 1 evaluated prereaders' reading performance using consonants as the target letters. Experiment 2 evaluated two groups of prereaders using vowels as the target letters. One group of children in Experiment 2 participated in a reading version of the task; the second group participated in a spelling version.

These experiments included 4 conditions – NAME INITIAL, NAME FINAL, CONTROL INITIAL, and CONTROL FINAL. Visual distinctiveness was eliminated in order to compare performance on systematic versus arbitrary spelling-to-sound relationships.

EXPERIMENT 1

Evaluated READING performance of prereaders across four conditions – name initial, name final, control initial, and control final – using CONSONANTS as the target letters.

METHOD

PARTICIPANTS

32 Prereaders	
Age (months)	54.9
Letter names produced	18.1
Letter sounds produced	10.6
Proportion of target letters recognized	0.96

PROCEDURE

SCREENING SESSION: Assessed reading ability, letter-name and sound knowledge, and target letter recognition

4 WORD-LEARNING SESSIONS: Each session was devoted to learning to READ words under different conditions using CONSONANTS as target letters

DEMONSTRATION TRIAL: Puppets showed cards consisting of 5 two-letter made-up words and identified their pronunciations.

TEST TRIALS: Children had up to 8 trials to learn to identify the 5 words

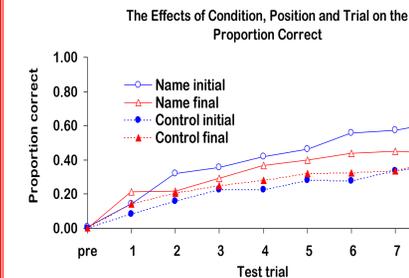
STIMULI

4 SETS OF 5 TWO-LETTER MADE-UP WORDS. Each set consisted of mixture of initial and final items from either the name condition or the control condition.

FL	LF	MR	RD
"fell"	"elf"	"fell"	"elf"
Name initial	Name final	Control initial	Control final

RESULTS

Proportion Correct		Main effects:
Initial	Final	
Name	0.43 0.35	Condition: Name > Control Trial: Improved across trials
Control	0.24 0.28	Condition X Position Interaction: Name initial > Control initial Name final = Control final Name initial > Name final



DISCUSSION

The results support the conclusions tentatively drawn earlier based on comparisons across different studies. Letter-name cues at the beginnings of words enhanced the performance of prereaders. Children performed better in the name initial condition than the control condition, a result that would not have been expected if the children were limited to a logographic approach in learning to pronounce new words. In contrast, children did not benefit significantly from letter-names cues at the ends of words. Thus, initial-position cues have a special status for prereaders. Because the same letters were used in the initial and final conditions, the results cannot reflect differences among letters with different properties.

EXPERIMENT 2

Evaluated READING and SPELLING performance of prereaders across four conditions – name initial, name final, control initial, and control final using VOWELS as the target letters.

METHODS

READING PARTICIPANTS

21 Prereaders	
Age (months)	57.6
Letter names produced	17.7
Letter sounds produced	9.5
Proportion of target letters recognized	0.95

PROCEDURE

4 WORD-LEARNING SESSIONS: Each session was devoted to learning to READ or SPELL words under different conditions using VOWELS as target letters

DEMONSTRATION TRIAL: In the READING version--puppets showed cards consisting of 5 two-letter made-up words and identified their pronunciations. In the SPELLING version--puppets demonstrated the spelling of 5 two-letter made-up words using plastic letters.

TEST TRIALS: Children were given up to 8 trials to learn to correctly identify or spell all 5 words.

FILLER TASKS FOR DELAYED MEMORY TASK: Assessed reading ability (session 1), letter-name and sound knowledge (balanced across sessions 2 and 3), and target letter recognition (session 4) after the final learning trial of the specific session.

MEMORY TASK: Evaluated children's memory for the words just learned after a brief delay

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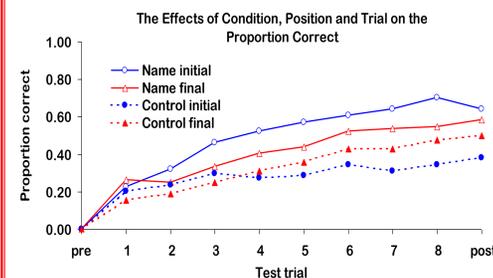
4 SETS OF 5 TWO-LETTER MADE-UP WORDS from a single condition and contained items in which an A, E, I, or O appeared in the relevant position. Words containing the letter Y were included in each condition in order to keep the set sizes consistent between studies. The Y words were not used in the data analysis

READING TASK – cards designed to be visually similar to spelling task

AP	PA	OM	MO
"ape"	"pay"	"ape"	"pay"
Name initial	Name final	Control initial	Control final

READING RESULTS

Proportion Correct		Main effects:
Initial	Final	
Name	0.51 0.41	Condition: Name > Control Trial: Improved across trials
Control	0.29 0.32	Condition X Position Interaction: Name initial > Control initial Name final = Control final Name initial > Name final



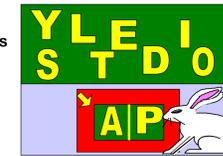
DISCUSSION

The children showed the same pattern of performance with letter-name vowels as with letter-name consonants, extending earlier results with consonants to vowels. With vowels, as with consonants, children used letter names at the beginnings of words when learning to pronounce new items. With vowels, as with consonants, children did not derive significant benefit from letter names located at the ends of words. The results provide further evidence of the special status of initial-position letter names. They also show that young children's ability to use initial-position letter names to connect print and speech is not limited to consonants.

SPELLING PARTICIPANTS

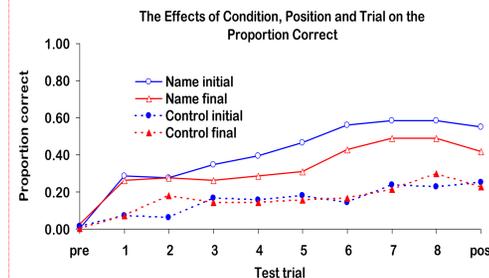
21 Prereaders	
Age (months)	57.0
Letter names produced	19.9
Letter sounds produced	9.2
Proportion of target letters recognized	0.95

SPELLING TASK – words spelled with the help of a puppet on a spelling board using plastic letters



SPELLING RESULTS

Proportion Correct		Main effects:
Initial	Final	
Name	0.44 0.35	Condition: Name > Control Trial: Improved across trials
Control	0.15 0.17	Condition X Position Interaction: Name initial > Control initial Name final > Control final Name initial > Name final



DISCUSSION

In spelling, children used letter-name cues at both the beginnings and the ends of two-letter words. There was evidence for a special status of word-initial cues in that the difference between the name and control conditions was larger in initial position than in final position. However, the children derived significant benefit from even final letter-name cues in spelling. Comparing the reading and spelling results, it appears that beginners rely on systematic spelling-sound relationships to a greater extent when learning to spell words than when learning to pronounce them. The lack of alphabetic relationships hurts their spelling more than it hurts their reading.

GENERAL DISCUSSION

BEYOND A LOGOGRAPHIC APPROACH

Our results suggest that several factors allow even young children to go beyond a logographic approach in learning about print.

One factor is the availability of links between print and speech that make sense based on knowledge that children possess. For many young children in the U.S. and other literate societies, this includes knowledge of letter names. Children typically start to learn the names of letters at an early age. They appear to use this information to form systematic connections between print and speech.

A second factor is detectable print-speech links in salient positions of words. Young children take more advantage of letter names when these cues are located at the beginnings of two-letter words than when they are located at the ends. Particularly for reading, children's ability to use letter names is fragile. However, letter names do provide young children with clues that help them systematically link print to speech.

A third factor is the nature of the task. Children are more likely to use systematic print-speech links in situations where rote memorization is less likely to succeed than in situations where rote memorization is likely to be more successful. One situation in which children go beyond rote memorization is the present spelling task, where five 2-letter responses are easily forgotten without some analytic approach. In the reading task, where five familiar real-word responses are more easily memorized, children are less likely to use systematic print-speech relationships.

It would be difficult to capture the influences of all three factors in a stage theory of literacy development. Even if a distinct letter-name stage were postulated, one would expect children at this stage to use letter-name information whenever it is available. As the results of these experiments show, however, the same child may successfully use letter-name information in some situations, such as when it occurs at the beginning of a word, but not in other situations, such as at the end of a word. Current stage theories are not flexible enough to capture this variability.

READING VS SPELLING DEVELOPMENT

The results of Experiment 2 suggest that spelling and reading do not always develop in synchrony. The lack of an alphabetic connection was a major stumbling block in the spelling task of Experiment 2, more so than in the reading tasks of both experiments. Children may be able to achieve some degree of success when using a logographic strategy in the control condition of the reading task. However, the greater demands of the spelling task may force children to use any alphabetic knowledge and analytic skills that they possess.

CONSONANTS VS VOWELS

Previous studies of children's use of letter names have focused on consonants. Because many real English words, such as *eat* and *no*, contain vowel letter names, this is an important limitation. The results of Experiment 2 suggest that children's ability to take advantage of vowel letter names follows the same patterns as their ability to use consonant letter names.

BEYOND A STAGE THEORY APPROACH

Our results may be viewed in terms of the overlapping waves theory (Siegler, 1996), which has been applied to spelling by Rittle-Johnson and Siegler (1999). In this view, children have more than one strategy available at a given time. Development may involve the acquisition of new strategies, but it may also involve the wider or more adaptive application of existing strategies. Consistent with this view, children are more likely to use their knowledge of letter names to connect print and speech in some situations (when the letter-name information is in a salient position of the word or when rote memorization is unlikely to work) than in other situations.

IMPLICATIONS

To assess the usefulness of these findings, we must ask how often relationships between print and speech that make sense on the basis of letter names occur in real English words. An examination of words found in reading materials targeted at kindergartners and first graders shows that 43% offer the possibility of linking at least one letter in the printed form to the corresponding letter name in some position of the spoken form. In many cases, as with *eat* and *no*, vowel letters are involved. In other cases, as with *pizza* and *car*, consonants are involved. Thus, young children are likely to encounter words that offer the possibility of letter-name connections between print and speech. The inclusion of such words in early instruction, particularly words that offer letter-name cues at the beginnings, may help children form their first partial connections between printed and spoken words. Children must eventually form full alphabetic connections, but letter names may play a special role in early development by helping children grasp the systematic relationships between print and speech.