How Words Cast Their Spell

Spelling Is an Integral Part of Learning the Language, Not a Matter of Memorization

By R. Malatesha Joshi, Rebecca Treiman, Suzanne Carreker, and Louisa C. Moats

I n 1773, Noah Webster stated that "spelling is the foundation of reading and the greatest ornament of writing."[1] He was right. Good spelling is critical for literacy, and it makes writing much easier—allowing the writer to focus on the ideas to be conveyed, not the letters needed to put those ideas on paper. But ever since Webster's "spellers" (which focused on how to spell the sounds that make up words and thus taught spelling and reading simultaneously) went out of fashion in the early 1900s, spelling has not received as much attention as reading. This is unfortunate because spelling instruction underpins reading success by creating an awareness of the sounds that make up words and the letters that spell those sounds. As children learn to spell, their knowledge of words improves and reading becomes easier.[2] And yet, even though there is a close relationship between reading and spelling (the correlation between the two is quite strong,[3] ranging from 0.66 to 0.90, where 0 would indicate no correlation

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and 1 would indicate a perfect correlation), spelling in the elementary grades is usually taught as an isolated skill, often as a visual task.*

Collectively, the authors of this paper have eight decades of experience helping preservice and inservice teachers improve their instruction in spelling, reading, and writing. One common perception we have encountered is that visual memory, analogous to taking a mental picture of the word, is the basis of spelling skill. Teachers often tell us that they teach spelling by encouraging whole-word memorization (e.g., using flashcards and having students write words 5 or 10 times) or by asking students to close their eyes and imagine words. We've encountered this perception that spelling relies on visual memory so many times that we became curious about when and how it originated—after all, it's a far cry from Webster's spellers. We traced it back to the 1920s: one of the earliest studies to stress the role of visual memory in spelling was published in 1926, and it found that deaf children spelled relatively well compared with normal children of similar reading experience.[4] Based on this study, and the perception that the relationship between sounds and the letters that spell them is highly variable, many people concluded that learning to spell is essentially a matter of rote memorization. Thus, researchers recommended that spelling instruction emphasize the development of visual memory for whole words.[5]

More recent studies, however, do not support the notion that visual memory is the key to good spelling.[6] Several researchers have found that rote visual memory for letter strings is limited to two or three letters in a word.[7] In addition, studies of the errors

* Throughout this article, the research and instructional strategies discussed are about spelling in English; they may not apply to other languages.

children make indicate that something other than visual memory is at work. If children relied on visual memory for spelling, regular words (e.g., *stamp*, *sing*, *strike*) and irregular words that are similar in length and frequency (e.g., *sword*, *said*, *enough*) should be misspelled equally often. But they are not. Children misspell irregular words more often than regular words.[8]

So, if words aren't memorized visually, how do we spell? That will be thoroughly explained later in this article. For now, here's the short answer: Webster was right not just on the importance of spelling, but on how to teach it too. Spelling is a linguistic task that requires knowledge of sounds and letter patterns. Unlike poor spellers, who fail to make such connections, good spellers develop insights into how words are spelled based on sound-letter correspondences,[†] meaningful parts of words (like the root *bio* and the suffix *logy*), and word origins and history.[9] This knowledge, in turn, supports a specialized memory system—memory for letters in words. The technical term for this is "orthographic memory," and it's developed in tandem with awareness of a word's internal structure—its sounds, syllables, meaningful parts, oddities, history, and so forth. Therefore, explicit instruction in language structure, and especially sound structure, is essential to learning to spell.

Don't Students Learn to Spell through Flashcards and Writing Words?

Given both the widespread belief that English spelling is irregular and the previous studies that stressed visual memory for

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[†] In technical terms, the smallest sounds of speech are known as phonemes, and the letters and letter groups that represent them are known as graphemes. So what we are calling sound-letter correspondences, other authors may refer to as phoneme-grapheme correspondences.

words, it's no surprise that many teachers teach spelling by writing words on flashcards and exposing students to them many times or by having students write words 5 to 10 times. Unfortunately, the effectiveness of such methods is not well established. In contrast, studies show that spelling instruction based on the sounds of language produces good results. For example, to test whether a visual approach or language-based method is better, researchers taught spelling to typical second graders using two different methods: a visual method and a method in which students focused on correspondences between sounds and letters.[10] After administering lists of words as spelling tests, these investigators drew the attention of the visual group to their errors, wrote the correct spellings on flashcards, and showed children the correct spellings. In contrast, the children in the language-based group were given instruction on the sounds involved in their misspellings. The group that received the language-based spelling instruction showed significantly greater progress than the visual group. Similarly, another researcher, after examining five successful spelling instructional approaches for children with learning disabilities, observed that the successful programs had one thing in common: they were all based on structured language instruction that explicitly taught principles like sound-letter correspondences.[11] Researchers also have found that second and third graders at risk of literacy problems improved their spelling (as well as their word recognition, handwriting, and composition skills) after structured spelling instruction based on the concept that speech sounds are represented by letters in printed words (i.e., the alphabetic principle).[12] And a series of studies showed that training in phonological awareness (i.e., awareness of the sounds that make up language) improved the spelling and reading of children in low-income, inner-city

schools. The training was especially effective among the lowest-performing children.[13] In sum, these and other studies have found that effective spelling instruction explicitly teaches students sound-spelling patterns. Students are taught to think about language, allowing them to learn how to spell—not just memorize words.

As a result, linguistically explicit spelling instruction improves spelling of studied words *and* novel words. Two exploratory spelling intervention studies contrasted linguistically explicit spelling instruction with implicit spelling instruction, and found that the explicit instruction gave students the knowledge of spelling patterns that they needed to more accurately spell novel words. In the first study, second- through fourth-grade students

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were taught to spell Latin-based words that ended in *tion* or *sion*.[14] The students were divided into two groups. One group was taught to spell the words with an emphasis on the orthographic patterns *tion* and *sion*, but without discussion of the words' sound patterns. Instead, activities focused students on the words' visual patterns. For example, students sorted spelling words by the final endings *tion* or *sion*. The second group, which received linguistically explicit instruction, was taught to spell the words with a simultaneous emphasis on the orthographic patterns *tion* and *sion* and the sound patterns /shŭn/ and /zhŭn/.* For example, students sorted words by letter patterns and by sound patterns. The orthographic and sound patterns of the other syllables in the words, in particular the syllables that preceded *tion* or *sion*, were also emphasized. For example, /shŭn/ is most frequently spelled *tion*. However, after a syllable that ends in /l/, the ending /shŭn/ is spelled *sion*, as in *compulsion* or *expulsion*. Compared with the students in the other group, the students who received the linguistically explicit instruction were better able to discriminate the sounds /sh/ and /zh/, spell the word endings correctly, and generalize the spellings of the word endings to novel words.

In the second study, first-grade students were divided into two groups.[15] Both groups were taught to spell one-syllable words that ended in /k/. One group was taught to spell the words by using letter units such as *ank*, *ack*, and *ake*. The other group was taught to segment the sounds of the words and to think about

the pattern that would determine the spelling of /k/ (e.g., after a consonant or two vowels, /k/ is spelled *k*; after a short vowel, /k/ is spelled *ck*; after a long vowel, /k/ is spelled *k* with a final *e*). The students in the second group spelled the words more accurately and read them faster.

Is English Predictable Enough for Explicit Spelling Instruction?

This is a question we hear often. If English spelling were completely arbitrary, one could argue that visual memorization would be the only option. However, spelling is not arbitrary. Researchers have estimated that the spellings of nearly 50 percent of English words are predictable based on sound-letter correspondences that can be taught (e.g., the spellings of the /k/ sound in *back*, *cook*, and *tract* are predictable to those who have learned the rules). And another 34 percent of words are predictable except for one sound (e.g., *knit*, *boat*, and *two*).[†] If other information such as word origin and word meaning are considered, only 4 percent of English words are truly irregular and, as a result, may have to be learned visually (e.g., by using flashcards or by writing the words many times).[16]

Far from being irregular and illogical, to the well-known linguists Noam Chomsky and Morris Halle, English is a "near optimal system for lexical representation."[17] How could they possibly make such a claim? They understand that written language is not merely speech written down. The major goal of the English writing system is not merely to ensure accurate pronunciation of the written word—it is to convey meaning. If words that sound the same (i.e., homophones such as *rain*, *rein*, and *reign*) were spelled the same way, their meanings would be harder to differentiate. For example, if we regularize the spelling, then the sentence *They rode along the rode and, when they reached the lake, they rode across it* would be hard to understand, while *They rode along the road and, when they reached the lake, they rowed*

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* To aid the reader, sounds of the letters are represented within / / rather than using the symbols from the International Phonetic Alphabet. Thus, /ʃ/ as in *ship* is represented by /sh/, and /tʃ/ as in *chin* is represented by /ch/.

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† Note that the exception was for one *sound*, not one *letter*. For example, only one sound is wrong if *automobile* is spelled *automobeal* or if *bite* is spelled *bight*.

The Real Magic of Spelling: Improving Reading and Writing

In the mid-19th century, spelling was the means by which children were taught to read. In the 21st century, however, spelling is the abandoned stepchild in the family of language arts, overlooked by federal grants such as Reading First, federal and state assessment policies, state program-adoption guidelines, publishers of comprehensive instructional programs, and the educational research community. The reasons for this are many, including the dominance of the "writers' workshop" approach to composition, in which spelling instruction is contextualized, nonsystematic, and reactive (since it often just addresses students' errors). In addition, many assumptions about the nature of spelling—including the widespread belief that spelling is a rote visual-memory skill—are misinformed. Knowledge of spelling, contrary to many people's expectations, is closely related to reading, writing, and vocabulary development, as they all rely on the same underlying language abilities.[1]

Spelling is most obviously connected to writing. A consistent research finding is that poor spelling, in addition to causing the writer frustration and embarrassment, adversely affects composition and transmission of ideas.[2] On the whole, students who spell poorly write fewer words[3] and write compositions of lower quality. Writers who struggle to remember spelling often limit themselves to words they can spell, losing expressive power. In addition, nonautomatic spelling drains attention needed for the conceptual challenges of planning, generating ideas, formulating sentences, and monitoring one's progress. The written work of poor spellers, moreover, is judged more harshly than that of students who present neat, correctly spelled work. Readers expect accurate spelling as a courtesy of communication, and inaccurate spelling may result in poor grades or poor job evaluations.

Although not as obvious, the development of spelling is also intimately connected with the development of reading.[4] Knowledge of speech sounds and their spellings, and fluent use of this knowledge, are necessary for both word reading and spelling. Young children become better readers and spellers when explicit instruction in speech sound awareness and sound-letter correspon-dence is emphasized in kindergarten and first grade.[5]

Good spellers are almost always good readers. Spelling, however, is more difficult than reading. We generally cannot accurately spell words we cannot read. On the other hand, since most of us spend much more time reading than writing, we typically read many more words than we spell. Poor spellers need dozens of opportunities to write difficult words before they can remember them. Indeed, poor spellers (who form the majority of students in many high-poverty schools) in the intermediate and middle grades make many spelling errors that reflect poor understanding of word structure, even when they can read in the average range.[6]

If we do learn to spell a word, the mental representation of all the letters in that word are fully specified in memory, and recall is likely to be fluent and accurate. Recognition of words "by sight" is facilitated by knowing the details of sound-letter correspondence in the spelling system.[7] Good spellers are also familiar with the patterns and constraints of English spelling[8] and use that knowledge to help them remember specific letters in specific words. On the other hand, general "visual" cues, such as the configuration or outside contour of a word in print, are not very helpful for either recognizing or recalling printed words. (See the main article for more on language-based versus visual spelling instruction.)

Spelling also has a strong relationship with reading comprehension.[9] The correlation between spelling and reading comprehension is high because both depend on a common denominator: proficiency with language. The poorer a child's language abilities, the poorer that child's spelling will tend to be.[10] The more deeply and thoroughly a student knows a word, the more likely he or she is to recognize it, spell it, define it, and use it appropriately in speech and writing.

Systematic spelling lessons (such as with the programs highlighted on page 14) provide an opportunity to learn to think analytically about words and language. The attention to detail required by comparison and differentiation of words like *flush*, *flesh*, *fresh*, and *thresh*[11] nurtures a more generalized

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consciousness about words that in turn encourages careful consideration of all aspects of language.

At its best, spelling instruction richly supports vocabulary and language development. Good spellers not only demonstrate a good sense of the sounds in words, they also have a good sense of the meaningful parts of words (e.g., *un-*, *desir[e]*, *-able*), the roles words play in sentences (e.g., *packed* is a past-tense verb, but *pact* is a noun), and the relationships among words' meanings that exist in spite of differences in their sounds (e.g., *image* and *imagination*). Precocious spellers in the Scripps National Spelling Bee display exceptional knowledge of vocabulary, etymology (the history of words), and parts of speech. A wide, deep knowledge base underlies what on the surface may seem like a "simple" skill. Not all children can win spelling bees, but all can benefit from knowing how spelling reflects word origin, meaning, and pronunciation.

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across it makes sense. In addition, the English writing system reveals the history of the English language. For example, *ch* pronounced as /ch/, as in *chair* or *chief*, appears in Anglo-Saxon or Old English words; the same letter combination *ch* pronounced as /sh/, as in *chef* and *chauffeur*, appears in French words of Latin origin; and *ch* pronounced as /k/, as in *ache* and *orchid*, appears in words borrowed from Greek. Approximately 20 percent to 25 percent of English words are of Anglo-Saxon origin and about 60 percent are of Latin origin (of which 50 percent are directly from Latin and another 10 percent are from Latin through French, as in *chef* and *chauffeur*). The remaining 15 to 20 percent of English words are primarily of Greek origin.*

What Types of Information Make Spelling Predictable?

There are three types of information that, once learned, make spelling much more predictable: (1) word origin and history, (2) syllable patterns and meaningful parts of words, and (3) letter patterns. Each of these is discussed briefly below; suggestions on when and how to teach them are in the sections that follow.

Word Origin and History

Knowing the origins of words can be helpful in pronouncing and spelling them.[18] For example, in words of Greek origin, which tend to be long and scientific, /f/ is reliably spelled *ph*, as in *photosynthesis* and *philodendron*, and /k/ is often spelled *ch*, as in *chlorophyll* and *chemistry*. Fancy French words use that same *ch* combination for the /sh/ sound, as in *champagne* and *chandelier*, but Anglo-Saxon uses *sh*, as in *ship* and *wish*, while sophisticated Latin words use *ti*, *si*, or *ci*, as in *nation*, *percussion*, and *special*.

Let's take a little closer look at words of Anglo-Saxon origin. They are typically short, related to daily life (as opposed to science, like a lot of Greek words, or lofty ideas, like a lot of Latin words), and often have silent letters that were once pronounced (e.g., **k**nee, **g**nat, **gh**ost, clim**b**, **w**rist). The pronunciations of the words changed over time, but the spellings did not—they continue to convey the earlier pronunciations. As students learn to spell these words, they may enjoy using a special Anglo-Saxon pronunciation to help them remember the silent letters. This pronunciation cues students to the correct spellings of the words. Students also can make connections among words that have similar meanings but that vary in whether or not they have silent letters. For example, in remembering how to spell words with a silent *w*, such as *wrist*, *wring*, and *wrench*, it is helpful for students to note that these words share the meaning "twist."

The spellings of some words are unusual because of their associations with certain historical figures. For instance, *caesarean* is associated with Julius Caesar, who is said to have been delivered through surgery, and *silhouette* can be traced to Etienne de Silhouette, a French finance minister in the middle of the 1700s who was known for his shady deals. *Leotard*, a garment worn by acrobats and dancers, was named for Jules Léotard, a 19th-century French aerialist. Similarly, *pasteurize* comes from

Louis Pasteur, the famous French chemist and microbiologist, and *galvanize* from Luigi Galvani, an Italian physician and physicist. *Maverick* comes from Sam Maverick, who refused to brand his cattle; hence a maverick is someone who is different, out of the ordinary. Other words come not from historical figures but from other words (especially, as we have seen, Latin and Greek words). For example, *radical* means root, hence *radish* means edible root. And *anthology* literally means flower gathering; thus, an anthology editor is supposed to have gathered the choicest flowers in the field.†

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Syllable Patterns and Meaningful Parts of Words

There are two common types of syllables, called closed and open, that are very helpful in spelling.[19] A closed syllable has one vowel followed by at least one consonant and the vowel is short (e.g., *cat*, *ball*, and *pencil*). An open syllable ends in one vowel and the vowel is long (e.g., *he*, *go*, and the first syllable in *hotel*). Learning about open and closed syllables is especially helpful for deciding whether or not to double a consonant in the middle of a word. If students have been taught about closed and open syllables, then they know why *rabbit* is spelled with two *b*'s in the middle while *label* is spelled with only one. The word *rabbit* divides between the two consonants, *rab*/*bit*. The first syllable, *rab*, is closed, and the vowel is pronounced as a short *a*. The word *label* divides before the consonant, *la*/*bel*. The first syllable, *la*, is open, and the vowel is pronounced with a long *a* sound. Known as the "rabbit rule," it's a simple formula to remember: in a two-syllable word, there's a double consonant in the middle after a short vowel.[20] Instead of memorizing whether to use one or two consonants in the middle of words like *cotton*, *tennis*, *sudden*, *muffin*, and *happen*, students can use the rabbit rule. Of course, there are exceptions, such as *cabin*, *robin*, *lemon*, and *camel*, but these words are not as frequent as words that follow the rabbit rule.

Knowledge of the meaningful parts of words—prefixes, suffixes, and roots—is of great help in the development of spelling (and vocabulary). Technically, what we're talking about here are known as morphemes—they are the smallest meaningful units in words. When the units have meaning by themselves, such as the words *cat* and *play*, they are referred to as free morphemes.

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† An excellent reference for words from various languages, words from Greek and Latin roots, and words from names is R. L. Venezky, *The American Way of Spelling: The Structure and Origins of American English Orthography* (New York: Guilford Press, 1999).

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* For more on the history of English, see "How Spelling Supports Reading" by Louisa C. Moats in the Winter 2005-06 issue of *American Educator,* online at **www.aft.org/pubs-reports/american_educator/issues/winter05-06/Moats.pdf**.

it. For example, researchers asked kindergartners and first graders to tell which item looked more like a real word: *nuss* or *nnus*.[21] A majority of children were able to identify correctly that *nuss* looks more like a real word. As noted in this and other studies, first graders do not often begin words with *ck* or with letter combinations like *bc*.[22]

Students need not learn all of the possible letter patterns, but they should learn the letter patterns that frequently represent speech sounds. For instance, /k/ in initial or medial position can be spelled with *c* or *k*. Before *a, o, u*, or any consonant, /k/ is spelled *c* (e.g., *cat, cot, cut, clasp, crust*). Before *e, i*, or *y*, /k/ is spelled *k* (e.g., *keep, kite, sky*). (One mnemonic device that is helpful involves the four criteria that are used for evaluating diamonds. The four *c*'s stand for *carat, color, cut*, and *clarity* or, when applied to spelling, /k/ is spelled with *c* before *a, o, u*, or any consonant.) Of course, there are exceptions to this pattern, such as *kangaroo, skunk*, and *skate*. By discovering exceptions, students can demonstrate and reinforce their understanding of patterns. Students may discover the exceptions on their own, or teachers may point them out and teach these words through mnemonic sentences (e.g., The *kangaroo* and the *skunk* like to *skate*) rather than asking students to visually memorize these words.

Clearly, there is a great deal for students to learn, but it is manageable when spread over several years. The next two sections provide an overview of what to teach in the elementary and middle grades, and suggestions for how to deliver language-based instruction. In addition, the sidebar on page 14 shows samples from two carefully developed, well-sequenced spelling programs.

What Should Be Taught in Each Grade?

The order in which various patterns are introduced may differ from one spelling program to the next. However, the following sequence offers some guidance for planning systematic, explicit spelling instruction for kindergarten through grade 7.

In kindergarten, activities that heighten students' awareness of the sounds that make up language and that develop their letter-name and letter-sound knowledge provide a foundation for spelling. For example, students can (1) count the number of syllables in words, (2) listen for a particular sound in words and give a "thumbs-up" if the sound is heard, and (3) count the number of sounds in words by saying a word slowly and moving a counting token for each sound. By the end of kindergarten, students should be able to quickly name letters on a chart as the teacher points to each letter, and quickly give the sounds of letters with one frequent sound (e.g., *b, d, f*). In addition, plentiful opportunities to write will help students connect speaking and writing.

Anglo-Saxon words with regular consonant and vowel sound-letter correspondences are introduced in grade 1. Students learn to spell one-syllable words with one-to-one correspondences such as the short vowels and the consonant sounds /b/, /d/, /f/, /g/, /h/, /l/, /m/, /n/, /p/, /s/, and /t/. They learn a few common patterns for sounds that have more than one spelling, such as that /k/ before *a, o, u*, or any consonant is spelled *c* (e.g., *cap, cot, cub, class, club*) and before *e, i*, or *y* is spelled *k* (e.g., *kept, kiss, skit*). Other common patterns to teach in first grade include (1) the fact that when a long vowel sound

However, *cats* has two morphemes—a free morpheme *cat* and a bound morpheme *s*. Bound morphemes do not have meaning by themselves; they take on meaning when attached to a free morpheme (another example is the *ed* in *played*).

Teaching morphemes often requires more information on word origin. For example, when teaching the spellings of words with the suffixes *er* and *or*, which mean *one who*, as in *worker* or *actor*, teachers can tell their students that words from Old English are basic survival words. Words such as *worker, carpenter, farmer, grocer, baker, brewer*, and *butcher* are Old English and use *er*, whereas words of Latin origin are more sophisticated and use *or*, as in *actor, professor, educator, aviator, director*, and *counselor*. The same principle applies to the suffixes *able* and *ible*, both meaning *able to*. We use *able* for Old English base words and *ible* for Latin roots. Thus, we have *passable, laughable, breakable, agreeable*, and *punishable*, as compared to *edible, audible, credible, visible*, and *indelible*.[‡]

Letter Patterns in Words

Knowledge of letter patterns in words provides students with clues for spelling. English has certain constraints on how letters can be used. For example, *q* is almost always followed by *u* and then another vowel, as in *queen* and *quail*. Exceptions are mostly proper nouns borrowed from other languages, like *Qatar* and *Iraq*. Another example of a letter pattern is the rule that words do not end with *v*; hence we have *give, love*, and *live*, with *kiev* being an exception because it is borrowed from Russian. Also, certain letters never or rarely double in any position, such as *h, k, j, v, x*, and *y*. A final example of a letter pattern is that words do not begin with identical consonants, *llama* being one of the few exceptions because of its Spanish origin. Even young children often follow this pattern, although they are unable to verbalize

in the initial or medial position is followed by one consonant sound, *e* is added to the end of the word (e.g., *name, these, five, rope, cube*), and (2) the "floss rule," which helps students remember that after a short vowel, a final /f/ is spelled *ff*, final /l/ is spelled *ll*, and final /s/ is spelled *ss* (as in *stiff, well,* and *grass*). Some common exceptions to point out are *if, this, us, thus, yes, bus,* and *his.* Once students are secure with the spelling of the first three sounds, they can add /z/, as in *fizz.*

By second grade, students should be ready for more complex Anglo-Saxon letter patterns and common inflectional endings. Students learn to spell one-syllable words with patterns such as:

- final /k/ after a short vowel in a one-syllable word is spelled *ck* (e.g., *back, peck, sick, sock, duck*);

- final /k/ after a consonant or two vowels is spelled *k* (e.g., *milk, desk, book, peek*);

- final /ch/ after a short vowel in a one-syllable word is spelled *tch* (e.g., *catch, pitch, match*), and after a consonant or two vowels is spelled *ch* (e.g., *bench, pouch*); the words *which, rich, much,* and *such* are exceptions;

- final /j/ after a short vowel in a one-syllable word is spelled *dge* and *ge* after a long vowel, a consonant, or two vowels (e.g., *badge, fudge, age, hinge, scrooge*); and

- initial and medial /au/ is usually spelled *ou* and final /au/ is spelled *ow* (e.g., *out, found, cow, how*).

Students also learn to spell words with inflectional endings, such as *ing* and *ed.* Spelling words with these endings may require doubling or dropping a letter. For example, when a suffix that begins with a vowel is added to a one-syllable word that ends in one vowel and one consonant, the final consonant is doubled (e.g., *hopping, running, stopped,* and *bagged*). The same is true when a suffix that begins with a vowel is added to the last syllable of a multisyllabic word that ends in one vowel and one consonant, and is stressed* (e.g., *beginning* and *occurred*). When a suffix that begins with a vowel is added to a word that ends in a final *e*, the final *e* is dropped (e.g., *hoping, naming, saved, joked*).

Students learn how to spell multisyllablic words, the unstressed vowel schwa (as in *sofa* and *alone*), and most common prefixes and suffixes in grade 3. They learn more complicated patterns such as using *c* for both the final /k/ after a short vowel in a word with more than one syllable (e.g., *public, lilac, fantastic*) and for the medial /s/ in a multisyllabic word after a vowel and before *e, i,* or *y* (e.g., *grocery, recess, recite*). Students also learn to spell words with common suffixes that may require changing a letter. For example, they learn to change *y* to *i* when a suffix that does not begin with *i* is added to a word that ends in a consonant and a final *y* (e.g., *happiness, babies, plentiful*).

Latin-based prefixes, suffixes, and roots are introduced in grade 4. Students spell words with meaningful word parts such

as *vis* (*television*), *audi* (*auditorium*), *duc* (*conductor*), *port* (*transportation*), and *spect* (*spectacular*).

Greek combining forms are introduced in grades 5 to 7. Students spell words with meaningful word parts such as *photo* (*photography*), *phono* (*symphony*), *logy* (*biology*), *philo* (*philosophy*), *tele* (*telescope*), and *thermo* (*thermodynamic*).

How Should Spelling Be Taught?

Students should be taught about the lawfulness of spelling, even while irregularities are acknowledged. Students can be encour-

The spellings of English words are influenced by the positions of the letters within the words, meaningful word parts, and the history of English. Spelling, therefore, is a window on what a person knows about words. Learning about words and about the language will improve spelling skills.

aged to recognize, learn, and use the patterns in English spelling through systematic, explicit instruction and activities. Such instruction requires careful planning, but is much more effective than memorizing words in a rote fashion.

With guidance, students can be led to recognize the sounds in words and their most frequent spellings.[23] For example, a sound-spelling pattern might be introduced by preparing a list of five or six words that contain the same sound and the same spelling of that sound. Let's use the words *ship, shop, wish, dish, flash,* and *usher* to see how such a lesson would unfold with first-grade students. Before diving into the list, students should be taught the terms *initial, medial,* and *final* to refer to the positions of sounds and letter patterns in words. *Initial* is used to denote a sound or letter pattern at the beginning of a word or syllable. *Medial* includes any sound or letter pattern that is between the initial and final positions (e.g., the letter *n* is in the medial position of the words *snip* and *splint*). *Final* denotes a sound or letter pattern at the end of a word or syllable. The lesson then proceeds as follows:

Teacher: Say each word after me and listen for the sound that is the same in all the words. [The teacher reads the words—*ship, shop, wish, dish, flash, usher*—one at a time. Students repeat each word.] Tell me the sound that is the same in all these words.
Students: /sh/
Teacher: In what positions did you hear /sh/? Did you hear it in the initial position?
Students: Yes.
Teacher: In which words?
Students: In *ship* and *shop*.

Teacher: Listen to the words again. [The teacher reads the words again.] Did you hear it in final position?

Students: Yes, in *dish* and *splash*.

Teacher: Listen to the words again and tell me if you hear /sh/ in medial position. [The teacher reads the words again.]

Students: Yes, in *usher*.

Teacher: [The teacher writes the words on the board.] Look at these words and tell me what letter or letters are the same.

Students: *sh*

Teacher: In what positions do you see the letter or letters?

Students: In initial position and in final position and in medial position.

Teacher: Tell me the pattern.

Students: When you hear /sh/, spell it *sh*.

This type of lesson heightens students' awareness of sounds in words and calls their attention to the letters and letter patterns that spell the sounds.

Students can also recognize letter patterns through word sorts. Table 1 shows a list of words where /k/ is spelled with *k* or *c* in the initial position and with *k*, *ck*, or *c* in the final position. Students can be given the list of words and asked to write the words where they belong in worksheets like those shown under Table 1. After completing this activity, students can be led to see when /k/ is represented by the letter *k* and when it is represented by the letter *c*. They will also see the spelling patterns of /k/ in final position. Even if only 10 to 30 of these words appear in the weekly spelling lesson and on the spelling test, students should be able to generalize what they've learned to all of the words that follow the patterns of spelling /k/.

A similar activity can be developed to teach *ch* or *tch* at the end of a word. Give a list of words that end in *ch* or *tch*, as in Table 2, and use this to help children figure out the spellings of the corresponding sound.

How Should Spelling Be Assessed?

When testing students' spelling, it's important to go beyond simply marking words right or wrong. The assessment should be an opportunity to evaluate students' understanding of sounds and conventional spelling patterns. The kinds of words that students miss and the types of errors they make are important in evaluating their spelling achievement and their understanding of language structures.[24] For example, by carefully reviewing students' errors, a teacher may see that some students are confusing /b/ and /p/. Figuring out what to do requires some follow-up. Many students confuse /b/ and /p/ because the letters that are used to spell them are visually similar. But some students who consistently confuse /b/ and /p/ may not be aware that even though the positions of the tongue, teeth, and lips are the same when pronouncing /b/ and /p/, one sound is voiced (i.e., /b/ activates the vocal cords) and the other is unvoiced.[25] This difficulty can be corrected by having the student place two fingers on his or her vocal cords as the word is pronounced in order to feel whether or not the vocal cords are activated.

To deliver more targeted instruction, researchers devised a

Table 1. List of words with various spellings for /k/ in initial and final positions.		
traffic	dock	lock
brick	music	seek
brook	book	block
keg	meek	lilac
hook	keep	kettle
public	thick	trunk
crash	pack	luck
track	cure	shook
kindle	kilt	culvert
week	crater	speck
quick	kept	duck
carpet	sulk	shellac
attic	crook	kin
cord	combat	elk
peck	frantic	rock
look	task	deck

Initial position

k	c
keg	crash

Final position

k	c	ck
brook	traffic	brick

Table 2. List of words with *ch* or *tch*.	
beach	witch
pouch	preach
starch	church
batch	notch
crunch	clutch
hitch	march
hutch	sketch
finch	scratch
botch	punch
perch	switch

ch	tch
beach	batch

Teaching Spelling

These Language-Based Programs Provide the Grade-by-Grade, Well-Sequenced Instruction That Students Need

English spelling is more regular and rule bound than commonly believed, but that doesn't mean it's easy to teach. Instruction needs to be carefully sequenced so as to build up from common, regular words (like cat) to uncommon, specialized words (like hydroponics). Since such instruction must be spread across several grades, educators may find that a well-planned program is the best way to deliver coherent spelling instruction.

Unfortunately, very little research exists to guide educators in selecting a program: we are not aware of any large-scale studies that compare the relative effectiveness of various spelling programs. Nonetheless, as explained in the main article, research has found language-based spelling instruction (e.g., that focuses on sound-letter correspondences) to be more effective than instruction that relies heavily on visual memorization of words (e.g., that uses flashcards). The two programs shown here—Primary Spelling by Pattern, for early elementary students, and Spellography, for upper elementary students—offer explicit, carefully sequenced instruction in the structure and history of the English language. They both emphasize sound-letter correspondences and provide an array of activities to help students understand and remember the regularities and patterns in English.

—EDITORS

Primary Spelling by Pattern

Developed by Ellen Javernick, a first- and second-grade teacher, and Louisa Moats, a researcher who specializes in reading and spelling, Primary Spelling by Pattern is a program for first through third graders, or for older students who are having difficulty. Level 1 of the program is currently available; two more levels are being developed. The samples shown here are all from Lesson 10 on how to spell the /k/ and /ng/ sounds; there are two pages from the teacher edition, one student worksheet, and the parent handout.

Spellography

Developed by Louisa Moats, a researcher who specializes in reading and spelling, and Bruce Rosow, a middle-grades resource teacher and curriculum coordinator, Spellography is a program for fourth and fifth graders (who read at or above the mid-third-grade level) or for middle-grades students in need of more structured language instruction. The sample pages shown here, all of which are from the student workbook, are from Lesson 15 on spelling the /j/ sound.

Word Construction Zone Compounding is an Anglo-Saxon way of forming new words by combining shorter words. Compound words can be joined together (**himself**), separated (**White House**), or hyphenated (**dog-eat-dog**).

Exercise 9

Stage Fright Congratulations! You are at the stage in life when it's just right for you to find compound words built with the word **stage**. List four of them here.

_____   _____

_____   _____

LESSON 15
Huge Smudge

Lesson 15 Word List

1. dodge
2. bulge
3. page
4. ridge
5. forge
6. huge
7. pledge
8. fringe
9. judge
10. stage
11. largely
12. cage
13. verge
14. plunge
15. dredge
16. refuge
17. smudge
18. indulge
19. message
20. damage
21. village
22. knowledge*
23. wreckage
24. challenge

Irregular words: sought, by, of, some

* Marks a word that does not follow the pattern.

Spelling Concept: At the ends of words, the /j/ sound is spelled with **-dge** or **-ge**. In this lesson, we'll review the work we did with the **-dge** or consonant + **-ge** spellings in Lesson 10—Hodgepodge, plus add a few more wrinkles to the /j/ sound study and—hopefully—to your brain.

First of all, it is a spelling fact that no words in English end in a plain letter **j**. So spelling /j/ with a **j** is NOT an option. That leaves us with "soft g": a **g** followed by an **e** to represent the sound /j/.

Short vowels need extra protection if you add **-ge** after them. If you add **-ge** after a vowel, a "magic **e**" spelling results. For example, the word **wage** has a long vowel followed by **-ge**. To spell a short vowel before a /j/ sound, the **-ge** needs some help from a guardian that will keep the "magic **e**" far enough away. That's why we add a **-dge** after short vowels, unless there is already another consonant between the vowel and the **-ge**. The words in this week's spelling list have these patterns:

short **v** + **-dge** (ridge, dodge)   short **v** + **-nge** (fringe, plunge)
short **v** + **-lge** (bulge, indulge)   **v** + **-r** + **-ge** (verge, forge)

Long vowels can be followed directly by **-ge**. The silent **e** is doing two jobs: it is representing the soft sound of **g** and it is marking the vowel as long.

long **v** + **-ge** (page, huge)

However, ... unaccented. This means that the silent **e** so ... ed into the dreaded ...

Lesson 15 • ...

Exercise 1

Phoneme Substitution and Deletion Create word magic by following these instructions.

Say **dot**. Change the /t/ to /j/.

Say **batch**. Change the /ch/ to /j/.

Say **refuge**. Change the /j/ to /s/.

Say **wreckage**. Change the /j/ to /n/.

Say **forge**. Change the /j/ to /s/.

Say **verge**. Change the /j/ to /s/.

Say **large**. Change the /j/ to /k/.

Say **strange**. Say it without the /j/.

Exercise 2a

Mark the vowels in these words from this lesson's study list as long (**L**), short (**S**), **v** + **-r** (**R**), or silent (/) (a diagonal line).

dodge   forge   judge   verge   smudge   page

bulge   huge   stage   plunge   indulge   cage

pledge   largely   dredge   ridge   fringe

...ese words also have schwa vowels. Mark the vowels as in Exercise #2a, ... then underline the schwa vowels.

Exercise 2b

knowledge   challenge

message   damage

wreckage

Exercise 11

Speed Read This journal entry describes Professor Thunker's life among the natives in Anchorage. Speed-read this absolutely fascinating account out loud, and record your time and errors on three different days.

Strange Georgia

North of Anchorage—through a peaceful village, along a ridge, and over an aged arched bridge—sits a hermitage with a cottage. The cottage is perched beside Three Cow Gorge, named for the strange cow Georgia who lives there with the sage, Page. For a cow, Georgia is strangely arranged and about the size of the grange. Each sunrise, Page trudges to the barn and gives Georgia a huge hug. Georgia nudges Page gently with her bulging baggage. Page then indulges Georgia, feeding her tonnage of organic wheat and corn porridge. Since Georgia gorges on porridge, her poundage is outrageously outstanding. Standing outside the hermitage, I often spot that huge cow and the grungy dog Bess near the garbage, bingeing on compost. Page thinks this is funny and is glad there is less wastage at the hermitage along the ridge.

Day 1	Day 2	Day 3
Time: _____	Time: _____	Time: _____
Errors: _____	Errors: _____	Errors: _____

Challenge Activity
Underline all of the letter spellings for the /j/ sound in this passage. How many did you find?

Finally: Take the Posttest, and record your score here. **Number Correct:** _____

68   Spellography • A Student Road Map to Better Spelling

Spelling Concept: The ge Complex If a word ending begins with any letter other than **e** or **i**, don't drop the **e** from **-ge** words. The word needs the **e** to keep the soft sound of **g**, which is /j/.

engagement   arrangement   damageable   knowledgeable

Exercise 6a

Add the given suffixes and write the new spellings in the blanks.

gorge + ous   _____

age + less   _____

outrage + ous   _____

arrange + ment   _____

huge + ly   _____

knowledge + able   _____

dodge + ing   _____

manage + able   _____

Spellography • A Student Road Map to Better Spelling

To learn more about Primary Spelling by Pattern and Spellography, go to **www.sopriswest.com** and use the "Search Products" box on the left side of the page.

seven-point rubric to judge kindergarten students' spelling.[26] A score of 0 designated a random string of letters with no alphabetic representations. Scores of 1 to 5 indicated increasing degrees of accuracy, and 6 represented a correct spelling. The scores of low-income, inner-city students improved on this measure after 11 weeks of instruction on the sounds that make up English words, even though the trained students did not spell all of the post-test words correctly. However, their post-test spellings demonstrated improvement in segmenting sounds and sound-letter knowledge. Although the assessment of spelling using a validated rubric takes more time than marking words right or wrong, it provides a more complete picture of students' linguistic knowledge and is helpful in designing appropriate instruction.*

Our knowledge of spelling (and writing) has lagged behind our understanding of reading. It has often been assumed that spelling mostly involves rote visual memorization, but we have argued that this is not the case. As Rebecca Treiman, one of the authors of this article, has written, "For young children, spelling is a creative linguistic process rather than a learned habit involving rote visual memorization. Young children create spellings for words based on their knowledge of language and their knowledge of print. They do not simply memorize letter sequences."[27] Treiman has further argued that "knowledge of the alphabet and phonological awareness are two foundations on which literacy learning rests. Young children are not just rote memorizers when learning about the sounds of letters, when learning about the printed forms of their own names, and when learning to read their first few words. Linguistic factors are intimately involved in this learning, just as they are in the development of phonological awareness."[28]

We do not wish to argue that visual memory has no role in learning to spell. Rather, we emphasize that memory for spelling patterns relies on and is facilitated by an understanding of linguistic concepts, including speech sounds, sound-letter correspondences, word origins, and meaningful parts of words. The primary mechanism for word memory is not a photographic memory, as many believe; it is insight into why the word is spelled the way it is.

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* To learn more about assessing spelling, see: Kathy Ganske, *Word Journeys: Assessment-Guided Phonics, Spelling, and Vocabulary Instruction* (New York: Guilford Press, 2000); and Donald R. Bear, Marcia Invernizzi, Shane R. Templeton, and Francine Johnston, *Words Their Way: Word Study for Phonics, Vocabulary, and Spelling Instruction* (Upper Saddle River, NJ: Prentice Hall, 2003).

Don't Computers Make Spelling Instruction Unnecessary?

Sometimes, spelling instruction ends up on the back burner because of the existence of computer spell checkers. Isn't mastery of correct spelling within the reach of every computer user? Not really. Spell checkers do not eliminate the need to learn to spell accurately. When we used a computer spell checker for the sentence *The bevers bild tunls to get to their loj*, the spell checker gave correct spellings for *bevers* (*beavers*) and *bild* (*build*). However, the spell checker did not come up with the words needed to replace *tunls* (*tunnels*) or *loj* (*lodge*). Instead, for *tunls* it provided *tuns*, *tunas*, *tunes*, *tongs*, *tens*, *tans*, *tons*, *tins*, *tense*, *teens*, and *towns*. And for *loj*, it provided *log*, *lot*, *lox*, *loge*, *look*, *lost*, *lorid*, *load*, *lock*, *lode*, *lout*, *lo*, *lob*, *lose*, *low*, and *logs*. The fact is, computer spell checkers are mainly a tool for correcting typos. They are helpful for those who are reasonably good spellers, but they cannot compen-sate for poor spelling. Further, computer spell checkers cannot be relied on with homophones. For instance, a spell checker cannot correct the errors in the sentence *Your sure glad to no* for *You're sure glad to know*. It also misses errors such as *meet* for *meat* and *week* for *weak*.

A study with two fourth-grade boys with learning disabilities reported that spell checkers provided the correct spellings of misspelled words 51–86 percent of the time.[1] Other studies reported a wider range of performance in identifying correct spellings, between about 25 percent and 80 percent of the time.[2] If a word was misspelled phoneti-cally, the spell checker was able to identify it about 80 percent of the time. If a word was not spelled phonetically—something that commonly occurs among young children—the spell checker was able to identify it only about 25 percent of the time. Addi-tional problems involving spell checkers include words spelled correctly but used inappropriately (e.g., *then* for *them*) and the fact that some children cannot pick the correct word from the list of suggested words.[3] Thus, although computer spell checkers are useful, they do not substitute for explicit spelling instruction.

–R.M.J., R.T., S.C., and L.C.M.

Endnotes

1. Bridget Dalton, N. E. Winbury, and Catherine Cobb Morocco, "'If You Could Just Push a Button': Two Fourth Grade Boys with Learning Disabilities Learn to Use a Computer Spelling Checker," *Journal of Special Education Technology* 10 (1990): 177–91.

2. Charles A. MacArthur, Steve Graham, J. B. Haynes, and S. DeLaPaz, "Spell Checkers and Students with Learning Disabilities: Performance Comparisons and Impact on Spelling," *Journal of Special Education* 30 (1996): 35–57; and Donna J. Montgomery, George R. Karlan, and Martha Coutinho, "The Effectiveness of Word Processor Spell Checker Programs to Produce Target Words for Misspellings Generated by Students with Learning Disabilities," *Journal of Special Education Technology* 16 (2001): 27–41.

3. Charles A. MacArthur, "Using Technology to Enhance the Writing Processes of Students with Learning Disabilities," *Journal of Learning Disabilities* 29 (1996): 344–54.

Language-Based Spelling Instruction

(Continued from page 16)

The spellings of English words are influenced by the positions of the letters within the words, meaningful word parts, and the history of English. Teachers can draw children's attention to the types of information provided in this article, and this may be expected to improve children's spelling performance. Spelling is a psychological, linguistic, and conceptual process involving knowledge of the alphabet, syllables, word meaning, and the history of words.[29] Spelling, therefore, is a window on what a person knows about words. Learning about words and about the language will improve spelling skills. ☐

Endnotes

1. Cited in Richard L. Venezky, "From Webster to Rice to Roosevelt," in *Cognitive Processes in Spelling*, ed. Uta Frith (London: Academic Press, 1980), 9–30.

2. Linnea C. Ehri, "Learning to Read and Learning to Spell Are One and the Same, Almost," in *Learning to Spell: Research, Theory, and Practice across Languages*, ed. Charles A. Perfetti, Laurence Rieben, and Michel Fayol (Mahwah, NJ: Lawrence Erlbaum Associates, 1997), 237–69; R. Malatesha Joshi and P. G. Aaron, "Specific Spelling Disability: Factual or Artifactual?" *Reading and Writing: An Interdisciplinary Journal* 2 (1990): 107–25; R. Malatesha Joshi and P. G. Aaron, "A New Way of Assessing Spelling and Its Classroom Applications," in *Literacy Acquisition, Assessment, and Instruction: The Role of Phonology, Orthography, and Morphology*, ed. R. Malatesha Joshi, Bozydar Kaczmarek, and Che Kan Leong (Amsterdam: IOS Press, 2003), 153–61; and Louisa C. Moats, "How Spelling Supports Reading: And Why It Is More Regular and Predictable Than You May Think," *American Educator* 29, no. 4 (2005-06): 12–22, 42–3.

3. Linnea C. Ehri, "The Development of Spelling Knowledge and Its Role in Reading Acquisition and Reading Disability," *Journal of Learning Disabilities* 22 (1989): 356–65.

4. Arthur I. Gates and Esther H. Chase, "Methods and Theories of Learning to Spell Tested by Studies of Deaf Children," *Journal of Educational Psychology* 17 (1926): 289–300.

5. Leonard S. Cahen, Marlys J. Craun, and Susan K. Johnson, "Spelling Difficulty: A Survey of the Research," *Review of Educational Research* 41 (1971): 281–301; Gates and Chase, "Methods and Theories"; Ernest Horn, "Spelling," in *Encyclopedia of Educational Research*, ed. Chester W. Harris, 3rd ed. (New York: Macmillan, 1960), 1337–54; and Thomas Horn, "Spelling," in *Encyclopedia of Educational Research*, ed. Robert L. Ebel, 4th ed. (New York: Macmillan, 1969), 1282–99.

6. Marie Cassar, Rebecca Treiman, Louisa C. Moats, Tatiana Cury Pollo, and Brett Kessler, "How Do the Spellings of Children with Dyslexia Compare with Those of Nondyslexic Children?" *Reading and Writing: An Interdisciplinary Journal* 18 (2005): 27–49; and Rebecca Treiman and Derrick C. Bourassa, "The Development of Spelling Skill," *Topics in Language Disorders* 20 (2000): 1–18.

7. Guojun Zhang and Herbert A. Simon, "STM Capacity for Chinese Words and Idioms: Chunking and Acoustical Loop Hypotheses," *Memory and Cognition* 13, no. 3 (1985): 193–201; and P. G. Aaron, Susan Wilczynski, and Victoria Keetay, "The Anatomy of Word-Specific Memory," in *Reading and Spelling: Development and Disorders*, ed. Charles Hulme and R. Malatesha Joshi (Mahwah, NJ: Lawrence Erlbaum Associates, 1998), 405–19.

8. Rebecca Treiman, *Beginning to Spell* (New York: Oxford University Press, 1993).

9. Cassar et al., "Children with Dyslexia"; Linnea C. Ehri, "Grapheme-Phoneme Knowledge Is Essential for Learning to Read Words in English," in *Word Recognition in Beginning Literacy*, ed. Jamie L. Metsala and Linnea C. Ehri (Mahwah, NJ: Lawrence Erlbaum Associates, 1998), 3–40; Linnea C. Ehri, "Learning to Read and Learning to Spell: Two Sides of a Coin," *Topics in Language Disorders* 20 (2000): 19–49; Louisa C. Moats, *Spelling: Development, Disability, and Instruction* (Baltimore, MD: York Press, 1995); and Louisa C. Moats, "Phonological Spelling Errors in the Writing of Dyslexic Adolescents," *Reading and Writing: An Interdisciplinary Journal* 8 (1996): 105–19.

10. Christopher T. Arra and P. G. Aaron, "Effects of Psycholinguistic Instruction on Spelling Performance," *Psychology in the Schools* 38, no. 4 (2001): 357–63.

11. Steve Graham, "Handwriting and Spelling Instruction for Students with Learning Disabilities: A Review," *Learning Disability Quarterly* 22 (1999): 78–98.

12. Virginia W. Berninger, Katherine Vaughan, Robert D. Abbott, Allison Brooks, Kristin Begay, Gerald Curtin, Kristina Byrd, and Steve Graham, "Language-Based Spelling Instruction: Teaching Children to Make Multiple Connections between Spoken and Written Words," *Learning Disability Quarterly* 23 (2000): 117–35.

13. Eileen Wynne Ball and Benita A. Blachman, "Does Phoneme Awareness Training in Kindergarten Make a Difference in Early Word Recognition and Developmental Spelling?" *Reading Research Quarterly* 26 (1991): 49–66; Benita A. Blachman, Eileen Wynne Ball, Rochella Black, and Darlene M. Tangel, "Kindergarten Teachers Develop Phoneme Awareness in Low-Income, Inner-City Classrooms: Does It Make a Difference?" *Reading and Writing: An Interdisciplinary Journal* 6 (1994): 1–18; and Benita A. Blachman, Darlene M. Tangel, Eileen Wynne Ball, Rochella Black, and Colleen K. McGraw, "Developing Phonological Awareness and Word Recognition Skills: A Two-Year Intervention with Low-Income, Inner-City Children," *Reading and Writing: An Interdisciplinary Journal* 11 (1999): 239–73.

14. Yolanda V. Post and Suzanne Carreker, "Orthographic Similarity and Phonological Transparency in Spelling," *Reading and Writing: An Interdisciplinary Journal* 15 (2002): 317–40.

15. Yolanda V. Post, Suzanne Carreker, and Ginger Holland, "The Spelling of Final Letter Patterns: A Comparison of Instruction at the Level of the Phoneme and the Rime," *Annals of Dyslexia* 51 (2001): 121–46.

16. Paul R. Hanna, Jean S. Hanna, Richard E. Hodges, and Edwin H. Rudorf, Jr., *Phoneme-Grapheme Correspondences as Cues to Spelling Improvement*, USDOE Publication No. 32008 (Washington, D.C.: U.S. Government Printing Office, 1966).

17. Noam Chomsky and Morris Halle, *The Sound Pattern of English* (New York: Harper and Row, 1968), 49.

18. Suzanne Carreker, "Teaching Spelling," in *Multisensory Teaching of Basic Language Skills*, ed. Judith R. Birsh, 2nd ed. (Baltimore, MD: Paul H. Brookes, 2005), 217–56; and Marcia K. Henry, "A Short History of the English Language," in *Multisensory Teaching of Basic Language Skills*, ed. Judith R. Birsh, 2nd ed. (Baltimore, MD: Paul H. Brookes, 2005), 119–39.

19. Marcia K. Henry, *Unlocking Literacy: Effective Decoding and Spelling Instruction* (Baltimore, MD: Paul H. Brookes, 2003); and Louisa C. Moats, *Speech to Print: Language Essentials for Teachers* (Baltimore, MD: Paul H. Brookes, 2000).

20. Carreker, "Teaching Spelling."

21. Marie Cassar and Rebecca Treiman, "The Beginnings of Orthographic Knowledge: Children's Knowledge of Double Letters in Words," *Journal of Educational Psychology* 89 (1997): 631–44.

22. Treiman, *Beginning to Spell*.

23. Carreker, "Teaching Spelling."

24. R. Malatesha Joshi, "Assessing Reading and Spelling Skills," *School Psychology Review* 24 (1995): 361–75.
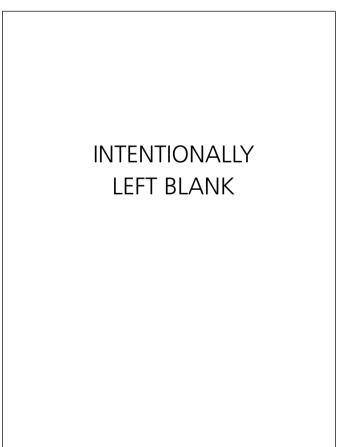
25. Louisa C. Moats, *Spellography for Teachers: How English Spelling Works; Language Essentials for Teachers of Reading and Spelling (LETRS), Module 3* (Longmont, CO: Sopris West, 2005); and Moats, "How Spelling Supports Reading."

26. Darlene M. Tangel and Benita A. Blachman, "Effect of Phoneme Awareness Instruction on Kindergarten Children's Invented Spelling," *Journal of Reading Behavior* 24 (1992): 233–61.

27. Rebecca Treiman, "Beginning to Spell in English," in *Reading and Spelling: Development and Disorders*, ed. Charles Hulme and R. Malatesha Joshi (Mahwah, NJ: Lawrence Erlbaum Associates, 1998), 371–93.

28. Rebecca Treiman, "Knowledge about Letters as a Foundation for Reading and Spelling," in *Handbook of Orthography and Literacy*, ed. R. Malatesha Joshi and P. G. Aaron (Mahwah, NJ: Lawrence Erlbaum Associates, 2006), 581–99.

29. Shane Templeton and Darrell Morris, "Spelling," in *Handbook of Reading Research*, ed. Michael L. Kamil, Peter B. Mosenthal, P. David Pearson, and Rebecca Barr (Mahwah, NJ: Lawrence Erlbaum Associates, 2000), 3:525–43.

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Spelling, Reading, and Writing

(Continued from page 9)

Endnotes

1. Catherine E. Snow, Peg Griffin, and M. Susan Burns, eds., *Knowledge to Support the Teaching of Reading: Preparing Teachers for a Changing World* (San Francisco: Jossey-Bass, 2005).

2. Bonnie D. Singer and Anthony S. Bashir, "Developmental Variations in Writing Composition Skills," in *Handbook of Language and Literacy: Development and Disorders*, ed. C. Addison Stone, Elaine R. Silliman, Barbara J. Ehren, and Kenn Apel (New York: Guilford Press, 2004), 559–82.

3. Louisa C. Moats, Barbara R. Foorman, and Patrick Taylor, "How Quality of Writing Instruction Impacts High-Risk Fourth Graders' Writing," *Reading and Writing: An Interdisciplinary Journal* 19 (2006): 363–91; and Anna Maria Re, Martina Pedron, and Cesare Cornoldi, "Expressive Writing Difficulties in Children Described as Exhibiting ADHD Symptoms," *Journal of Learning Disabilities* 40 (2007): 244–55.

4. Linnea C. Ehri, "Learning to Read and Learning to Spell: Two Sides of a Coin," *Topics in Language Disorders* 20 (2000): 19–49.

5. Benita A. Blachman, Darlene M. Tangel, Eileen Wynne Ball, Rochella Black, and Colleen K. McGraw, "Developing Phonological Awareness and Word Recognition Skills: A Two-Year Intervention with Low-Income, Inner-City Children," *Reading and Writing: An Interdisciplinary Journal* 11 (1999): 239-73; Linnea C. Ehri, "Grapheme-Phoneme Knowledge Is Essential for Learning to Read Words in English," in *Word Recognition in Beginning Literacy*, ed. Jamie L. Metsala and Linnea C. Ehri (Mahwah, NJ: Lawrence Erlbaum Associates, 1998), 3–40; and Joanna K. Uhry and Margaret Jo Shepherd, "Segmentation and Spelling Instruction as Part of a First-Grade Reading Program: Effects on Several Measures of Reading," *Reading Research Quarterly* 28 (1993): 219–33.

6. Moats, Foorman, and Taylor, "Quality of Writing Instruction"; and Marie Cassar, Rebecca Treiman, Louisa C. Moats, Tatiana Cury Pollo, and Brett Kessler, "How Do the Spellings of Children with Dyslexia Compare with Those of Nondyslexic Children?" *Reading and Writing: An Interdisciplinary Journal* 18 (2005): 27–49.

7. Linnea C. Ehri and Margaret J. Snowling, "Developmental Variation in Word Recognition," in *Handbook of Language and Literacy: Development and Disorders*, ed. C. Addison Stone, Elaine R. Silliman, Barbara J. Ehren, and Kenn Apel (New York: Guilford Press, 2004), 433–60.

8. Kenn Apel, Julie A. Wolter, and Julie J. Masterson, "Effects of Phonotactic and Orthotactic Probabilities during Fast Mapping on 5-Year-Olds' Learning to Spell," *Developmental Neuropsychology* 29 (2006): 21–42.

9. Ehri, "Learning to Read"; and Paras D. Mehta, Barbara R. Foorman, Lee Branum-Martin, and Patrick Taylor, "Literacy as a Unidimensional Multilevel Construct: Validation, Sources of Influence, and Implications in a Longitudinal Study in Grades 1 to 4," *Scientific Studies of Reading* 9 (2005): 85–116.

10. Alan G. Kamhi and Linette N. Hinton, "Explaining Individual Differences in Spelling Ability," *Topics in Language Disorders* 20 (2000): 37–49; Carolyn Lennox and Linda S. Siegel, "Phonological and Orthographic Processes in Good and Poor Spellers," in *Reading and Spelling: Development and Disorders*, ed. Charles Hulme and R. Malatesha Joshi (Mahwah, NJ: Lawrence Erlbaum Associates, 1998), 395–404; and Louisa C. Moats, *Spelling: Development, Disability, and Instruction* (Baltimore, MD: York Press, 1995).

11. Patricia C. Lindamood, "Issues in Researching the Link between Phonological Awareness, Learning Disabilities, and Spelling," in *Frames of Reference for the Assessment of Learning Disabilities: New Views on Measurement Issues*, ed. G. Reid Lyon (Baltimore, MD: Paul H. Brookes, 1994), 351–73.

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