



How Children Learn to Spell

by Louisa Moats

Researchers' neglect of spelling disability and spelling instruction is puzzling, as Kamhi and Hinton (2000) have noted. Our society expects that anyone with average intelligence should know how to spell, even though spelling problems are very common in the general population. Educated people, such as Vice President Dan Quayle, who famously misspelled the word "potato," are judged harshly for their errors. Learning to spell, however, is neither simple nor natural, and effective spelling instruction has yet to receive sufficient attention in high quality, experimental studies.

In the last two decades or so, research has shown that rote visual memory is neither the basis for good spelling nor the main culprit in poor spelling (Treiman and Bourassa, 2000; Cassar, Treiman, Moats, Pollo, and Kessler, 2005). Rather, good spellers (at least of English) successively gain insights into the way print represents spoken language as they develop a storehouse of known words for writing (Ehri, 1998, 2000). Poor spellers, in contrast, never become fully aware of the connections between speech sounds, print representation, word meaning, and word origin, and thus their recall of exact letter

sequences remains limited (Cassar et al, 2005; Moats, 1995, 1996).

The precocious demonstration of spelling ability at the annual National Spelling Bee reveals how good spellers think. To cue their recall of obscure word spellings, competitors may ask the moderator, "How is the word pronounced?" "From what language did it originate?" "What does the word mean?" Spelling recall is prompted by knowledge of language structure, especially phonological awareness, word origin, and morphology, or awareness of the meaningful parts. But how does this proficiency develop?

First and most importantly, novice spellers must identify and segment the speech sounds, or phonemes, in the spoken word (Ehri, 2000; National Institute of Child Health and Human Development, 2000; Stanovich, Siegel, and Gattardo, 1997; Treiman and Bourassa, 2000). Progressive differentiation of the units of spoken language – including words in sentences, syllables, rime units and phonemes will be necessary before children can match written alphabetic symbols to speech. Gradually, knowledge of letter patterns within syllables, syllable spelling patterns,

and meaningful word parts are learned as the student's spelling vocabulary expands. While visual memory – or more specifically, memory for the letter sequences in orthography – is necessary for spelling, spelling accuracy develops most rapidly if students are taught (or intuit) the phoneme-grapheme and syllable structure words (Bhattacharya and Ehri, 2004; Ehri, 2000; Scott, 2000; Tangel and Blachman, 1995; Treiman, 1993; Uhry and Shepherd, 1993).

Researchers trained at the University of Virginia have preferred to describe spelling development in terms of a series of predictable stages (Bear, Invernizzi, Templeton, and Johnston, 2000; Ganske, 2000). Other researchers emphasize the idea that novice spellers gradually and continuously integrate information about sounds, letter patterns, and meaningful word parts (morphemes) as they progress (Cassar et al., 2005; Ehri, 1998, 2000; Treiman, 1993). Rather than a developmental progression characterized by distinct stages, learning to spell is more accurately described as a continual amalgamation of phonological, morphological, and orthographic knowledge (see Table 1).

TABLE 1: PHASES OF WORD READING AND SPELLING DEVELOPMENT (After Ehri, 1998, 2000)

PHASE	Logographic or Preconventional	Novice (Early) Alphabetic	Mature (Later) Alphabetic	Transitional Or Orthographic
How Child Reads Familiar Words	Rote learning of incidental visual features of a word; no letter-sound awareness	Partial use of letter-sound correspondence; initial sound and salient consonants	Pronunciation of whole word on basis of complete phoneme-grapheme mapping	Variously by phonemes, syllabic units, morpheme units, and whole words
How Child Reads Unfamiliar Words	Guessing constrained by context or memory of text	Constrained by context; gets first sound and guesses	Full use of phoneme-grapheme correspondence; blends all sounds left to right; begins to use analogy to known patterns	Sequential and hierarchical decoding – notices familiar parts first, reads by analogy to similar known words
Other Indicators	Dependent on context; few words; errors and confusions; cannot read text	Similar appearing words are confused	Rapid, unitized reading of whole familiar words is increasing	Remembers multi-syllabic words; analogizes easily, associates word structure with meaning
How the Child Spells	Strings letters together, assigns meaning without representing sounds in words	Represents a few salient sounds, such as beginning and ending consonants; fills in other letters randomly; some letter names for sounds	Phonetically accurate; beginning to incorporate conventional letter sequences and patterns; sight word knowledge increasing	Word knowledge includes language of origin, morphemes, syntactic role, ending rules, prefix, suffix & root forms

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Very young children who are just beginning to learn letters and write their names may not be able to segment the speech sounds in a simple word and may not understand what letters are used for. These characteristics are associated with a "prealphabetic" or "preconventional" stage of spelling. Nevertheless, children know something about print from looking at it in books. Their "pretend" writing may go from left to right. Capital letters may be used before some words, some letters may be doubled and vowel-consonant alternations may occur. Numbers may be mixed in with letters.

Next, with experience and instruction, children develop the insight that print represents the segmentable sounds in speech (phonemes), but they will spell only some of the sounds in words. In this early or novice alphabetic stage, children often spell one or two salient phonemes in a word, such as the first consonant. They may draw on their knowledge of letter names to derive spellings for sounds. For example, they may write YOH for "watch", using the letter name "y" to derive the /w/ sound-spelling, and the letter name "h" to derive the /ch/ sound-spelling. Other typical spellings would be ILSRA (illustrated), DIF (drive), and TKU (thank you).

As their phoneme awareness and familiarity with print continue to grow, however, children who are on track quickly become good phonetic spellers, able to spell each sound they detect in a word. At that point, they are often described as late alphabetic stage spellers. Detailed and complete phonetic spelling of words, a step typical of normally progressing students in late kindergarten and beginning first grade, is possible when children understand the alphabetic principle – that phonemes are represented with letters and letter combinations. Typical spelling would be "I wet trik or treding for my brthda. I shod mi chres to my gram and my grap." [I went trick or treating for my birthday. I showed my treats to my gram and my gramp.] Children who can spell phonetically typically learn to read and spell in first grade with little difficulty (Tangel and Blachman, 1995; Uhry and Shepherd, 1993).

As they are developing phoneme awareness, students simultaneously gain orthographic awareness, or knowledge of features of print. For example, most children learn quickly that -ck is used at the ends of words, not the beginnings. In addition, their spelling attempts show that certain letters can be doubled at the ends of words but not at the beginnings; that

only certain letters are doubled; and that syllables typically contain a vowel letter. Moreover, children learn early that -s means more than one, in spite of the fact that sound of the plural on words such as "dogs" is /z/ (Treiman, 1993).

To become conventional spellers, students must learn the system by which English orthography represents language. Central in that process is the realization that graphemes – the units that represent phonemes – are often more than one letter. For example, the phonemes /th/, /sh/, /ch/, and /ng/ are usually represented with letter combinations, and many vowel spellings are vowel teams (igh, ei, aw, oy). One of the most important facts about

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English spelling is that the single letter is not the only – or even the most common – unit of correspondence. To complete the transition to conventional spelling, students also must learn the rules for adding endings to words, and recognize meaningful parts such as the parts of compounds. Conventional spelling also requires knowledge of grapho-syllabic conventions, such as the use of doubled letters after short vowels. As children are progressing through this transitional stage to conventional spelling, they may write words such as NIHGT (night), MOVEING (moving), SRATE (straight), WRITEING (writing) and FRIGHTEND (frightened). Each of those errors is informed by partial knowledge of the letter combinations, syllable patterns, and meaningful parts that make up words.

Students who achieve conventional spelling mastery can store memories for recurring letter patterns in the form of "chunks" – syllable spellings, common endings and word parts, and high frequency words. However, accurate and fluent recall of syllables, endings, and high frequency words rests on accurate phoneme-grapheme mapping as well as sensitivity to orthographic patterns (Bhattacharya and

Ehri, 2004; Ehri, 2000; Foorman et al., 1991). Practice with activities such as proofreading and error correction also support retention of word-specific information (Berninger et al., 1998).

Children who are poor spellers seem never to complete the progression through the stages of spelling development. Certain linguistic challenges are never resolved. Weak foundations in phonological awareness and orthographic awareness inhibit storage and retrieval of letter sequences at the beginning stages (Goswami, 1992; Kamhi & Hinton, 2000; Masterson & Apel, 2000; Moats, 1996). Children with reading and spelling disabilities do not make errors that are qualitatively distinctive from those of younger, normally progressing children who are matched on level of spelling achievement (Cassar et al. 2005; Moats, 1983; Nelson, 1980), but they appear to get stuck on spelling problems that other children resolve more quickly and easily. The cited studies converge in showing that some linguistic structures are relatively difficult for all learners and are simply never learned by some children. Young children and older children tend to make more errors on the representation of consonant blends than on single consonant spellings, the placement of /r/ and /l/ in syllables after a vowel, the representation of nasal consonants after a vowel (as in *point*, *went*, *brand*) and before a following consonant, and the spelling of unaccented (schwa) vowels (Cassar et al., 2005; Moats, 1996; Read, 1986; Treiman and Bourassa, 2000). In addition, inflected endings (plural -s, past tense -ed especially) account for a large number of the errors of intermediate children (Bryant, Nunes, & Bindman, 1997; Carlisle, 1994) whose awareness of morphology and the grammatical role of words must be improved.

What is to be learned from studies of spelling development? Children will benefit from being taught the structure of written language in a logical progression from sounds to symbols to syllables and morphemes, because that is what good spellers know. Poor spellers need much more practice and a very systematic approach that builds each of the component skills in parallel strands. Developmental studies suggest that individual sounds and letters, letter sequences within words, syllables and their combinations, and knowledge of prefixes, roots, suffixes, are all targets for good spelling instruction.

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APPENDIX: AMERICAN ENGLISH CONSONANT PHONEME-GRAPHEME UNITS

Phonetic Symbol / Phonic Symbol	Examples	Graphemes for Spelling*
/p/	p	p
/b/	b	b
/m/	m	m, mb, mn
/t/	t	t, tt, ed
/d/	d	d, ed
/n/	n	n, kn, gn
/k/	k	k, c, ck, ch, lk, q
/g/	g	g, gh
/ŋ/	ng	n, ng
/f/	f	f, ff, gh, ph, lf
/v/	v	v, ve
/s/	s	s, ss, sc, ps
/z/	z	z, zz, se, s, x
/θ/	th	th
/ð/	th	th
/ʃ/	sh	sh, s, ss, sc, ch
/ʒ/	zh	s, z
/tʃ/	ch	ch, tch
/dʒ/	j	j, ge, dge
/l/	l	l, ll, le
/r/	r	r, wr, er/ur/ir
/j/, /y/	y	y, i, (u, eu)
/w/	w	w, (q)u, wh
/ɹ/	wh	wh
/h/	h	h

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*Note: Graphemes are spellings for individual phonemes; those in the word list are among the most common spellings but the list does not include all possible graphemes for a given consonant. This table also appears in Moats, L.C., (2004), *Language Essentials for Teachers of Reading and Spelling (LETRS) Module 3, Spellography for Teachers*. Longmont, CO: Sopris West.

<u>SYLLABLE TYPES</u>	<u>EXAMPLES</u>	<u>DEFINITION</u>
Closed	dapple hostel Beverage	A syllable with a short vowel, ending in a consonant.
Open	program table recent	A syllable that ends with a long vowel sound, spelled with a single vowel letter.
Consonant-l-e	bible beagle little	An unaccented final syllable containing a consonant, /l/ and silent e.
Vowel Team and Diphthong	awesome trainer congeal spoilage	Syllables with long or short vowel sounds that use a vowel combination for spelling. Diphthongs ou/ow and oi/oy are included in this category.
R-controlled	spurious consort charter	Any syllable in which the vowel is followed by an /r/. Vowel pronunciation often changes before /r/.
Vowel-C-e	compete despite	Syllable has a long vowel spelled with a vowel-consonant-silent e.

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