Children's Invented Spelling: What We Have Learned in Forty Years*

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Some preschool and primary-grade children create their own spellings as they write, in many cases without prompting from adults. For example, a US five-year-old created the sign for his father's study that appears in Figure 13.1:

![Image of a handwritten sign with the text: DOT MAK NOYS MY DADAAY WRX HIR B CWIYIT]

Figure 13.1 Sign written by US five-year-old. The child's writing of 'B CWIYIT' has been retraced with a darker crayon to make it more visible.

DOT MAK NOYS
MY DADAAY WRX HIR
B CWIYIT

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The non-standard spellings in this message, including DOT [don't] and WRX [works] (we follow the convention here of placing children's spellings in upper case, and standard spellings in lower-case italics), are the child's creation, at least in part. They cannot have been acquired from instruction or dictation, as the standard spelling MY may have been. The invented spellings may thus tell us something about the child's knowledge of language. For example, the fact that WRX does not explicitly represent the morphology (base + inflection) tells us that, for this child at this time, writing is closer to a phonological representation than is standard orthography. That distinction defines part of what this child has to learn.

As it turns out, the child who created the sign for his father's office is not unique. Analyzing a collection of writings from twenty such children, Charles Read (1970, 1971) found some spelling patterns to be quite consistent. For example, a spelling like DOT for don't, with no representation of a nasal sound before a consonant, is common in young children's spelling. Read identified several such patterns and proposed explanations, mainly phonological, for each. Carol Chomsky contributed significantly to this line of work, with additional examples and close observation of children engaged in writing. Her greatest contribution was her thinking about what invented spelling might mean for learning to read and how writing might be incorporated into a preschool or primary-grade classroom.

In this chapter, we will summarize these early contributions. We will then examine what four decades of further research has uncovered. How well have the initial views of the nature of invented spelling and the early ideas about classroom instruction held up? What else can we learn from the spellings of children in the US and other countries? How do the early spellings fit into the larger picture of spelling development in general?

13.1 Early Work on the Nature of Invented Spelling

The basic assertions in the 1970s publications were that invented spelling exists, that it has common characteristics across children, and that these characteristics shed light on children's knowledge about language. As mentioned previously, Read (1970, 1971) examined spellings from twenty US children, ages three to five, who had begun to create their own spellings at home or in preschool. Read (1975) analyzed those and the spellings of twelve more children, who spelled 1,201 different words altogether. Carol Chomsky (1971, 1976b) contributed additional examples, including first-hand accounts of interacting with children as they wrote. In Chomsky (1975a), she described how one first-grade teacher encouraged independent writing as a regular classroom activity, fostering and valuing the children's spellings.

While there is considerable variation among children, certain features are observed again and again in US children who are learning English. These features are discussed in Read (1970, 1971, 1975) and further discussed and exemplified by Carol Chomsky (1971, 1975a, 1976b, 1979). We have chosen six such features to discuss here.
First, young spellers often use a letter to represent its entire name, as in MAK for make, FEL for feel, TIM for time, KOK for Coke, and HUMIN for human. US children writing English frequently use A, E, I, O, and U in this way. Viewed in relation to standard spelling, these cases may suggest that a letter, such as the final e of make, has simply been omitted. However, other examples show more distinctively the influence of letter names, including YL for while, THAKQ for thank you, and R U DF for Are you deaf? (Bissex 1980).

To represent vowels that do not correspond directly to a letter name, children may use a letter whose name at least begins with a similar vowel. Thus, for example, they use A to represent /e/ as in MAS for mess, SHALF for shelf, ALLS for else, and PRTAND for pretend. They use E to represent /i/ in SEP for ship, FES for fish, LETL for little, and FLEPR for flipper. And I represents /a/ in spellings such as GIT for got, BICS for box, DIKTR for doctor, and UPIN for upon.

The two patterns we have discussed so far appear to be strongly influenced by letter names, but other patterns may reflect details of pronunciation. For example, in American English, when /t/ or /d/ occurs between a stressed and an unstressed vowel, it is pronounced as a tap of the tongue tip. The tap is voiced, like the vowels on either side of it. In that respect, it is more like /d/, even when it is spelled t. Thus in most American pronunciation, letter is pronounced /lɛɛr/, where /ɛ/ represents the tap. Children sometimes spell this tap with a D, appearing to represent the voicing. Thus, we see spellings such as LADR for letter, BODOM for bottom, AODOV for out of, and WOODR for water. This spelling is not, however, in the majority in Read's (1975) tabulation.

As in spellings like DOT for don't and THAKQ for thank you, children often omit nasal sounds before stop consonants, as in the sequences /mp/, /mb/, /nt/, /nd/, /ŋk/ and /ŋ/. Such omissions are especially common when the consonant that follows the nasal is voiceless. For example, children may write STAPS for stamps, NUBRS for numbers, PLAT for plant, and THEKCE for thinks. In Read's (1975) study, these are the most frequent non-standard spellings; in fact, for the velar nasal /ŋ/, they are more frequent than the standard nk or ng. Read proposed that the explanation is phonetic and/or phonological. When a nasal occurs before another consonant within an English syllable, especially if that consonant is voiceless, the nasal is realized primarily as a nasalized vowel, not as a consonant. Moreover, the articulation of the nasal is predictable: only /n/ can occur before /t/ or /d/, only /m/ before /p/ or /b/, and only /ŋ/ before /k/ or /g/. This explanation assumes that young spellers can hear the difference between such pairs as set–sent and sick–sink. However, because that difference is not a segment, the children do not represent it in their spelling. As in the spelling of taps, the invented spellings seem to reflect a phonetic fact, but in this case children fail to represent a meaningful distinction. This suggests that perhaps children proceed segment by segment as they spell.

To represent sonorant consonants like /l/ or a nasal when they constitute an entire syllable (with no vowel), children often use only the letter for that consonant: LITL
for little, PESL for pencil, GOBL for gobble, KITN for kitten, SATNS for sentence. Standard spelling, on the other hand, consistently adds a vowel letter, making the syllable structure explicit. In this respect, too, the invented spellings are closer to a segmental representation.

When representing /tr/ and /dr/ at the beginning of a syllable, children sometimes write CHR and JR, respectively. For example, they may write AS CHRAY for ashtray, CHRIE for try, CHRAC for truck, JRAJIN for dragon, and JRADL for dreidel. These spellings are in the minority in the corpus analyzed in Read (1975). However, they have a plausible phonetic basis. Within a syllable, a /t/ or /d/ before /r/ is retracted and is released more slowly than is /t/ or /d/ before a vowel. The resulting turbulent sound is similar to the affrication in the sounds spelled ch and j in standard spelling. A writer with incomplete knowledge of standard spelling who wishes to write try is thus making a reasonable choice when he or she writes CHR.

The invented spellings, the 1970s researchers concluded, are a window into the conceptions of language and of writing that some children share during the course of their development. Children who create these spellings have acquired the crucial alphabetic principle (Rozin and Gleitman 1977) that spellings represent roughly phoneme-sized units in the stream of speech. They have also learned at least some letter names and some standard sound–spelling correspondences. While they have learned some standard spellings, they are willing and able to apply their partial knowledge to create spellings of their own. When they do, they represent language at the level of the phonemic segment, primarily, but they also represent some phonetic details that are not reflected in standard English orthography. The processes that children use sometimes yield spellings that appear strange to adults, especially when inventions are combined within a word. Our knowledge of standard spelling in effect tells us what categories sounds belong in; those categorizations are in some cases arbitrary from the perspective of someone who is starting afresh.

13.2 Early Ideas about Instructional Implications of Invented Spelling

As interesting as it is to infer something of children’s linguistic development from their spelling, as well as from the content of their writing, a more intriguing question for most people is what children’s writing might mean for preschool and primary-grade learning. Two of Carol Chomsky’s first publications on the subject of invented spelling (1971, 1975a) addressed this topic and appeared in journals for teachers. They put forward two main arguments. The first is that ‘children ought to learn how to read by creating their own spellings for familiar words as a beginning’ (1971: 296), an argument previously made by Montessori (1912/1964: 282–3, 296). Chomsky’s second argument is that teachers can and should encourage young children to write independently as part of ordinary classroom activities.

The first argument, encapsulated as ‘Write first, read later,’ is based on Chomsky’s observations of children engaged in writing. She argued that with some degree of
phonemic awareness and a knowledge of which sounds some letters represent, a child may need little more than writing materials, such as plastic letters, and encouragement in order to begin to write. She emphasized the excitement of then reading one's own productions: 'And what better way to read for the first time than to try recognizing the very word you have just carefully built up on the table in front of you?' (1971: 296). Based on such observations, Chomsky (1971, 1972b) proposed that quasi-independent writing should precede and support learning to read. She argued that to start with one's own message and figure out how to inscribe it, whether in writing or with movable letters, is a more concrete, more accessible, and more natural operation than trying to deduce someone else's message from print.

Chomsky's second main argument is that young children should be encouraged to write as part of normal classroom activities. Doing so fosters the growth of literacy and, equally important, a child's joy and confidence in his or her own communicative abilities. Quoting a first-grade teacher: 'By providing [children with] immediate access to the printed word, writing can give them a sense of power very quickly' (1975a: 37). Invented spelling may make an essential contribution to this growing sense of mastery because it involves relying on one's own judgments: 'Let [the young writer] trust his linguistic judgments...' (1971: 299).

Not only is this self-motivated writing empowering, according to Chomsky, it is the kind of creative work that leads to genuine, lasting understanding. On this point, Chomsky cited Piaget: 'children have real understanding only of that which they invent themselves, and each time we try to teach them something too quickly, we keep them from reinventing it themselves' (1972b: 127). This emphasis on the value of learning through discovery became an important theme in the study of children's invented spelling in relation to schooling (Ferreiro and Teberosky 1982). The theory known as constructivism, based on the work of Vygotsky as well as Piaget, provided an epistemological framework for this view (Piaget 1973).

Chomsky argued that early writing is 'a creative feat' (Chomsky 1981: 145), like the acquisition of language itself, and is properly compared to artwork. It must 'not degenerate into a form of exercise', and it must be guided by the child. 'How much writing he will eventually produce, if any, depends on his own inclination and interest' (1981: 148). Both of these warnings, against turning early writing into a required exercise and against adults setting the pace, speak to debates that arose later over the place of early writing in the school curriculum.

13.3 Later Work on US Children's Classroom Writings

Not many four- or five-year-olds will spontaneously write a multi-word message asking people to refrain from making noise in father's office. There is no good basis for estimating what proportion of preschoolers will do this, but Read (1970) called such spontaneous spelling by preschoolers 'rare' (p. 16). One might therefore ask whether
the phenomena that he and Chomsky observed are limited to a special group of linguistically precocious youngsters. In fact, that question initially limited the impact of Read's (1971) article on thinking about school practices (Shanahan and Neuman 1997: 207).

It turns out, however, that somewhat older children produce very similar sorts of spellings when they are encouraged to write independently at school and when correct spelling is downplayed. That activity was common in many US primary schools in the 1970s and 1980s, in part because of Chomsky's writings on the educational value of early spelling. Many teachers of the time followed a whole-language approach, emphasizing the communicative function of reading and writing and deemphasizing correct spelling. Children, they believed, could and should construct an understanding of the writing system largely on their own. Teachers who followed a whole-language approach encouraged children to spell words as they thought best and, during the first few years of schooling, encouraged and accepted non-standard spelling.

Rebecca Treiman (1993) studied forty-three US first graders (aged between about six and seven) whose teacher advocated a whole-language approach. These children attended an ordinary public (i.e., state-supported) school; they were not especially privileged or precocious. The teacher set aside about a half an hour each morning for independent writing. She told the children that they should spell words on their own. They should not copy from one another, and they should not ask an adult. A child who could not yet write words or letters was encouraged to draw pictures instead. When children had finished writing, they dictated their story to a teacher or teacher's aide. The adult wrote the children's words on the child's paper in standard form but did not point out how the child's spellings differed from the conventional ones.

Examining a total of 5,617 spellings that were produced by forty-three students in this classroom during two successive school years, Treiman (1993) found many of the same phenomena that the researchers of the 1970s had discovered among preschoolers who start to spell on their own. Thus, the first graders showed each of the phenomena discussed earlier—use of a letter to represent the entire syllable that is its name, spelling of vowels that are not the names of letters on the basis of their similarity to those that are, use of D as well as T to spell taps, omissions of nasals in words like don't and sink, use of single letters to represent syllabic consonants, and spellings of /d/ and /t/ before /r/ that represented the affrication of these sounds.

Treiman's (1993) results further suggested that some of the spellings that had been reported in the 1970s were manifestations of larger phenomena. For example, earlier researchers had noted that children sometimes failed to spell nasals that immediately preceded other consonants at the ends of words, especially when the following consonants were voiceless. Treiman verified this finding. However, she found that omissions of consonants were by no means restricted to nasals in final clusters. They occurred as well for other types of consonants in the initial positions of final clusters, as in OD for old, HOS for horse, SES for cents, and FUOS for fox. They also occurred for the
second (and third) consonants of initial clusters, as in BO for blow, AFAD for afraid, and SET for street. At syllable boundaries, too, the last consonant of the first syllable was susceptible to omission, as in PESEI for Pepsi. Thus, nasal omissions appeared to be one manifestation of a larger effect of syllable structure on children's spelling. These effects arise because the segments in a syllable do not have equal status. Segments in certain positions of a syllable are more easily conceptualized as separate units than others. For example, the /l/ of /blo/ (blow) is closely bound to the /b/, /bl/ forming the syllable's onset and /o/ its rime. Children apparently find it natural to spell /bl/ with a single letter, just as they find it natural to spell the nasalized vowel of don't with a single letter. Children's difficulties in analyzing syllables into units of the size required by the writing system are exacerbated, in the case of nasal–voiceless consonant clusters, by certain phonetic properties of the nasals. However, omissions of consonants in early spelling are not restricted to this structure.

Other phenomena, Treiman (1993) found, are more limited than the early work implied. For example, Read (1970, 1971, 1975) reported that children sometimes use a letter to stand for its full name, as in CRT for cart, HLP for help, HM for hem, DF for deaf, and BD for bead. Treiman confirmed the existence of such errors, but she found that those involving R were more common than those involving vowel–obstruent or consonant–vowel letter names. Letter-name errors involving the vowel–liquid letter name L and the vowel–nasal letter names M and N were fairly common as well. The explanation, Treiman proposed, lies in the internal structure of the syllable. Consonants that are high on the sonority scale form a strong unit with a preceding vowel. For example, the /a/ and the following /r/ of a word like /kar/ (cart) are tightly linked. The strong linguistic bond encourages children to spell the sequence as a unit, using their knowledge of letter names. In a word like /best/ (best), in contrast, the vowel and the obstruent are not so tightly linked. Even when children know that /es/ is the name of s, they are not likely to spell /es/ as a unit. Similarly, the relatively weak link between /b/ (the onset) and /i/ (the first part of the rime) in a word like /bid/ (bead) means that children do not often spell these two sounds as a unit. Thus, spellings like BD for bead and BST for best are less common than spellings like CRT for cart. Treiman's results show that children who bring knowledge of letter names to the task of spelling sometimes spell letter name sequences as units but that the knowledge of letter names interacts with the phonological properties of the units. It is not the case (as proposed by Henderson and Beers 1980) that children go through a stage during which they consistently spell letter name sequences with the corresponding letters.

Treiman's (1993) results confirm that children sometimes make different choices than the standard writing system does when representing sounds. Thus, the first graders in her study sometimes chose G or J to represent /d/ before /r/ and CH or C to represent /t/ before /r/. They occasionally represented stop consonants after /s/ as voiced, as in SGIE for sky. This is another plausible but unconventional choice:
The second segment of a word like sky is indeed similar in lack of aspiration to /g/. And children sometimes produced spellings such as TEKN for chicken, implicitly recognizing that the affricate begins with a /t/ portion. Even professional linguists have differing opinions in these cases, and it is not surprising that children's analyses sometimes differ from those that are embodied in the conventional English writing system.

Also not surprisingly, children's identifications of segments are sometimes inexact. Treiman's (1993) results indicate that children sometimes confuse consonants that differ only in voicing. For example, they may spell the first consonant of care as if it were the voiced /g/ rather than the voiceless /k/: GARY. Some of children's substitutions reflect the visual similarity among letters, but many reflect phonological factors.

13.4 Experimental Studies

A child who spends ten or fifteen minutes drawing a boy standing on the ground at the bottom of a castle and writing the words JAC JUPT (Jack jumped) has worked hard to convey an idea. Whether the child does this at home or in a classroom where he is encouraged to write on topics of his own choosing, he has selected the message, the words, and the letters. That independence is important for learning, according to Chomsky, and we will talk more about its educational value later in the chapter. However, the independence can cause problems for researchers who are trying to learn about the nature of children's early spellings. One problem is that children who select their own messages may choose to spell some kinds of words and not others. The data that researchers get may be unbalanced and incomplete.

In an attempt to solve these problems, Read (1971, 1975) supplemented naturalistic data with experiments. For example, he asked children to write selected words that begin with /dr/ and /tr/ in order to verify the existence of spellings such as JR, GR, and CHR and to test ideas about their nature and development. The experiments that Read reported examined several of the phenomena that were mentioned earlier, including omissions of nasals in final clusters. Encouragingly, the results of the experiments aligned well with the results of the naturalistic study. For example, children produced spellings such as BET for bent when they were asked to write specific words, as when they composed messages of their own choosing. In experiments, moreover, children could be asked to perform tasks or make judgments designed to shed light on the basis for their spelling inventions. For example, the children in an experiment reported by Read (1975) tended to judge that the difference between bent and bet lay on the vowel.

In the 1980s and beyond, researchers increasingly adopted an experimental approach to the study of children's spelling (see Treiman 1998 for more on the experimental work carried out in the 1980s and 1990s). In what follows, we will consider the results of experiments as well as the results of naturalistic studies when discussing what we have learned about the nature of children's early spelling.
13.5 Beyond Phonology

Children's early spellings must be considered in light of the characteristics of the writing system that is their target. The English writing system is often considered deficient because many segments have more than one possible spelling and because those spellings may be complex, containing more than one letter. For example, /ʃ/ is spelled *sh* in *shoot*, *ch* in *chute*, and *ci* in *magician*. The *ch* in *chute* reflects the word's French origins. Users of English will find this spelling unexpected unless they know that the word comes from French and unless they know something about the spelling of that language. The *c* in *magician* reflects its relationship to *magic*. Users of English who know that a magician is someone who does magic and who know that the spellings of base words are often retained in the spellings of derived forms will not be surprised by the *c* of *magician*.

Carol Chomsky (1970) drew educators’ attention to the view, put forward by Noam Chomsky and Morris Halle (1968), that the English writing system is more principled than it first appears. The language includes many spellings such as *magician*, which make morphology visible, and this means that people who think about related words can often find solutions to their spelling questions. For example, thinking about *magic* can help one to spell *magician* and thinking about *preside* can help one to spell the second vowel of *president*. Chomsky suggested that children be encouraged to look for reasons, morphological or other, why words are spelled the way they are. Teachers should understand and convey the idea that ‘spelling very often is not arbitrary, but rather corresponds to something real that … [the child] already knows and can exploit’ (C. Chomsky 1970: 307).

The five-year-old who spelled *works* as WRX seems not to have considered the base form *work* when doing so. However, children who are only a little older have been found to use morphology at least in simple spelling tasks. For example, the older five- and six-year-olds tested by Treiman, Cassar, and Zukowski (1994) were significantly more likely to spell the tap of a two-morpheme word like *later* with *T* (rather than *D*) than to spell the tap of a one-morpheme word like *city* with *T*. To at least some extent, the children could use their knowledge that *late* ends with /t/ to help infer the standard spelling of the tap of the related word *later*. Children of this age could probably not use *preside* to help spell *president*; indeed they probably don't know the word *preside*. However, the beginnings of the idea that spelling reflects morphology as well as phonology appear to be present from an early age in US children.

The spellings of a language represent aspects of its linguistic structure, including phonology and morphology in the case of English. The spellings also have a characteristic appearance: they follow certain graphotactic patterns. For example, a vowel or consonant letter sometimes appears twice in sequence in an English word, as in *seem* and *sell*. Sequences of three identical letters do not appear in English. Consonant doublets occur in the middles and at the ends of words but rarely at the beginnings;
words like pillow and ball are fairly common but words like llama are rare. Vowel doublets may appear in all positions, as in eel, Lee, and seem. The researchers of the 1970s, seeing invented spelling as a window onto children's ideas about spoken language, focused on its phonological patterns. They did not examine the degree to which invented spellers honored graphic patterns such as the ones just described.

In recent years, researchers have broadened their focus by examining children's knowledge of graphotactic patterns. The first-graders in Treiman's (1993) study followed some such patterns in their classroom writings. For example, they produced a number of errors such as SUPRMORKKIT for supermarket and FASS for face, with consonant doublets in the middle or at the end of a word. They produced fewer errors such as MMNE for money, with consonant doublets at the beginning. In experiments in which first-graders spelled non-words to dictation, spellings such as DASS for /dɛs/ outnumbered spellings such as DDAS for /dɛs/ (see Cassar and Treiman 1997). Moreover, children of this age showed some success in other experimental tasks that were designed to tap knowledge of graphotactic patterns. Thus, they performed above the level expected by random guessing when asked whether baff or bbaf looks more like a word of English (Cassar and Treiman 1997).

This early knowledge of graphic patterns, although unexpected from the perspective of theories that relegate such knowledge to a later stage of development (Henderson and Beers 1980), is not surprising given that children in the US and other literate societies are surrounded by print from an early age. An infant's name may be embroidered on her blanket, the alphabet may be written on toys and posters, and print abounds on the labels of commercial products, on street signs, and so on. Some of this writing, like that in many books, is not designed to draw children's attention and indeed does not (Evans and Saint-Aubin 2005). Other writing, like that on packages of breakfast cereals that children favor, is colorful and attractive. Parents and preschool teachers actively draw children's attention to written words when they do such things as write a child's name. Where writing is concerned, the input to most modern children is rich, not poor. From this exposure, it appears, children learn about the properties of writing as a graphic object.

Recent work suggests, in fact, that children learn about some of the graphic properties of writing even before they learn about its link to language. Before they invent spellings that reflect the sounds in spoken words, children sometimes produce ones that do not. For example, one four-year-old boy wrote a banner with the letters SSIDCA to tell his mother welcome home (Bissex 1980). A number of the first-graders in Treiman's (1993) study wrote similar sorts of things before they began to produce phonologically based writing. Near the beginning of the school year, for example, Calvin wrote ACR and told the teacher that it said 'I like swings and I like slides. And I like the sun.' Such productions have traditionally been considered to reflect a stage of spelling development during which children string together random sequences of letters, but recent work suggests that they may be more than this.
Pollo, Kessler, and Treiman (2009) showed that US four-year-olds who do not yet represent phonology in their spelling do not string letters together purely randomly. The frequency with which they use individual letters is related to the frequency of the letters in the language, and the frequency with which they use pairs of letters is related to the frequency of the pairs in written texts. Children’s exposure to the alphabet sequence is also influential: their non-phonological spellings include, more often than expected by chance, sequences of letters in alphabetical order such as BC and FG. Moreover, children use letters from their own first name—letters that are especially frequent in their own experience—at especially high rates. These results suggest that, from an early age, children pick up patterns in the writing around them. To do this, they appear to use the same statistical learning skills that they use in some other aspects of language learning and in other aspects of learning more generally. Young writers reproduce certain graphotactic patterns before knowing what they mean in terms of letter–sound correspondence.

13.6 Beyond US Learners of English

The 1970s work on invented spelling concentrated on monolingual US learners of English, but the reasoning behind such studies points to the value of studying early spelling in a variety of languages and educational contexts. The logic is that the relationship between the sound system of a language and its writing system defines what a speller must learn. In contrast to English, for example, Spanish uses alphabetic spelling that is closer to a consistent representation of phonemes. Chinese characters represent meaningful units that are generally one syllable in length; its writing system is not alphabetic. By comparing how beginning writers approach these very different systems, we stand to learn much more about their strategies.

Research with children in other cultures and learning other languages is still relatively sparse. In one early study, Temple (1980) studied children learning Spanish in the Dominican Republic. Other early studies summarized by Read (1986: 76–98) involved Dutch, French, German, and Spanish. More recently, a special issue of an online journal (Fijalkow 2007) included studies of French, Spanish, Greek, Japanese, and Mayan. Although less work has been done with other languages than with English, the findings point to many of the same underlying principles at work.

In many societies, children learn the names of letters from an early age and use this knowledge to help invent spellings. The most basic letter name strategy in spelling is to use a letter to symbolize all of the sounds in its name. The Portuguese-speaking child who spelled UUU for uruba ‘vulture’ (Nunes Carraher and Rego 1984) and the Spanish-speaking child who spelled AO for sapo ‘frog’ (Ferreiro and Teberosky 1982) seem to have used this strategy, just as US learners of English do. The tendency that has been reported by some investigators for beginning spellers to write the same number of letters as syllables (Ferreiro and Teberosky 1982) may reflect, in part, this
use of letter names. The spoken words of Portuguese and Spanish contain many vowel sounds that are the names of letters, and so a child who goes through a word and writes the letter names that he or she hears would produce many spellings that have the same number of letters as syllables (Pollo, Kessler, and Treiman 2005).

The effects of letter names are not limited to exact matches. Children sometimes use a letter to spell a sequence that is similar but not identical to the letter's name. We saw this earlier in the case of English vowels, and a similar phenomenon has been reported for the Portuguese letter \textit{q}, which is named /ke/. Young Portuguese speakers sometimes spell /ke/ as Q, an exact match, but they sometimes also spell /ge/ as Q (Pollo, Treiman, and Kessler 2008), an inexact match and a highly unusual spelling from the point of view of standard Portuguese. The sequence /ge/ matches /ke/ in the vowel and in all features of the consonant except voicing. Evidently, the child classifies /ge/ as similar enough to /ke/ to merit the spelling of /ge/ with the same letter that is associated with /ke/. In making this judgment, the child generalizes over voicing, the same generalization we saw earlier in the case of English spellings such as GARY for care.

The effects we have been discussing depend on children knowing the names of letters. Children who are not familiar with the names of letters cannot use this information to guide their spellings. Currently in England teachers and parents often refer to letters by the sounds that they make in words (e.g., /s/ for S) rather than by their conventional names (e.g., /es/ for S), and children are expected to do the same. Consequently, the effects of letter names on spelling that have been reported in US children appear to be small or non-existent in English children (Ellefson, Treiman, and Kessler 2009).

US learners, we have seen, pick up some of the more obvious graphotactic patterns of their writing system from an early age. The same is true for children in other literate societies. Consider French, in which vowel letters may not double and consonant doublets may occur in the middles of words but hardly ever at the beginnings or the ends. Correspondingly, French six-year-olds are more likely to place a consonant doublet such as \textit{ll} in the middle of a word than at the end (Pacton, Perruchet, Fayol, and Cleeremans 2001). Moreover, when asked to choose whether for example \textit{jukker} or \textit{jiuker} looks more like a word of their language, they tend to pick the item with the doublet in the middle. In Finland, children who have just started formal instruction in reading and writing already prefer items with medial consonant doublets, which are legal in Finnish, over items with initial consonant doublets, which are illegal (Lehtonen and Bryant 2005).

Further evidence for early knowledge of graphotactic patterns comes from the above-mentioned study of Pollo et al. (2009), which examined early spellings that did not represent phonology. In addition to studying US children who were exposed to English, Pollo et al. studied Brazilian children who were exposed to Portuguese. The productions of the two groups of children looked somewhat different.
For example, the Brazilian children used more vowel letters than the US children. This is probably because vowel letters are more common in Portuguese than in English. Neither group of children represented phonology, but the children's productions had already been molded by some of the properties of the writing in their environments.

13.7 Invented Spelling as a Part of Spelling Development

The researchers of the 1970s were interested in children's invented spellings, in large part because of what these spellings could show us about children's knowledge of spoken language. Thus, Read titled his 1975 book *Children's Categorization of Speech Sounds in English*; the term spelling did not appear in the title. More recently, investigators have been examining early invented spelling within the context of spelling development in general.

The 1970s research drew a sharp distinction between invented spelling and conventional spelling. Children's non-standard spellings, because they are invented, inform us about their conceptions of sounds. Children's conventional spellings may not be informative because they could have been produced through memorization or observation. Thus, Read (1975) did not include conventional spellings in his corpus. But, as we have seen, observation of the patterns in conventional spelling plays a role from early on. The distinction between invented spelling and conventional spelling is not as sharp as it first appeared.

Virtually every speller—child or adult, beginner or expert—invents in some situations. For example, a skilled speller may retrieve some parts of a complex spelling from memory but, having a poor memory for other parts of the spelling, may be forced to invent. What differentiates beginners from experts may be the sources of constraint on their spelling inventions. The spellings of young children who produce sequences like ACR for *I like swings* are constrained only graphically. Children who produce such spellings know something about the letters in their writing system and how often they occur individually and in groups. They know that English is usually written horizontally, from left to right. However, their choice of letters is not yet constrained by phonology. Learning to spell involves learning more and more constraints—phonological, graphotactic, and morphological. When a skilled speller invents part or all of a spelling, it is thus likely to be close to the conventional one. It may even be fully correct, not recognizable as an invention. Likewise, even a young child who writes *me* as ME may have used invention as well as memorization.

13.8 Back to Education

Earlier in this chapter, we discussed the value of experimental work on children's spelling. Experiments can provide data that would be difficult or impossible to obtain in naturalistic studies. However, experiments can draw us away from looking at
writing as it occurs in classrooms. One of Carol Chomsky's primary concerns was with the classroom, and we return in this final section of the chapter to that topic.

Children's spellings are creative achievements, and there are often good reasons why children produce the spellings that they do. At the same time, it is important for children to learn conventional spelling. One approach, adopted by the teacher of the children studied by Treiman (1993), is to assume that children will learn standard spelling largely on their own. This teacher therefore provided children with minimal feedback. If they asked how to spell a word as they were writing, the teacher did not answer.

Carol Chomsky did not agree with that approach, nor do we. Children need guidance and instruction in spelling, as in many other domains (Mayer 2004); they cannot be relied upon to discover on their own the principles that underlie the system. Explicit instruction is more important for learning to spell and read than for learning to speak and understand, for which humans are better equipped. Adults who care should appreciate and support children's independent spelling efforts, but they should also provide correction that is calibrated to children's level of development. For example, if a child asks a direct question about spelling, a teacher or parent may take that as evidence of what that child is ready to learn. The adult may respond with an accurate statement about standard spelling in a way that does not deny the legitimacy of the child's own judgments. Read (1975: 77–8) gives an example of feedback that is meant to acknowledge the phonetic basis of a child's own spelling while being truthful about standard spelling, and Chomsky (1976b: 503–5) tells of helping two nursery-school children at the very beginning of writing by posing questions that bring out what the child knows and providing explicit direction when the child is at a loss. This balance between accepting, even celebrating, a child's own invention and teaching toward an adult model is characteristic of thoughtful instruction in many domains, but many parents and teachers may find it more difficult to honor non-standard spelling than, say, stick-figure artwork. Traditional views of spelling are more like those of basic arithmetic: an area in which invention is unwelcome.

To provide useful feedback, teachers need to know about the characteristics of early spellings and why they occur. Teachers should also know about the characteristics of the target writing system, including the fact that most English spellings are not arbitrary and that there are often good reasons why words are spelled the way they are. Teachers' own literacy is a double-edged sword, because it can make it hard for them to think about how a language seems to a person who does not yet know how to spell it. Teachers may not appreciate, for example, the logic behind a child's non-standard categorizations of certain sounds. Teachers' skills can be increased through appropriate instruction (Moats 1994), and this may in turn benefit students.

If there were identifiable stages in the development of spelling, then we could design a curriculum for spelling instruction based on knowledge about the order in which concepts should be introduced. We would have a powerful basis for individualized
assessment and teaching; a child at stage B is ready for instruction at stage C, but not D. We could reliably evaluate instructional materials: those that move children from B to D in a year are probably better than those that manage only C. However, theories that attempt to identify discrete stages during the development of spelling, such as those proposed by Henderson and Beers (1980), are problematic. Some of the empirical challenges to these theories have been mentioned previously, such as the fact that children don't appear to go through a stage during which they spell all letter name sequences with the corresponding letter and that early spellings that have been interpreted as reflecting a random-letter stage may not be as random as they appear. Other challenges to the theories are ones that any stage theory of development faces: the fact that there is a great deal of variation within a child at a given time. Varnhagen (1995) challenged the concept of stages as it applies to spelling, noting that 'progression from stage to stage is not invariant' (p. 260) and that children have a variety of strategies available to them from an early age. At this point, we have come closer to consensus on identifying some of the strategies that children use in spelling than in arranging those strategies on a developmental continuum sufficiently precise that it could be used for instruction and evaluation.

Although questions remain, a great deal has been learned about children's spelling in the years since Chomsky and Read began to work on the topic. The continuing work has increased our appreciation for the variety and depth of cognitive activity that is involved, even at early ages, in acquiring what might seem to be a subordinate part of language and literacy.