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Learning to label letters by sounds or names: A comparison of England and the United States

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ABSTRACT

Learning about letters is an important foundation for literacy development. Should children be taught to label letters by conventional names, such as /bi/ for *b*, or by sounds, such as /bə/? We queried parents and teachers, finding that those in the United States stress letter names with young children, whereas those in England begin with sounds. Looking at 5- to 7-year-olds in the two countries, we found that U.S. children were better at providing the names of letters than were English children. English children outperformed U.S. children on letter-sound tasks, and differences between children in the two countries declined with age. We further found that children use the first-learned set of labels to inform the learning of the second set. As a result, English and U.S. children made different types of errors in letter-name and letter-sound tasks. The children's invented spellings also differed in ways reflecting the labels they used for letters.

Introduction

The written words of English and other alphabetic languages are composed of letters, and learning about these letters is an important part of learning to read and spell. Most North American children begin to learn the conventional names for letters at an early age. From parents, educational media, and preschool teachers, they learn to sing the Alphabet Song. They become familiar with the shape that corresponds to each letter, typically starting with the uppercase shape. By the time that formal instruction in reading and writing begins, U.S. and Canadian children usually know the names of many uppercase letters (e.g., Evans, Bell, Shaw, Moretti, & Page, 2006; McBride-Chang, 1999; Worden &

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Boettcher, 1990). The same is true for children in some other countries as well (e.g., Levin, Shatil-Carmon, & Asif-Rave, 2006; Treiman, Kessler, & Pollo, 2006; Treiman, Levin, & Kessler, 2007).

Letter-name learning appears to be in many ways similar to vocabulary learning in general (Treiman et al., 2006). Children learn that the shape B has the name /bi/ in much the same way that they learn that the shape □ has the name /skwɛr/. (For an explanation of the phonetic symbols used in this article, see International Phonetic Association, 1999) Letter-name learning differs from the learning of most other words, however, in that learning the name of a letter has the potential to teach children something about the letter's function. Letter names may be helpful in this regard because they are usually phonetically *iconic;* most letter names in English and other languages contain the phonemes that the letters represent when they are used to spell words. For example, the name of *b* contains the sound that this letter symbolizes in *boy*, and the name of *o* is the phoneme that the letter symbolizes in *over*. Most often, the phoneme is at the beginning of the letter name; the name is *acrophonic*. The phonetic iconicity of letter names means that acquisition of letter names could potentially serve as a bridge to literacy. Children could begin to learn the links between letter shapes and names in a rote fashion but could then use the phonetic iconicity of the letter names to begin learning the sounds that the letters symbolize.

Research findings support the idea that children use their knowledge of letter names in learning and remembering the sounds that the letters represent. Treiman, Tincoff, Rodriguez, Mouzaki, and Francis (1998) examined U.S. children's knowledge about letters that do and do not have acrophonic names. They found that children between approximately 4 and 7 years of age were better at providing the sounds of acrophonic letters such as *b* and *v* than of nonacrophonic letters such as *w* and *l*. Children apparently used the name of a letter such as *b* to help remember the letter's sound in a way that they were not able to do with letters such as *w*. Children did not perform better on acrophonic letters than on nonacrophonic letters when they were asked to provide the letters' names, suggesting that acrophonic letters are not generally more familiar or more visually distinctive. Differences between acrophonic and nonacrophonic letters in tests of letter-sound knowledge have also been reported in other studies of North American children (Evans et al., 2006; Foy & Mann, 2006; McBride-Chang, 1999).

Further supporting the idea that children use their knowledge of letter names to suggest letters' sounds, learners of English sometimes provide /də/ for the sound of *w* and /wə/ for the sound of *y* (Thompson, Fletcher-Flinn, & Cottrell, 1999; Treiman, Weatherston, & Berch, 1994). Children who make these errors generalize the strategy of treating a letter name's first phoneme as the phoneme for which it stands—a strategy that works well for acrophonic letters such as *b* and *v*—to other letters. Similar phenomena are found for learners of Hebrew (Share, 2004).

Children also use their knowledge of letter names when they invent spellings for words. For example, U.S. kindergartners sometimes use *y* to begin their spellings of words such as *wet* and *work* (Treiman et al., 1994). Errors such as "yrk" for *work* may seem bizarre until one notices that *y* is a reasonable attempt to represent the /w/ of *work*, the first phoneme of *y*'s name. Another example of letter-name use involves spellings such as "fl" for *fell*, where children use a single letter to represent both phonemes in the letter's name. Such errors are especially common for *r*, as in "cr" for *car* (Treiman, 1993, 1994). Omissions of the final *e* of words such as *tame*, which are frequent among North American beginners (e.g., Reece & Treiman, 2001; Treiman, 1993; Varnhagen, McCallum, & Burstow, 1997), also appear to reflect children's reliance on letter names. To young children, "tam" seems to be an excellent way to spell *tame;* the vowel phoneme /e/ is represented with the letter that has this name. Children have difficulty in understanding why the word's spelling actually ends with *e*. Use of letter names in early spelling has also been found among children in Brazil (e.g., Cardoso-Martins, Resende, & Rodrigues, 2002; Pollo, Kessler, & Treiman, 2005), France (Jaffré, 1992), and Israel (Levin, Patel, Margalit, & Barad, 2002).

The evidence reviewed so far suggests that knowledge of letter names serves as a bridge to literacy in English-speaking cultures as well as in Brazil, France, and Israel. We cannot be sure that letter names are a universal bridge toward literacy development, however, until we have evidence from children from a broader range of languages, cultures, and educational backgrounds (Foulin, 2005). In the current study, we examined two English-speaking cultures: England and the United States. These countries share a language, but they differ in some important educational and social practices involving the learning of letters.

In England, a government-mandated curriculum for literacy instruction emphasizes phonics and letter sounds (Department for Education and Skills, 2001). During the first year of compulsory schooling, which begins during the school year after a child's fourth birthday and which is called reception year, children are taught to label letter shapes with the phonemes that they typically represent in words (followed by /ə/ in the case of stop consonants). This practice reflects the belief that sounds are more helpful than names in learning to read and spell (e.g., Johnston, Anderson, & Holligan, 1996; Levin et al., 2006; Murray, Stahl, & Ivey, 1996; Thompson et al., 1999). The letter sounds are taught through drill and repetition, and letters are not referred to at first by their conventional names. Thus, a child who asks how to spell *bus* is told that it is /bə/ followed by /ʌ/ and /s/. Phonics-oriented instruction in reading and spelling begins during reception year and continues during the next year of formal schooling, called Year 1. In the school attended by the English children in the current study, the names of the letters are not formally taught until the end of Year 1. Outside of school as well, English children are exposed to letter names less often than are U.S. children. For example, parents and teachers in the region of England where the current study was undertaken report that the American version of the television program *Sesame Street*, which stresses the names of letters and their order in the alphabet, has not been broadcast over the air since 2001.

In most parts of the United States, kindergarten is the first year of compulsory schooling. In the area where the current study was carried out, children typically begin kindergarten during the school year that starts after their fifth birthday. Children who have not reached their fifth birthday by the start of this school year, or who are not considered to be ready for kindergarten, often attend preschool. U.S. preschools expose children to letters informally, and letters are generally labeled by their names. Children of this age are also exposed to letter names through activities such as singing the Alphabet Song and watching television programs such as *Sesame Street*. Exposure to letter names continues in kindergarten, and U.S. kindergartners are also taught about the sounds that the letters typically represent. Even when children become familiar with letters' sounds, however, they and their teachers usually talk about letters by their names. For example, U.S. children are told that *bus* is spelled /bi/, /ju/, and /ɛs/. The stress on letter names reflects, in part, an assumption that letter names are easier for children to learn than are letter sounds. For example, McBride-Chang (1999) suggested that letter names are easier to learn because they are more similar to other words of English and easier to discriminate from one another than are letter sounds. Traditionally, formal reading instruction began in first grade in the United States. However, in many kindergartens, including the ones studied here, children are expected to read and spell simple words by the end of the school year. More intensive instruction in reading and spelling takes place in first grade. The United States has no nationally mandated literacy curriculum, but schools often include a mix of phonics and whole-word instruction.

The preceding description suggests that early literacy is approached rather differently in the United States than in England even though the countries have the same language and writing system. A comparison between the two countries, therefore, can shed light on whether knowledge of letter names provides a universal bridge to literacy or whether it is a product of particular educational and social circumstances. If letter names play a special role in literacy development, children in the United States should benefit from their early knowledge of letter names. Learning to label letters by their sounds may be rather difficult for young English children, and it may show relatively little transfer to other tasks.

The main purpose of the current study was to exploit the natural experiment involving English and the United States, thereby expanding our knowledge about the learning of labels for letters and the role of these labels in early literacy. Such a study can provide a foundation for future work evaluating the appropriate use of letter names and sounds in early literacy. The current study had three specific goals. The first was to document the practices of parents and teachers in England and the United States. We expected that U.S. adults would report more emphasis on letter names and that those from England would emphasize letter sounds. Previous studies have shown that parents engage in many literacy- and alphabet-related activities with their children (e.g., Levy, Gong, Hessels, Evans, & Jared, 2006; Sénéchal & LeFevre, 2002), and teachers certainly do so as well. However, previous work has not systematically examined the stress that is placed on names relative to sounds in different countries.

Our second goal was to examine the letter-name and letter-sound knowledge of U.S. and English children. We tested English children in reception year, Year 1, and Year 2, and we tested U.S. children in preschool, kindergarten, and first grade. Children were asked to provide the name of each letter of the alphabet in a letter-name task and to provide its sound in a letter-sound task. We predicted that English children would perform better on sounds than on names and that U.S. children would show the opposite pattern. We further predicted that the U.S. children, like those in previous studies, would do better on the sound task with acrophonic letters than with nonacrophonic letters (Evans et al., 2006; Foy & Mann, 2006; McBride-Chang, 1999; Treiman et al., 1998). We asked whether the English children showed a similar pattern. We also examined children's errors in the name and sound tasks. U.S. children, as mentioned earlier, make certain errors in the letter-sound task that reflect their knowledge of letters' names, such as giving /wə/ as the sound of *y* (Thompson et al., 1999; Treiman et al., 1994). We asked whether English children made similar errors.

The third goal of our study was to explore the effects of letter-name and letter-sound knowledge on children's spelling. We were interested in the spellings that children invent, rather than retrieve as wholes from memory, and so we asked the children to spell unfamiliar items. These nonwords were designed to elicit specific errors that reflected use of letter names or sounds. One set of nonwords was the *CV (consonant–vowel) letter-name stimuli*. Some of the items in this set, the full-letter-name items, included the entire name of *c, g,* or *y* in their pronunciation. For example, a full-letter-name item for *y* was /waɪb/. We expected that the U.S. children would sometimes start their spelling of this nonword with *y* because they hear the name of *y* at the beginning. A spelling of /waɪb/ that begins with *y* is, of course, unusual; /w/ is never conventionally spelled as *y* in English. Each full-letter-name item had a corresponding phoneme-only item, /web/ in the example. It contained the same initial consonant sound as the full-letter-name item but contained a different vowel. We expected the U.S. children to produce fewer *y*-initial spellings of phoneme-only items such as /web/ than of full-letter-name items such as /waɪb/. The other two letter names that featured in the CV letter-name stimuli, c and *g*, are less extreme cases in that English /s/ and /dʒ/ are sometimes spelled with *c* and *g*, respectively. If children produce a large number of *c*- and *g*-initial spellings, especially for items such as /sib/ and /dʒib/ that contain the entire letter names in their pronunciations, this would suggest use of letter names. Some *y* spellings of words beginning with /w/ have been reported in U.S. children (Treiman et al., 1994), but English children's spellings of such items have not been examined.

We also asked children to spell *VC (vowel–consonant) letter-name items*. The full-letter-name items in this set ended with a VC sequence that was the name of a consonant letter. For example, the name of *n* is heard at the end of /gɛn/. The corresponding phoneme-only control item, /gæn/, contains the consonant phoneme from the letter name but a different vowel. We asked whether children used the critical letter, *n* in this example, at the end of their spellings of these items. Children who rely on letter names may be more likely to include this letter in their spellings of the full-letter-name items than of the control items because the letter's entire name is heard in the full-letter-name items. This may provide an additional cue, above and beyond knowledge of conventional sound–letter correspondences, that this letter belongs in the spelling. Previous studies of VC letter-name effects in spelling (e.g., Treiman, 1994) have included syllables such as /vɑr/ among the letter-name items. We did not include such items because /r/ is dropped after vowels in the area of England where we conducted this study. Dialect features such as /r/ dropping affect children's spelling (Treiman, Goswami, Tincoff, & Leevers, 1997), and we did not want this to contaminate our comparisons between English and U.S. children.

The two sets of nonwords described so far were designed to determine whether children use letter names when constructing spellings. A third set was designed around the letter sounds that are taught to English children. The nonwords in this letter-sound set included pairs such as /wubə/ and /wusə/. English children are taught the sound /bə/ for *b*, so /wubə/ is labeled a taught letter-sound item. For these children, /bə/ is a familiar sequence that is identified with *b*. Therefore, they might spell /wubə/ with a final *b*, omitting the vowel letter that would be expected at the end of the spelling. English children are taught that *s* makes the sound /s/. Teachers are taught not to include a schwa when pronouncing the sound of this letter, and our classroom observations suggest that they generally do not. Thus, items such as /wusə/ are called untaught letter-sound items because /sə/ is not a letter sound that English children are taught. We hypothesized that the English children would not produce many spellings of /wusə/ with an *s* at the end and no following vowel letter. If the English children's spellings of

the taught and untaught letter-sound items differ in this way, this would suggest that English children use the whole letter sounds they are taught when constructing spellings.

Method

Participants

Children

A total of 182 children participated: 90 in England and 92 in the United States. Table 1 shows the number of children in each school grade in each country. English reception year children and U.S. preschoolers are called the younger groups, English Year 1 students and U.S. kindergartners are called the middle groups, and English Year 2 students and U.S. first graders are called the older groups. All of the English children attended the same school in eastern England. The U.S. children attended several different preschools and elementary schools in the St. Louis, Missouri, area. The children in both countries were generally from middle-class backgrounds and were native speakers of either British English or American English. The groups of U.S. children were somewhat older than the groups of English children. This age difference reflects the times during the school year when the children were tested (mentioned below) and differences in ages of school entry.

We tested the reception children in England after they had received only a few months of formal literacy instruction. We expected that their literacy levels would be rather low and similar to those of U.S. preschoolers who were scheduled to enter kindergarten in the near future. The English Year 1 and Year 2 students were tested near the beginning of their school year, and the U.S. kindergartners and first graders were tested later in their school year, again with the hope that the middle and older groups would have similar overall literacy levels. As Table 1 shows, the English and U.S. children indeed performed similarly on the spelling subtest of the Wide Range Achievement Test–Third Edition (WRAT-3) (Jastak & Wilkinson, 1993). The mean scores of both the U.S. preschoolers and English reception year children corresponded to a kindergarten level of performance according to U.S. norms. This reflects familiarity with a number of letters and an ability to correctly spell some simple real words such as *go* and *cat*. Both the U.S. kindergartners and English Year 1 students performed at a first-grade level. This corresponds to an ability to spell words such as *boy*, *will*, and *run*. Both the U.S. first graders and English Year 2 students performed at a second-grade level, corresponding to an ability to spell words such as *dress*, *train*, and *watch*. An analysis of variance (ANOVA) using the factors of country and age group found only a main effect of age group, $F(2, 176) = 78.12$, $p < .001$. The similar spelling levels of English and U.S. groups mean that our comparisons between the two countries involve children who were similar in overall spelling ability according to a widely used measure. The U.S. children were somewhat older than the corresponding English children (as noted above), but

Table 1
Characteristics of participants

School grade	*n*	Mean age and age range[a] (years;months)	Mean[b] WRAT Spelling subtest raw score	WRAT Spelling subtest grade equivalent
England				
Reception	30	5;1 (4;7–5;6)	13.63 (5.36)	Kindergarten
Year 1	28	5;8 (5;2–6;1)	17.75 (3.33)	First grade
Year 2	32	6;6 (6;1–7;1)	21.13 (3.52)	Second grade
United States				
Preschool	33	5;5 (4;10–5;11)	12.97 (3.29)	Kindergarten
Kindergarten	27	6;3 (5;9–7;9)	18.19 (2.99)	First grade
First grade	32	6;11(6:3–7;6)	21.47 (2.58)	Second grade

[a] Age ranges are in parentheses.
[b] Standard deviations are in parentheses.

comparisons between children of similar levels of spelling performance are most informative for our purposes.

Parents

Questionnaires on the use of letter names and letter sounds were distributed to the parents of the children who participated in the study. A total of 80 parents returned completed questionnaires, and Table 2 shows the number in each group.

Teachers

Questionnaires were distributed to English teachers at the reception, Year 1, and Year 2 levels and to U.S. teachers of preschool, kindergarten, and first grade. Some were the teachers of the students who participated in this study, and additional teachers were included to increase the size of the sample. Table 3 shows the number of teachers at each level.

Materials

Children

To test children's letter knowledge, 26 cards were used. Each card contained the uppercase and lowercase form of a single letter. Each card was 7.6 by 12.7 cm, and the uppercase letters were approximately 5 cm high.

The 60 items for the nonword spelling task are shown in Appendix A. A total of 24 items were based on the names of *c* (/si/), *g* (/dʒi/), or *y* (/waɪ/), letters whose names have a CV structure. Half of these items, the full-letter-name items, were CVC (consonant–vowel–consonant) syllables that began with the full name of *c*, *g*, or *y*. Another 12 CVC items, the phoneme-only items, had the same initial phonemes—/s/, /dʒ/, or /w/—but different vowels. The full-letter-name and phoneme-only items were constructed in pairs. The items in each experimental–control pair were the same except for the vowel.

Table 2
Mean ratings (and standard deviations) from parent questionnaire and number of parent participants in each group

Age group	*n*	Use of letter names	Use of letter sounds	Relative use of letter names
England				
Younger	19	3.05 (1.13)	6.00 (0.88)	2.11 (0.66)
Middle	12	3.67 (1.67)	5.83 (1.03)	2.83 (0.94)
Older	6	4.50 (1.05)	6.00 (1.10)	3.33 (1.37)
United States				
Younger	13	5.92 (1.12)	4.23 (1.01)	5.38 (0.87)
Middle	11	6.64 (0.81)	4.82 (1.25)	4.64 (1.29)
Older	19	4.85 (1.61)	4.63 (1.12)	4.26 (1.69)

Note. Standard deviations are in parentheses.

Table 3
Mean ratings (and standard deviations) from teacher questionnaire, pooling over activity, and number of teachers in each group

Age group	*n*	Use of letter names	Use of letter sounds	Relative use of letter names
England				
Younger	13	3.09 (1.51)	6.60 (0.55)	2.10 (0.79)
Middle	12	4.47 (1.40)	5.75 (0.95)	3.07 (1.02)
Older	9	4.91 (1.29)	5.54 (1.36)	3.56 (1.22)
United States				
Younger	13	5.56 (1.44)	4.59 (1.60)	4.72 (1.40)
Middle	11	5.25 (1.36)	5.27 (1.30)	4.09 (1.32)
Older	11	5.33 (1.44)	4.82 (1.67)	4.33 (1.39)

Note. Standard deviations are in parentheses.

The 24 stimuli in another set of nonwords were based on VC letter names. Half of these were full-letter-name items that ended with the complete names of *l* (/ɛl/), *m* (/ɛm/), or *n* (/ɛn/). Another 12 phoneme-only items contained the same final phonemes but different vowels. The items formed pairs that were the same except for the vowel. In addition, 6 bisyllabic nonwords had /bə/, /gə/, /kə/, or /pə/ as the final syllable. These items, the taught letter-sound items, were selected because English children are taught these consonant–schwa sequences as the sounds of *b*, *g*, *k*, and *p*. Another 6 items, the untaught-letter-sound items, had the final syllable /fə/, /lə/, /mə/, /nə/, /sə/, or /zə/. Children in England learn the sounds of *f*, *l*, *m*, *n*, *s*, and *z* without a following schwa, and so the final syllables of the untaught-letter-sound items are not a taught letter-sound unit.

The 60 items for the nonword spelling task were split into two lists of 30. The two lists contained equal numbers of stimuli from the CV letter-name, VC letter-name, and letter-sound sets. The two lists also contained equal numbers of experimental and control items. If an experimental item was in one list, its control item was in the other list. The order of presentation of the two lists was counterbalanced across children. There were two different random orders for each list, and approximately half of the children at each age level were assigned to each order.

Parents

The parent questionnaire asked parents to consider the situations in which they dealt with letters with the target children. The introductory portion of the questionnaire provided a brief description of the types of activities that may occur at home, including identifying letters, writing letters, and spelling and reading words. A description of conventional letter names and letter sounds was provided. The first item asked, "Generally, when dealing with letters with your child, how often do you identify letters by their names?" Parents used a 7-point scale (1 for *never*, 2 for *rarely*, 3 for *occasionally*, 4 for *sometimes*, 5 for *regularly*, 6 for *frequently*, and 7 for *always*). The second item asked parents to rate their use of letter sounds on the same scale. The third item asked for a rating of the relative use of letter names and sounds using a different 7-point scale (1 for *sounds only*, 2 for *usually sounds with some names*, 3 for *sounds more often than names*, 4 for *sounds and names equally*, 5 for *names more often than sounds*, 6 for *usually names with some sounds*, and 7 for *names only*).

Teachers

Teachers completed a 15-item questionnaire to document use of letter names and sounds in their classrooms. The teacher questionnaire was divided into five areas: letter identification, reading, spelling handwriting, and general practice. For each area, teachers rated the extent to which they identified letters by their names, the extent to which they identified letters by their sounds, and their relative use of names and sounds. The scales were the same as those used by the parents.

Procedures

Children

Each child participated in at least three sessions that were held a minimum of 2 days apart. Most children completed the sessions within 2 weeks, but due to school vacations and absences, a few children took up to 4 weeks and one child took 6 weeks. During the first session, most children spelled one list of nonwords and took the spelling subtest of the WRAT. During the second session, children spelled the second list of nonwords. Some of the younger children needed two sessions to complete each nonword spelling list. The letter knowledge tasks were given during the final session, with the order of the letter-name and letter-sound tasks balanced across children at each age level. In general, the spelling tests were administered in small groups, whereas the letter knowledge tasks were given to each child individually. The English children were tested by native speakers of British English. The experimenters in the United States were native speakers of American English.

For the nonword spelling task, the children were told that the items they would hear were not real words and that the experimenter wanted to know what the children thought were the best spellings for these items. The experimenter said each nonword and the child repeated it. If the child repeated the item correctly, he or she was then asked to spell it. If the child repeated the item incorrectly, the

experimenter said it again and asked the child to repeat it. If the child still had not repeated the nonword correctly after three attempts (this did not occur often), the child was asked to spell the item.

The spelling subtest of the WRAT was administered using the standard protocol with one exception. In the standard protocol, which was developed for U.S. children, participants are asked to write letters that are named by the examiner. Because our English participants are introduced to letters by their sounds instead of by their names, these children heard both the letter name and the letter sound. For example, participants were instructed to "Write the letter /i/; the letter /i/ makes the /ɛ/ sound."

The cards for the letter-name and letter-sound tasks were shuffled for each participant and task. Participants were asked to provide either the name or sound of the letter, depending on the task. If the child gave the correct letter sound in the letter-name task, the experimenter said, "That is the sound this letter makes. Can you tell me the name of this letter?" If the child then used the correct letter name, the item was counted as correct. The same procedure was used for letter names that were not appropriate answers in the letter-sound task.

Parents

The questionnaires were given to the parents of the children who participated in the study along with a stamped envelope in which to return the questionnaire to the researchers.

Teachers

Participating teachers were given the questionnaire together with instructions for returning it to the researchers.

Results

We describe first the results of the parent and teacher questionnaires. These data are relevant to the first goal of our study—to document parent and teacher practices relative to letter names and sounds—and they provide a foundation for interpreting the data from the children. We then present the results on children's knowledge of letter names and sounds and on children's spellings.

Parent questionnaires

Table 2 shows the results of the parent questionnaire. The data for each question were analyzed using ANOVAs with the factors of country (England or United States) and age group of children (younger, middle, or older). U.S. parents reported using letter names more often than did English parents, $F(1, 74) = 29.89$, $p < .001$, $d = 1.37$ using Cohen's (1988) d statistic. The differences between parents in the two countries in letter name use were relatively large for the younger age group, $d = 2.55$, and for the middle age group, $d = 2.26$, but were small and not statistically significant for the oldest age group. This was reflected in an interaction between country and age group, $F(2, 74) = 5.34$, $p < .01$. Parents in England reported more use of letter sounds than did parents in the United States, $F(1, 74) = 29.74$, $p < .001$, $d = 1.34$, and no significant interaction with age group was observed on this question. U.S. parents' responses to the final question reflected more use of letter names than of letter sounds. English parents' mean rating was significantly lower, $F(1, 74) = 49.12$, $p < .001$, $d = 1.75$, reflecting more use of sounds than of names. An interaction with age group, $F(2, 74) = 6.13$, $p < .01$, arose because the difference between U.S. and English parents decreased as the age of the children increased. Specifically, the differences between the two countries were significant for the younger children, $d = 4.23$, and middle children, $d = 1.60$, but not for the older children.

Teacher questionnaires

The teachers' responses to each type of question—letter name, letter sound, and relative use of names versus sounds—were subjected to ANOVAs using the factors of country, age group of children taught, and activity (letter identification, reading, handwriting, spelling, or general practice).

We discuss first the effects of country and age, which are summarized in Table 3, and then consider the effects of activity. U.S. teachers reported using letter names more often than did English teachers, resulting in a main effect of country, $F(1, 63) = 23.15$, $p < .001$, $d = 0.87$. There was a main effect of age, $F(2, 63) = 3.67$, $p < .05$, $d = 0.51$, and an interaction of country and age, $F(2, 63) = 6.26$, $p < .01$. Differences between U.S. and English teachers decreased with the age of the children taught, with statistically significant differences for teachers of younger children only, $d = 1.67$. When asked about their use of letter sounds, English teachers gave higher ratings than did U.S. teachers, $F(1, 63) = 28.19$, $p < .001$, $d = 0.86$. A significant interaction between country and age, $F(2, 63) = 5.80$, $p < .01$, indicated that differences between the two countries decreased as the ages of the children taught increased. The differences between U.S. and English teachers on this question were statistically reliable for teachers of younger children only, $d = 1.68$. Finally, when asked to compare their use of letter sounds and letter names, English teachers reported using sounds more often than names, whereas U.S. teachers reported using names more often than sounds. This difference was reflected in a main effect of country, $F(1, 63) = 69.77$, $p < .001$, $d = 1.22$. A significant interaction between country and age, $F(2, 63) = 11.00$, $p < .001$, reflected the fact that the country differences were largest for teachers of younger children, $d = 2.30$, although they were statistically significant for teachers of middle children, $d = 0.86$, and older children, $d = 0.59$. These patterns are similar to those observed for the parents.

Table 4 illustrates that there were main effects of activity for all three questions: letter sounds, $F(4, 63) = 35.84$, $p < .001$, $d = 0.99$; letter names, $F(4, 63) = 32.08$, $p < .001$, $d = 1.03$; relative use of sounds and names, $F(4, 63) = 35.50$, $p < .001$, $d = 1.13$. In general, letter sounds were least likely to be used in handwriting and most likely to be used in reading. Activity interacted with country for letter sounds, $F(4, 63) = 8.22$, $p < .001$, and relative use of sounds and names, $F(4, 63) = 5.68$, $p < .001$. Differences between the two countries were larger for handwriting than for other activities for letter sounds (ds = 1.38 for handwriting, 0.97 for reading, 0.92 for letter identification, 0.80 for general practice, and 0.59 for spelling) and relative use of sounds and names (ds = 1.85 for handwriting, 1.55 for general practice, 1.52 for letter identification, 1.20 for reading, and 0.76 for spelling). Activity interacted with both age and country for letter names, $F(8, 63) = 2.38$, $p < .05$. Country differences in letter-name use decreased across age groups for letter identification (ds = 2.13, 0.67, and 0.32 for younger, middle, and

Table 4
Mean ratings (and standard deviations) for each activity from teacher questionnaire

	England			United States		
	Younger	Middle	Older	Younger	Middle	Older
Use of letter names						
Letter identification	3.62 (1.26)	4.75 (1.42)	5.56 (0.88)	6.08 (1.04)	5.64 (1.21)	5.18 (1.40)
Reading	2.46 (1.45)	3.50 (1.31)	3.67 (0.87)	4.20 (1.48)	4.64 (1.50)	4.82 (1.47)
Handwriting	3.31 (1.55)	5.50 (1.24)	5.44 (1.13)	6.08 (1.61)	6.27 (0.47)	6.45 (0.69)
Spelling	2.23 (1.36)	4.08 (1.24)	4.89 (1.69)	5.33 (1.56)	4.27 (1.68)	5.00 (1.73)
General practice	3.85 (1.46)	4.50 (1.09)	5.00 (1.00)	5.77 (0.83)	5.45 (0.69)	5.18 (1.33)
Use of letter sounds						
Letter identification	6.54 (0.66)	6.00 (0.95)	5.94 (1.01)	4.69 (1.75)	5.45 (0.93)	5.18 (1.47)
Reading	6.69 (0.48)	6.00 (0.95)	6.22 (0.67)	5.30 (0.95)	5.73 (0.47)	5.45 (1.21)
Handwriting	6.62 (0.51)	5.08 (1.24)	4.56 (2.01)	3.23 (1.69)	3.64 (1.80)	3.00 (1.73)
Spelling	6.62 (0.51)	6.00 (0.60)	5.44 (1.51)	5.08 (1.51)	5.82 (0.75)	5.36 (1.43)
General practice	6.54 (0.66)	5.67 (0.65)	5.56 (0.73)	4.85 (1.14)	5.73 (0.65)	5.09 (1.30)
Relative use of letter names						
Letter identification	2.23 (0.60)	2.92 (0.79)	3.78 (0.97)	5.00 (1.35)	4.55 (1.04)	4.18 (1.33)
Reading	2.00 (0.91)	2.58 (0.79)	2.67 (0.50)	3.70 (1.25)	3.27 (0.79)	3.64 (1.21)
Handwriting	2.15 (0.90)	4.08 (1.38)	4.22 (1.48)	5.69 (0.95)	5.64 (0.92)	5.82 (0.75)
Spelling	1.92 (0.86)	2.67 (0.49)	3.56 (1.67)	4.00 (1.48)	3.09 (1.45)	3.82 (1.54)
General practice	2.23 (0.73)	3.08 (0.79)	3.56 (0.73)	4.92 (1.19)	3.91 (0.30)	4.18 (0.98)

Note. Standard deviations are in parentheses.

older children, respectively), spelling (*d*s = 2.12, 0.13, and 0.06), and general practice (*d*s = 1.62, 1.04, and 0.15). However, U.S. teachers used letter names more than did English teachers with children of all ages for reading (*d* = 1.01) and handwriting (*d* = 1.14). As one teacher from England said,

> I think that letter sounds for foundation stage children [those from reception year, Year 1, and Year 2], when used at all times, make the learning of reading, spelling, and writing as simple as possible and show rapid results. ... As children develop confidence with their "sounding out" words and learn other blends [around 6 or 7 years of age], introduction of letter names and the alphabet would hopefully come quite easily.

This view contrasts with that of a representative U.S. teacher, who advocated that preschoolers be exposed primarily to letter names and that sounds be introduced as children get older:

> I believe kindergartners are developmentally ready to learn both letter names and letter sounds. Younger children should be exposed to letter names but not necessarily sounds. Older children should focus more on sounds.

The results confirm that teachers in England stress letter sounds, whereas those in the United States are more likely to use letter names. Teachers are more likely to use letter names in teaching handwriting than in other activities, probably because handwriting instruction focuses on the shapes of letters and not their sound-symbolizing functions. However, teachers from England—especially teachers of the youngest children—often talk about children's formation of, for example, a /bə/.

Children's letter knowledge

Table 5 shows the children's results on the letter-name and letter-sound tasks. We begin by discussing the results pooled across all letters, as shown in the columns labeled *All*. In scoring the letter-name task, we accepted both /zi/ and /zɛd/ as correct responses for *z*. The U.S. children always used the former, and English children nearly always (91% of the time) used the latter. For the letter-sound task, we scored as correct both the "short" and "long" sounds of vowels and both the "soft" (i.e., /s/, /sə/, /dʒ/, /dʒə/) and "hard" (i.e., /kə/, /gə/) sounds of *c* and *g*.

The data on correct responses were subjected to a by-participants ANOVA using the factors of country, age group, and task (name or sound). There were main effects of country, $F(1, 176) = 12.15$, $p < .001$, $d = 0.19$, age group, $F(2, 176) = 53.61$, $p < .001$, $d = 0.78$, and task, $F(1, 176) = 14.83$, $p < .001$, $d = 0.14$. These main effects were qualified by a two-way interaction of task and country, $F(1, 176) = 297.16$, $p < .001$, a two-way interaction of task and age, $F(2, 176) = 6.17$, $p < .01$, and a three-way interaction of task, age, and country, $F(2, 176) = 50.16$, $p < .001$. All groups of English children per-

Table 5
Mean proportions (and standard deviations) of correct responses by children from England and the United States on letter-name and letter-sound tasks

Age group	Letter-name task			Letter-sound task		
	All	Acrophonic	Nonacrophonic	All	Acrophonic	Nonacrophonic
England						
Younger	.39 (.49)	.46 (.50)	.32 (.47)	.88 (.33)	.85 (.36)	.88 (.32)
Middle	.57 (.50)	.63 (.48)	.48 (.50)	.98 (.14)	.99 (.12)	.98 (.14)
Older	.84 (.36)	.86 (.34)	.82 (.39)	.98 (.13)	.99 (.12)	.98 (.14)
United States						
Younger	.91 (.28)	.92 (.27)	.92 (.28)	.43 (.50)	.64 (.48)	.32 (.47)
Middle	.99 (.11)	.99 (.12)	.99 (.10)	.86 (.35)	.98 (.15)	.82 (.38)
Older	1.00 (.05)	1.00 (.00)	1.00 (.05)	.95 (.21)	.99 (.09)	.93 (.26)

Note. Standard deviations are in parentheses.

formed significantly better on the sound task than on the name task (*d*s = 1.16, 1.14, and 0.51 for the older, middle, and younger age groups, respectively). Although performance on the name task improved with age, even the children in the oldest English group made some errors on this task. The U.S. children in the young age group (*d* = 1.20) and middle age group (*d* = 0.50) performed significantly better on the name task than on the sound task. The older U.S. group was close to ceiling on both the sound task and name task, and these children no longer showed a significant superiority for names over sounds. These results support our predictions that U.S. children show a superiority for names, whereas English children show a superiority for sounds. They further show that performance on the weaker task was lower for the English children than for the U.S. children.

For several letters, as mentioned above, we counted more than one response as correct in the sound task. The choices of English and U.S. children differed in ways suggesting that the U.S. children, but not the English children, derived their knowledge of letter sounds in part from their knowledge of letter names. The U.S. children sometimes produced /s/ or /sə/ when asked for the sound of *c* and produced /dʒ/ or /dʒə/ when asked for the sound of *g*. These responses, which include the first phonemes of the letters' names, constituted 84% of the correct responses for the younger U.S. group, 17% of the correct responses for the middle U.S. group, and 25% of the correct responses for the older U.S. group. The letters *c* and *g* are pronounced as /s/ and /dʒ/ in words such as *cent* and *gem*, but such pronunciations are much less common than the /k/ and /g/ pronunciations observed in words such as *cat* and *get*. If children derived their knowledge of letter sounds from the spelling–sound correspondences that appear in words they read, we would expect a low rate of /s/ and /dʒ/ responses. To get a better idea of the rate that would be expected under this hypothesis, we examined the words that appear in reading materials targeted at kindergartners and first graders according to Zeno, Ivenz, Millard, and Duvvuri (1995) and that also have a pronunciation in the Carnegie Mellon Pronouncing Dictionary (Carnegie Mellon University, 1998). For *c*-initial words, the proportion of /s/-initial pronunciations is 5% by types (counting each word equally) and 2% by tokens (weighting each word by its frequency in Zeno et al., 1995). For *g*-initial words, the proportion of /dʒ/-initial pronunciations is 10% by types and 3% by tokens. Thus, the U.S. children, especially the younger ones, produced more frequent /s/ and /dʒ/ responses than would be expected based on their exposure to these correspondences in printed words. The U.S. children's excess /s/ and /dʒ/ responses must reflect their use of letter names to derive the sounds for which the letters stand. Consistent with this view, the English children never produced /s/ and /dʒ/ responses when asked about the sounds of *c* and *g*.

Further supporting the idea that the younger U.S. children's responses in the letter-sound task were based in part on their knowledge of letter names, these children sometimes provided the "long" sounds of the vowel letters. Such responses constituted 14% of the correct responses of the younger U.S. group even though the letter-sound task was carried out in such a way as to discourage responses that were the names of letters. These letter-name-influenced responses on vowels were rare for the middle (2%) and older (1%) U.S. groups. They never occurred among the English children.

Further insights into the children's performance come from examining their performance on the acrophonic and nonacrophonic letters in the name and sound tasks. For the analyses shown in Table 5, the letters *b, d, j, k, p, t, v,* and *z* were included in the acrophonic category. The letters *f, h, l, m, n, q, r, s, w, x,* and *y* were counted as nonacrophonic.[1] The nonacrophonic category includes cases in which the sound is at the end of the name and cases in which the sound is not in the name. We did not distinguish these here because there are not a large number of letters of each type and because *r*, although nonacrophonic for both U.S. and English children, has its sound at the end of its name as pronounced in the United States and does not have its sound in the isolated letter name as pronounced in England. Following Treiman et al. (1998), *a, e, i, o,* and *u* were excluded from the analysis because they have both short sounds that are nonacrophonic and long sounds that are acrophonic. In addition, *g* and *c* were excluded because their soft pronunciations are acrophonic and their hard pronunciations are not.

[1] The children at this school learned a nonacrophonic name for *h*, /etʃ/. However, the name is sometimes pronounced with an initial /h/ in England, making the status of this letter somewhat questionable. The same results were obtained when the analyses were run without *h*.

Several studies have reported that U.S. children perform better on acrophonic letters than on nonacrophonic letters when asked to provide the letters' sounds (Evans et al., 2006; Foy & Mann, 2006; McBride-Chang, 1999; Treiman et al., 1998). To determine whether this pattern held true for the U.S. and English children in the current study, we ran an analysis using the factors of country, age, task, and acrophonicity (acrophonic or nonacrophonic). There was a four-way interaction, $F(2, 176) = 12.04$, $p < .001$, and we followed up the results involving acrophonicity by means of t tests. The U.S. children did not show significant differences between acrophonic and nonacrophonic letters in the name task. However, the younger and middle U.S. groups performed significantly better on the acrophonic letters ($d = 0.66$) than on the nonacrophonic letters ($d = 0.53$) in the sound task. The older U.S. group performed close to ceiling on the sound task and no longer showed a significant difference between the two types of letters. These results replicate previous findings with U.S. children. Turning to the results of the English children, the younger and middle groups performed significantly better on the acrophonic letters ($d = 0.29$) than on the nonacrophonic letters ($d = 0.30$) in the name task. The older group did not show a significant difference between the two types of letters. That is, the younger and middle English children were more likely to provide the correct names of letters such as *b* and *v*, the names of which begin with the sound that the children have learned, than of letters such as *l* and *h*, the names of which do not begin with the learned sound. On the letter-sound task, none of the groups of English children showed a significant difference between acrophonic and nonacrophonic letters. Although the younger English children showed roughly the same level of overall accuracy as the middle U.S. children, the difference between the acrophonic and nonacrophonic items was not significant for the English children.

U.S. children's use of letter names to make inferences about letter sounds has been reported to lead to systematic errors in the letter-sound task (e.g., Treiman, 1994). These errors occur when children use the first phoneme of the letter name for the letter sound and therefore are called *acrophonic*. For the U.S. children in the current study, 35% of errors on the sound task were acrophonic, consisting of the first phoneme of the letter name followed optionally by one or more other phonemes. (The denominator for this and the other percentages reported for the error analyses exclude cases in which children declined to provide a response and cases in which children used the letter name in the sound task or the letter sound in the name task.) For example, the U.S. children sometimes provided /də/ for the sound of *w* and provided /ɛ/ for the sound of *m*, *n*, or *l*. These acrophonic responses constituted a smaller percentage (12%) of the English children's errors on the sound task. The significant association between error type and country, $\chi^2(1, N = 468) = 5.59$, $p < .02$, supports the idea that U.S. children use their knowledge of letter names to induce letter sounds in a way that English children, with their weaker knowledge of letter names, do not.

The English children's errors in the name task suggested an influence in the other direction—use of a taught letter sound to induce the letter's name. The English children sometimes produced errors in the letter-name task that began with the letter sound they had been taught (or the consonantal portion in the case of a taught sound with final /ə/) and that ended with a vowel other than /ə/. For example, some English children gave /kwi/ for the name of *q*. This answer is wrong, of course, but it follows the general phonological structure of other English letter names and it begins with the /kw/ that children have learned as the sound of *q*. Other sound-influenced errors on the letter-name task include /ki/ for the name of *k* or *c*, /gi/ for the name of *g*, /dʒi/ for the name of *j*, /si/ for the name of *s*, /ri/ for the name of *r*, /wi/ for the name of *w*, and /jaɪ/ for the name of *y*. The percentage of errors in the name task that were influenced by letter sounds in this way was much greater for the English children (56%) than for the U.S. children (7%), $\chi^2(1, N = 233) = 47.46$, $p < .001$. These results show that English children use their knowledge of letter sounds to learn letter names. As a result, they sometimes invent plausible but wrong letter names.

Children's nonword spelling

CV letter-name stimuli

Table 6 shows the proportions of children's spellings of the CV letter-name nonwords that began with the critical letter—*c*, *g*, or *y*. Results are shown for full-letter-name items such as /waɪb/ and phoneme-only items such as /web/. If children begin their spellings of full-letter-name items such as

Table 6
Mean proportions (and standard deviations) of responses by children from England and the United States beginning with critical letter (*c*, *g*, or *y*) for CV letter-name stimuli

Age group	Full letter name	Phoneme only
England		
Younger	.03 (.16)	.02 (.14)
Middle	.04 (.20)	.04 (.21)
Older	.11 (.31)	.04 (.19)
United States		
Younger	.39 (.49)	.09 (.29)
Middle	.24 (.43)	.07 (.25)
Older	.29 (.45)	.13 (.33)

Note. Standard deviations are in parentheses.

/waɪb/ with *y* rather than the conventional *w*, this would suggest that they use their knowledge of *y*'s name, /waɪ/, in spelling. We expected that errors such as "yb" would be more common for full-letter-name items such as /waɪb/ than for phoneme-only items such as /web/, especially among U.S. children. If so, this would suggest that U.S. children are particularly likely to use their knowledge of letter names when constructing spellings.

The data were subjected to ANOVAs using the factors of country, age group, and stimulus type (full-letter-name or phoneme-only items). Here and for the following ANOVAs for which we generalize over stimuli as well as participants, we performed participants (F_1) and items (F_2) analyses and report as significant effects for which $p < .05$ in both types of analyses. There were significant main effects of country, $F_1(1, 176) = 87.30$, $p < .001$, $F_2(1, 22) = 88.02$, $p < .001$, $d = 0.48$, and stimulus type, $F_1(1, 176) = 112.55$, $p < .001$, $F_2(1, 44) = 9.75$, $p < .01$, $d = 0.37$. These main effects were qualified by two-way interactions between age and country, $F_1(2, 176) = 4.00$, $p < .05$, $F_2(2, 44) = 17.20$, $p < .001$, for both and between stimulus type and country, $F_1(1, 176) = 70.53$, $F_2(1, 44) = 32.23$, $p < .001$, for both as well as a three-way interaction involving stimulus type, country, and age, $F_1(2, 176) = 7.23$, $F_2(2, 44) = 14.09$, $p < .001$, for both. The U.S. children used the critical letter more than did the English children, particularly for the full-letter-name items ($d = 0.67$). Spellings such as "yb" for the full-letter-name item /waɪb/ were especially common among the younger U.S. children, occurring nearly 40% of the time. The difference between full-letter-name items and phoneme-only items, although still significant for all age groups, was larger for younger U.S. children ($d = 0.75$) than for middle and older U.S. children ($ds = 0.48$ and 0.41, respectively). As a group, English children showed little difference between the full-letter-name and the phoneme-only stimuli. Some letter-name-based spellings of the full-letter-name stimuli did appear among the older English children, and for this group the difference between the full-letter-name and phoneme-only items was statistically significant ($d = 0.27$). Thus, the English children began to show some effects of full letter names in their spelling once they had started to learn the letter names, but these effects were weaker than those shown by the U.S. children.

Although our main interest was in children's use of the specific letters outlined above, we also examined the phonological plausibility of the spellings as a whole. A spelling was scored as phonemically plausible if it contained a plausible spelling for every phoneme in the correct left-to-right sequence. Extra letters were permitted. A letter was considered to be a plausible spelling for a phoneme if it spelled that phoneme, in any context, in any of the 9661 words identified in Zeno and colleagues (1995) as being reasonably common in texts read by children in kindergarten through second grade—specifically as having, for one of those grades, a *U* value (frequency adjusted for variation in distribution) of at least one word per million. Because the stimuli were selected to be largely dialect neutral, we encountered no substantial problems scoring U.S. and English spellings by the same procedures. However, to accommodate sound–spelling correspondences more common in England, but not rare in the United States, spellings with *r* were counted correct for /ə/ and spellings with *th* were counted correct for /f/ and /v/. The plausibility scores, which are shown in Table 7, were analyzed using the factors of country, age group, and stimulus type. There were significant main effects of

Table 7
Mean proportions (and standard deviations) of plausible spellings by children from England and the United States for CV letter-name stimuli, VC letter-name stimuli, and letter-sound stimuli

Age group	CV letter name	VC letter name	Letter sound
England			
Younger	.48 (.50)	.49 (.50)	.19 (.39)
Middle	.75 (.43)	.76 (.43)	.33 (.47)
Older	.86 (.35)	.85 (.36)	.67 (.47)
United States			
Younger	.06 (.24)	.06 (.24)	.03 (.11)
Middle	.47 (.50)	.47 (.50)	.34 (.47)
Older	.80 (.40)	.79 (.41)	.64 (.48)

Note. Standard deviations are in parentheses.

country, $F_1(1, 176) = 47.42$, $p < .001$, $F_2(1, 22) = 718.15$, $p < .001$, $d = 0.55$, and age group, $F_1(2, 176) = 81.95$, $p < .001$, $F_2(2, 22) = 495.64$, $p < .001$, $d = 1.38$. The English children used plausible spellings more often than did the U.S. children, and the use of plausible spellings increased with age. These results were qualified by an interaction between country and age group, $F_1(2, 176) = 8.94$, $p < .001$, $F_2(2, 44) = 65.66$, $p < .001$, such that the differences between the two countries were smaller for the the older children (ds = 1.08, 0.60, and 0.15 for the younger, middle, and older age groups, respectively). Stimulus type did not participate in any significant effects.

VC letter-name stimuli

Table 8 shows the proportions of children's spellings of the VC letter-name items that ended with the critical letter—*l*, *m*, or *n*. If U.S. children can select these spellings on the basis of letter names as well as on the basis of sound–letter relationships, they should more often produce spellings ending with the critical letter for the full-letter-name items, such as /vɛl/, than for the phoneme-only items, such as /vɪl/. Thus, an effect of stimulus type (full-letter-name or phoneme-only items) would point to the use of letter names in spelling.

The data were analyzed using the factors of country, age group, and stimulus type. There were significant main effects of country, $F_1(1, 176) = 30.23$, $p < .001$, $F_2(1, 22) = 1117.15$, $p < .001$, $d = 0.50$, and age group, $F_1(2, 176) = 63.89$, $p < .001$, $F_2(2, 22) = 248.48$, $p < .001$, $d = 1.33$. The English children included the critical letter at the end of their spellings more often than did the U.S. children, and use of the critical letter, which is the correct spelling, increased with age. These results were qualified by an interaction between country and age group, $F_1(2, 176) = 7.02$, $p < .01$, $F_2(2, 44) = 43.42$, $p < .001$, such that the differences between the two countries were smaller for the the older age group ($d = 0.22$) than for the younger and middle age groups (ds = 0.92 and 0.41, respectively). The younger U.S. children showed a trend toward more use of the critical letter for the full-letter-name stimuli than

Table 8
Mean proportions (and standard deviations) of spellings by children from England and the United States ending with the critical letter (*l*, *m*, or *n*) for full letter-name and phoneme-only VC items

Age group	Full letter name	Phoneme only
England		
Younger	.59 (.49)	.59 (.49)
Middle	.84 (.37)	.82 (.38)
Older	.95 (.22)	.93 (.26)
United States		
Younger	.21 (.41)	.16 (.37)
Middle	.67 (.47)	.65 (.48)
Older	.87 (.33)	.88 (.33)

Note. Standard deviations are in parentheses.

for the phoneme-only stimuli ($d = 0.13$) as compared with the younger English children ($d = 0.00$). Contrary to our predictions, stimulus type did not participate in any significant effects.

We analyzed the plausibility of the spellings as a whole with ANOVAs using the factors of country, age group, and stimulus type (see Table 7). There were significant main effects of country, $F_1(1, 176) = 48.24$, $p < .001$, $F_2(1, 22) = 334.02$, $p < .001$, $d = 0.56$, and age group, $F_1(2, 176) = 75.95$, $p < .001$, $F_2(2, 22) = 581.42$, $p < .001$, $d = 1.35$. The English children used plausible spellings more often than did the U.S. children, and the use of plausible spellings increased with age. These results were qualified by an interaction between country and age group, $F_1(2, 176) = 8.51$, $p < .001$, $F_2(2, 44) = 45.99$, $p < .001$, such that the differences between the two countries were smaller for the the older children ($d = 0.16$) than for the younger and middle age groups ($ds = 1.08$ and 0.64, respectively).

Letter-sound stimuli

Table 9 shows the proportions of children's spellings of the letter-sound stimuli that ended with the critical consonant letter—*b*, *g*, *k*, or *p* for taught letter sounds and *s*, *z*, *m*, *l*, *f*, or *n* for untaught letter sounds. Spellings that ended with a consonant letter were errors. The spoken stimuli, such as /wubə/ in the taught letter-sound condition and /wusə/ in the untaught letter-sound condition, end with vowel phonemes and should be spelled with a final vowel letter. We expected that the English children, who have been taught /bə/ as the label for *b*, might sometimes spell a nonword such as /wubə/ with a final *b* without the expected vowel. Such errors might be less common for untaught-letter-sound items such as /wusə/ because English children are not taught to pronounce a schwa in the sound of *s* and so /sə/ is not a unit for them in the same way that /bə/ is.

ANOVAs using the factors of country, age group, and stimulus type (taught or untaught letter sound) showed main effects of country, $F_1(1, 176) = 31.02$, $p < .001$, $F_2(1, 10) = 51.66$, $p < .001$, $d = 0.45$, and age group, $F_1(2, 176) = 3.68$, $p < .05$, $F_2(2, 10) = 9.40$, $p < .01$, $d = 0.29$. These main effects were qualified by a significant interaction between country and age, $F_1(2, 176) = 9.73$, $F_2(2, 20) = 27.18$, $p < .001$, for both. Pooling over the taught and untaught letter-sound items, spellings that ended with the critical consonant were significantly more common for the English children than for the U.S. children in the younger and middle age groups ($ds = 0.80$ and 0.72, respectively) but not in the older age group ($d = 0.04$). The interaction between country and stimulus was significant by participants, $F_1(1, 176) = 13.43$, $p < .001$, and marginal by items, $F_2(1, 20) = 4.64$, $p = .057$. The English children were significantly more likely to include the critical letter in the last position for the taught letter-sound items than for the untaught-letter-sound items ($d = 0.26$). As a group, the U.S. children did not show a significant difference between the taught-and untaught-letter-sound items. These results indicate that English children, having been taught a sequence such as /bə/ as a label for *b*, sometimes use just the letter *b* with no following vowel to spell this sequence. They are less likely to make such errors for sequences such as /sə/, which they have not been taught as a unit.

Plausibility scores were analyzed using the factors of country, age group, and stimulus type (see Table 7). There were significant main effects of age group, $F_1(2, 176) = 58.87$, $p < .001$, $F_2(2,$

Table 9
Mean proportions (and standard deviations) of spellings by children from England and the United States ending with the critical letter for stimuli with taught letter sounds (*b*, *g*, *k*, and *p*) and untaught letter sounds (*s*, *z*, *m*, *l*, *f*, and *n*)

Age group	Taught letter sound	Untaught letter sound
England		
Younger	.35 (.48)	.19 (.40)
Middle	.47 (.50)	.35 (.48)
Older	.24 (.43)	.15 (.36)
United States		
Younger	.02 (.12)	.01 (.10)
Middle	.08 (.27)	.12 (.33)
Older	.25 (.43)	.18 (.39)

Note. Standard deviations are in parentheses.

20) = 219.97, $p < .001$, $d = 1.39$, and stimulus type, $F_1(1, 176) = 41.85$, $p < .001$, $F_2(1, 20) = 8.17$, $p < .05$, $d = 0.20$. Plausible spellings increased with age, and they were more frequent for items containing untaught letter sounds ($M = .41$, $SD = .49$) than for those containing taught letter sounds ($M = .32$, $SD = .47$).

Discussion

Learning about letters is an important foundation for learning to read and spell. This learning requires that letters be labeled in some way. English-speaking countries differ in the labels that children are taught for letters. In the United States and a number of other countries, children learn the traditional names /e/ for *a*, /bi/ for *b*, and so on. Many of these names contain the phoneme that the letter usually represents in words, but others do not. For example, the letter *c* more often spells /k/ than /s/, and the letter *y* never spells /w/. Given these facts, some educators advocate that children be taught labels that begin with the phoneme that the letter most often represents. Such labels are taught first in England, with conventional letter names being taught later. The current study exploited this natural experiment between England and the United States so as to shed light on the nature and consequences of learning labels for letters.

The first goal of our study was to document teacher and parent practices in England and the United States. As expected, we found that teachers and parents in the United States emphasize letter names at first and that those in England emphasize letter sounds. The differences between the two countries decrease as the other set of labels is increasingly used with older children.

Having documented the different practices of English and U.S. adults, our second goal was to examine children's learning of letter names and sounds. We were particularly interested in whether names are easier for children to learn than are sounds, as McBride-Chang (1999) suggested. We found that children from the United States were better at providing letter names than providing letter sounds and that children from England showed the opposite pattern. No previous studies have compared children in the two countries on these skills, although a few studies in England have reported better performance on sounds than on names (Caravolas, Hulme, & Snowling, 2001; Caravolas, Kessler, Hulme, & Snowling, 2005). British researchers and educators have tended to count either knowledge of names or knowledge of sounds as evidence of letter knowledge, however, making it hard to differentiate between the two skills (e.g., Carroll, Snowling, Stevenson, & Hulme, 2003; Gallagher, Frith, & Snowling, 2002; Muter, Hulme, Snowling, & Stevenson, 2004). Importantly, we did not find evidence that letter sounds are intrinsically difficult for children and that letter names are intrinsically easy. The children from England performed well on sounds even at 5 years of age, and some children in the oldest group did not know all of the names. Our results support the idea that children learn what they are taught. There are no intrinsic differences in ease of learning between conventional English letter names and sounds that are strong enough to overcome the effects of experience. The same appears to be true for Hebrew (Levin et al., 2006). Our finding that U.S. children become proficient with letter sounds earlier than English children become proficient with letter names may reflect the fact that letter sounds are practiced more often during the course of reading and writing as children decode and spell words.

Our results suggest that the first set of labels—letter names in the United States and many other countries and letter sounds in England—is learned in a rote fashion. At this point, children typically do not have other knowledge about the letters that could rationalize the labels. Thus, children learn them in much the same way that they learn most other words—as arbitrary labels. The situation is different for the second set of labels. Here the first label helps to rationalize the second label. We found transfer in the name-to-sound direction for U.S. children, such that knowledge of conventional names such as /bɪ/ for *b* helped children to learn the sound /bə/, but knowledge of names such as /waɪ/ for *y* sometimes caused them to report *y*'s sound as /wə/. Such name-to-sound transfer has been found in previous studies of U.S. children (e.g., Treiman et al., 1998). A new finding was that of transfer in the sound-to-name direction for English children. Knowledge of sounds such as /bə/ for *b* helped children to learn the acrophonic letter name /bɪ/, but knowledge of sounds such as /wə/ for *w* sometimes caused children to name *w* as /wi/. Ours is the first study of English-speaking children to report such sound-to-name transfer; Levin et al. (2006) reported transfer in this direction with Hebrew speakers.

These findings reflect the fact that arbitrary associations are difficult for people to learn and remember. When possible, people use what they know to make new information less arbitrary. Our findings show that even young children do this with letters. They do it whether they learn the names first or the sounds first.

A third goal of our study was to examine children's invented spelling and whether it varies with a culture's stress on letter names versus sounds. We found some differences between the invented spellings of English children and those of U.S. children. The U.S. children were more likely to produce spellings such as "yb" for /waɪb/, using *y* to represent both phonemes in their label for the letter /waɪ/. The English children were more likely to produce spellings such as "wub" for /wubə/, using b to represent both phonemes in their label for the letter /bə/, whereas U.S. children were more likely to represent the final vowel. Such use of taught letter sounds in spelling has not been documented previously among children in England. Our study, unlike previous studies (Treiman, 1993; Treiman, 1994), did not find many errors such as "vl" for /vɛl/ among U.S. children. The previous studies reported many letter-name spellings with items that included the name of *r*, such as /vɑr/, but we did not include such items here because of dialect differences between England and the United States. Despite this, our results indicate that children use the labels they possess for letters when they invent spellings for words. The different experiences and knowledge of the English and U.S. children cause their early spellings to differ in some ways.

Although the children in England and the United States performed similarly on the standardized spelling test, which includes real words, the English children—especially the younger ones—produced more phonologically plausible spellings for most types of nonwords in our study. The only type of nonword for which a significant difference favoring the English children was not found was the bisyllabic letter-sound nonwords, which were difficult for children in both countries. One possible explanation for these differences in phonological plausibility is that early teaching of letter sounds helps children to use the alphabetic principle when spelling novel items. Children with more knowledge of letter sounds may show more transfer from real words to nonwords than do children with less knowledge of letter sounds. However, the observed differences between English and U.S. children in the phonological plausibility of nonword spelling could reflect factors other than the order of learning letter sounds and names. English children begin formal education earlier than do U.S. children, and the literacy instruction provided to the two groups differs in many ways other than the order of teaching of letter names and sounds.

Do letter names provide a bridge to literacy (e.g., Foulin, 2005)? In North America, it is widely believed that they do. Learning the alphabet, in the sense of learning the letter names in their conventional order, is considered as very important, and one goal of North American parents and early childhood educators is to instill this information before formal reading instruction begins. However, our results show that children can start to read and write without it. Several of the English children in our study performed at the first-grade level on the standardized spelling test even though they knew the names of just a few letters. In contrast, a number of U.S. children knew a large majority of the letter names and yet performed at the preschool or kindergarten level. We did not find any evidence that learning the conventional names of letters first provides children with a boost that learning the sound labels first does not provide. The two labels function differently for adults, who know that /s/ is the sound to which *s* corresponds in words and that /ɛs/ contains an extra phoneme. For young children, however, both /s/ and /ɛs/ are arbitrary labels for a shape. Young children learn the labels at first by rote, later using the first-learned label to help learn the second label. Our results offer no reason to believe that learning one type of label before the other leads to better long-term performance.

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Appendix A

A.1. Stimuli for nonword spelling task

A.1.1. CV letter-name stimuli

Full letter name: sib, sif, sig, siv, dʒib, dʒim, dʒid, dʒit, waɪb, waɪm, waɪð, waɪdʒ

Phoneme only: seb, saɪf, sog, sov, dʒaɪb, dʒom, dʒaɪd, dʒaɪt, web, wom, weð, wodʒ.

A.1.2. VC letter-name stimuli

Full letter name: kɛl, θɛl, vɛl, zɛl, zɛm, nɛm, vɛm, wɛm, drɛn, gɛn, θɛn, vɛn

Phoneme only: kæl, θɪl, vɪl, zɪl, zæm, næm, vɑm/vɒm, wɑm/wɒm (/ɑ/ was used for these items in the United States, and /ɒ/ was used in England), dræn, gæn, θæn, vʌn

A.1.3. Letter-sound stimuli (all were stressed on the first syllable)

Taught letter sound: wubə, vubə, sugə, nugə, mukə, gupə

Untaught letter sound: wusə, vuzə, sumə, nulə, mufə, gunə

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