

Why is English orthography so critical? (Science of Reading series, Part 1)

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The concept that letters and sounds are related in particular ways is fundamental to becoming literate in English. The relationship between sounds and written symbols is called an orthography. The written and sound systems of languages, as is the case with Arabic, Chinese and Russian, vary considerably from one another and from English:

Arabic الكرة

Chinese 球

Russian. мяч

These words represent the same object, one that is familiar to children the world over: ball. In playgrounds, fields, and streets, we see children rolling, kicking, or tossing a ball. The actions may be the same, but the graphic symbols and the sounds associated with these symbols differ substantially, as illustrated above.

In the English orthography, there are 26 letters and 44 phonemes. Each letter has a relationship to one or more phonemes. But the relationships between the letters and sounds in English are not perfect; in English, a letter does not always relate to the same sound. When the letter-sound relationships aren't perfect as in English, the orthography is described as "deep." An orthography described as "shallow" has highly consistent relationships between letters and sounds. Finnish is a language with a shallow orthography in that a one-to-one relationship exists between letters and sounds.

In a study of children's reading development in European Union countries, researchers concluded that children reading in a deep orthography—such as English—took twice as long to learn to read as those learning to read in a shallow orthography¹. The reason was not the quality of instruction or when children entered school; rather it was a function of the complexity of syllables and the orthographic relationships.

An overview of English orthography gives a sense of the task for children learning to read in English:

Consonants: Most of the 21 letters of the English alphabet that serve as consonants are usually associated with a single sound (e.g., *p, m, b, v, g*). Two consonants (*c, x*) do not have a unique phoneme associated with them but use sounds associated with other letters. Further, there are several phonemes that are associated with letter combinations, such as the relationship between the letters *sh* and the phoneme [ʃ] (as in *show*). Even so, the relationships are fairly straightforward, in that 21 consonants are represented by 24 phonemes.



Vowels: It's the vowels in English where there is considerable variation. There are only five letters that are consistently vowels, but these five letters are responsible for the other 20 phonemes in English. The letters that are consistently vowels are: *a, e, i, o, u*. Three consonants pair with vowels: *r, w,* and *y*. And then there is the consonant *y*, which also functions as a vowel on its own (*myth, my*).

In Fry'sⁱⁱ (2004) analysis of 17,310 words, the 20 vowel phonemes had correspondences with 127 letters or letter combinations. A single phoneme can have a number of graphemes associated with it. This is illustrated in Table 1 by the graphemes associated with the phoneme /i:/, which sounds like the name for the letter *e*.

Grapheme	Example	Number of appearances in words ¹
e	me	1765
y	very	1801
ee	keep	249
ea	eat	245
e-e	these	62
ie	field	62
i-e	police	44
ey	money	40
i	unique	38
ea-e	peace	30
ie-e	piece	23
ei	ceiling	16

¹In database of 17,310 words (adapted from Fry, 2004)

In looking at the frequencies, remember that Fry did not differentiate between appearances in monosyllabic and multisyllabic words. Each multisyllabic word has at least two syllables, and each syllable has a vowel, so the frequencies can be high. The ratio of monosyllabic to multisyllabic words is approximately 1:6.ⁱⁱⁱ That means that all of these words won't show up in the reading acquisition period. But to become proficient readers, students will need to be able to recognize the patterns in multisyllabic words.

When we look at all of these letter associations with this one phoneme, a critical question is: Which of these many patterns should be taught? Fry put the letter-sound correspondences into three groups: (a) regular—usually the most common use; (b) unusual—frequency less than regular but more than 50; and (c) rare—frequency less than 50 but 10 or more.

Do beginning readers need to be exposed to all patterns? Or just to the regular ones? Or to those in monosyllabic words only? At this point, we don't have definitive answers about how many of the rare and unusual patterns need to be taught. We do, however, have definitive evidence that students need not only to be introduced to regular patterns, but to learn them.

Given the inconsistencies in English's orthography, some may wonder why we should prioritize children's fluency with letter-sound patterns. The answer is that English is *always* an alphabetic



language. In iPhone texts, we may insert emojis and other symbols. However, in the long history of English, we have stayed with the 26 letters and the 44 phonemes, and understanding the relationship between those letters and phonemes is essential to learning to read.

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- ⁱ Seymour, P. H. K., Aro, M., & Erskine, J. M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, 94(Pt 2), 143–174.
doi:[10.1348/000712603321661859](https://doi.org/10.1348/000712603321661859)
- ⁱⁱ Fry, E. (2004). Phonics: A large phoneme-grapheme frequency count revised. *Journal of Literacy Research*, 36(1), 85-98.
- ⁱⁱⁱ Vousden, J. I. (2008). Units of English spelling-to-sound mapping: A rational approach to reading instruction. *Applied Cognitive Psychology*, 22(2), 247-272.



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