## A Catalog of Spellings

The top spellings for phonemes and their percentages of the 17,000 most frequent words were investigated by Paul Hanna (see Hodges, R E. (1966). The case for teaching sound-to-letter correspondences in spelling. Elementary School Journal, 66, 327-336, and the update, Fry, E. (2004). Phonics: A large phoneme-grapheme frequency count revisited. Journal of Literacy Research, 36, 85-98). I will only include graphemes that account for at least $3 \%$ of the example words. For the reliability of phonics generalizations, see the chart below summarizing Francine Johnston's research.

| Phoneme | Principal spellings in order of frequency (Hanna, Fry) and example words |
| :---: | :---: |
| /a/ | a (sack), 97\%; a_e (have), 3\% |
| /A/ | a (bacon), 45\%; a_e (bake), $35 \%$; ai (raid), 9\%; ay (play), $6 \%$ |
| /Ar/ | ar (parable), 29\%; are (bare), $23 \%$; air (fair), $21 \%$; ere (there), $15 \%$; ear (bear), 6\% |
| /ar/ | ar (bar), $89 \%$; are (are), $5 \%$; ear (heart), $3 \%$ |
| /aw/ | o (lost), 41\%; a (ball), 22\%; au (haul), 19\%; aw (saw) $10 \%$ |
| /b/ | b (big), $97 \%$ |
| /ch/ | ch (chair), $55 \%$, t (feature), $31 \%$; tch (catch), $11 \%$ |
| /d/ | d (do), $98 \%$ |
| /u/ (schwa) | o (other), 24\%; u (up), 20\%; a (alarm), 19\%; i (panic), 18\%; e (enough), $11 \%$; ou (famous), $5 \%$ |
| /e/ | e (bed), $91 \%$; ea (bread) 4\% |
| /E/ | y (very), $41 \%$; e (beware), $40 \%$; ee (feet), 6\%; ea (seat), $6 \%$ |
| /Er/ | er (experience), $32 \%$; ear (fear), $25 \%$; eer (deer), $18 \%$; e_e (here), 14\%; ier (tier), $7 \%$ |
| /ul/ | le (table), $95 \%$ |
| /er/ | er (hammer), $77 \%$; or (odor), 12\%; ar (cellar), $8 \%$ |
| /f/ | $\mathrm{f}(\mathrm{fox}), 78 \%$; ph (phone), 12\%; ff (stuff), $9 \%$ |
| /g/ | $\mathrm{g}(\mathrm{girl}), 88 \%$; gg (egg), 5\%; x (exit), $3 \%$ |
| /h/ | h (hot), $98 \%$ |
| /hw/ | wh (white), 100\% |
| /i/ | i (hit), $92 \%$; i-e (give), $6 \%$ [y (gym), 2\%] |
| /I/ | i_e (pipe), $37 \%$; i (Bible), 37\%; y (by), 14\%; igh (right), $6 \%$ |
| /j/ | ge (age), $66 \%$; j (jet), $22 \%$; dge (edge), $5 \%$; d (soldier), $3 \%$ |
| /k/ | c (car), $73 \%$; k (kit), $13 \%$; ck (sick), $6 \%$; ch (choir), $3 \%$ |
| /ks/ | $\mathrm{x}($ six) , $90 \%$; cs (tocsin), $10 \%$ |
| /kw/ | qu (quit), $97 \%$ |
| I/ | 1 (leg), 91\%; 11 (tell), 9\% |
| /m/ | m (mad), $94 \%$; mm (dimmer), $4 \%$ |
| /n/ | n (no), 97\% [kn (know)<1\%] |


| /ng/ | ng (sing), 59\%; n (monkey), 41\% |
| :---: | :---: |
| /0/ | o (hot), 94\%; a (want), 5\% |
| /O/ | o (focus), 73\%; о_е (hope), 14\%; oa (boat), 5\%; ow (row), 5\% |
| /oi/ | oi (oil), 62\%; oy (toy), $32 \%$ |
| /oo/ | u (bush), 61\%; оо (hook), 35\%; о (woman), $5 \%$ |
| /Or/ | or (for), $97 \%$; ore (core), $3 \%$ |
| /ow/ | ou (shout), $56 \%$; ow (howl), $29 \%$; ou_e (house), $13 \%$ |
| /p/ | p (pin), $96 \%$, pp (happen), 4\% |
| /r/ | r (run), 97\% |
| /s/ | s (say), 73\%, c (cereal), 17\%; ss (toss), 7\% |
| /sh/ | ti (action), 53\%; sh (shy), 26\%; ci (special), 5\%; ssi (fission), 3\% |
| /t/ | t (top), $97 \%$ |
| /th/ | th (bath) 100\% |
| /u/ | u (bus) $86 \%$; o (ton), $8 \%$ |
| /U/ or /OO/ | u (human), 59\%; u_e (use), 19\%; oo (moon), 11\%; ew (few) 4\% |
| /v/ | v (very), 99.5\% |
| /w/ | w (way), 92\%; u (suede), 7.5\% |
| /y/ | i (onion), $55 \%$ y (yes), $44 \%$ |
| /z/ | s (was), 64\%; z (zero), 23\%; es (flies), 4\%, x (xylophone), 4\% |
| /zh/ | si (incision), 49\%; s (pleasure), 33\%; g (garage), 15\% |

The frequency of spelling patterns is a matter of scientific discovery. Much of what I learned from Hanna's study surprised me, e.g., that $s$ is the most common spelling of $/ \mathrm{z} /$. We don't want to burden children and teachers with rare spellings, nor do we want to omit common ones.

## How reliably do vowel spellings represent phonemes?

Evidence from Johnston's study of the $\mathbf{3 0 0 0}$ most common words
From Johnston, F. P. (2001). The utility of phonic generalizations: Let's take another look at Clymer's conclusions. The Reading Teacher, 55, 132-143.

| Correspondence | Phoneme, example word, and percent of reliability in common words |
| :---: | :---: |
| a_e | /A/ (cake) 78\% |
| ai | /A/ (rain) $75 \%$ |
| ay | /A/ (play) 96\% |
| e_e | /E/ (these) 17\% |
| ee | /E/ (feet) 96\% |
| ea | /E/ (seat) 64\%; /e/ (head) 17\% |
| ei | /A/ (rein) 50\%; /E/ (either) 25\% |
| ey | /E/ (monkey) 77\% |
| ie | /E/ (field) 49\%; /I/ (tied) 27\% |
| i_e | /I/ (five) $74 \%$ |
| o_e | /O/ (stove) $58 \%$ |
| oa | /O/ (coat) 95\% |
| ow | /O/ (snow) 68\%; /ow/ (how) 32\% |
| oe | /O/ (toe) $44 \%$; /OO/ (shoe) $33 \%$; /u/ (does) $22 \%$ [only 9 words in sample] |
| ou | /ow/ (out) 43\%; /u/ (touch) 18\%; /U/ (your) 7\% |
| u_e | /OO/ or /U/ (rule, refuse) $77 \%$ |
| oo | /OO/ (boot) 50\%; /oo/ (book) 40\% |
| ew | /OO/ (blew) 88\%; /U/ (few) 19\% [some overlap, e.g., new] |
| ui | /i/ (build) 53\%; /U/ (fruit) 24\% |
| au | /aw/ (cause) 79\% |
| aw | /aw/ (saw) 100\% |
| oi | /oy/ (join) 100\% |
| oy | /oy/ (boy) 100\% |
| ia | /E/a/ (piano) 54\%; /u/ (Asia) 46\% |
| y (unaccented syllable) | /E/ (lucky) 100\% |

