

## HOW WELL DO PEOPLE SPELL?

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A review of studies in which spelling accuracy was calculated as a percentage of total words spelled correctly in essays and letters reveals that people spell quite well. Spelling accuracy among college freshmen, for example, ranges from 97.7% correct to 99.8% correct. Such accuracy may not meet society's standards, but it is an impressive accomplishment, because the system that is acquired is so complex. It is unlikely that such high levels of competence are a result of formal instruction: studies show no relationship between amount of instruction and spelling competence, and also show that spelling can improve without instruction. In addition, spelling rules do not capture the complexity of the system; even if they did, they would not be of much use, because students typically do not learn the rules well. It is also doubtful that spelling comes from writing, because people don't write enough and don't get enough feedback on their writing. Most likely, spelling comes from reading, a hypothesis consistent with the more general hypothesis that we acquire language by receiving comprehensible input.

How well do people spell? This question is interesting for both theoretical and practical reasons. Since it is well-established that English spelling is extraordinarily complex, showing that at least some people spell well suggests that such mastery could not have taken place in the traditional way - it could not, for example, be the result only of memorizing lists or consciously learning rules.

Similar arguments have been made in other domains of language development. It has been pointed out that syntax is too complex to be consciously learned (e.g. Krashen, 1982) and that adults know too many words to learn one at a time in skill-building type programs (e.g. Nagy, Herman and Anderson, 1985).

Practically, knowing how well people spell is also of interest in view of the fact

that the public places a high value on correct spelling, and has the impression that literacy standards are declining.

In this paper, I review studies in which subjects' spelling accuracy in writing was assessed. While there is some variation in methodology, the basic approach in each study was the same: The number of correctly spelled words was divided by the total number of words written. Table 1 presents brief summaries of studies in which spelling accuracy in writing was reported. Before discussing these results, several methodological issues need to be considered.

### Methodological Issues

It can be argued that measuring spelling competence by simply considering the percentage of total words spelled correctly both overestimates and underestimates true spelling competence.

Overestimation occurs in two ways. First, in writing, subjects choose the words they use, and may avoid more difficult words (Wallin, 1910). Second, when an analysis includes all words written, not

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TABLE 1  
Studies of Spelling Accuracy

study	description	grades (n)	% correct
Rice, 1897	Retelling of story read to children	4 (10)	97.5
		5 (10)	98.3
		6 (8)	98.5
		7 (7)	98.9
		8 (9)	99.1
Cornman, 1902(a)	compositions"	3 (107)	94.3
		4 (88)	94.3
		5 (99)	97.8
		6 (94)	99.0
		7 (55)	98.6
		8 (42)	99.8
Johnson, 1917	impromptu essays	high school freshmen(132)	98.7
		college freshmen(66)	99.4
Lester, 1922	College Board Essays	high school seniors(2414)	99.8(b)
Brandenberg, 1919	essay exams	college freshmen(B)	99.6
		college sophomores(60)	99.5
		college juniors(20)	99.3
		college seniors(5)	99.6
Hilderbrant, 1924	free writing	high school (n=15,500)	98.9
Ashbaugh, 1927	personal letters	7 (100)	97.4
		9 (100)	98.3
		12 (100)	98.6
Fitzgerald, 1932	personal letters	4 (742 letters)	96.6
		5 (1199)	95.8
		6 (1243)	93.1(c)
Lange, 1948	take-home essay (psychology)	college (261)	98.9

(table 1 continued)

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(table 1 continued)

Kitzhaber, 1963	in-class essay	college freshmen	99.8
	"commentaries"(d)	college sophomores	99.7
	journal entries	college seniors	99.6
Kessler & Quinn, 1984	science report	high school	87
	dialog letter	sophomore/ESL	92
Pitts and Hirshfield, 1987(e)	in-class essay	college "basic skills" (n=71)	97
Applebee, Langer, and Mullis, 1987	free writing	age 9 (418)	92.0
		age 13 (452)	96.6
		age 17 (461)	97.6
Wilde, 1988	in-class writing (215 stories)	3 (6)	84.6
		4 (6)	87.6
Clarke, 1988 (f)	in-class writing	grade 1:	
		invented spelling(48)	58.4
		traditional (54)	94
Connors & Lunsford 1988	essay	college freshmen & sophomores (n=3000 papers)	99.6
Bernhardt, 1988	impromptu essay on assigned topic	college (basic writing) (42)	97.7
Haswell, 1988	impromptu essay on assigned topic	college freshmen(32)	97.9
		college sophomores(32)	98.2
		college juniors(32)	98.3
		postgraduate(32)(g)	99.4
Otte, 1989	in-class essay out-of-class essay	college "basic"	96.1
		writer (n=1)	97.7(h)
Tudor & Hafiz, 1989	essay (choice of 3 topics)	secondary school, ESL (n=16)	
		pretest, (i)	91.1
		post-test	98.2

(table 1 continues)

*(table 1 continued)*Hafiz &  
Tudor, 1990essay (30",  
choice of  
3 topics)secondary school,  
EFL

pre-test, (j)	
comparison (24)	93.9
experimental (25)	93.7
post-test,	
comparison	94.7
experimental	98.1

Sloan, 1990

essay (2 hrs)  
(topic given  
2 weeks in  
advance)

college freshmen (n=20)	99.6
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Chall, Jacobs,  
and Baldwin,  
1990

narratives

low-income students

2	79.3
3	87.9
4	88.9
5	92.2
6	92.5
7	93.3

"above-average"  
readers

2	80.1
3	88.9
4	93.5
5	94.4
6	96.1
7	98.3

"below-average"  
readers

2	78.7
3	87.3
4	82.5
5	89.1
6	88.9
7	88.2

expository  
writing

2	77.5
3	93.5
4	91.3
5	92.1
6	91.8
7	91.1

*(table 1 continues)*

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(table 1 continued)

		"above-average"	
		readers	
		2	76.5
		3	92.2
		4	93.9
		5	94.2
		6	94.7
		7	93.3
		"below-average"	
		readers	
		2	78.2
		3	94.4
		4	87.7
		5	89.2
		6	89.0
		7	89.0
Robbins, Beverstock & Farr, 1990	essays	grade 2	87
		grade 3	90
		grade 5	94
		grade 7	95
		high school	97
		college	98
		(total n = 28,000)	
Conners & Lunsford, 1992	essays	college (200 papers)	
	word-processed	without spell-check	99.14
		with spell-check	99.64

Kitzhaber (1963) described by Haswell (1988).

(a) Data from June, 1900 testing.

(b) Each misspelled word counted only once. When repeated misspellings counted as errors, accuracy = 99.0%

(c) For "unique words" (rather than total words written), spelling accuracy for grade 4 = 55.3%, grade 5 = 61.3%, grade 6 = 66.5%.

(d) Sophomores "wrote commentaries in a schoolwide reading program" (Haswell, 1988, p. 496).

(e) 28 out of 71 subjects spoke English as a second language

(table 1 continues)

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(f) "traditional" students were focussed on correct spelling and were given extensive spelling help both before and during their writing. "Invented" spelling students received no such help. ("Invented" spellers outperformed traditional spellers on two out of three spelling tests at the end of grade one.)

(g) "postgraduate" = age 30 or older, in business, industry, or civil service, considered by their supervisors to be "competent" writers.

(h) For "unique words" (rather than total words written), spelling accuracy = 92.6% (in-class essay) and 91.9% (out-of-class essay)

(i) Subjects in Tudor and Hafiz, 1989, and experimental students in Hafiz and Tudor, 1990, participated in a free reading study.

(j) Chall et. al. studied 30 children, 10 in grade 2, 12 in grade 4, and eight in grade 6. The same children were retested one year later.

ers drop out of school).'

How do writers reach such high levels of competence? There are several possibilities: (1) formal instruction, (2) writing, and (3) reading.

#### *Formal Instruction*

It is unlikely that such high levels of competence occur from formal instruction. Research has revealed little or no relationship between the amount of spelling instruction students receive and their spelling competence (see e.g. Rice, 1997; for a reanalysis of Rice's data as well as a review of other literature, see Krashen and White, 1991). Studies have also shown that spelling competence can improve without instruction (e.g. Comman, 1902, reanalyzed in Krashen and White, 1991; Goodman and Goodman, 1982; other studies reviewed in Krashen, 1989). It has been shown, in addition, that pedagogical rules fail to capture the enormous complexity of the English spelling system (see e.g. Horn, 1957; Smith, 1981, 1982).

Even if the rules worked, they would not be of much use, because students don't learn them very well. Cook (1912) provides an

excellent demonstration. In his study, remedial college freshmen and high school freshmen and seniors who had studied spelling rules the previous semester were given a 50 word spelling test exemplifying common spelling rules. After taking the test, subjects were asked to write all spelling rules they consciously used while spelling the words, noting which words they used the rules for, and to write all rules that were exemplified by the list, but which they did not think of while taking the test.

Table 2 presents Cook's results for four spelling rules. While no statistical tests were performed, it seems clear that subjects who said they applied spelling rules did not do much better on words using the rules than those who either knew the rules but didn't apply them or subjects who didn't know the rules at all.

Even though the students had just studied the rules, many could not recall them (Table 3). Of those who did recall rules, the version they gave was often much simpler than the version they were recently taught:

"Curiously enough, most of the collegians who cited a version of the ie/ei rule as consciously used relied upon the word

TABLE 2  
Percentage of Words Spelled Correctly by Subjects Who  
Were Aware and Unaware of Spelling Rules

rule	conscious of rule while writing	conscious of rule did not use it while writing	unconscious of rule
ie/ei			
HS:	79	71	73
UNIV:	87	87	86
final e			
HS:	82	78	82
UNIV:	87	94	88
final y			
HS:	74	67	73
UNIV:	94	96	91
final C			
HS:	78	72	75
UNIV:	88	87	84

from: Cook, 1912

#### Explanation of Rules

ie/ei: "i before e except after c, or when sounded like a, as in *neighbor* and *weigh*." (Cook, p. 317)

final e: "Final e is dropped before a suffix beginning with a vowel; but it is retained (1) when the suffix begins with a consonant, (2) when a word in -ce or -ge suffixes -able or -ous, (3) to keep the pronunciation of a word constant, (4) to maintain the identity of a word." (Cook, p. 317)

final y: "Final v after a consonant changes to i before all suffixes not beginning with i; final y after a vowel is usually retained." (Cook, p. 317)

final C: "Monosyllables and words accented on the last, ending in a consonant after a single vowel, double that consonant before a suffix beginning with a vowel, unless the suffix changes the accent." (Cook, P. 318)

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'Alice' and other mnemonic devices which gave a clue to only one or two of the 11 words (relating to the ie/ei rule) ... No (high school) freshman cited the rule as recently taught, but four had it almost correct ... Three (high school) seniors gave the rule substantially as taught, but nearly all the others who cited anything gave a version of something taught in earlier years, the 'Alice' rule, etc. The rule seems more likely to stick as first learned (Cook, p. 322).

The data in Tables 2 and 3 also indicate that high school students knew some rules better than the college students did. The college students, however, performed better on the test, confirming that conscious rule knowledge makes little contribution to spelling competence.

#### Writing

It is also unlikely that spelling comes from writing. In two studies, students who had less direct instruction in spelling but who did more meaningful writing made better progress in spelling (Hillerich, 1971; Callaway, McDaniel and Mason, 1972), but there are serious problems with the "writing hypothesis." For spelling to develop from writing, writers would have to try out words in their writing, get accurate feedback, and use this feedback efficiently to alter their current hypotheses about spelling. But

writers simply do not write enough for this to happen, do not get enough feedback, and don't pay attention to a lot of the feedback they do get. As Smith (1981) points out: "... it seems most improbable to me that anyone could discover the spelling of 50,000 words by writing down a guess, making a mistake and having a teacher or other friendly adult put a ring around the error in red or even insert the correct spelling. Even if students pay attention to the red ink, how often does such an opportunity occur? We may have learned two or three hundred words in our lifetime in school from teachers correcting words whose spelling we have incorrectly guessed ..." (Smith, 1981, pp. 6-7).

This view is confirmed by studies showing that writing, both in school and outside of school, is not frequent (Applebee, Langer, and Mullis, 1986), and by Brandenberg (1919), who reported no improvement in spelling accuracy among college students after their psychology papers were "persistently and clearly" marked for spelling errors for one semester.

#### Reading

The final possibility is that spelling comes from reading (Smith, 1981). In support of this hypothesis are read and test" studies demonstrating that some spelling

TABLE 3  
Number of Students Conscious of Spelling Rules

rule	high	school	university
ie/ei	31/69	(45%)	30/70 (43%)
final e	52/69	(75%)	29/70 (41%)
final y	29/69	(42%)	31/70 (44%)
final C	42/69	(61%)	34/70 (49%)

from: Cook, 1912

development takes place after very few exposures to unfamiliar words in meaningful texts, even when readers are not focussed on learning spelling (Gilbert, 1934a; 1934b; 1935; Nisbet, 1941; Ormrod, 1986). In all these studies, the increase in spelling proficiency after a single exposure was modest. Nisbet, in fact, was not impressed with his results, a five percent gain in spelling after one exposure, and concluded that such small gains do not mean that spelling instruction can be neglected. Yet, given enough reading, modest gains after a single exposure may be enough to account for spelling proficiency, an argument Nagy, Herman and Anderson (1985) have used to support the hypothesis that vocabulary development comes largely from reading.

The reading hypothesis predicts that more reading will result in better spelling. Research, however, only partially confirms this prediction. Polak and Krashen (1988) found that college ESL students who reported more free reading did better on a spelling test. Collins (1980) reported that elementary school children who participated in a 15 week sustained silent reading program tended to improve in spelling more than a comparison group ( $p < .08$ ), but Greaney (1970; see also Greaney and Clarke, 1975) found no difference in spelling achievement between children participating in sustained silent reading and a traditional language arts program, and Pfau (1967) found that adding sustained silent reading did not result in additional gains in spelling.

It is possible that spelling is acquired in a combination of ways, e.g. through reading and writing. Results of read and test studies suggest, however, that reading can do nearly the entire job alone.

If the reading hypothesis is correct, it suggests that spelling competence is developed the same way the rest of language is acquired, by understanding messages, or receiving "comprehensible input" (Krashen,

1982; 1985).<sup>2</sup>

### Conclusions

"Orthography is so absolutely necessary for a man of letters ... that one false spelling may fix a ridicule upon him for the rest of his life ... I know a man of quality who never recovered (from) the ridicule of having spelled wholesome without the w." (Ches-terfield, 1919, cited by Hodges, 1987).

Society demands 100% accuracy in spelling. A single spelling mistake in public is unacceptable. Indeed, it can mean humiliation (this may explain why presidential debates are oral and not written). Thus, a speller who correctly spells 99.5% of the words he writes, someone who makes about one spelling error per page, is not a good speller, from the public's point of view. Public standards, however, should not prevent us from appreciating the fact that a 99.5% speller has accomplished a great deal. He has acquired a great deal of a bewilderingly complex system.

### Notes

1 There is another tendency in the data: Spelling accuracy appears to be lower in more recent studies. Compare, for example, fourth grade spelling accuracy in the two recent studies (Chall, Jacobs, and Baldwin, 1990, Wilde, 1988) and the two older studies (Rice, 1897, Comman, 1902). Compare also the performance of students in Applebee, Langer and Mullis (1987), with Ashbaugh (1919) and Johnson (1917): It appears to be the case that 11th graders in 1987 reach a level of accuracy attained by seventh graders in 1919.

This apparent decline may simply be a result of social class variation in the samples (Stedman and Kaestle, 1987). It is well-known that socioeconomic class differences are related to differences in literacy development (see Chall et. al., 1990 for a recent review). Groups tested more recently may include students from a wider range of social classes. Indeed, the goal of some of the more recent studies in Table I was to study special populations of students; Chall et.al. (1990) studied only "low income" students, Wilde (1988) studied American Indian children living on a federal reservation, Pitts and Hirschfield (1987), Bernhardt (1968), and Otte (1989) studied college students in "basic skills" classes (note, however, that unselected college students in recent studies appear to spell just as well as those in earlier studies).

2 A common spelling correction for readers who (1989) distinguish Great (Perfect) a very small Great Spelling Spellers, but because good the page, using meaning (C

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2 A common argument against the hypothesis that spelling comes from reading is the existence of good readers who appear to be poor spellers. Krashen (1985, 1989) distinguished Poor Spellers, Good Spellers, and Great (Perfect) Spellers, and hypothesized that there is a very small difference between Good Spelling and Great Spelling. Reading, it is argued, develops Good Spellers, but not necessarily Great Spellers. This occurs because good readers do not attend to every detail on the page, using print only to confirm hypotheses about meaning (Goodman, 1982; Smith, 1988).

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