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Address editorial correspondence to
Michael N. Milone, Jr.
Spelling Progress Quarterly
203 8th Street
Honesdale, PA 18431

Address subscriptions and change of address to
Spelling Progress Quarterly
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In This Issue

About the Authors

Myrna J. Walters is coordinator consultant of Elementary Reading and Language Arts, School Board of Seminole County, Sanford, Florida.

Larry Gentry is with SWRL Educational Research and Development, Los Alamitos, California.

Michael Milone is an adjunct professor at The Ohio State University, Columbus, Ohio.

John Arena is publisher and **Rick Brownell** is associate editor of Academic Therapy, Novato, California.

Valerie Yule is Honorary Research Fellow in the Department of Psychology, University of Aberdeen, Old Aberdeen, Scotland. [See see **Books**, **Journals**, **Newsletters**, **Media,** Personal Views **10** & **16**, **Anthology**, **Bulletins**.

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1. The Diagnostic Spelling Potential Test

John Arena and Rick Brownell

Approximately four percent of the total school population of the United States is classified as learning disabled. This means that about 1.8 million children have been identified as requiring special educational treatment for their unique learning needs. While spelling is not one of the seven categories specifically identified by Public Law 94142 for testing, it is an important part of written language and as such should be evaluated accurately.

The primary rationale upon which the *Diagnostic Spelling Potential Test* is based is that spelling, much like reading, handwriting, and arithmetic, is hierarchical in nature. Children hear the language, match auditory language to visual language, read simple meaningful words, and then begin to write the language. At the writing stage, an interplay of whole-to-part and part-to-whole learning takes place. That is, the discrete elements of writing, the phonemes and graphemes, assume an identity of their own. They must be learned, integrated, applied, and generalized.

A secondary rationale for the *DSPT* is that special education personnel, specifically teachers, are expected to do a certain level of testing. Because of time limitations, it is important that they derive as much information as possible from the time available for testing.

It was because of these factors that the *DSPT* (Arena, 1982) was standardized and published. The process required ten years of clinical study and research and has resulted in an instrument that is both practical and psychometrically sound.

The *DSPT* is an individually administered test that consists of four subtests, five norm-referenced scores, and one clinical score. By using the results of the *DSPT,* the diagnostician is able to identify strengths and weaknesses in the child's language and spelling abilities and then proceed with a logical approach to remediation.

- Subtest 1 is a standard spelling test in which a word is pronounced, used in a phrase, and then pronounced again.
- Subtest 2 is a word decoding test that yields two scores, one for immediate identification and the other for delayed or phonetic analysis.
- Subtest 3 is a visual recognition test in which the word is presented in four different spellings, one of which is correct.
- Subtest 4 is an auditory-visual test in which the student must match the auditory stimulus to the correctly spelled word.

Analysis

The comprehensive analysis that is the outcome of the *DSPT* is its unique offering to those involved in the testing and remediation of spelling disabilities. It is best described by reviewing the results of Tim Jones, an eleven-year-old youngster with a full scale WISC-R IQ of 126.

Figure 1 presents the Fact Sheet of the *DSPT.* It has three elements:

- The Score Box shows Tim's raw scores converted to standard scores, percentile ranks, and grade ratings. By reviewing it, one can note the range of grade-level equivalencies as well as the ranges of the other normative data. Tim, obviously, is not doing well in spelling.
- The Profile Chart is a graphic representation of Tim's standard scores, placed according to standard deviations. This profile shows that while actual spelling performance is below average, his performance in the other areas is at the average level.
- The Spelling Error Analysis Chart shows that there was no phonetic pattern to the majority of his errors and suggests a weak phonetic understanding of spelling.

Figure 2 is the *DSPT* Profile Analysis Chart in which the standard scores from the Score Box above are transferred. It is in this presentation that Tim's needs become dramatically apparent. As evidenced by a difference of seven standard score points, there are significant inconsistencies between several abilities:

- spelling and sight recognition
- spelling and phonetic recognition
- spelling and visual recognition
- spelling and auditory-visual recognition
- sight recognition and visual recognition
- sight recognition and auditory-visual recognition
- phonetic recognition and visual recognition
- phonetic recognition and auditory-visual recognition.

Discussion

Tim's primary problem appears to be his inability to apply phonetic principles to both encoding and decoding. The profile suggests that he is able to draw upon strong visual (Subtest 3) and auditory (Subtest 4) recall systems, but his performance breaks down quickly when confronted with unfamiliar words. This failure to utilize phonetic principles is also readily apparent from an inspection of the two scores from Subtest 2. The minimal difference between Sight and Phonetic decoding verifies this inability. It is of further interest to note that Tim's teacher, Alma Miller, wrote in her request for testing that "Tim's comprehension in silent reading is quite good and at grade level. His oral reading, however, leaves much to be desired." One would guess that Tim, as a bright youngster, is doing some excellent guessing in silent reading, using context whenever possible to identify unknown words.

It is not clear whether Tim has been unable to integrate phonetic generalizations presented to him or simply has not received a balanced program of instruction in phonetic principles. What is clear, based on the results of this evaluation, is that he needs help applying phonetic generalizations when he is called upon to spell a word.

The eight significant differences between subtest scores listed above offer the teacher, Miss Miller, eight unified but different approaches to remediating Tim's problems. Teachers have at their disposal, for example, dozens of formal and informal activities to enhance and strengthen the relationship between spelling and sight recognition of words. The same applies to spelling and phonetic recognition and so on down the list.

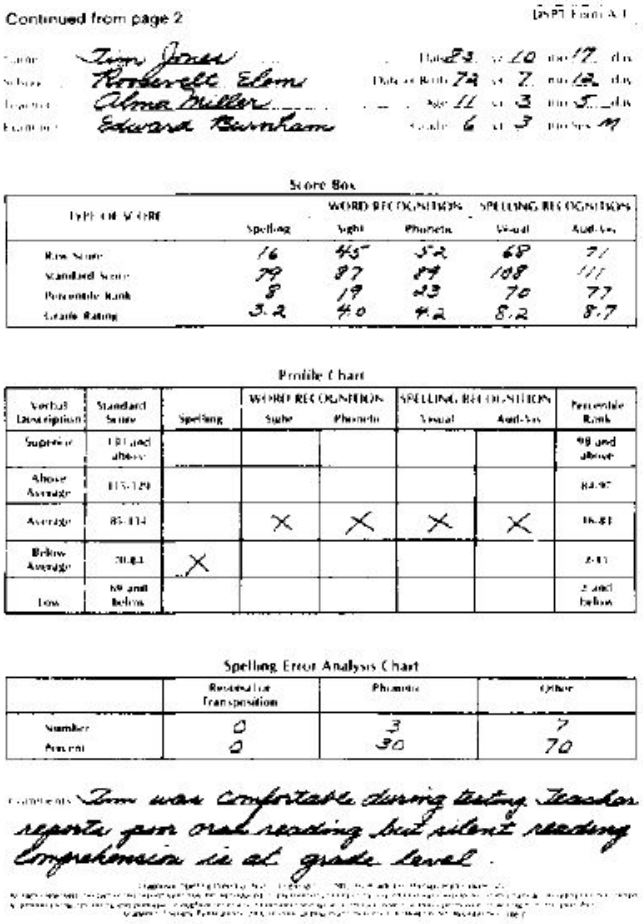
The *Diagnostic Spelling Potential Test* is more than just another spelling test. It offers diagnosticians, remedial specialists, and other educators a logical, organized way to identify specific spelling needs and to tie these needs to meaningful remedial practices. The *DSPT* will not solve all the spelling problems

encountered by students but when used sensibly will go a long way toward helping students become better spellers.

Reference

Arena, John. *Diagnostic spelling potential test.* Novato, California: Academic Therapy Publications, 1982.

Figure 1. Fact Sheet of the *DSPT.* Figure 2. *DSPT* Profile Analysis Chart.



Continued from page 2

Score Box

Type of Score	Spelling	Word Recognition: Sight	Word Recognition: Phonetic	Spelling Recognition: Visual	Spelling Recognition: Aud-Vis
Raw Score	16	45	52	68	71
Standard Score	79	87	89	108	111
Percentile Rank	8	19	23	70	77
Grade Rating	3.2	4.0	4.2	8.2	8.7

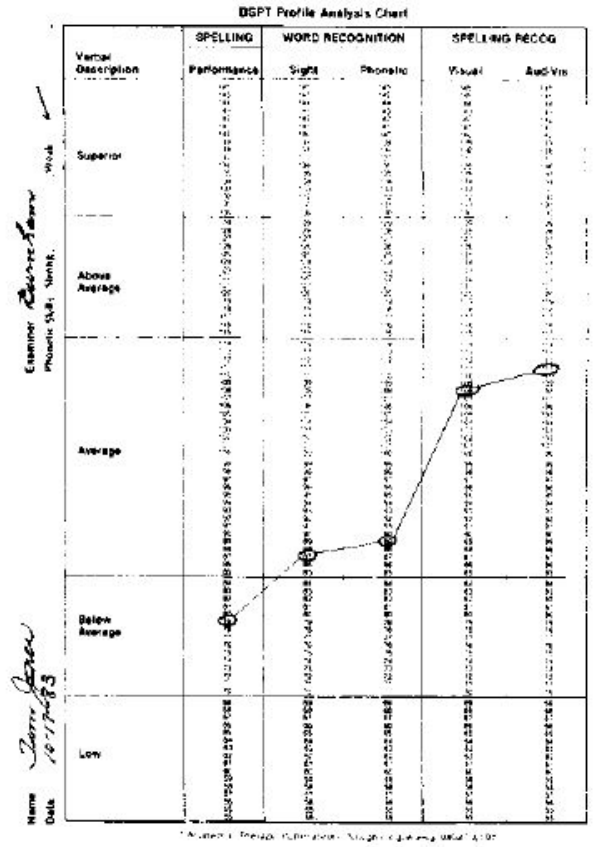
Profile Chart

Verbal Description	Standard Score	Spelling	Word Recognition: Sight	Word Recognition: Phonetic	Spelling Recognition: Visual	Spelling Recognition: Aud-Vis	Percentile Rank
Superior	130 and above						98 and above
Above Average	115-129						84-97
Average	85-114		X	X	X	X	16-83
Below Average	70-84	X					2-15
Low	69 and below						2 and below

Spelling Error Analysis Chart

	Reversal or Transposition	Phonetic	Other
Number	0	3	7
Percent	0	30	70

Comments: Tom was comfortable during testing. Teacher reports good oral reading but silent reading comprehension is at grade level.



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Spelling and Reading

2. A Taxonomy of Phoneme-Grapheme Correspondences

Larry Gentry

The taxonomy of phoneme-grapheme correspondences that is featured on below owes its genesis to the pioneering research of Hanna, Hanna, Hodges, & Rudorf (1966), Dewey (1971), and Richard Venezky (1970).

Perhaps the taxonomy's most noteworthy departure from earlier lists is the reclassification of a number of final *e* spellings. For example, where both Dewey and the group led by Hanna would hold that the final *e's* in *college* and *voice* are vowel markers. I contend that they reflect consonant correspondences. The final *e* in *college* has no relationship to the preceding vowel, but indicates that *g* is pronounced /j/ and not /g/. Similarly, the final *e* in *voice* indicates that the final consonant is pronounced /s/ instead of /k/.

In another departure from earlier studies, I have taken the liberty of adding phoneme-cluster categories where they seemed essential to accurate classification. These categories include /wi/ as in *memoir,* /wu/ as in *once,* /yar/ as in *accurate,* /gzh/ as in *luxury.* /ksh/ as in *section,* and /ts/ as in *schizophrenia.*

Any systematic examination of English orthography is, of course, heavily influenced by the researcher's choice of a dictionary. The present study thus offers the advantages (and disadvantages) proffered by the paperback edition of the *American Heritage Dictionary* (1977). Hanna's group analyzed some 17,000 words, using *Webster's New Collegiate Dictionary* (1961) as a guide; Dewey's investigation apparently included the entire corpus of the 132,000-word *Random House American College Dictionary* (1966). Since the primary purpose of my study was reclassification rather than expansion, the 55,000-word corpus provided by *American Heritage* was deemed adequate.

Excluded from the study were proper names, contracted word forms, hyphenated words, abbreviations, archaic words, and foreign phrases (e.g., hors d'oeuvre). Given this limitation, the tables on the following pages can be considered a taxonomy of phoneme-grapheme correspondences of everyday English.

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Vowel Correspondences

/a/
a	at
as	baa
a..e	morale
ah	dahlia
ai	plaid
au	laugh
i	meringue

/a/
a	able
a.e	ate
ae	maelstrom
ai	mail
ai..e	aide
aigh	straight
ait	parfait
au	gauge
e	cafe
ea	break
e..e	crepe
ee	matinee
eh	eh
ei	vein
ei..e	seine
eigh	eight
er	dossier
et	ballet
ey	they
ez	rendezvous
ie	lingerie

/ä/
a	father
an	bazaar
a..e	are
ah	hurrah
at	eclat
e	sergeant
ea	heart
i	lingerie

/wa/
oi	memoir
oi..e	repertoire
ois	bourgeois

/e/
a	any
ae	aesthetic
ai	said
ay	says
e	end
ea	head
e..e	cigarette
ei	heifer
eo	leopard
ie	friend
oe	roentgen
u	bury

/ē/
ae	algae
agh	shillelagh
ay	quay
e	me
ea	eat
e..e	theme
ee	see
ei	ceiling
ei..e	caffeine
eo	people
ey	key
hy	dinghy
i	ski
i..e	machine
ie	grief
is	debris
it	esprit
oe	amoeba
ois	chamois
ue	dengue
y	city

/i/
a	spinach
a..e	pirate
ae	caesarean
ai	portrait
e	pretty
ee	been
ei	counterfeit
hea	forehead
hi	exhibit
i	if
ia	marriage
i..e	favorite
ie	mischief
0	women
u	busy
u..e	minute
ui	build
y	myth

/i/
ae	maestro
ai	shanghai
ai..e	aisle
aille	canaille
ay	bayou
aye	aye
ei	stein
eigh	height
ey	geyser
eye	eye
i	find
ia	diamond
i..e	like
ie	pie
igh	high
is	viscount
oy	coyote
uy	buy
y	by
y..e	type
ye	dye

/o/
a	want
eau	bureaucracy
ho	honest
o	hot
o..e	omelet
oh	johnnycake
ow	knowledge
yo	beyond

/ō/
ao	curacao
au	chauffeur
eau	plateau
eaux	trousseaux
eo	yeoman
ew	sew
o	old
oa	boat
o..e	home
oe	toe
ah	oh
oo	brooch
ore	forecastle
os	apropos
otf	depot
ou	shoulder
ou..e	cantaloupe
ough	though
ow	own
owe	owe

/ô/
a	all
ao	extraordinary
au	haul
au..e	vaudeville
augh	caught
aw	saw
awe	awe
hau	exhaust
ho	exhort
o	off
oa	broad
o..e	gone
ao	door
ou	cough
ough	bought
ow	toward

/oi/
oi	oil
oi..e	voile
oy	boy
oy..e	gargoyle
uoy	buoyancy

/ou/
au	gaucho
hou	hour
ou	out
ough	drought
ow	owl

/u/
o	won
o.e	come
oo	flood
ou	young
u	but

/wu/
o	once
o..e	one

/ŏ/
eu	pleurisy
o	woman
oo	book
ou	would
u	push
u..e	sure

/yŏ/
u	refugee
u..e	secure

/ōō
eu	sleuth
ew	crew
hou	silhouette
ieu	lieutenant
o	do
oe	shoe
oo	too
ooh	pooh
ou	you
ou..e	route
oue	denouement
ough	through
oui	bouillon
oup	coup
ous	rendezvous
out	ragout
u	truth
u..e	rule
ue	true
ui	fruit
uo	buoy

/yōō/
eau	beautiful
eu	feud
eue	queue
ew	few
ewe	ewe
hu.e	exhume
ieu	adieu
ou	coupon
u	union
u..e	mule
ue	value
ui	nuisance
ut	debut
uu	vacuum

/ ə/
a	about
ah	cheetah
ai	mountain
anc	blancmange
au	epaulet
e	open
ei	sovereign
ea	luncheon
ha	gingham
he	vehement
hi	vehicle
i	pencil
ia	parliament
i.e	engine
ie	mischievous
io	fashion
o	lion
o.e	welcome
oi	porpoise
ou	dangerous
u	circus
ua	victual
u..e	fortune
wa.e	gunwale
y	analysis

/yə/
u	regular

Vowels Controlled by /r/

/ âr/
aer	aerial
air	chair
aire	millionaire
ar	canary
are	care
ear	bear
eir	their
er	wherever
ere	there
erre	daguerreotype
heir	heir

/ îr/
ear	hear
eer	deer
eir	weird
er	period
ere	here
ier	pier
iere	boutonniere
ir	souvenir

/ûr/
ear	learn
er	her
er.e	berkelium
ere	were
err	deterrent
eur	masseur
her	herb
ir	bird
irr	squirrel
of	colonel
or	worm
orr	worry
our	journey
ur	fur
ur.e	nocturne
urr	current
yr	syrup
y rrh	myrrh

/ər/
ar	sugar
our	restaurant
er	after
eur	chauffeur
her	shepherd
ir	confirm
oar	cupboard
oir	avoirdupois
or	honor
our	glamour
r	iron
re	acre
ur	surprise
ure	picture
yr	martyr

/yər/
ur	accurate
ure	figure

Consonant Correspondences

/b/

b	big
bb	rabbit
bh	bhang
pb	cupboard

/ch/

c	cello
ch	child
che	avalanche
h	posthumous
t	picture
tch	match
te	righteous
ti	question
ts	atsup

/d/

d	dog
dd	add
dh	jodhpurs
ed	called
ld	could

/f/

f	farm
ff	off
ft	often
gh	laugh
lf	calf
pf	hasenpfeffer
ph	phone
pph	sapphire
v	veldt

/g/

gu	blackguard
g	game
gg	egg
gh	ghost
gu	guess
gue	league

/x/

x	example

/gzh/

x	luxury

/h/

h	his
j	junta
wh	who

/j/

d	education
dg	midget
dge	bridge
di	soldier
dj	adjust
g	giant
ge	large
gg	exaggerate
gi	legion
j	jar

/k/

c can	
ca	forecastle
/r/	/ts/ queen
cc	occupy
ch	saccharine
ch	chorus
ck	back
aq	acquaint
cqu	lacquer
cu	circuit
g	length
k	kite
kh	khaki
kk	chukka
lk	talk
q	queen
qu	liquor
que	clique
x	except

/ks/

x	box

/ksh/

x	sexual

/l/

all	practically
gl	intaglio
l	let
le	turtle
ll	bell
ln	kiln
ol	chocolate
sl	island

/m/

am	brougham
gm	phlegm
lm	palm
m	man
mb	climb
mm	summer
mn	autumn

/n/

g	cognac
gn	gnaw
kn	know
mn	mnemonic
mp	comptroller
n	not
nd	handsome
ng	chitterlings
nn	funny
on	colonel
pn	pneumonia
sne	demesne

/ng/

n	ink
nd	handkerchief
ng	sing
ngue	tongue

/p/

gh	hiccough
p	pet
pp	apple

/r/

ar	quandary
er	every
l	colonel
or	laboratory
r	red
rh	rhyme
rps	corps
rr	arrow
rh	myrrh
rs	velours
rt	mortgage
wr	write

/s/

c	cent
ce	dance
ps	psalm
rs	worsted
s	set
sc	science
sce	convalesce
sch	schism
se	house
ss	miss
st	listen
sth	isthmus
sw	sword
tsw	boatswain
z	waltz

/sh/

c	appreciate
ce	ocean
ch	chef
che	mustache
chsi	fuchsia
ci	social
i	anxious
psh	pshaw
s	sure
sc	fascism
sch	schwa
sci	conscious
se	nauseous
sh	she
si	mansion
ss	pressure
ssi	mission
t	initiate
ti	station

/t/

bt	doubt
cht	yacht
ct	indict
d	apartheid
dt	veldt
ed	looked
pt	ptomaine
t	ten
th	thyme
tt	better
tter	chitterlings
tw	two
z	pizza

/ts/

z	schizophrenia

/th/

h	eighth
th	think
the	absinthe

/TH/

dh	ed h
th	the
the	soothe

/v/

f	of
lv	calves
lye	salve
v	very
ve	give
vv	divvy
w	edelweiss

/w/

hu	marihuana
ju	marijuana
o	choir
u	queen
w	well

/y/

e	azalea
i	million
j	hallelujah
ll	bouillon
n	cognac
y	yes

/z/

cz	czar
es	goes
s	is
se	please
si	business
sp	raspberry
ss	dessert
sth	asthma
thes	clothes
ts	tsar
x	xylophone
z	zoo
ze	sneeze
zz	buzz

/zh/

g	regime
ge	garage
j	jabot
s	usual
sh	cashmere
Si	vision
ti	equation
z	azure
zi	glazier

3. Research and Development in Spelling Reform

Valerie Yule

Part 1: English Spelling as Communication Technology

If we consider English to be one of the components of modern communication technology, then we can subject it to the same principles of research and development that have transformed the transmission of information over the years. Three major principles apply.

First, if you cannot change the people to fit the equipment, change the equipment to fit the people. Make it "user-friendly." This principle of human engineering in spelling improvement can alert researchers to how people would like to spell. In determining exactly which spellings are preferred by the users of the language, that is, which changes would make English spelling user-friendly, researchers should consider several factors.

Children who are first learning to write use "invented spellings" that are often logical yet depart significantly from conventional forms. Typically, this early writing is economical rather than elaborate and follows generalized rules rather than invidious auditory distinctions.

Dictionaries don't reflect how people really spell. If they did, they would include the most common spelling mistakes as permissible alternatives. Although spelling errors can be weird and wonderful, as people try to emulate the conventional model, the most common mistakes tend to be simplifications, for example, *exilarate* or *vally.*

Most of the spelling changes in commercial advertising and brand names are shortenings made not only for the impact of novelty, but also because they are easier to read when quickly scanning shop shelves or advertisements and can be read by the semiliterate masses. Even public notices that must be read quickly by motorists contain shorter spellings, for example, *hiway, thruway,* and *dubl.*

One direction for spelling improvement that is becoming popular is to drop letters that can be shown experimentally to serve no purpose in indicating meaning or pronunciation of words—beginning particularly with omissions that would not be missed and are usually hardly even noticed, for example, *rememberd, shoud, comunication.*

The press at times has seen this as advocating a wider use of shorthand. Shorthand is not desirable as the standard form of spelling. To be read, it must be reconstituted, and it has to be learned, as a special code has to be. It presents too many difficulties to young learners and foreigners. Some languages have spellings that omit vowel symbols; a study of comparative spelling can observe the disadvantages as well as advantages.

Others have taken up the idea of removing clutter enthusiastically, as if the motto was to cut as much as possible, to the bare bone. However, that is not the primary aim; what we need is to find what sort of spelling change could be most helpful and most welcomed now.

We learn to speak our language by intuitive generalization of rules we never really learn. A good deal of the work we do in school in grammar is to undo the generalizations we have made that do not apply to our irregular forms of verbs, nouns, and so on. We have to unlearn patterns we have inaccurately generalized, such as *sing-sang-sung* therefore *bring-brang-brung* and *fling-flang-flung;* and *I show, I showed* therefore *I go, I goed* and *I know, I knowed.*

A spelling that is consistent would require learning only basic patterns; everything else would be obvious, because even small children have a remarkable ability to generalize language rules. This already is the case in Spanish and Italian. For example, the teaching method of Paulo Preire allows peasants, with few exceptions, to read and write anything they like after learning to spell about twenty words. In English spelling as it is, all words must be individually learned or assigned to some limited spelling pattern that probably does not cover other similar words as might be expected.

Second, test your assumptions. Almost every modern invention has challenged common-sense assumptions; for example, the airplane was considered a miracle because few people thought that anything heavier than air could fly.

Let us examine some of the assumptions that have been impeding the improvement of English spelling. Some are assumptions about the nature of written language, and some are about the abilities of human beings.

It is often thought, for example, that if a spelling were easy to learn, it would be difficult to use. If it were easy to write, it would be difficult to read. If suitable for machines, it would be difficult for humans. If easy for dull people, it would slow down clever people. If it were a clear guide to pronunciation, it would prevent fast visual scanning for meaning (Frith, 1981; Gillooly, 1972; Smith, 1972).

Most of this argument is based on assumptions about what sort of spelling would be easiest to learn or to use. It has generally been assumed that any reform of English spelling must result in a system of "spelling as you speak." In fact, I have often been chagrined to find my own work described in the media under this heading, and it is often accompanied by editors' examples of what they think looks like funny "spelling as she spoke."

One assertion that has not been supported by research is that the best has already been achieved. Yet many people still agree with Chomsky's belief (1970) that English orthography, despite its often cited inconsistencies, comes remarkably close to an optimal orthographic system for English. Repeated demonstrations by a series of researchers show that the examples provided by him and by Carol Chomsky (1970) are hardly more than anecdotal, since most of the unpredictable spellings in English represent no underlying lexical structure at all. Downing (1983) summarizes much of the contradicting research.
A more fruitful approach to improving English spelling is to look at the supposed advantages of both present spelling and proposals for reform. We can then test out which principles would in fact be of greatest advantage and perform all the functions a spelling should.

What would English spelling look like if it really did show how words with similar meaning are related, as suggested by Chomsky's notion of deep structure? Suppose we did have *fli/ flies/ flite/ flu, speke speehe/ spoke, strategy/ strategem, slepe/ slept, hi / hite,* and so on? Would it really be of greater benefit to all? Would consistent representation of grammatical markers such as *-s. -d, -n* for plurals and participles really aid fast visual scanning for meaning? Is redundancy valuable in every situation? Do letters that indicate neither meaning nor pronunciation of words serve any purpose except to clutter the spelling and hinder fast reading and easy learning? All these questions should lead us to look at other assumptions about the capacity of humans to acquire spelling and use it in reading and writing.

Volume upon volume of research in spelling concentrates on either analyzing the features of present spelling or identifying what may be wrong with those who fail to learn it. Only recently have psychologists begun examining the abilities of those who can learn. Perhaps we should reanalyze existing research for what it can tell us about a new spelling system that everyone could learn and use easily.

It has been generally assumed that everyone can learn to read and spell if only they try hard enough. Failure indicates lack of diligence or inadequate teaching; those who still fail must have some peculiar medical defect. The occasional cases reported of bilinguals who are dyslexic only in English are

described as if they are fascinatingly peculiar, when it very well may be English spelling that deserves that description.

Our picture of spelling abilities is rather unbalanced because research has been unbalanced. The test material most commonly consists of single words rather than everyday reading and writing tasks, and subjects are usually either highly skilled or unskilled. There has been little real investigation of the skills of the average person with average verbal abilities. It is only when large-scale surveys reveal the extent of adult illiteracy, semi-literacy, and ex-literacy (that which is lost through disuse) that we realize that perhaps ten years of expensive compulsory education in Anglo-Saxon countries is not cost effective and that the path to fluent literacy may have been too much of a minefield. Even university entrants can be found today with reading speeds of less than a hundred words a minute for simple narrative. This may he a key reason for subsequent failure and high dropout rates. Slow readers can read less, and it is also harder for them to read with comprehension because the beginning may very well be forgotten by the time the end is reached.

The arbiters of spelling are people of high verbal ability and are usually allied with good visual memory and above average intelligence. They are like acrobats in the psycholinguistic guessing game of reading and find it difficult to realize that others may need a steady set of steps to even get off the ground.

On the other hand, highly literate adults assume that once they have learned one spelling system, learning to read another would be far too difficult. They believe that English spelling itself is so complicated and unpredictable that any other form of spelling would involve the same difficulty. They do not stop to consider that when they set out to learn Spanish, Italian, German, Indonesian, and so on, they can master the single page of spelling rules in twenty minutes. Accent and intonation apart, they can then read aloud what they cannot yet translate, and well enough to be understood by a native speaker. The average English reader also automatically adjusts to reading English whether it is in upper or lower-case, print or manuscript, a hundred varieties of type styles, and even more varieties of handwriting.

Third, unless it is a radically new development, an invention makes sense only if it can fit in with what already exists. This is the principle of backward capability.
Experiments based on the work of John Beech test how English speakers can adapt to changes in spelling. Such experiments reveal that adaptation to more regular forms of present spelling can be almost immediate in reading tests and requires only a few hours' practice in writing tests. Even the more drastic change of a pure phonemic "spelling as you speak" would hardly slow anyone down for more than a few weeks in reading. Dabblers in spelling reform can write with equal care in present spelling and in some invention of their own. In countries like Australia, which accept both English and American spellings, few notice which is used; signs in a television shop window can read both *color* and *colour.*

Improvements that are in the same direction as current trends could be used on the electronic screen, and the changes would barely be noticed. Individuals can use alternative spellings as they like. Firms can change their house rules to the degree they wish simply by modifying the dictionary on their word processors. Schools can experiment with improvements such as initial learning spellings even if this means immediate transition to reading present spelling. With Pitman's Initial Teaching Alphabet, the transition to reading present spelling is postponed.

English spelling should be designed to be optimal for use on visual display screens, in computer languages and in speech-print and print-speech computer transliteration in microfiche, and in language translations by machine. It needs to be streamlined for the most efficient use of time, money, energy, storage, and materials.

One suggestion for reducing the machine's difficulty with homophones has been to turn the homophones into words with slight sound and print *differences:* for example, to pronounce *to, too,* and *two* as they are spelled, and similarly for *sun* and *son. for* and *four.* It would also be possible simply to eliminate the less

familiar word in some homophone pairs and use a different word instead—the language is rich enough. It would be interesting to design a thesaurus that performed this task.

Spelling reformers have sometimes imagined that an acceptable reform need only be designed, and that it will at once either be adopted in schools or by a government commission or both. The aim however is not merely to improve the present English system; that is easy. Anyone can design a better spelling system in an afternoon, and many people have. The aim must be for the best possible representation of language, one that will best satisfy many different criteria and constraints, including the following:

- learning from international comparative spelling research and from examinations of possible reforms;
- testing with every variety of user, including machines, and across age, social class, IQ, educational level, regional dialects, and various types of linguistic handicaps;
- testing immediate and long-term adaptation, speed and accuracy, and the advantages compared with present spelling;
- investigating its feasibility (How easily and inexpensively can it be implemented?);
- determining how it shapes up as a component of modern communications technology.

We are at present approaching a situation when the only question will be "Who will dare first to bell the cat?" and take the risk as well as reap the potential rewards.

But in the communications industry, risk-takers have always been found. Indeed, following a familiar precedent, the first use of tested and improved English spelling could well be by the Japanese, for reasons of international commerce.

The following paragraphs are taken from this article and have been rewritten with the omission of letters that "woud not be mised."

Improvements that are in th same direction as current trends coud be used on the electronic screen, and th changes woud barely be noticed. Individuals can use alternativ spellings as they like. Firms can change their house rules to th degree they wish simply by modifying th dictionary on their word processors. Scools can experiment with improvements such as initial lerning spellings even if this means imediat transition to reading present spelling. With Pitman's Initial Teaching Alphabet, the transition to reading present spelling is postponed....

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Relative Frequency of Letter Used in English

Each point on the chart represents the percentage of use for a particular letter. The letter *e,* for example, accounts for 12.62 percent of the total number of letters used in written English. From Solso, E. and King, J. Frequency and versatility of letters in the English language. *Behavior Research Methods and Instrumentation,* 1976, *8,* 283-286.

a	7.61	f	2.34	k	.65	p	2.03	u	2.72
b	1.54	g	1.95	l	4.11	q	.10	v	.99
c	3.11	h	5.51	m	2.54	r	6.15	w	1.89
d	3.95	i	7.34	n	7.11	s	6.50	x	.19
e	12.62	j	.15	o	7.65	t	9.33	y	1.72
								z	.09

Per cent																									
13																									
12																									
11																									
10																									
9																									
8																									
7																									
6																									
5																									
4																									
3																									
2																									
2																									
1																									
0																									
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z

Bigram Rank Matrix

Down: 1st Letter. Across: 2nd Letter

	a	b	c	d	e	f	g	h	i	j	k	l	m
a	436	127	65	67	344	226	132	324	89	337	183	24	106
b	149	311	475	440	45	560	501	501	195	305	550	119	386
c	53	517	232	490	44	508	578	46	118	578	150	163	463
d	155	397	413	252	34	416	276	380	66	357	483	262	309
e	36	289	70	11	74	159	190	284	145	382	285	50	85
f	146	492	539	539	122	166	517	530	108	550	525	234	508
g	157	456	578	447	84	428	273	110	161	578	530	240	352
h	23	364	402	421	2	408	495	445	28	560	501	316	328
i	121	214	40	97	88	137	111	451	432	449	244	60	95
j	282	539	578	499	259	578	578	578	389	578	578	578	578
k	296	443	517	460	107	392	412	377	191	478	472	312	422
l	57	355	346	102	30	246	363	410	43	578	278	42	274
m	48	203	460	487	32	378	478	478	100	578	517	374	209
n	103	376	82	10	35	250	22	335	94	333	238	224	290
o	223	200	160	142	258	20	218	288	210	356	219	90	47
p	101	478	501	508	59	422	483	217	170	530	454	114	306
q	578	578	578	578	578	578	578	578	578	578	578	495	578
r	41	281	193	140	6	275	206	298	39	517	201	198	156
s	120	345	167	351	29	314	424	86	49	539	251	227	228
t	52	391	261	426	15	347	418	1	14	560	487	182	277
u	181	212	144	208	172	301	162	436	194	462	408	93	177
v	184	578	560	525	31	578	578	578	117	578	560	525	578
w	54	420	468	367	83	436	539	76	75	578	427	315	434
x	286	550	283	578	304	472	578	384	279	578	578	470	560
y	303	339	343	378	186	456	415	433	267	550	445	317	287
z	294	513	578	247	247	560	517	517	321	578	495	394	539

	n	o	p	q	r	s	t	u	v	w	x	y	z
a	5	370	143	425	21	26	8	188	130	229	295	123	308
b	483	126	501	578	189	266	319	125	358	499	578	154	578
c	450	33	550	383	165	297	80	174	578	560	578	269	487
d	354	135	463	419	196	179	416	180	307	349	578	239	539
e	9	235	147	256	4	13	68	292	112	171	139	148	373
f	490	56	578	578	129	388	215	199	578	472	578	350	578
g	243	158	501	578	133	249	302	222	560	483	578	310	530
h	280	51	463	475	213	322	153	220	501	365	578	255	494
i	3	38	211	323	99	16	17	329	115	467	300	513	236
j	578	245	578	578	413	578	578	230	578	578	578	578	578
k	237	337	456	578	399	254	431	407	560	401	578	332	578
l	367	81	291	530	326	173	192	174	272	313	578	58	478
m	336	91	131	578	265	202	439	176	530	463	578	242	578
n	205	61	362	370	340	62	27	221	257	359	400	185	396
o	7	109	128	443	12	105	69	25	138	87	320	264	372
p	468	96	168	578	73	248	216	197	560	440	578	391	578
q	530	578	578	578	578	578	578	169	560	550	578	578	578
r	151	37	260	451	187	72	92	178	241	325	495	123	455
s	318	78	141	331	386	79	19	104	440	270	578	253	475
t	347	18	403	578	77	98	134	124	525	225	578	136	381
u	71	330	164	508	55	63	64	451	403	550	375	359	390
v	560	233	550	578	471	448	560	406	550	578	578	366	560
w	204	116	430	578	268	271	367	410	578	539	578	395	560
x	539	397	231	513	517	539	263	385	560	492	530	405	578
y	327	152	299	578	333	207	293	434	513	353	578	539	428
z	578	361	578	578	530	550	560	456	508	525	578	393	:342

From Solso, R. et al, Bigram and trigram frequencies and versatilities in the English language. *Behavior Research, Methods, and Instrumentation,* 1979, *11* (5), 476.

Rank Order Table of Bigram Frequency

RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM	RANK	BIGRAM
1	th	86	sh	171	ew	256	eq	341	py	426	td	511	uq	596	jc		
2	he	87	ow	172	ue	257	nv	342	zz	427	wk	512	zv	597	jf		
3	in	88	ie	173	ls	258	oe	343	yc	428	gf	513	iy	598	jg		
4	er	89	ai	174	cu	259	je	344	ae	429	yz	514	xq	599	jh		
5	an	90	ol	175	lu	260	rp	345	sb	430	wp	515	yv	600	jj		
6	re	91	mo	176	mu	261	tc	346	lc	431	kt	516	zb	601	jk		
7	on	92	rt	177	um	262	dl	347	tn	432	ii	517	cb	602	jl		
8	at	93	ul	178	ru	263	xt	348	tf	433	yh	518	fg	603	jm		
9	en	94	ni	179	ds	264	oy	349	dw	434	wm	519	kc	604	jn		
10	nd	95	im	180	du	265	mr	350	fy	435	yu	520	mk	605	jp		
11	ed	96	po	181	ua	266	bs	351	sd	436	aa	521	rj	606	jq		
12	or	97	id	182	tl	267	yi	352	gm	437	uh	522	xr	607	js		
13	es	98	ts	183	ak	268	wr	353	yw	438	wf	523	zg	608	jt		
14	ti	99	ir	184	va	269	cy	354	dn	439	mt	524	zh	609	jv		
15	te	100	mi	185	ny	270	sw	355	lb	440	bd	525	fk	610	jw		
16	is	101	pa	186	ye	271	ws	356	oj	441	pw	526	tv	611	jx		
17	it	102	ld	187	rr	272	lv	357	dj	442	sv	527	vd	612	jy		
18	to	103	na	188	au	273	gg	358	bv	443	kb	528	vl	613	jz		
19	st	104	su	189	br	274	lm	359	nw	444	oq	529	zw	614	kq		
20	of	105	os	190	eg	275	rf	360	uy	445	hh	530	fh	615	kx		
21	ar	106	am	191	ki	276	dg	361	xo	446	yk	531	gk	616	kz		
22	ng	107	ke	192	lt	277	tm	362	np	447	gd	532	gz	617	lj		
23	ha	108	fi	193	rc	278	lk	363	lg	448	vs	533	lq	618	lx		
24	al	109	oo	194	ui	279	xi	364	hb	449	ij	534	mv	619	mj		
25	ou	110	gh	195	hi	280	hn	365	hw	450	cn	535	pj	620	mq		
26	as	111	ig	196	dr	281	rb	366	vy	451	ih	536	qn	621	mx		
27	nt	112	ev	197	pu	282	ja	367	ln	452	rq	537	xx	622	mz		
28	bi	113	ay	198	rl	283	xc	368	wd	453	uu	538	zr	623	pq		
29	se	114	pl	199	fu	284	eh	369	wt	454	pk	539	dz	624	px		
30	le	115	iv	200	ob	285	ek	370	nq	455	rz	540	fc	625	pz		
31	ve	116	wo	201	rk	286	xa	371	ao	456	gb	541	fd	626	qa		
32	me	117	vi	202	ms	287	ym	372	oz	457	kp	542	jb	627	qb		
33	co	118	ci	203	mb	288	oh	373	ez	458	yf	543	sj	628	qc		
34	de	119	bl	204	wn	289	eb	374	ml	459	zu	544	wg	629	qd		
35	ne	120	sa	205	nn	290	nm	375	ux	460	kd	545	ww	630	qe		
36	ea	121	ia	206	rg	291	lp	376	nb	461	mc	546	xn	631	qf		
37	ro	122	fe	207	ys	292	eu	377	kh	462	uj	547	xs	632	qg		
38	io	123	ry	208	ud	293	yt	378	mf	463	cm	548	yy	633	qh		
39	ri	124	tu	209	mm	294	za	379	yd	464	dp	549	zm	634	qi		
40	ic	125	bu	210	oi	295	ax	380	dh	465	hp	550	bk	635	qj		
41	ra	126	bo	211	ip	296	ka	381	tz	466	mw	551	cp	636	qk		
42	ll	127	ab	212	ub	297	cs	382	ej	467	iw	552	fj	637	qm		
43	li	128	op	213	hr	298	rh	383	cq	468	pn	553	qw	638	qo		
44	ce	129	fr	214	ib	299	yp	384	xh	469	wc	554	uw	639	qp		
45	be	130	av	215	ft	300	ix	385	xu	470	xl	555	vp	640	qq		
46	ch	131	mp	216	pt	301	uf	386	bm	471	vr	556	vv	641	qr		
47	om	132	ag	217	ph	302	gt	387	sr	472	fw	557	xb	642	qs		

48	ma	133	gr	218	og	303	ya	388	fs	473	kk	558	yj	643	qt
49	si	134	tt	219	ok	304	xe	389	ji	474	xf	559	zs	644	qx
50	el	135	do	220	hu	305	bj	390	uz	475	bc	560	bf	645	qy
51	ho	136	ty	221	nu	306	pm	391	tb	476	hq	561	cw	646	qz
52	ta	137	if	222	gu	307	dv	392	kf	477	sz	562	gv	647	sx
53	ca	138	ov	223	oa	308	az	393	zy	478	kj	563	hj	648	tq
54	wa	139	ex	224	nl	309	dm	394	zl	479	lz	564	kv	649	tx
55	ur	140	rd	225	tw	310	gy	395	wy	480	mg	565	pv	650	vb
56	fo	141	sp	226	af	311	bb	396	nz	481	mh	566	qv	651	vf
57	la	142	od	227	sl	312	kl	397	db	482	pb	567	tj	652	vg
58	ly	143	ap	228	sm	313	lw	398	xo	483	bn	568	yc	653	vh
59	pe	144	uc	229	aw	314	sf	399	kr	484	dk	569	vk	654	vj
60	il	145	ei	230	ju	315	wl	400	nx	485	gw	570	vn	655	vm
61	no	146	fa	231	xp	316	hl	401	kw	486	pg	571	vt	656	vq
62	ns	147	ep	232	cc	317	yl	402	hc	487	cz	572	vz	657	vw
63	us	148	ey	233	vo	318	sn	403	tp	488	md	573	wz	658	vx
64	ut	149	ba	234	fl	319	bt	404	uv	489	tk	574	xm	659	wj
65	ac	150	ck	235	eo	320	ox	405	xy	490	cd	575	xv	660	wq
66	di	151	rn	236	iz	321	zi	406	vu	491	fn	576	zf	661	wv
67	ad	152	yo	237	kn	322	hs	407	ku	492	fb	577	zt	662	wx
68	et	153	ht	238	nk	323	iq	408	hf	493	xw	578	bq	663	xd
69	ot	154	by	239	dy	324	ah	409	uk	494	hz	579	bx	664	xg
70	ec	155	da	240	gl	325	rw	410	lh	495	hg	580	bz	665	xj
71	un	156	rm	241	rv	326	lr	411	wu	496	ql	581	cg	666	xk
72	rs	157	ga	242	my	327	yn	412	kg	497	rx	582	cj	667	xz
73	pr	158	go	243	gn	328	hm	413	dc	498	zk	583	cv	668	yq
74	ee	159	ef	244	ik	329	iu	414	jr	499	bw	584	cx	669	yx
75	wi	160	oc	245	jo	330	uo	415	yg	500	jd	585	dx	670	zc
76	wh	161	gi	246	lf	331	sq	416	df	501	bg	586	fp	671	zd
77	tr	162	ug	247	ze	332	ky	417	dt	502	bh	587	fq	672	zj
78	so	163	cl	248	ps	333	nj	418	tg	503	bp	588	fv	673	zn
79	ss	164	up	249	gs	334	yr	419	dq	504	gp	589	fx	674	zp
80	ct	165	cr	250	nf	335	nh	420	wb	505	hk	590	fz	675	zq
81	lo	166	ff	251	sk	336	mn	421	hd	506	hv	591	gc	676	zx
82	nc	167	sc	252	dd	337	aj	422	km	507	pc	592	gj		
83	we	168	pp	253	sy	338	ko	423	pf	508	cf	593	gq		
84	ge	169	qu	254	ks	339	yb	424	sg	509	fm	594	gx		
85	em	170	pi	255	hy	340	nr	425	aq	510	pd	595	hx		

200 Most Common Syllables in the English Language

Ranked in the Order of Frequency

RANK	SYLLABLE	RANK	SYLLABLE	RANK	SYLLABLE	RANK	SYLLABLE
1	the	51	oth	101	could	151	side
2	a	52	all	102	ber	152	fer
3	of	53	out	103	did	153	dif
4	to	54	we	104	ty	154	round
5	and	55	ry	105	see	155	pa
6	in	56	your	106	num	156	let
7	ing	57	when	107	day	157	tions
8	er	58	there	108	time	158	just
9	is	59	how	109	most	159	work
10	i	60	said	110	make	160	know
11	be	61	up	111	peo	161	our
12	you	62	de	112	its	162	ther
13	it	63	ver	113	ble	163	through
14	that	64	ex	114	than	164	try
15	y	65	each	115	of	165	fore
16	on	66	en	116	ers	166	called
17	he	67	which	117	may	167	great
18	for	68	do	118	word	168	est
19	was	69	she	119	first	169	fa
20	ly	70	their	120	mer	170	good
21	an	71	them	121	wa	171	used
22	as	72	if	122	ten	172	la
23	are	73	will	123	been	173	land
24	with	74	di	124	who	174	part
25	ter	75	him	125	ment	175	car
26	his	76	bout	126	use	176	el
27	at	77	corn	127	now	177	think
28	or	78	ple	128	ti	178	n't
29	they	79	u	129	pro	179	much
30	al	80	then	130	down	180	si
31	ed	81	her	131	find	181	set
32	es	82	no	132	ar	182	ent
33	this	83	words	133	me	183	yen
34	from	84	these	134	ma	184	ev
35	one	85	con	135	new	185	too
36	have	86	way	136	lit	186	men
37	e	87	per	137	made	187	old
38	by	88	would	138	get	188	same
39	man	89	low	139	ri	189	ac
40	tion	90	un	140	thing	190	ca
41	had	91	like	141	eve	191	does
42	not	92	long	142	us	192	sound
43	but	93	has	143	sen	193	fol
44	can	94	two	144	read	194	right
45	so	95	my	145	come	195	place
46	re	96	more	146	came	196	ful
47	some	97	go	147	where	197	son
48	what	98	write	148	ture	198	na
49	o	99	der	149	look	199	tain
50	were	100	tie	150	back	200	ning

From Sakiry, E. et al. A syllable frequency count. *Visible Language*,1980, 19 (2).

[Spelling Progress Quarterly. Volume 1, Number 2, Page 11 in the printed version]

200 Most Common Syllables Listed in Alphabetical Order

a
ac
of
al
all
an
and
ar
are
as
at
back
be
been
ber
ble
bout
but
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Spelling Instruction

4. Fundamentals of Spelling instruction

Myrna J. Walters

Direct instruction in spelling is a necessary part of the elementary curriculum. It promotes vocabulary development, enhances reading skills, and teaches students about the structure of our language. Most importantly, spelling is one of the foundations upon which writing is based, so students should have as many opportunities as possible to use in their writing the words that constitute their spelling lessons.

The basis of spelling instruction is the word list which should include high-frequency or high-utility words. One of the best word lists consists of the thousand most common words and can be found in the April 1979 issue of *The Reading Teacher* and *Spelling: Basic Skills for Effective Communication* (Barbe et al., 1982).

Once the basic list has been compiled, the words need to be introduced and taught systematically. Research suggests that the test-teach-test method is the most effective.

It is also important that students learn spelling rules, especially that "for every rule there is an exception." Spelling rules, even though they are fallible, give students a set of guidelines that they can use to attempt words they cannot spell.

What follows is a list of these rules. As was mentioned previously, the rules are not perfect, but they are a great improvement over the "best guess" method many students seem to employ.

Forming Plurals
The incorrect spelling and usage of plurals appears early in students' writing, so it is vital to focus on the rules of forming plurals. A lesson on plurals should include words representing all s and es rules, and students should have several opportunities to classify the words by pattern.

- Add *s* to
  -most nouns. (*bags, safes, radios*)
  -nouns ending in *y* following a vowel. (*days*) -some nouns ending in *f* or *fe*, after changing the *f* or *fe* to *ye*. (*thief, thieves; knife, knives*)

- Add *es* to
  -nouns ending in *s, x, ch*, and *sh*. (*buses, boxes, branches, dishes*)
  -some nouns ending in *o* following a consonant. (*heroes*)
  -nouns ending in *y* following a consonant, after changing the *y* to *i*. (*family*, *families*)

One of the most baffling aspects of the English language is the words that have irregular plural forms.

man men
woman women

child children
ox oxen

foot feet
goose geese
tooth teeth

mouse mice

Equally confusing is the discovery that some singular words don't change at all in their plural forms.

sheep	*swine*
deer	*fish*
moose	*bison*

Possessives

Possessives often give students difficulty. Direct instruction and the memorization of the following rules should minimize the problem.

- First, write the word, and then add the *'s* or the apostrophe to make it possessive (Hillerich, 1976).
- To form the possessive of singular nouns, add *'s*.
  cat *cat's* *class* *class's*
- To form the possessive of plural nouns, add only an apostrophe.
  cats *cats'* *classes* *classes'*
- To form the possessive of irregular plurals of words, add *'s.*
  woman *women* *women's* *child* *children* *children's*

Adding Suffixes

Adding suffixes correctly is a challenge to most students. It requires patient, consistent instruction over a long period of time. Again, memorization of the rules for adding suffixes is important.

Final Consonant Rules

- If a word ends in *x* (*fix*) or two or more consonants (*help*), merely add the suffix. (*fixed, helping*)
- If a word ends in a consonant following a vowel, double the consonant before adding a suffix that begins with a vowel.
  run running

Silent *e* Rules

- If a word ends in *e*, drop the *e* and then add the suffix if the suffix begins with a vowel. If the suffix begins with a consonant, do not drop the *e*; merely add the suffix. (*excited, excitable, exciting*)
- Do not drop the *e* after soft *c* or *g* if the suffix begins with *a* or *o*. (*changeable*)

Rules for Words Ending in *y*

- To add a suffix to most words ending in y, change the *y* to *i* and add the suffix. *(easy, easily)*
- To add the suffix *ing,* do not change the *y* to *i. (studying)*
- To add a suffix to most words ending in *y* following a vowel, do not change the *y* to *i;* merely add the suffix. *(play, played, playing)*

Homophones, words that sound alike but are spelled differently, confuse even the best spellers. Frequently, a student will spell homophones correctly on the weekly test but misspell them in a composition thirty minutes later. This is the student's way of saying. "I haven't had enough experience applying these words in my writing to use and spell them correctly." Rather than responding by providing additional practice featuring the words in isolation, give the student opportunities to use the words in a written assignment. It is also helpful to separate the homophones and to teach them emphasizing the different meanings rather than the similar pronunciations.

Errors are helpful to learning and diminish with time and practice. Graves (1983) advocates using compositions to diagnose students' spelling problems. He suggests that "a line should be drawn under words that are almost spelled correctly and a circle placed around words that the student suspects are way off in spelling" (Graves, 1983, pp. 202-203).

But of what value is a lesson of ten or twenty words if after the lesson the student can spell only those words? The goal of spelling instruction is to provide each student with fundamental spelling skills that should give the student clues to spelling new or unknown words.

Procedure for Spelling an Unknown Word

- Say the word to yourself.
- Determine the number of syllables in the word.
- Decide if the word includes a suffix and if any changes were made to the word before the suffix was added.
- Give your best try — write it.
- If it looks incorrect, try the dictionary.
- If all else fails, ask for help.

Summary

Spelling requires structured, systematic instruction on a regular basis. High-frequency and high-utility words need to be learned, because they will serve as the foundation for writing. Basic rules for plurals, possessives, and suffixes should also be learned, as they will provide students with the tools they will need to unlock new words. Direct spelling instruction is essential, but so, too, is the opportunity to apply correct spelling and usage in composition. This combination of direct instruction and application will help students develop into competent users of our language.

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What does the teacher do?

1. Provide direct instruction for spelling skills. Check yourself or have a colleague check to make sure you are instructing, not assigning.
2. Schedule daily skill lessons that are 10 to 15 minutes long.
3. Provide time each day for students to apply their skills in spelling by writing.
4. Provide a composition checklist that includes spelling skills (Walters. 1984).
5. Change grading techniques by identifying the number of incorrect words in a line or page, and have the student identify and correct them.
6. Assist the students in using time wisely so they have more time on task.
7. Provide more vocabulary development activities.
8. Provide for different learning modalities. Visual students need to see words spelled correctly, auditory students must hear words spelled orally, and kinesthetic students have to write the words.
9. Select appropriate spelling words from students' compositions.
10. Provide meaningful repetition and memorization practice.
11. Direct the student to list any misspelled words in a personalized dictionary.
12. Post a chart listing the procedures for spelling an unknown word.
13. Provide immediate and positive feedback for each student on a regular basis (Flood and Salus, 1984).
14. Be enthusiastic and expect correct spelling.

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