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A Syllable Frequency Count

A frequency count of the syllables in an edited list of the 5,000 most common English words generated an unweighted list of the most common 322 syllables in 5,000 words and a list of 290 syllables weighted by the frequency of occurrence of words of which the syllables were constituents. The unweighted list contained 222 nonword-syllables and 100 word-syllables. The weighted list contained 190 word-syllables and 100 nonword-syllables. The latter 290 syllables account for 72 percent of the 5,890,868 syllable tokens in the 5,000 most common English words. These lists are seen as potential base data for the development of curriculum materials in reading, spelling, and other areas. They are also seen as potential base data for investigations and technologies in readability, computer translation, verbal learning, and language acquisition.

Certain aspects of basic knowledge about the syllable are updated and refined in this study. Historically, the syllable was one of the mainstays of the teaching of reading; it played a prominent role in the methodology of the 18th century *New England Primer*. At various times subsequently in the history of instruction the syllable has been featured in reading, spelling, and writing instruction. Syllables continue to merit some importance in those areas. They are more important, however, in dictionary use, speech correction, typography, computer translation, readability, verbal learning, and language research.

The purpose of this study was to develop a syllable rank-order list. The study attempts to answer the questions "What is the commonest syllable? What is the next commonest syllable?" etc.

These questions pose another question, "What does *common* mean?" In terms of this study, it means both an unweighted rank-order list and a weighted rank-order list. The lists are composed of

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types and *tokens*. Types are separate or different syllables; tokens are the occurrences, or frequencies, of the types. Each occurrence of a type is a token. The unweighted list presents the number of occurrences of each different syllable in a list of the 5,000 most common words in an edited list based on the Carroll, Davies, and Richman, or *American Heritage* (1971), count. The weighted list reflects the frequency of occurrence of each syllable in the 5,000 words weighted by the number of times each of those words appeared in 5,088,721 running words. These two lists are then compared.

BACKGROUND

The last major syllable count was done by Osburn (1954). He listed the 15 commonest initial, medial, and final syllables. Unfortunately, the bulk of his syllable count on the 9,000 polysyllabic words of the now-dated Rinsland (1945) list did not find its way into the professional literature and, for most practical purposes, is lost.

Three decades earlier Dewey counted phonic syllables (spoken syllables) in 100,000 printed words of adult material. He ranked the 220 most common of the 4,400 different syllables obtained (1923). Later he appended initial, medial, and final positions for these syllables (1950).

Dolch (1938) obtained 8,509 nonword syllables in 3,931 polysyllabic words found in 14,000 running words of elementary texts. There were 1,255 different syllables. His published alphabetical list of the 100 commonest syllables does not answer the question of which is the commonest syllable. The list of 100 syllables is all that is apparently available (Dolch, 1940). Additionally, the Dolch count, like the Dewey and Osburn counts, was an unweighted one.

DATA BASE

The Carroll et al. frequencies that served as the data base were generated by a computerized count of occurrences of different words in 5,088,721 running words. These words were in 10,043 five-hundred-word samples of reading materials used in grades three through nine in 22 different categories. This count yielded 86,741 different words or types. A type might not be a word because numerals such as "1905" and initializations such as "USA" are types. A token is the frequency of a word. For example, the type "the" occurred 373,123 times, or "the" had 373,123 tokens.

METHOD

The 86,741 different words (types) of the Carroll et al. count, together with their frequencies of occurrence, were on computer data tape deposited at the National Archives for Linguistics in Arlington, Virginia. Punched cards were generated from these tapes for 52,000 words that occurred more than once per five million.

The first phase was to edit the Carroll et al. list. They defined a word as a group of symbols with a space on either side. This facilitated selection, scoring, and counting by the computer. It also had the advantage of nonjudgmental objectivity. However, for the purposes of this study it had the obvious drawback of counting *nonwords* such as "&," "$100," and "1945," and "USA" as words. Also, words which differed only in case of letters such as "Run," "run," and "RUN" were counted as three different words with three different frequencies of occurrence for each word.

Hand editing was necessary to eliminate nonalphabetic symbols and nonwords. Hand editing was also used to combine frequencies for different graphic forms of the same word, such as "Run" and "run," into one word. However, *inflected forms* of the word, such as "runs," "running," and "ran" were not combined; this would have omitted syllables such as "ed" and "ing."

After hand editing, 44,174 word cards remained. Of these words, the count was on the 5,000 most frequent. These words account for 4,513,777 occurrences or 89 percent of the word tokens in the 5,088,721 running words. These 5,000 high-frequency words are all the words that occur more than approximately 15 times per million running words.

The 5,000 most frequent words were then divided into *graphemic syllables*. Graphemic syllables refer to syllables whose boundaries were determined for graphic (written) use. The *American Heritage School Dictionary* (1977) was the authority for this syllabification.

Phonetic syllables are those syllables used in the phonetic or pronunciation part of a dictionary definition; they are said to be more akin to speech patterns. There is a lack of agreement among dictionaries on syllable boundaries, particularly for phonetic syllables.

The computer programs used were based on Fortran Sort-Merge and the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, and Brent, 1975).

RESULTS

Unweighted List

There were 9,358 graphemic syllables or syllable tokens in the 5,000 words, an average of about 1.9 syllables per word. These 9,358 syllables were comprised of 3,402 different syllables or syllable types. The different syllables may be divided into word-syllables and nonword-syllables. A word-syllable is one like "the" that is a simple word and may also be part of a larger word like "theater." A nonword-syllable is a syllable like "ing," which never occurs as a single word. Of the 3,402 different syllables, 1,982 or 58 percent are word-syllables and 1,420 or 42 percent are nonword-syllables.

The 322 most frequent graphemic syllables are presented in Table I. These are syllables that occurred in five or more of the 5,000 words. Of these syllables, 222 or 69 percent are nonword-syllables and 100 or 31 percent are word-syllables. The five most frequent syllables, "ing," "er," "a," "ly," and "ed," are all nonword-syllables. The syllables "a" and "ed" were not counted as words because "a" generally functions as a single vowel syllable, and "ed" is a word only when capitalized and used as a nickname. The first word-syllable, "in," has a rank of 10; the second word-syllable, "an," has a rank of 22.

The sum of the frequencies of the 222 nonword-syllables is 3,329 or 36 percent of the 9,358 syllable tokens in the 5,000 words. The sum of the frequencies of the 100 word-syllables is 1,496 or 16 percent of the syllable tokens. Thus, 322 syllables account for 52 percent of the 9,358 syllable tokens.

Weighted List

The rank, weighted frequency, and unweighted frequency of each of the 290 syllables with a weighted frequency of 3,000 or more are in Table II. Of these 290 syllables, 190 or 66 percent are word-syllables and 100 or 34 percent are nonword-syllables. The most frequent syllable of the unweighted list, "ing," drops to rank seven in the weighted list, and "er" drops from rank two to rank eight. Of the first 100 syllables, 72 are word-syllables.

When 3,402 syllable types in the 5,000 words are weighted for frequency of the words in which they appear, there are 5,890,868 syllable tokens. The common 190 word-syllables in Table II account for 3,260,280 or 55 percent of these tokens. The 100 nonword-syllables account for 977,456 or 17 percent of these tokens. All 290 syllables account for 4,237,736 or 72 percent of the 5,890,868 tokens.

TABLE I The 322 most common unweighted graphemic syllables in the English language ranked in order of frequency in the 5,000 most frequent words.

Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.
1	ing	230	40	der	25	80	pre	14
2	er	129		ma	23		tive	14
3	a	124		na	22		car	13
4	ly	119		si	22		ci	13
5	ed	114		un	22		mo	13
6	i	112	45	at	21	85	on	13
7	es	98		dis	21		ous	13
8	re	90		ca	20		pi	13
9	tion	83		cal	20		se	13
10	in	78		man	20		ten	13
	e	67	50	ap	19	90	tor	13
	con	64		po	19		ver	13
	y	63		sion	19		ber	12
	ter	60		vi	19		can	12
15	ex	58		el	18		dy	12
	al	56	55	est	18	95	et	12
	de	55		la	18		it	12
	com	51		lar	18		mu	12
	o	51		pa	18		no	12
20	di	46		ture	18		ple	12
	en	42	60	for	17	100	cu	11
	an	39		is	17		fac	11
	ty	39		mer	17		fer	11
	ry	37		pe	17		gen	11
25	u	36		ra	17		ic	11
	ti	35	65	so	16	105	land	11
	ri	32		ta	16		light	11
	be	30		as	15		ob	11
	per	29		col	15		of	11
30	to	29		fi	15		pos	11
	pro	28	70	ful	15	110	tain	11
	ac	26		ger	15		den	10
	ad	26		low	15		ings	10
	ar	26		ni	15		mag	10
35	ers	26		par	15		ments	10
	ment	26	75	son	15	115	set	10
	or	26		tle	15		some	10
	tions	26		day	14		sub	10
	ble	25		ny	14		sur	10
				pen	14		ters	10

TABLE I (Continued)

Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.
120	tu	10	160	my	8	200	ton	7
	af	9		nal	8		try	7
	au	9		ness	8		um	7
	cy	9		ning	8		ure	7
	fa	9		n't	8		way	7
125	im	9	165	nu	8	205	ate	6
	li	9		oc	8		bet	6
	lo	9		pres	8		bles	6
	men	9		sup	8		bod	6
	min	9		te	8		cap	6
130	mon	9	170	ted	8	210	cial	6
	op	9		tem	8		cir	6
	out	9		tin	8		cor	6
	rec	9		tri	8		coun	6
	ro	9		tro	8		cus	6
135	sen	9	175	up	8	215	dan	6
	side	9		va	8		dle	6
	tal	9		ven	8		ef	6
	tic	9		vis	8		end	6
	ties	9		am	8		ent	6
140	ward	9	180	bor	8	220	ered	6
	age	8		by	8		fin	6
	ba	8		cat	8		form	6
	but	8		cent	7		go	6
	cit	8		ev	7		har	6
145	cle	8	185	gan	7	225	ish	6
	co	8		gle	7		lands	6
	cov	8		head	7		let	6
	da	8		high	7		long	6
	dif	8		il	7		mat	6
150	ence	8	190	lu	7	230	meas	6
	ern	8		me	7		mem	6
	eve	8		nor	7		mul	6
	hap	8		part	7		ner	6
	ies	8		por	7		play	6
155	ket	8	195	read	7	235	ples	6
	lec	8		rep	7		ply	6
	main	8		su	7		port	6
	mar	8		tend	7		press	6
	mis	8		ther	7		sat	6

TABLE I (Continued)

Rank	Syl.	F.	Rank	Syl.	F.	Rank	Syl.	F.
240	sec	6	270	fix	5	300	round	5
	ser	6		gi	5		row	5
	south	6		grand	5		sa	5
	sun	6		great	5		sand	5
	the	6		heav	5		self	5
245	ting	6	275	ho	5	305	sent	5
	tra	6		hunt	5		ship	5
	tures	6		ion	5		sim	5
	val	6		its	5		sions	5
	var	6		jo	5		sis	5
250	vid	6	280	lat	5	310	sons	5
	wil	6		lead	5		stand	5
	win	6		lect	5		sug	5
	won	6		lent	5		tel	5
	work	6		less	5		tom	5
255	act	5	285	lin	5	315	tors	5
	ag	5		mal	5		tract	5
	air	5		mi	5		tray	5
	als	5		mil	5		us	5
	bat	5		moth	5		vel	5
260	bi	5	290	near	5	320	west	5
	cate	5		nel	5		where	5
	cen	5		net	5		writ	5
	char	5		new	5			
	come	5		one	5			
265	cul	5	295	point	5			
	ders	5		prac	5			
	east	5		ral	5			
	fect	5		rect	5			
	fish	5		ried	5			

This table contains all syllables that occurred five or more times in the 5,000 highest frequency English words. These 322 syllables comprise 52 percent of all the syllables (tokens) in the 5,000 words.

TABLE II The 290 most common syllables in the English language ranked in order of frequency in 5,088,721 running words.

Rank	Syl.	Frequencies		Rank	Syl.	Frequencies	
		Weighted[b]	Unwtd.[a]			Weighted[b]	Unwtd.[a]
1	the	374,747	6	40	tion	20,975	83
2	a	191,870	124		had	20,802	2
3	of	150,386	11		not	20,090	3
4	to	143,284	29		but	19,993	3
5	and	133,921	1		can	19,683	12
6	in	131,121	78	45	so	19,242	16
7	ing	71,958	230		re	18,799	90
8	er	64,846	129		some	18,558	10
9	is	64,816	17		what	18,301	3
10	i	59,077	112		o	18,094	51
	be	57,052	30	50	were	17,207	2
	you	50,999	1		oth	17,172	4
	it	50,254	12		all	17,042	1
	that	47,462	1		out	16,892	9
15	y	46,700	63		we	16,474	3
	on	46,634	13	55	ry	16,278	37
	he	46,532	3		your	16,214	2
	for	44,258	17		when	16,183	2
	was	41,685	2		there	15,692	2
20	ly	40,685	119		how	15,422	3
	an	40,572	39	60	said	15,309	1
	as	35,619	15		up	15,291	8
	are	35,502	1		de	14,977	55
	with	33,817	3		ver	14,953	13
25	ter	32,154	60		ex	14,710	58
	his	30,244	3	65	each	14,290	1
	at	27,710	21		en	14,158	42
	or	27,697	26		which	14,016	1
	they	27,627	1		do	13,744	3
30	al	27,231	56		she	13,657	1
	ed	26,367	114	70	their	13,258	1
	es	24,969	98		them	12,959	2
	this	23,316	1		if	12,912	1
	from	22,810	1		will	12,873	2
35	one	22,644	5		di	12,810	46
	have	22,444	2	75	him	12,542	2
	e	21,956	67		bout	12,507	1
	by	21,746	7		com	12,439	51
	man	21,081	20		ple	12,420	12
					u	12,248	36

TABLE II (Continued)

Rank	Syl.	Frequencies		Rank	Syl.	Frequencies	
		Weighted[b]	Unwtd.[a]			Weighted[b]	Unwtd.[a]
80	then	12,026	1	120	mer	7,726	17
	her	11,814	2		wa	7,699	3
	no	11,763	12		ten	7,661	13
	words	11,707	1		been	7,651	1
	these	11,611	1		who	7,608	1
85	con	11,598	64	125	ment	7,535	26
	way	11,406	7		use	7,529	3
	per	11,315	29		now	7,465	1
	would	11,191	1		ti	7,451	35
	low	10,801	15		pro	7,447	28
90	un	10,748	22	130	down	7,419	3
	like	10,644	4		find	7,313	2
	long	10,616	6		ar	7,285	26
	has	10,469	2		me	7,256	7
	two	10,144	1		ma	7,231	23
95	my	10,142	8	135	new	7,190	5
	more	10,130	2		lit	7,157	4
	go	10,055	6		made	7,157	2
	write	9,974	2		get	7,029	4
	der	9,844	25		ri	6,956	32
100	tle	9,636	15	140	thing	6,817	4
	could	9,464	2		eve	6,806	8
	ber	9,397	12		us	6,608	5
	did	9,276	3		sen	6,601	9
	ty	9,080	39		read	6,584	7
105	see	8,981	3	145	come	6467	5
	num	8,955	4		came	6,418	2
	day	8,949	14		where	6,413	5
	time	8,643	3		ture	6,411	18
	most	8,372	3		look	6,286	2
110	make	8,340	1	150	back	6,252	4
	peo	8,281	3		side	6,228	9
	its	8,197	5		fer	6,211	11
	ble	8,159	25		dif	6,201	8
	than	8,057	2		round	6,168	5
115	af	7,934	9	155	pa	6,105	18
	ers	7,911	26		let	5,998	6
	may	7,836	3		tions	5,981	26
	word	7,804	1		just	5,939	2
	first	7,776	1		work	5,932	6

TABLE II (Continued)

Rank	Syl.	Frequencies		Rank	Syl.	Frequencies	
		Weighted[b]	Unwtd.[a]			Weighted[b]	Unwtd.[a]
160	know	5,926	2	200	ning	4,715	8
	our	5,922	2		cause	4,714	2
	ther	5,913	7		ways	4,685	3
	through	5,909	2		col	4,627	15
	try	5,898	7		am	4,621	7
165	fore	5,870	3	205	par	4,621	15
	called	5,789	1		dis	4,549	21
	great	5,737	5		small	4,509	3
	est	5,728	18		air	4,492	5
	fa	5,705	9		three	4,479	1
170	good	5,629	3	210	put	4,455	4
	used	5,611	1		say	4,442	2
	la	5,608	18		ern	4,409	8
	land	5,597	11		help	4,387	3
	part	5,551	7		self	4,380	5
175	car	5,491	13	215	ny	4,372	14
	el	5,474	18		times	4,361	2
	think	5,445	2		well	4,350	2
	n't	5,433	8		cit	4,331	8
	much	5,388	1		must	4,307	1
180	si	5,218	22	220	want	4,292	2
	set	5,217	10		big	4,254	3
	ent	5,187	6		take	4,252	2
	ven	5,098	8		po	4,247	19
	ev	5,096	7		such	4,223	1
185	too	5,074	1	225	cal	4,197	20
	men	5,064	9		here	4,192	1
	old	5,034	3		why	4,158	1
	same	5,024	1		tell	4,137	2
	ac	5,012	26		went	4,132	1
190	ca	5,008	20	230	line	4,131	4
	does	5,001	2		pen	4,121	14
	sound	4,964	2		mu	4,097	12
	fol	4,932	4		things	4,078	1
	right	4,931	2		moth	4,077	5
195	place	4,883	4	235	gain	4,065	2
	ful	4,867	15		end	4,027	6
	son	4,747	15		pic	4,017	4
	na	4,726	22		im	4,001	9
	tain	4,716	11		to	3,989	16

TABLE II (Continued)

Rank	Syl.	Frequencies		Rank	Syl.	Frequencies	
		Weighted[b]	Unwtd.[a]			Weighted[b]	Unwtd.[a]
240	years	3,975	1	265	home	3,370	1
	off	3,875	1		give	3,369	1
	name	3,864	2		tween	3,344	1
	high	3,861	7		own	3,313	3
	light	3,809	11		gan	3,285	7
245	head	3,795	7	270	bod	3,276	6
	coun	3,770	6		add	3,254	3
	mon	3,712	9		tence	3,252	2
	pe	3,698	17		ward	3,250	9
	near	3,677	5		hap	3,238	8
250	lar	3,654	18	275	nev	3,238	2
	por	3,595	7		ure	3,208	7
	fi	3,579	15		mem	3,206	6
	bers	3,563	3		mean	3,201	4
	sec	3,557	6		looked	3,197	1
255	ap	3,545	19	280	earth	3,177	2
	stud	3,491	4		ters	3,174	10
	found	3,477	2		cov	3,165	8
	should	3,470	1		ger	3,147	15
	ad	3,431	21		last	3,132	2
260	still	3,424	1	285	nit	3,095	3
	form	3,414	6		show	3,089	2
	need	3,412	2		might	3,077	2
	play	3,392	6		stand	3,058	5
	world	3,383	1		house	3,054	2
				290	got	3,051	3

a. *Unweighted* Frequency means number of occurrences in the 5,000 different words. This is the same as Table I count.

b. *Weighted* Frequency means number of occurrences per five million running words using words from the 5,000 word list. For example, the 189th syllable "ac" appeared in 26 different words of the 5,000 word list and these 26 words were used a total of 5,012 times in five million running words.

These 290 syllables account for 72 percent of all the syllables (tokens) in the 5,000 most common words.

DISCUSSION

A relatively small number of syllables account for a large proportion of our written language.

In the *weighted list*, a mere 290 word- and nonword-syllables account for 72 percent of the 5,890,868 syllable tokens in the 5,000 most common words weighted for their frequency. This reflects the J-curve distribution of the weighted frequencies in which a few types occur with high frequency and many types occur with moderate-to-low frequencies.

High-frequency whole words continue to be important. Of the 290 weighted syllables, 190 are word-syllables that account for 55 percent of the 5,890,868 tokens or more than half of all written English. This lends support to the efficacy of teaching a high frequency or basic sight vocabulary such as those developed by Dolch (1936) and Fry (1957), since both the Dolch and Fry list contain a high percentage of the same one-syllable words. For example, the basic word "let" is instantly recognized as a syllable when encountered in such words as "gauntlet," "inlet," and "lettuce." Furthermore, the 190 word-syllables presented in Table II make up about half of all written English since the 190 words make up 49 percent of the five million running words in the Carroll count.

Another finding of this study is that only 100 nonword-syllables of the weighted list account for an additional 17 percent of the 5,890,868 syllable tokens. Thus, the 100 syllables account for approximately another sixth of all written English.

These findings cannot be compared with those of earlier counts. Dolch and Osburn counted only polysyllabic words; Dewey used phonemic syllables, all of which were unweighted counts.

The *unweighted count* presented here provides a different orientation than the weighted count. When one looks at the unweighted list, in this analysis of 5,000 common words, the 222 nonword-syllables of Table I make up 36 percent of the total syllables, and 100 word-syllables make up 16 percent of the total. Thus, nonword-syllables assume greater importance on the unweighted list than on the weighted list.

Other researchers provide evidence that the syllable is a viable unit for at least some phases of literacy instruction. The objection to teaching syllables in addition to words and phonemes in reading stems from the belief that graphemic or written syllables have numerous

pronunciations. However, Sakiey and Martin (1980) have shown that 92 percent of the syllables found in basal readers in the primary grades have two or less pronunciations. Sixty-six percent had only one pronunciation. Savin and Bever (1970) demonstrated "that even for literate adults the syllable is a far more natural, more easily available perceptual unit than is the phoneme" (p. 322). Using both urban and suburban kindergarten-age children, Allen, Rozin, and Gleitman (1972) found that prereaders were more likely to recognize a meaningful word when segmented syllabically than when segmented phonemically.

Blending of two syllables was found to be easier than blending two phonemes (Brown, 1971) for children of ages 56 to 80 months. Children 4 to 6 years old had more difficulty analyzing words into phonemes than syllables (Liberman, Shankweiler, Carter, and Fischer, 1972). Finally, tachistoscopic studies have shown that the syllable functions as a single perceptual unit (Spoehr and Smith, 1973).

Ruddell (1976) called for "A study of various decoding units . . . and the relationship between these units and early reading success" (p. 35). This is only one of the areas in which high-frequency syllable lists might be employed. They might be used in the development of curriculum materials for developmental and remedial reading as well as in spelling and typing instruction. Syllable frequency lists may also be useful in a wide variety of investigation and technologies of readability, spelling reform, verbal learning, language acquisition, and computer translation.

The unique contribution of this study is in providing a weighted syllable frequency count and in determining that a relatively small number of syllables make up a fairly substantial portion of all written language.

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