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# EUPHONY AND CACOPHONY OF WORDS AND SOUNDS

by

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Certain words and combinations of words and certain of the sounds of which words and parts of words are composed are supposed to be more pleasing than others. This supposition is correct. The correctness of customary views concerning which words and combinations of words and parts of words are more pleasing than others and why they are so is by no means certain. In particular the part played by the mere sound of the words has probably been exaggerated, and the importance, within the field of the sound of words, of vowels, liquids, and musical quality may have been exaggerated.

The orthodox views concerning the pleasant and unpleasant features of words as words will be recalled by the following quotation:

«It is probable that in particular the tone color of the vowels is significant, so that the fuller tone color of the open vowels is more pleasing to the ear than the poorer tone color of the closed vowels, that, for example, the open German *a* is preferable to the closed Danish *a*. Moreover, the variety which a rich system of vowels offers make a direct appeal. Among the consonants the voiced influence the ear more agreeably than the voiceless, which have only the effect of noise» [Flagstad, Chr. B., Psychologie der Sprachpädagogik, p. 32].

With a view to finding out more about likings for words, I have made two rather extensive surveys in the case of college students and educated adults. The first was of general likings, for words presented visually alone, or visually and by

sound, the subjects of the experiment being instructed: — «You are to record your liking or dislike for each of these words as a word. You may consider how it looks, how it sounds, and any other features of it. You are to report your attitude toward the words, not the realities they stand for. Thus it is your feelings for the words, *money* and *Christmas* not for the real things, *money* and *Christmas*, that you are to record. Write LL if you are sure that you like the word. Write L if you think you like it, but are not sure. Write DD if you are sure that you dislike the word. Write D if you think you like it but are not sure. If you have no clear feeling toward the word, write nothing». Sometimes numbers were used instead of the LL, L, D and DD.

The second set of experiments was similar except that the likings and dislikes were reported for the sounds alone.

I have records from 16 or more persons, and usually from 64 or more, for each of over two thousand words. As a measure, I shall use the difference, likes (sure and probable) minus dislikes (sure and probable) in a group of 16. This can vary from + 16 to — 16. The figure will commonly be an average from four or more groups and so represent rather precisely the general drift among educated adults. We will call the scores for words as words G scores, and those for sound alone S scores.

Feelings toward words are universal among the hundreds of persons studied. Not one was found in either survey who had no likes and dislikes, though every group was told that they were to report nothing but genuine feelings.

The great majority of educated adults are unable to distinguish their feelings toward the mere sound of a word from their feelings toward it as a word. It may even be doubted whether experts in phonetics or music can do so. Most teachers of literature cannot.

The evidence for these statements is that the likes and dislikes reported for sound alone are much the same as those reported for the word as a word.

I have made many measurements of this sort, which show that the attitude toward the mere sound of a word is for most persons inseparable from the general attitude toward the word as a word. Either the likes and dislikes of the sounds deter-

mine almost entirely the likes and dislikes of the word as a whole, or the latter so suffuse and interpenetrate the former that a person who thinks he is reporting for sound alone is, in most cases, really expressing his general attitude.

The latter is what happens. The word as a word evokes certain tendencies. Regardless of how these may have been formed in the past, they are felt as belonging to the sound. They determine the response, for most persons, equally when the person thinks of the word in a general way and when he thinks of the sound alone. The evidence for this is found first in the *S* likings for words which sound much alike but have very different past associations. Thus the sounds of hoar, quaint and coral are much liked, but the sounds of whore, ain't and quarrel are extremely unpleasant! It cannot be the sounds.

A list of the words most liked and most disliked for sound alone is instructive. Such a list chosen from 1600 words each of which was reported on by at least sixteen college students or graduates is presented below. The numerical values for the different words are not strictly comparable, since the numbers of men and of women, of old and of young, of teachers of English and of persons having slight literary interest, differs from word to word and differs greatly in some words. But the general impression left by the list will be entirely trustworthy.

It shows clearly and emphatically that the attitudes associated with the words in past experiences of them mainly determine likes and dislikes. Words which have been accompanied by dignity, grandeur, beauty, charm, health, vigor, cleanliness, success, joy, freedom and the like, real or imagined, sound well to us. It shows clearly that records of likings for the sounds of real words are an extremely inefficient means to reveal the intrinsic pleasantness or unpleasantness of sounds. Many sorts of sounds appear both in those most liked and those most disliked. If differences did appear, we should have to allow for possible differences in their past associations, a very difficult task.

In order to measure the pleasantness and unpleasantness of articulate sounds as such, utterly uninfluenced by meaning and past history, a much better procedure will be to use nonsense words, or, to make the judgments more natural and genuine,

names of people and places that are devoid of past associations. The facts so obtained may not be entirely free from indirect influence from the past associations of real words of similar sounds, but they will be much nearer to what is needed than reports on real words.

**Likings for words (sound alone): the words whose sounds were most liked and most disliked by college students and graduates.**

| S Average balance | |
|---|---|
| +15 | harmony madonna melody |
| +14 | Endymion lily lullaby lyrical regal resonant serene silvery swan |
| +13 | alpha alpine clarion ebony fantasy fragrant gallant garland gondola Havana haven India Jericho lavender lilac loyal radiant revere sapphire sherry sonata sparkle splendor starry tranquil vista vesper |
| +12 | aglow Andes anemone blossom bobolink caravan caress carol castle cavalier chalice core daffodil dawn elfin epic ermine fairyland fascination Geneva gleam Hercules immemorial ivory laurel leaf linen love mandarin mandolin promenade rendezvous serenade slumber tapestry tendril tingle tulip twinkle valiant violet volley |
| +11 | adorable adore amber arabesque Ariosto artesian artistic auburn ballad Bethlehem brilliant cedar clover columbine coral damsel debonair delta elysian emerald facility fiancée firmament foamy foliage folio fragile fraternal Galilee gaze gazelle glen halo harpoon hazel hyacinth immensity jade jasmine Java jubilant labyrinth laureate limpid lustre Madeira magnolia manoever manorial narrative opal Pantheon paramour quaint resplendent rosary saganore Samoa sanctuary scarlet shell silvan tang terrace topaz tower trophy troubadour vintage violin willowy |
| − 4 | accompt ache addle arnica artichoke bastard beadle beg behemoth bib boggy bossy bumper buttocks cankerworm |

chunk clutch cribbage daub douse dowager gabble gewgaw habergeon hack hook jag liverwort morgue mucuous ogre rancid rat rut sackcloth sag satchel sauerkrout spigot

— 5 antichrist asexual asp asphyxia astute brackish cackle carboy chew collop concupiscence cuspidor dandruff dank diabetes dub dyspeptic egg fagged fake flabby fodder hawser hoist hulk hussy irk junk libbard lockjaw lump Meg rot ruder rump scum scurvy soggy steapsin ulcer

— 6 arch-duke blether bum clack corset defunct drug fag fatty fetter forger gibber haggis lobster nasal ogle pip punk shank slicker spavin spinach whore yelp

— 7 bosky cad corpse croak gaff gopher hank hump husk itch maugre pimp sewage silk skunk

— 8 apse asthma bug clumsy diarrhoea hog mickle muck mumps stench

— 9 abduct ague gad sackbut slop

—10 skulk spittoon

—11 ain't cockroach funk hunk mawkish punk squawk vomit wart

—12 brat stink

—13 abut belch

## Experiments with Nonsense Words and Names of Persons and Places.

Three lists were used. List I contained 160 words, announced as «foreign» words, consisting of (A) some rich in liquids and open vowels, (B) some rich in aspirates, gutterals and close vowels, and combinations hard to pronounce, (C) a few duplicating real words in sound (e. g. ainshunt, addul, idil), (D) some almost duplicating real words in sound (e. g. darmunny, taffotil, garlent), and (E) others made up by random joining of syllables in sufficient numbers to prevent the subjects from expecting any real words and from seeking for resemblance to real words.

List II contained 160 words, announced as «names of people or places», consisting of a few well-known names (e. g. Lincoln, Paris, Quebec, Aristotle), some other real names (e. g. Schurz, Torrey, Bloom, Jonas), and some others of classes A, B, C, D above, plus a majority of class E above.

List III contained 303 words consisting entirely of nonsense combinations of sounds chosen with no regard for likenesses to real words, but so as to include sets alike in all save one sound. The words in such sets were scattered among many others, so that no hearer would be aware of them.

Lists I and II were presented to some groups as sounds alone, and to others as printed words which the subject heard the experimenter pronounce, but could also see and pronounce for himself. Each word was rated within three or four seconds after the experimenter said it. List III was presented as sounds alone.

The experimenter said, «I shall read a series of foreign words. You will listen, and for each word, write LL if you surely like its sound, L if you think you like its sound, O if you neither like it nor dislike it, D if you think you dislike the sound, DD if you surely dislike its sound». He then read the words. All were accented on the first syllable unless otherwise noted in what follows. Most of the words were constructed so as to compare the likings for words alike in all save one sound.

Thus we have in the list:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | amus | 128. | emus | 27. | ɔmus | 44. | oimus |
| 54. | anush | 13. | enush | 179. | ɔnush | 209. | oinush |
| 90. | aluhz | 67. | eluhz | 144. | ɔluhz | 234. | oiluhz |
| 104. | atuhl | 123. | etuhl | 194. | ɔtuhl | 77. | oituhl |

by which to compare the sounds of initial a (as in father), e (as in men), (a as in hall), and oi (as in oil).

The sounds included and the symbols by which they will be designated in this report were

ɔ a as in ball, hall
ạ a as in father, ah

æ a as in hat, man
e e as in men, red
ė e as e in her or i in bird
i i as in machine, e as in evil
ī i as in pin, fill
o o as in glory (with some care not to prolong the sound into the diphthong oo, as in oh)
u as oo in boot, loose
uh as in utter
ə the «vowel murmur» or slurred vowel of e in giver, a in sofa
ai as in line, fire
oi as oi in boil, poison
ow as ou in house, ow in fowl
b, d, f, h, k as in English bed, rib, din, red, fun, if, hen, ken
g as in go, get
l, m, n, p, r as in English (r being sounded as by an educated New Yorker)
ng as in ring, single
s as in sat, past
t, v, z as in English
zh as j in French Jean
sh as in shun, dish

There were 60 subjects, all students at Brooklyn College. We record for each word the number of ratings of LL, L, O, D and DD. For example, we have:

| | LL | L | O | D | DD | |
|---|---|---|---|---|---|---|
| sistuh | 13 | 26 | 15 | 4 | 2 | respectively, |
| and slak | 2 | 4 | 20 | 15 | 9 | respectively. |

There were, for all the words, about 9% rated LL, 23% rated L, 39% rated O (indifferent), 21% rated D, and 8% rated DD. We compute the median rating for each word assuming a continuous scale on which LL = the step from + 2.5 to + 1.5, L = the step from + 1.5 to + 0.5, 0 = the step from + 0.5 to − 0.5, D = from − 0.5 to − 1.5, and DD = from − 1.5 to − 2.5. Thus sistuh rated + .85, and slak − .77.

The ratings for amus, emus, ɔmus, and oimus were .25, −.05, .45 and −.17 giving differences as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ɔ (a in hall) | > | a | .20 | a (a in far) | > | e | .30 |
| » | > | e | .50 | » | > | oi | .42 |
| » | > | oi | .62 | (e in men) | > | oi | .12 |

The data provide three other comparisons of these vowels as initial sounds, so that in all we have differences as follows:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ɔ | > | a | .20, | .22, | .45, | and | .27, | averaging | .15 |
| ɔ | > | e | .50, | .42, | .44, | and | −.24, | averaging | .28 |
| ɔ | > | oi | .62, | .38, | .38, | and | .26, | averaging | .41 |
| a | > | e | .30, | .20, | −.01, | and | .03, | averaging | .13 |
| a | > | oi | .42, | .06, | −.07, | and | .53, | averaging | .26 |
| e | > | oi | .12, | −.04, | −.06, | and | .50, | averaging | .13 |

The variation in the four results for the same two sounds is in part due to the fact that even with 60 persons' ratings, the score for any single word is not a precise equivalent of what the average score from many repetitions of the experiment with the same individuals would be, and partly probably to the fact that liking of the total sound of any word is subject to association and other influences.

From many sets of such comparisons of words identical in all save one consonant sound we have the average difference shown in Table 1.

For vowel sounds ɔ (a as in hall) scores +0.2; a (as in ah) scores +0.5; i scores 0; e, aɛ, ai, o, and u are about −.10; oi (except as final) is about −.20.

According to this experiment, the d, l, s and t sounds are superior and almost equally so. The g, z, and sh sounds are on the average about .25 inferior to d, l, s, and t. f is even worse. b is intermediate. So probably is ng. m is liked a little better than n, and about as well as the d, l, s, and t group.

In lists I and II there were 81 words which were identical in sound with some of our 1600 meaningful English words, or identical except for an interchange of d, l, s, t, m and n, or of g, z, and sh, or of e, aɛ, ai, o, and u, or of ɔ, a and ə (which is known from other evidence to be rather well liked), or for a transposition of vowels, or other minor alteration. The closeness

TABLE 1.

The average superiorities of certain sounds to others as measured by the superiorities in liking of words alike in all else save the sound in question. Each entry is an average from a set of four comparisons. Each entry is the superiority of the sound listed above it to the sound listed at the left of it.

| | e | b | d | f | g | k | l | m | n | ng | p | r | s | t | z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b | | | | | | | | | | | | | | | |
| d | | | | | | | | | | | | | | | |
| f | | .24 | | | | | | | | | | | | | |
| | | .05 | | | | | | | | | | | | | |
| g | | | .22 | | | | | | | | | | | | |
| | | | .21 | | | | | | | | | | | | |
| k | | | .26 | | —.18 | | | | | | | | | | |
| | | | .03 | | | | | | | | | | | | |
| l | —1.6 | | | | | | | | | | | | | | |
| m | | | | —.58 | | | | | | | | | | | |
| n | | .16 | | —.39 | —.03 | | | .10 | | | | | | | |
| | | | | | | | | .19 | | | | | | | |
| ng | | | | —.12 | | | | .23 | .05 | | | | | | |
| | | | | —.35 | | | | | | | | | | | |
| p | | | | | | | | | | | | | | | |
| r | | | | | | | .08 | | | | | | | | |
| s | 0.2 | —.36 | | | —.23 | | .04 | | —.20 | | | | | | |
| | | | | | | | .18 | | | | | | | | |
| | | | | | | | .19 | | | | | | | | |
| t | —1.9 | .11 | —0.2 | | —.22 | —.04 | —.03 | | | | | —.21 | | | |
| z | | | | | | | .52 | | | | | .48 | | | |
| | | | | | | | .32 | | | | | .13 | | | |
| zh | | | | | | | | | | | | | | | |
| sh | | | | | | | .29 | | | | | .25 | | —.23 | |
| | | | | | | | .23 | | | | | .04 | | —.09 | |

of the correlation between the liking for the sound of the meaningful word (e. g. dimple, cedar) and the liking for the sound of its less meaningful artificial counterpart (e. g. timpəl, midar) gives an upper limit of the intrinsic influence of the sounds themselves. Not over one fourth of the variation in liking for the sounds of real words can be accounted for by the differences in their sounds. Three fourths or more is attributable to the associations, that is, meanings.

**The Comparative Frequency of Certain Sounds in Words Meaning Pleasant Things, Qualities and Events, and in Words Meaning Unpleasant Things, Qualities and Events.**

On general psychological grounds one would expect that if sounds and combinations of sounds differ at all in their intrinsic pleasantness and if pleasant and unpleasant meanings differ at all in their constituent sounds the former will have comparatively more pleasant sounds and combinations of sounds. There is a general tendency for a mood or attitude or set of mind to call up responses which have accompanied or closely followed it and have belonged to it. Suppose, for example, that the sound of *b* is intrinsically a little pleasanter than that of *f* to make, or both to make and to hear. Then in connection with a pleasant fact there will be a stronger tendency to mismake or mishear *b* for *f* than to mismake or mishear *f* for *b*. If one creates a new name for a pleasant fact he will be more likely to use *b* than *f* in it. Moreover speakers and hearers of harsh sounds or combinations of sounds will be more often satisfied by them and less tempted to change them when the meaning is something unpleasant, so that the sounds seem fit and proper.

I have studied the single sounds constituting words meaning pleasant and unpleasant things, qualities and events, in English, Greek, Latin, German and French. The list for English included 140 «bad» words, chosen with absolute impartiality with respect to their sounds.

The following are pairs taken at random from the 140.

strong weak, sweet bitter, gay weary, crown fetter, rain mud, aroma stink, grow decay, turquoise pimple (1), star dark, kiss spit, brook ditch, drops dregs, genius idiot, gallant lout, marble rubble, solid mire, music discord, economical niggard, harvest plague, blood pus, roar grunt, genuine sham, sober sot, honest swindle, noble vile.

The «good» words probably represent an average percentile rank for pleasantness, dignity, etc. of the fact named well above 95; and the «bad» words, an average well below 5.

(1) Besides opposites, and pleasant-unpleasant alternatives, I have included some names of jewels, dignitaries and the like in the «good» list, and some names of diseases, deformations and the like in the «bad» list.

The Greek, Latin and German lists include the Greek, Latin and German equivalents of the English words where there clearly are such. To save time, endings are not included in these counts of sounds for Greek and Latin. They would merely dilute the results.

A similar count was made for French but without separation of the vowel sounds (except into certain broad categories such as all the nazalized vowel sounds), and without any allowance for the varying pronounciation of final consonants before words beginning with vowels.

In a first general survey it is unnecessary to exercise great care either to obtain the best fits of words to our «good» and «bad» things and qualities, or to determine the sounds of the words with great precision. I have trusted to available dictionaries for Greek and Latin. Dr. Irving Lorge took the responsibility in the case of German. If any positive results of importance appear they can be checked by expert linguists and phoneticians, and extended to other languages. If the results are negative, or positive by only a very small amount, there will be no likelihood that a more rigorous investigation will reveal positive results of great importance.

The results (shown in Tables 2 and 3) are positive, but by only a very small mount. The percentage of vowel and diphthongal sounds combined is a little higher for the «good» than for the «bad» words in each of the four language counts (and also in a rough count for French). The figures obtained were :

| | «Good» | | «Bad» | |
|---|---|---|---|---|
| Greek | 37.9 | and | 37.6 | Diff. 0.3 |
| Latin | 36.6 | | 35.3 | 1.3 |
| French(1) | 43.6 | | 42.6 | 1.0 |
| German | 33.9 | | 32.9 | 1.0 |
| English | 35.4 | | 33.1 | 2.3 |
| Average | | | | 1.2 |

The percentages of l and r (dental + uvular) were closely the same in the «good» and in the «bad», being :

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Greek | 15.1 | 14.4, | Diff. 0.7 | German | 15.8 | 15.9 | Diff. −0.1 |
| Latin | 14.9 | 16.1 | −1.2 | Fnglish | 17.0 | 17.2 | −0.2 |
| French | 15.1 | 13.7 | 1.4 | Average | | | 0.2 |

(1) Including the nazalized vowel sounds.

As between the more euphonious and less euphonious vowels, by any reasonable assumption concerning which these are, the «good» words are favored little, if at all, more than the «bad» words. The frequencies (in percents) and the ratios of the frequencies in the good words to those in the bad are shown in Table 2.

Among the common vowel sounds, the one most favored by the good words is the short e of continental languages (including the English e as in met). The percents for this are 7.6 to 3.8 in Greek, 6.6 to 5.8 in Latin, 2.8 to 2.2 in German and 3.9 to 2.2 in English. It thus occurs one and a half times as often in the «goods» as in the «bads». Few musicians, linguists, or persons of general good taste would choose this as the most euphonious of the vowel sounds. The common vowel sound most eschewed by the good words is short o, of which the «good» words contain less than three-quarters as many as the «bad».

The facts for consonant sounds are reported in Table 3. The ratios in Table 3 for c, χ, j, ng, θ, zh, and the soft g of English are from too few words to be considered very seriously singly. Among the others, h, n, s, t and w are high, and d, f, k, m, ch, v and z are low.

The sounds f, g, sh and z, which were disliked in our experiments, do occur much less often in «good» than in «bad» (average ratio, .77).

More experiments are desirable, but the facts so far make it almost certain (1) that the pleasantness of sounds in speech is not the same as their musical quality, (2) that the orthodox doctrines of the greater euphony of open vowels over closed, liquids over consonants in general, and voiced sounds over the corresponding voiceless sounds need some amendments, (3) that words sound unpleasant mainly because of the fusion of the unpleasantness of their associated ideas with the sounds, secondarily because of difficulty in pronouncing them, and only very slightly because of the elementary sounds which they contain. There seems to be a real but slight tendency for pleasant facts to be expressed in sounds which are easy to pronounce and lepasant to hear.

TABLE 2.

The frequency (as percentages of the number of sounds counted for «good» and «bad» words respectively in each language) of certain groups of vowel sounds, and the ratios (% G / % B).

| | 1 | | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | α+a (I.P.A.) | | | e+ε (I.P.A.) | | | i (I.P.A.) | | |
| | % G | % B | Ratio | % G | % B | Ratio | % G | % B | Ratio |
| Gr. . . . | 10.5 | 9.2 | 1.14 | 10.7 | 6.3 | 1.70 | 4.7 | 3.9 | 1.12 |
| Lat. . . . | 8.3 | 7.4 | 1.13 | 8.3 | 7.6 | 1.08 | 1.9 | 2.0 | .95 |
| Fr. . . . | 5.8 | 7.0 | .83 | 9.6 | 9.2 | 1.04 | | | |
| Ger. . . . | 4.4 | 5.3 | .83 | 4.9 | 5.0 | .97 | 1.1 | 1.1 | .97 |
| Eng. . . . | 1.0 | 0.9 | 1.18 | 5.3 | 3.5 | 1.53 | 2.7 | 2.9 | .94 |
| Sum . . . | 30.0 | 29.8 | 1.01 | 38.8 | 31.6 | 1.23 | 10.4 | 9.9 | 1.05 |

| | 4 | | | 3+4 | | | 5 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ī (I.P.A.) | | | i+ī | | | ō | | |
| | % G | % B | Ratio | % G | % B | Ratio | % G | % B | Ratio |
| Gr. . . . | 1.2 | 0.5 | 2.40 | 5.9 | 4.4 | 1.35 | 1.7 | 1.3 | 1.28 |
| Lat. . . . | 7.6 | 6.3 | 1.20 | 9.4 | 8.3 | 1.14 | 2.2 | 2.0 | 1.09 |
| Fr. . . . | | | | 7.5 | 7.7 | .98 | | | |
| Ger. . . . | 5.3 | 3.4 | 1.56 | 6.4 | 4.5 | 1.42 | 2.3 | 1.4 | 1.66 |
| Eng. . . . | 6.0 | 7.2 | .83 | 8.6 | 10.0 | .86 | 2.7 | 1.7 | 1.56 |
| Sum . . . | 20.1 | 17.4 | 1.16 | 37.8 | 34.9 | 1.08 | 8.9 | 6.4 | 1.39 |

| | 6 | | | 5+6 | | | 7 | | |
|---|---|---|---|---|---|---|---|---|---|
| | o | | | ō+o | | | u | | |
| | % G | % B | Ratio | % G | % B | Ratio | % G | % B | Ratio |
| Gr. . . . | 3.3 | 7.2 | .45 | 4.9 | 8.5 | .58 | 2.9 | 4.2 | .70 |
| Lat. . . . | 2.3 | 2.7 | .84 | 4.4 | 4.7 | .94 | 5.0 | 5.0 | .98 |
| Fr. . . . | | | | 4.5 | 5.3 | .85 | 1.5 | 2.1 | .70 |
| Ger. . . . | 1.5 | 0.7 | 2.15 | 3.7 | 2.0 | 1.82 | 3.6 | 2.9 | 1.25 |
| Eng. . . . | 2.8 | 2.9 | .95 | 5.5 | 4.7 | 1.17 | 2.8 | 1.8 | 1.52 |
| Sum . . . | 9.9 | 13.5 | .73 | 23.0 | 25.2 | .91 | 15.8 | 16.0 | .99 |

TABLE 8.

The frequencies of various sounds (average percentages in Gr., Lat., Fr., Ger. and Eng. counts) in words naming pleasant or dignified facts (Goods) and in words naming unpleasant, mean, or degraded facts (Bads).

| | Goods | Bads | Goods/Bads |
|---|---|---|---|
| b as in be. . . . . | 2.24 | 2.35 | .96 |
| c as in Ger. ich . . . | .42 | .19 | 2.23 |
| χ as in Ger. ach . . . | .38 | 1.07 | .36 |
| d as in do . . . . . | 2.75 | 3.67 | .75 |
| f as in fun . . . . . | 1.94 | 3.08 | .63 |
| g as in go . . . . . | 2.66 | 2.59 | 1.03 |
| h as in hat . . . . . | 1.03 | .52 | 1.99 |
| j as y in yes . . . . | .21 | .14 | 1.57 |
| k as in king . . . . . | 4.34 | 4.91 | .88 |
| l as in love . . . . . | 6.71 | 6.74 | 1.00 |
| m as in man . . . . . | 3.62 | 4.14 | .87 |
| n as in not . . . . . | 6.97 | 5.91 | 1.18 |
| ng as in singing . . . . | .31 | .57 | .54 |
| p as in pat . . . . . | 3.19 | 3.26 | .98 |
| r + R . . . . . | 8.86 | 8.72 | 1.01 |
| s as in son . . . . . | 4.71 | 4.13 | 1.14 |
| sh as in shoe . . . . . | .91 | 1.54 | .59 |
| t as in tin . . . . . | 6.40 | 5.98 | 1.07 |
| θ as th in thin . . . . | .62 | .21 | 1.52 |
| v as in very . . . . . | .86 | 1.29 | .67 |
| w as in will . . . . . | 1.04 | .92 | 1.13 |
| z as in lazy . . . . . | .64 | .77 | .83 |
| zh as s in pleasure . . . | .77 | .32 | 2.42 |