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Euphony in American Indian languages: A phonetic universal

Abstract. In making comparisons among languages we take into consideration the basic features of sound classes and groups. Vowels and sonorant consonants constitute the vocalo-sonorant structure of the sound picture of any language. The basic features include the frequency of occurrence of vowels and sonorant consonants in the speech chain. These basic features may be found in any world language; euphony (melodicity) is one more language universal. This paper compares the value of euphony in Amerindian languages in comparison to different world languages. By analysing the value of euphony, one can construct the typology of distribution of language taxa according to this universal characteristic. Euphony, i.e. the total of vowels and sonorant consonants, may be considered a phonetic universal.

Key words: euphony, vocalo-sonorant quotient, maximum and minimum value of euphony, melodicity, language group, language family, language taxa, genetic classification, typological classification, under-exploit vowels and sonorant consonants, over-exploit, the probable theoretical frequency, the actual mean frequency of euphony, ordered series, coefficient of variation, world languages, a phonetic universal.

Introduction

Each of the languages in the world has its own sound picture. By the sound picture of a language we mean the distribution of its speech sounds in the speech sound chain. These sound pictures have their features which are common to languages as it is. It is very interesting to find the which languages are euphonic and which are not. Euphony is the total of the vowels and sonorant consonants in the speech sound chain of a language. It is also possible to call this total the vocalo-sonorant quotient. Thus, the degree of euphony

(melodicity), i.e., the total of the frequency of occurrence of the vowels and sonorant consonants in the language speech sound chain, is the value of this quotient.

The goal of this paper is to compare the value of euphony (or melodicity) in Amerindian languages in comparison to different world languages. It is important to find the maximum and minimum of euphony in the 226 world languages taken for this study to see what place the American Indian languages take among them. World languages are united in various language taxa. Therefore, one can estimate the degree of euphony of this or that language taxa by its mean. Here by American Indian languages we take a sample of 32 Indian languages of North, Central and South America. They enter different language branches and families but their classification is still controversial since their origins and interrelationships are unclear. In fact, their classification is not genetic but geographical. One has to admit that they are usually described with reference to the main geographical areas involved (Crystal, 1992: 17). David Crystal correctly points out that the classification of this family is still controversial because they are classified by different linguists differently (Crystal, 1992: 18). Our data can show whether the degrees of the euphony of the speech sound chain of its members are similar.

Euphony data for language taxons

In 32 American Indian languages taken for this study (Tab.1) the mean concentration of vowels is 44.06%. The least concentration of vowels is in Kadiweu — 35.73%. The major concentration of vowels is in Iquito — 58.84%. One can compare the use of vowels in some other world languages (Tab.2 - 21).

In English, vowels constitute 38.49% of the speech sound chain (Tambovtsev, 2001-a). It is less than in any of the calculated Germanic languages. Thus, in Swedish it is 38.60%; in Dutch — 38.66%; German — 38.72%; Danish — 40.00%; Norwegian — 44.70%. We can compare these data to any other world language taken at random. For instance, Chinese

speech sounds are rather different from English, but the concentration of vowels in the speech sound chain (below) is not too different, at least not by the order of magnitude.

In Chinese, vowels comprise 44.41% of the speech chain. This is more than in Tibetan (34.17%), Thai (39.71%), or Dungan (43.63%), but it is a bit less than in Burmese (44.66%). Thus, the concentration of vowels in Chinese is quite high (Tambovtsev, 2001). Austronesian languages have a great concentration of vowels in the speech sound chain (e.g. maximum - 65.24% in Hawaiian and 69.75% in Samoan).

Now, if we add the value of the concentration of sonorant consonants in the speech chain, we obtain the degree of euphony. In the 32 Amerindian languages the mean concentration of vowels and sonorants in the speech sound chain is 65.09%. One can see the value of euphony, i.e. vocalo-sonorant quotient, in some other world languages.

The mean of the vocalo-sonorant quotient turned out to be greater in the following language taxa: Sino-Tibetan family (Burmese - 75.67%), Bantu (Swahili - 76.29%), Afro-Asian family (Neo-Aramaic- 81.47%), Austronesian family (Hawaiian- 83.29%), languages of Australian aboriginals- Nunggubuyu- 85.14%). It means that 85.14% of the Nunggubuyu speech sound chain consists of vowels and sonorant consonants.

On the other hand, some of the world languages have a minimum concentration of vowels. So, in the Itelmen language (Paleo-Asiatic family) vowels comprise only 32.61% while the sonorants — 26.91%. Thus, Itelman's euphony is rather low — 59.52%. It is very close to the absolute minimum. The minimum of the vocalo-sonorant quotient happens to be in the Adygian language (Caucasian family), which reaches only 54.07%.

It should be mentioned that on the average the Caucasian language family has a rather low vocalo-sonorant quotient — 61.66%. It is much less than in the American Indian languages, which is 65.09%. Now let us see what place they take among the other world languages. The ordered series of the average of the vocalo-sonorant quotient in different

language taxa is the following: Baltic group of Indo-European family — 62.76%; Iranian group of the Indo-European family — 63.95%); Slavonic group — 64.64%; Germanic — 64.78%; Samoyedic family — 65.16%; Finno-Ugric family — 65.57%; Mongolic family — 66.06%; Balkan language unity — 66.18%; Indic group of the Indo-European family — 66.77%; Turkic family — 66.99%; Paleo-Asiatic family — 67.58%; Sino-Tebetan family — 67.63%; Roman group of I-E family — 68.57%; Afro-Asiatic family — 68.96%; Manchu-Tungusic family — 69.54%; Austronesian family — 73.16%; Bantu — 73.40%; Languages of Australian aboriginals — 80.51%.

Vowels and sonorant consonants constitute the vocalo-sonorant structure of the sound picture of any language. We take into consideration the basic features of sound classes and groups. Our basic features consist of the frequency of occurrence of vowels and sonorant consonants in the speech chain. These basic features may be found in any world language. This is the reason that euphony (melodicity) is one more language universal. It is possible to call it a language universal since a language universal is a property claimed to be characteristic of all languages (Crystal, 1992: 405). Analysing the value of euphony, one can construct the typology of distribution of language taxa according to this universal phonetic characteristic. We analysed the euphony in nearly all language groups and families of world languages. Language subgroups, groups, unities or phyla can be in general called language taxa. Let us mention the examined language taxa in alphabetic order: Afro-Asiatic family; American Indian taxon, Austronesian family; Balkan language union; Baltic group of the Indo-European family; Caucasian family; Finno-Ugric family; Germanic group of the Indo-European family; Indic group of the Indo-European family; Iranian group of the Indo-European family; Manchu-Tungusic family; Paleo-Asiatic family; Romance group of the Indo-European family; Samoyedic family; Sino-Tibetan family; Turkic; set of American

Indian languages; set of Australian aboriginal languages; set of Bantu and some other African languages; Slavonic group of the Indo-European family; and some isolate languages

Euphony is close to the notion of euphony in poetry (Tambovtsev, 1979). In poetry, usually, euphony of a speech sound chain means the degree of beauty it bears. However, until now noone has tried to measure the degree of euphony of a language speech sound chain in the exact numbers by one and the same method. We proposed to measure the degree of euphony (melodicity) of a language on the basis of the most melodical elements of the sound speech chain, that is, vowels and sonorant consonants long ago (Tambovtsev, 1977). Usually, when a euphonic language comes to mind, Italian is named. Our measurements show that Italian, with a value of 69.53%, is not a world champion in the degree of euphony. However, it is not even the champion in its own group of Romance languages. In fact, its degree of euphony is less than that of Romanian — 69.91% in the group of the Romance group of Indo-European family, not to speak of many others in other language taxa (see Tab.1 - 21).

We can calculate the theoretical expected frequency of euphony in a language. If we follow what the great American mathematician G. Polya proposed, we must find the theoretical expected frequency of a linguistic element. If we juxtapose it to the speech chain, then we must know the number of the elements or groups of this chain. When G. Polya wanted to know the theoretical expected frequency of a letter, he divided 100% by 26, because there were 26 letters in the letter inventory (Polya, 1954: 316-317). Now let us apply his reasoning to our case. Since euphony consists of the frequency of vowels, we must reserve 50% for vowels. The rest 50% out of 100%, we reserve for consonants. Now let us calculate the number of our elements, which are, in fact, groups of consonants. We have 3 groups of consonants defined from the point of view of the manner of articulation: sonorant, occlusive, and fricative. Therefore, we must divide 50% by 3. In this way we obtain 16.67%. Thus, we reserve 16.67% for the sonorant consonants as the probable theoretical frequency in

a language speech sound chain. Consequently, the theoretical euphony (melodicity) in any language is equal to 50% + 16.67% = 66.75%. We can reason in the following way: if the value of the euphony of some language is greater than 66.75%, then the language in question over-uses the vowels and sonorant consonants in its speech sound chain. This means that this language puts a greater load on vowels and sonorants. So, vowels and sonorants overrun the limits of the theoretical frequency, i.e., the probability of occurrence. We can thus claim that they are over-exploited.

In the American Indian languages taken for this study (Tab.1) the mean degree of euphony is equal to 65.09%. This is less than the theoretical degree of euphony in a language, which means that American Indian languages in general under-exploit vowels and sonorant consonants in their speech sound chain (c.f. 65.09% and 66.75%. Nevertheless, some American Indian languages like Guarani (74.89%) or Iquito (76.85%), surely over-exploit the use of vowels and sonorants (Tab.1). The Kekchi language (64.90%) is very close to the mean of euphony in these 32 American Indian languages.

In other language families the situation is different. So, in the ordered series of the Turkic languages (Tab.3) Kirgiz is in the middle with the frequency of occurrence of 66.68%. Thus Chuvash, Jakut and the other Turkic language (Tab.3) overload their speech sound chains. It is possible to call these languages melodical or euphonic from the point of view of Turkic languages. However, to understand what the degree of euphony in general, one should take into account the mean degree of euphony in world languages. We found this euphonic mean in 226 world languages to be 67.03%. This is very close to the theoretical value 66.67%. To a human ear in general the languages with a degree of euphony greater than 67.03% should sound more melodic (see Tab 1-21). Consequently, Kirgiz with its vocalo-sonorant quotient (66.68%) cannot be recognised as a euphonic language from the point of view of world languages.

Euphony and comparison

Why should we bother to spend so much time and energy to obtain the mean value of euphony in world languages? It is as simple as this: the theoretical probability may be much greater or much lower than the real degree of euphony. It this case, the theoretical probability is rather close to the actual probability of euphony. This is just a lucky chance. Nevertheless, one can suppose that any human language tends to use enough of vowels and sonorant since it is easier to hear them in adverse conditions.

However, we do agree with those linguists who object that the theoretical probability of linguistic elements is too abstract to say anything about real world languages. This is why a linguist must spend much time and effort to count the actual phonemic frequencies of occurrence in different languages to draw some solid conclusions about languages. Therefore, we had to calculate the empirical mean of the melodicity of 226 world languages which turned to be equal to 67.03% of the speech sound chain. We repeat this value because it is very important. It shows how a human language works. It is advisable to use the value of this characteristic to find out the melodic or euphonic languages in the mass of world languages.

The mean degree of euphony is also less than this number (c.f. 65.09% and 67.03%). It indicates that American Indian languages in general do not use as many vowels and sonorant consonants as the other world languages. Nahuatl (Aztecan) has the degree of euphony (67.27%) close to the mean degree of euphony in the world languages, i.e. 67.03%.

The mean degree of euphony of the 26 Turkic languages (Tab.3) is a bit less than 67.03%. It is 66.99%. It means that on the average Turkic languages are not very melodical. However, the mean melodicity of Mongolian language family (66.06%) is even less than 67.03%. Thus, Mongolian languages under-use vowels and sonorant consonants in their speech sound chain (Tab.2). Now let us consider what language taxa do not use enough euphonic elements in their speech sound chain. In fact, Caucasian (Tab.12 — 61,66%),

Finno-Ugric (Tab.4 — 65.57%), Samoyedic (Tab.5 — 65.16%) American Indian languages (Tab.20 — 65.09%), Indic (Tab.13 - 66.77%) also under-exploit vowels and sonorant consonants. This is just an example. One can see in detail which language taxa under-exploit in the ordered series of the means of euphony. We discuss this in detail later.

On the other hand, one can find individual languages in whose speech sound chain the vowels and sonorant consonants do not occur as often as 67.03%. One can analyse the ordered series of the Turkic languages taken for the study. Such languages as Tofalar, Kazah and the other Turkic languages, whose vocalo-sonorant quotient is less than the threshold, under-exploit (under-use) vowels and sonorants. Thus, their vowels and sonorants do not occupy the speech sound chain in great numbers. It is possible to look through our tables (Tab.1 — 21) in order to see euphonic languages and those which cannot be called euphonic languages by our classification.

The other important question is how close the euphonic values are crowded around the mean in this or that language taxa. That is, how high is the quotient of its compactness. This can be measured by the coefficient of variance or the coefficient of variation (Herdan, 1966: 93-94). The lower this coefficient, the tighter the values around its mean. If the coefficient of variation is great, then the values of euphony are distributed sparsely. Christopher Butler is correct to warn linguists that it is not possible to compare two or more means of different samples without testing for homogeneity of variance (Butler, 1985: 127). If the coefficient of variation is too great, then we can say that there is no homogeneity of data. Therefore, the samples cannot be compared. Studying many languages we can come to a conclusion that if the coefficient of variation is greater than 33%, than there is no homogeneity (Tambovtsev, 2003: 12 — 16).

Let us consider the value of the coefficient of variation in different language taxa. It is possible to construct the following ordered series: Romance (1.53%); Mongolic (1.83%);

Samoyedic (1.98%); Bantu (2.28%); Iranian (2.25%); Indic (2.29%) Manchu-Tungusic (2.66%); Baltic (3.06%); Turkic (3.36%); Germanic (3.81%); Australian Aboriginal (3.90%); Slavonic (4.24%); Finno-Ugric (5.02%); Caucasian (7.01%); Paleo-Asiatic (7.28%); Austronesian (8.02%); American Indian (8.13%); Afro-Asian (9.61%); Sino-Tibetan (10.29%). One can see that all the language taxa have the values of the coefficient of variation which are much less than 33%. Nevertheless, the American Indian languages cannot be called a very compact taxon by this parameter (8.13%).

Conclusions:

1. The mean concentration of vowels in the taxon of American Indian languages is 44.06%. This is much lower than in the Austronesian languages, which have a great concentration of vowels in the speech sound chain - 53.40%. In American Indian languages the maximum of coefficient of euphony is found in Odjibwe — 64.32%. It is much less than in Samoan - 69.75%.

2. Let us consider the maximum and minimum value of euphony in American Indian languages in comparison to all the language taxa under investigation. The maximum of the euphony is in the Australian Aboriginal language of Nunggubuyu (85.14%), the minimum — in the Caucasian language of Adygian (54.07%). In American Indian languages this span is not so great: maximum in Iquito (76.85%) and minimum in Kadiweu — 55.23%.

We will also consider the maximum value of euphony in different language taxa. It is possible to put the maximum values of the quotient of euphony, that is, vocalo-sonorant quotient in the ordered series: Latvian (Baltic of Indo-European) — 64.11%; Kurdish (Iranian of Indo-European) — 65.79%; Georgean (Caucasian) — 66.25%; Nenets (Samoyedic) — 66.38%; Buriat (Mongolic) — 66.84%; Norwegian (Germanic of Indo-European) — 67.80%; Marathi (Indic of Indo-European) — 68.59%; Romanian (Romance of Indo-European) — 69.91%;

Serbian (Slavonic of Indo-European) — 70.19%; Salarian of the Turkic family — 71.75%; Evenk (Manchu-Tungusic) — 71.98%; Choockchee (Paleo-Asiatic) — 72.84%; Finnish (Finno-Ugric) — 72.85%; Burmese ((Sino-Tibetan) — 75.67%; Swahili (Bantu) — 76.29%; Neo-Aramaic Afro-Asiatic) — 81.47%; Hawaiian (Austronesian) — 83.29%; Nunggubuyu (Autralian Aboriginal) — 85.14%.

Thus, one can see that the vocalo-sonorant quotient turned out to be bigger in five language taxa. May be, there is something special in the phonetic systems of the following languages of different language taxa: Burmese - 75.67%, Swahili- 76.29%, Neo-Aramaic- 81.47%, Hawaiian- 83.29%, Nunggubuyu- 85.14%. It means that the greater part (85.14%) of the Nunggubuyu speech sound chain consists of vowels and sonorant consonants.

On the other hand, some of the world languages have a minimum of concentration of vowels. So, in the Itelmen language (Paleo-Asiatic family) vowels comprise only 32.61%. Let us consider the minimum of the vocalo-sonorant quotient in different language taxa. Thus, in the Adygian language (Caucasian family) this quotient reaches only 54.07%. Therefore, the ordered series of the vocalo-sonorant quotient of the languages in different language taxa is the following: Kadeweu (American Indian) — 55.23%; Tibetan (Sino-Tibetan) — 56.50%; Itel'men (Paleo-Asiatic) — 59.52%; Sokotrian (Afro-Asiatic) — 60.32%; Belorussian (Slavonic of Indo-European) — 60.66%; English (Germanic of Indo-European) — 61.08%; Vepsian (Finno-Ugric) — 61.34%; Lithuanian (Baltic of Indo-European) — 61.40%; Tadjic (Iranian of Indo-European) — 61.60%; Chalkan (Turkic) — 62.83%; Sel'kup (Samoyedic) — 63.34%; Kalmyk (Mongolic) — 64.66%; Gujarati (Indic of Indo-European) — 65.14; Indonesian (Austronesian) — 66.01%; Oroch (Manch-Tungusic) — 66.09%; Romanian (Romance of Indo-European) — 67.37; Moore (Bantu) — 70.90%; Ngandi (Australian Aboriginal) — 76.84%.

In the American Indian languages it is rather low — 55.23% in Kadeweu, which is second to the world euphonic minimum.

3. Let us consider the average value of euphony in different language taxa. It should be mentioned that on the average the Caucasian language family has a rather low vocalo-sonorant quotient — 61.66%. The ordered series of the average of the vocalo-sonorant quotient in different language taxa is the following: Baltic group of Indo-European family — 62.76%; Iranian group of the Indo-European family — 63.95%); Slavonic group — 64.64%; Germanic — 64.78%; American Indian languages — 65.09%; Samoyedic family — 65.16%; Finno-Ugric family — 65.57%; Mongolic family — 66.06%; Balkan language unity — 66.18%; Indic group of the Indo-European family — 66.77%; Turkic family — 66.99%; Paleo-Asiatic family — 67.58%; Sino-Tebetan family — 67.63%; Roman group of I-E family — 68.57%; Afro-Asiatic family — 68.96%; Manchu-Tungusic family — 69.54%; Austronesian family — 73.16%; Bantu — 73.40%; Languages of Australian aboriginals — 80.51%.

4. Euphony, i.e., the total of vowels and sonorant consonants in the speech sound chain, may be considered a phonetic universal.

Tab.1
Euphony of the languages of American Indians

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Kadiweu	35.73	19.50	55.23
2.	Oowekeeno	39.52	17.52	57.04
3.	Oneida	41.24	16.83	58.07
4.	Mam	35.90	22.33	58.23
5.	Haida	39.37	20.91	60.28
6.	Cocopa	34.76	26.21	60.97
7.	Totonac	38.29	22.90	61.19
8.	Kawasquar	39.25	22.20	61.45
9.	Huastec	38.47	23.36	61.83
10.	Capanahua	45.66	16.65	62.31
11.	Quiche	41.46	20.90	62.36
12.	Cofan	53.04	10.02	63.06
13.	Piratapuyo	50.70	13.01	63.71
14.	Jacoltek	39.61	24.20	63.81
15.	Sayula populuca	43.33	20.73	64.06
16.	Acateco	40.00	24.13	64.13
17.	Sweet Grass Cree	43.42	20.74	64.16
18.	Navaho	47.95	16.23	64.18
19.	Odjibwe	37.64	26.68	64.32
20.	Quequechi	40.06	24.84	64.90
21.	Pocomchi	41.71	24.35	66.06
22.	Tzutujil	43.53	23.17	66.70
23.	Nahuatl (Aztek)	42.41	24.86	67.27
24.	Secoya	51.43	16.63	68.06
25.	Kaiwa	55.75	13.19	68.94
26.	Guambiano	44.25	25.87	70.12
27.	Apinaye	41.42	29.19	70.61
28.	Kechua	44.49	26.79	71.28
29.	Inga	46.06	25.66	71.72
30.	Guarani	58.29	16.60	74.89
31.	Siriano	56.26	18.76	75.02
32.	Iquito	58.84	18.01	76.85
	Mean	44.06	21.03	65.09
	Standard (S)	6.68	4.60	5.29
	Coefficient of variation (V%)	15.16	21.87	8.13

Tab.2
Euphony of the languages of the Sino-Tibetan language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Tibetan	34.17	22.33	56.50
2.	Chinese	44.41	23.54	67.95
3.	Dungan	43.63	24.57	68.20
4.	Thai	39.71	30.14	69.85
5.	Burmese	44.66	31.01	75.67
	Mean	41.32	26.32	67.63
	Standard (S)	4.46	3.98	6.96
	Coefficient of variation (V%)	10.79	15.12	10.29

Tab. 3
Euphony of the languages of the Turkic language family

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Altaic (Chalkan)	42.26	20.57	62.83
2.	Shor	41.07	22.62	63.69
3.	Kumandin	41.65	22.18	63.83
4.	Sary-Ujgur	40.93	23.44	64.37
5.	Altaic (Kizhi)	41.52	23.63	65.15
6.	Hakas	41.75	23.47	65.22
7.	Tatar (Chulym)	41.07	24.17	65.24
8.	Tuvin	41.62	23.89	65.51
9.	Dolgan	42.87	23.03	65.90
10.	Kazah	42.84	23.20	66.04
11.	Tofalar	42.04	24.23	66.27
12.	Kirgiz	42.37	24.31	66.68
13.	Chuvash	41.96	24.90	66.86
14.	Jakut	42.64	24.29	66.93
15.	Uzbek	41.92	25.24	67.16
16.	Ujgur	42.77	24.40	67.17
17.	Turkish	42.63	24.89	67.52
18.	Bashkir	42.37	25.90	68.27
19.	Tatar (Baraba)	42.88	25.73	68.61
20.	Tatar (Krym)	42.34	26.29	68.63
21.	Tatar (Kazan)	42.34	26.54	68.88
22.	Turkmen	42.23	27.26	69.49
23.	Azerbajdzhan	42.92	26.66	69.58
24.	Karachaevo-Balkar	42.23	27.48	69.71
25.	Karakalpak	39.89	30.68	70.57
26.	Salar	47.27	24.48	71.75

	Mean	42.25	24.65	66.99
	Standard (S)	1.25	2.02	2.25
	Coefficient of variation (V%)	2.96	8.18	3.36
	(Old Turkic)	42.55	24.04	66.59

Tab. 4
Euphony of the languages of the Mongolian language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Kalmyk	40.22	24.44	64.66
2.	Halha-Mongolian	43.11	23.56	66.67
3.	Buriat	45.45	21.39	66.84
	Mean	42.93	23.13	66.06
	Standard (S)	2.62	1.57	1.21
	Coefficient of variation (V%)	6.10	6.79	1.83

Tab. 5
Euphony of the languages of the Manchu-Tungusic language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Oroch	48.90	17.19	66.09
2.	Nanaj	47.62	20.05	67.67
3.	Negidal	43.47	25.29	68.76
4.	Orok	48.43	20.64	69.07
5.	Even (Lamut)	42.34	27.71	70.05
6.	Ul'ch	47.80	22.43	70.23
7.	Manchu	49.88	20.79	70.67
8.	Udeghe	50.48	20.83	71.31
9.	Even (Tungus)	43.66	28.32	71.98
	Mean	46.95	22.58	69.54
	Standard (S)	3.01	3.74	1.85
	Coefficient of variation (V%)	6.41	16.56	2.66

Tab.6
Euphony of the languages of the Finno-Ugric language family

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Veps	42.04	19.30	61.34
2.	Hanty (East)	40.02	21.83	61.85
3.	Mordovian (Moksha)	41.43	20.78	62.21
4.	Karelian (Ludik)	43.24	19.01	62.25
5.	Komi-Permian	41.76	20.79	62.55
6.	Komi-Zyrian	41.32	21.83	63.15
7.	Mordovian (Erzia)	40.30	23.37	63.67

8.	Saami (Lopari)	37.90	25.87	63.77
9.	Hungarian	41.98	22.53	64.51
10.	Vodian	44.10	20.71	64.81
11.	Mari (Lawn)	41.40	23.81	65.21
12.	Karelian (Livvik)	43.87	21.85	65.72
13.	Udmurt	41.22	25.10	66.32
14.	Mari (Mountain)	42.13	24.62	66.75
15.	Karelian (Tihvin)	45.30	21.73	67.03
16.	Mansi (Konda)	37.22	30.07	67.29
17.	Estonian	45.43	22.45	67.88
18.	Mansi (Northern)	38.93	32.03	70.96
19.	Hanty (Kazym)	40.36	30.96	71.32
20.	Finnish	49.53	23.32	72.85
	Mean	41.97	23.56	65.57
	Standard (S)	2.80	3.66	3.29
	Coefficient of variation (V%)	6.67	15.52	5.02

Tab. 7
Euphony of the languages of the Samoyedic language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Sel'kup	41.97	21.37	63.34
2.	Kamassin	41.21	24.21	65.42
3.	Nganasan	45.00	20.51	65.51
4.	Nenets	40.74	25.64	66.38
	Mean	42.23	22.93	65.16
	Standard (S)	1.91	2.40	1.29
	Coefficient of variation (V%)	4.52	10.47	1.98

Tab. 8
Euphony of the languages of the Austronesian language family

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Indonesian	40.61	25.40	66.01
2.	Marquiz	57.42	9.41	66.83
3.	Dajak	46.51	22.50	69.01
4.	Uma	51.55	19.38	70.93
5.	Cebuano	45.86	25.83	71.69
6.	Tagalog	46.00	28.70	74.70
7.	Maori	57.70	18.20	75.90
8.	Samoa	69.75	10.32	80.07
9.	Hawaiin	65.24	18.05	83.29
	Mean	53.40	19.75	73.16

	Standard (S)	9.80	6.69	5.85
	Coefficient of variation (V%)	18.35	33.87	8.02

Tab. 9
Euphony of the Bantu and some other languages of Africa

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Moore	41.53	29.37	70.90
2.	Wolof	41.38	29.69	71.07
3.	Tonga	46.16	25.92	72.08
4.	Fulde	44.38	27.86	72.24
5.	Luganda	46.99	25.37	72.36
6.	Kiniarwanda	48.10	24.62	72.72
7.	X'osa	48.83	24.22	73.05
8.	Tsewana	49.18	24.09	73.27
9.	Chichewa	47.80	25.93	73.73
10.	Zarma	45.93	28.15	74.08
11.	Lwo	48.83	25.89	74.72
12.	Bemba	49.06	26.26	75.32
13.	Hanga	48.18	27.57	75.75
14.	Swahili	49.85	26.44	76.29
	Mean	46.87	26.53	73.40
	Standard (S)	2.73	1.78	1.67
	Coefficient of variation (V%)	5.82	6.71	2.28

Tab.10
Euphony of the languages of the Paleo-Asiatic language family

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Itel'men	32.61	26.91	59.52
2. Eskimo (Naukan)	43.51	24.25	67.76
3. Eskomo (Imaklin)	44.41	23.92	68.33
4. Koriak	39.01	30.46	69.47
5. Chukot	40.22	32.62	72.84
Mean	39.95	27.43	67.58
Standard (S)	4.67	3.90	4.92
Coefficient of variation (V%)	11.69	14.22	7.28

Tab. 11
Euphony of the languages of Australian aboriginals

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Ngandi	43.60	33.24	76.84
2. Ngaanyatjarra	41.52	35.58	77.10

3. Nyangumada	47.30	33.50	80.80
4. Dyingili	47.13	34.14	81.27
5. Mangarayi	42.44	39.49	81.93
6. Nunggubuyu	50.66	34.48	85.14
Mean	45.44	35.07	80.51
Standard (S)	3.50	2.32	3.14
Coefficient of variation (V%)	7.70	6.60	3.90

Tab. 12
Euphony of the languages of the Afro-Asian language family

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Sokotrian	40.01	20.31	60.32
2. Arabic	39.47	25.17	64.64
3. Assyrian	42.29	25.15	67.44
4. Hebrew	43.90	23.58	67.48
5. Somali	45.28	24.03	69.31
6. Hausa	47.96	24.09	72.05
7. Neo-Aramaic	59.10	22.37	81.47
Mean	45.43	23.53	68.96
Standard (S)	6.71	1.51	6.63
Coefficient of variation (V%)	14.77	7.27	9.61

Tab. 13
Euphony of the languages of the Caucasian language family

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Adygian	41.33	12.74	54.07
2. Kabardian	45.07	15.55	60.62
3. Abhaz	40.29	20.82	61.11
4. Chechen	42.58	20.23	62.81
5. Avarian	44.83	20.29	65.12
6. Georgian	43.07	23.18	66.25
Mean	42.86	18.80	61.66
Standard (S)	1.89	3.87	4.32
Coefficient of variation (V%)	4.41	20.59	7.01

Tab. 14
Euphony of the languages of the Indic group of the Indo-European language family

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Gudjarati	40.70	24.44	65.14
2. Hindi	43.64	22.27	65.91
3. Bengali	42.42	23.58	66.00

4. Gypsy	43.61	24.60	68.21
5. Marathi	42.63	25.96	68.59
Mean	42.60	24.17	66.77
Standard (S)	1.20	1.36	1.53
Coefficient of variation (V%)	2.82	5.64	2.29

Tab. 15
Euphony of the languages of Iranian group of the Indo-European language family

№ Language	Vowels, %	Sonorant, %	Euphony, %
1. Tadjic	40.54	21.06	61.60
2. Dari (Afganistan)	41.37	20.91	62.28
3. Iranian	40.56	22.93	63.49
4. Pushtu (Pashto)	41.11	22.90	64.01
5. Osetian	41.35	22.91	64.26
6. Gilian	43.10	21.94	65.04
7. Talysh	45.14	19.99	65.13
8. Kurdish	38.41	27.38	65.79
Mean	41.45	22.50	63.95
Standard (S)	1.98	2.25	1.44
Coefficient of variation (V%)	4.78	10.01	2.25

Tab. 16
Euphony of the languages of Slavonic group of the Indo-European language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Belorussian	39.96	20.70	60.66
2.	Polish	40.86	21.10	61.96
3.	Czech	41.20	21.39	62.59
4.	Mecedonian	44.29	18.68	62.97
5.	Ukrainian	42.20	21.42	63.62
6.	Slovak	43.58	20.25	63.83
7.	Old Russian	44.57	19.44	64.01
8.	Russian	42.18	23.07	65.25
9.	Slovene	41.25	24.04	65.29
10.	Sorbian	39.90	27.12	67.02
11.	Bulgarian	48.72	19.54	68.26
12.	Serbo-Croatian	45.13	25.06	70.19
	Mean	42.82	21.82	64.64
	Standard (S)	2.56	2.53	2.74
	Coefficient of variation (V%)	5.98	11.59	4.24

Tab. 17
Euphony of the languages of the Baltic group of the Indo-European language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Lithuanian	42.02	19.38	61.40
2.	Latvian	44.63	19.48	64.11
	Mean	43.33	19.43	62.76
	Standard (S)	1.85	0.07	1.92
	Coefficient of variation (V%)	4.27	0.36	3.06

Tab. 18
Euphony of the languages of the Romance group of the Indo-European language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	French	43.31	24.06	67.37
2.	Portuguese	44.74	22.67	67.41
3.	Moldavian	44.82	23.63	68.45
4.	Spanish	49.40	19.35	68.75
5.	Italian	44.53	24.99	69.52
6.	Rumanian	45.20	24.71	69.91
	Mean	45.33	23.24	23.24
	Standard (S)	2.09	2.07	1.05
	Coefficient of variation (V%)	4.61	8.91	1.53

Tab. 19
Euphony of the languages of the Germanic group of the Indo-European language family

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	English	38.49	22.59	61.08
2.	Dutch	38.66	24.95	63.61
3.	German	38.72	25.18	63.90
4.	Swedish	38.60	26.60	65.20
5.	Danish	40.00	27.08	67.08
6.	Norwegian	44.70	23.10	67.80
	Mean	39.86	24.92	64.78
	Standard (S)	2.43	1.81	2.47
	Coefficient of variation (V%)	6.10	7.26	3.81

Tab. 20
Euphony of the languages of the Balkan Language Union

№	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Albanian	38.45	18.11	56.56
2.	Greek	46.24	20.71	66.95
3.	Bulgarian	48.72	19.54	68.46

4. Rumanian	47.95	20.77	68.72
5. Serbo-Croatian	45.13	25.06	70.19
Mean	45.30	20.84	66.18
Standard (S)	4.08	2.60	5.50
Coefficient of variation (V%)	9.01	12.46	8.31

Tab.21
Euphony of the Isolated languages

#	Language	Vowels, %	Sonorant, %	Euphony, %
1.	Albanian	38.45	18.11	56.56
2.	Nivhi	37.03	24.09	61.12
3.	Ket (Yug)	43.64	19.11	62.75
4.	Latin	41.39	23.77	65.16
5.	Japanese	48.14	17.48	65.62
6.	Greek	46.23	20.71	66.94
7.	Armenian	40.59	27.75	68.34
8.	Korean	46.27	22.77	69.04
9.	Basque	48.63	20.23	69.06
10.	Esperanto	45.88	25.47	71.35
11.	Yukaghir	38.38	33.53	71.91
12.	Old Japanese	51.06	23.11	74.17
13.	Ainu	49.18	25.74	74.92

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