

EXPERIMENT IN INTERLINGUAL TYPOLOGICAL  
EXAMINATION OF VOWELS

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Abstract

We showed certain possibilities of the realization of the known connections between sound quality and the function of the organs and their relations. Our typological comparison pointed out the role of certain articulatory features of the examined sounds in forming the phonetic peculiarities.

The purpose of the examination

In our analysis we examined sounds belonging to five types /„i,e,a,o,u“/ in German, Hungarian, Russian, and Polish languages /see Fig./. On comparing the articulatory features we want to give an answer for the question of how to inter-

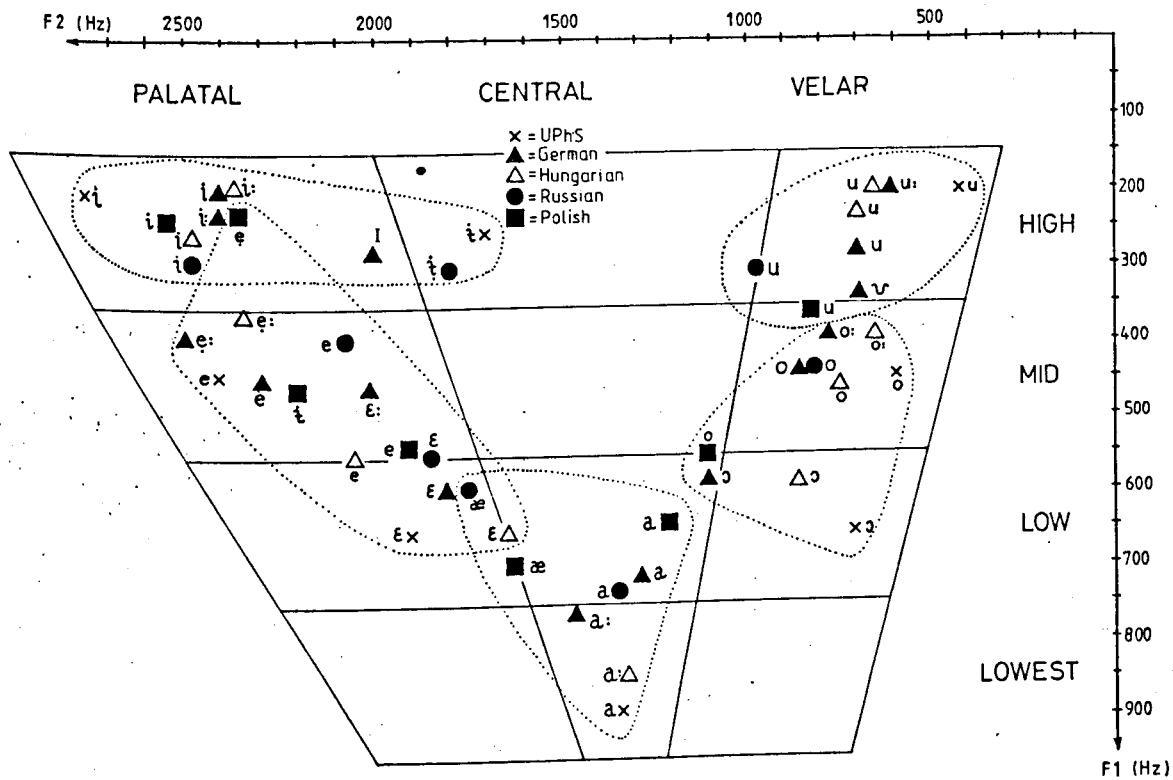


Fig. The analysed vowels according to the articulatory features and F1, F2 values

pret the more palatal, more open or more labial articulatory character of a sound. We also examined what articulatory processes result in the sounds of near acoustical features /8/.

#### The course of the examination

We examined the connections between the articulatory features and acoustic characteristics of the sounds on the basis of data obtained from dynamic spectrum analysis and the analysis of the cinelabiographic and cineradiographic recordings of sounds by computer /1/, /2/, /4/, /5/, /6/, /7/. All of this was made according to the features given in the Universal Phonetic Sound Standard - ergo according to the exact etalon - elaborated by Kálmán Bolla /3/. The analysis of the position of the articulatory organs and the zone relations of the supraglottal cavities was by cineradiographic examination.

If we compare the proportion of the velar /T3/ and palatal /T2/ zones of a sound to the proportion value of another similar sound we can point out the strengthening of the palatal character or the weakening of the velar character.

If we compare the order of the sounds formed in this way according to the place of articulation with the order supposed on the basis of the F2 values, the conclusion on the connection between the

articulatory features and acoustic characteristics, and on possible modifying influence can be drawn /Table 1./. The orders of two kinds of "e" type are different for example in Hungarian and Polish languages, almost the same in German, and the very same in Russian language. We can see on the Figure that the elements of the Hungarian and Polish "e" type are on different bond of tongue position, they scatter a lot.

P → V	GERMAN	HUNGARIAN	RUSSIAN	POLISH
F2	[i],[i],[i]	[i],[i]	[i],[i]	[i],[i]
T3/T2	[i],[i],[i]	[i],[i]	[i],[i]	[i],[i]
F2	[e],[e],[e],[e]	[e],[e],[e]	[e],[e]	[e],[e]
T3/T2	[e],[e],[e],[e]	[e],[e],[e]	[e],[e]	[e],[e]
F2	[v],[u],[u]	[u],[u]	[u]	[u]
T3/T2	[v],[u],[u]	[u],[u]	[u]	[u]
F2	[o],[o],[o]	[o],[o],[o]	[o]	[o]
T3/T2	[o],[o],[o]	[o],[o],[o]	[o]	[o]
F2	[a],[a]	[a]	[æ],[a]	[æ],[a]
T3/T2	[a],[a]	[a]	[a],[æ]	[æ],[a]

Table 1. The sound types according to the horizontal movement of the tongue

The other sound type also prove that in languages where the orders of two kinds according to the place of articulation are the same, the sounds are formed on almost the same height of the tongue, and the difference in the orders of two kinds is connecting with the difference of the height of the tongue. So there is a relationship in the same sound type between the F2 data and the place of articulation but it is valid only within the same height of the tongue.

We can see in the Fig. that the steep

ness of the straight line connecting the elements of the Hungarian "i" and Russian "a" has an opposite sign in comparison with the "i" and "a" types of other languages.

From the F1, F2 values we can come to the conclusion on the shape of the lips: smaller F1, F2 values refer to more labial character. Its realization can be characterized by proportion of the vertical and horizontal diameter of the shape of the lips / V/H /. The opposite sign change of F1, F2 values can be connected to opposite direction physiological processes.

If the angle between the jaws, that is the change of the distance of the upper and lower lips can be connected to the changes of the F1 value, then the change of the distance of the corners of the lips will have the contrary effect to this, and we can suppose that the F2 value has a connection with the change of the vertical diameter of the shape of the lips. On the basis of V/H values the change of the distance of the corners of the lips plays a dominant role in formation of the character of labialization.

The F1, F2 values of the Polish [ɛ] and [ɛ̃], the Russian [æ] sounds are close to the values of other sound-types. This phenomenon can be examined according to the Table 2.

On the basis of all this for example we can state that the Polish [ɛ̃] sound

is articulated by other tongue position as it could be expected on the basis of the F1, F2 values. Only the F1, F2 values of the [ɛ̃] sound and its surroundings are acoustically the same, the other

	ACOUSTIC FEATURES		ARTICULATION		ALL ACOUSTIC FEATURES
	F1, F2	WHOLE	TONGUE	WHOLE	
1.	+	+	+	+	+
2.	+	+	+	-	+
3.	+	+	-	-	+
4.	+	-	-	-	-
5.	+	+	-	+	+
6.	+	-	+	+	-
7.	+	-	-	+	-
8.	+	-	+	-	-

The comparison of the acoustic and articulatory features of two sounds (+ = similar, - = different)

Table 2.

different acoustic features are based on the articulative base constituted by not only the different tongue positions but other articulatory marks /e.g. the degree of lip rounding/.

Our methods of examination help the expressive and quick objective analysis of the lingual facts. These methods improve our knowledge of certain sounds not only by characteristics grantable by typological and interlingual comparisons, but they make it possible to elucidate the specific connection of articulatory features from new sides.

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