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THE EXPERIMENTAL RESEARCH OF QUALITATIVE CHARACTERISTICS OF LABIALISED VOWELS IN STANDARD LITHUANIAN

Summary

In natural language, sounds usually do not exist in isolation, they are included in larger units – syllables, words, phrases, sentences, and their specific realisation depends mostly on the influence of adjacent sounds. Language would be very easy to study if it was realized through separate allophones. We would then see clearly, where one sound ends and where another begins, but the sounds merged in the speech stream become not only difficult to distinguish, but also acquire the sound of another phonetic unit or completely new features. Traditionally, there are two variants of vowels usually recognized in phonetics: positional and combinational. Positional variants depend on accent. This feature has been extensively investigated in the Lithuanian language. Combinational variants of vowels is another phenomenon, which occurs due to the influence of adjacent sounds.

Although the term labialization is mentioned quite often in the works of Lithuanian linguists, so far little attention has been paid to detailed and systematic studies of Lithuanian standard language vowels influenced by labialization, usually only the most general features of labialization are described. Therefore, the aim of this paper is to describe labialized vowels and compare the main qualitative characteristics of labialized and isolated (zero context) vowels found by experimental research.

All long [ɑː, oː, uː, æː, eː, iː] and short [ɐ, ɔ, ʊ, ɪ, ɛ] vowels of the Lithuanian standard language were selected for the study. They were produced in zero context and C_pVC_p sequences by 2 native male speakers with flawless articulation. To achieve the aim, two types of experiments were carried out using words that are actually used in speech and artificially

constructed ones. The segmentation and analysis of the sounds was performed using free license sound processing and analysis software PRAAT. The allophones analysed in this study were divided into 3 parts and the meaning of formants in the beginning, the middle part and the end of the segment were calculated, i. e., 1/3 of the sound part. This was done to find out which part of the investigated allophone receives the strongest coarticulation influence. For the measurements of the isolative pronounced vowel, the average of the values forming the whole sound was taken, because this sound is not affected by the adjacent sounds, the dynamics of its formant values is quite even, the spectrum varies little. In order to describe better the qualitative ratios of the analysed allophones, the following acoustic parameters of the beginning, the middle part and the end of the segment articulation positions were calculated according to the first, second and third formant values (Hz): compactness (C), tonality (T), flatness (b), diffusivity (df) and tension (it). The relationships of the graphically compared vowel variants are represented in the psychoacoustic F_2'/F_1 space, in which the researched allophones are marked by circles of 1 bark size (z) in diameter, and the distances between them indicate the degree of difference in perceived quality: the farther the circles are from each other, the more qualitatively those sounds differ.

After a detailed study of the qualitative characteristics of labialized vowels of the Lithuanian standard language and their comparison with the data of isolated vowels, the following general tendencies were identified. Labialized allophones are most evidently and stably characterised by the data of the third formant F_3 – in all articulation positions, i. e., in the beginning, the middle part, and the end of the segment, they are characterised by lower-frequency F_3 values. Thus, it is considered that the most obvious signs of sound labialization in the spectrum are primarily related to the degradation of the third formant. The change in the values of the second formant F_2 of labialized vowels is also greatly pronounced and tendentious, but its changes are related to the pronunciation of vowels. The labialized allophones of back vowels [ɑː], [ɐ], [oː], [ɔ], [uː], [ʊ] of all the studied groups more often have higher frequency F_2 values, so they should be slightly more front articulation than pronounced in isolation. The corresponding variants of the front vowels [æː], [ɛ], [eː], [iː], [ɪ] have a

resonant F_2 in the lower frequency range, so they are likely to have a slightly more back articulation. The effect of labialization on the values of the first formant F_1 is not systematic. The evaluation of labialized allophone formant values has shown that consistent trends were found by analysing the values of compactness/diffusion, tonality, flatness and stress indices, but systematic differences were not recorded in all groups of vowels.

The analysis of the relationships of vowel variants in psychoacoustic space has shown that in many cases, the allophones pronounced in different positions are perceived as sounds of unequal quality.

Attention was drawn to the fact that no greater qualitative difference was observed between the words that are actually used in speech and artificially constructed ones – labialization has a very similar effect on their acoustic characteristics.

The strength of coarticulation influence on the quality characteristics of labialized vowels depends primarily on the length of the vowel. Long allophones are more likely to experience a stronger influence of adjacent consonants in the beginning or in the beginning and the end of the segment articulation positions. Short vowel variants experience a stronger effect of full-sound coarticulation because no more pronounced differences were found between the measured articulation positions – all allophonic phases receive a similar effect of adjacent consonants.

KEYWORDS: labialization; coarticulation; quality; allophone.

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