

Phonetic and phonological vowel reduction in Russian

Sylwester Jaworski (University of Szczecin)

One of the most characteristic features of stress-timed languages is the fact that unaccented vowels undergo obligatory reduction to schwa. In Russian the process appears to be more complex because the five-element vowel inventory found in accented syllables is reduced to a sub-system made up of [i, a, u] in immediately pre-tonic position, which is further reduced to [i, ə, u] in other pre-tonic and post-tonic positions (Kasatkin 2006, Kniازهv – Pozaritskaya 2005). It is claimed in the phonetic literature that the low vowel [a] that results from 1st degree reduction differs both qualitatively and quantitatively from [ə], which is the outcome of 2nd degree reduction. However, Barnes (2006) maintains that there is only one degree of phonological reduction in Russian which simplifies the [i, e, a, ɔ, u] system to the [i, a, u] subsystem and that the change of the low vowel to schwa is the result of phonetic vowel reduction that does not take place in certain phonological contexts, e.g. in hiatus and in phrase-final position.

The present paper reports the results of an empirical study that was designed to shed more light on the reduction process in Russian. In order to find out whether the acoustic characteristics of [a] vowels placed in immediately pre-tonic position differ substantially from those of [ə] found in other unaccented positions, four native speakers of standard Russian were asked to read a number of short meaningful sentences in slow, natural and fast speech. The F1 and F2 values of twenty [a] sounds found in immediately pre-tonic position as well as twenty [ə] sounds resulting from 2nd degree reduction were measured at the peak of F1. Vowels placed in palatalised environments were excluded from the experiment, and so were word-initial and word-final ones. The acoustic parameters of the twenty tokens of [a] were compared with those of [ə] by means of a T-test for independent samples, which is the usual procedure when one wants to determine whether two sets of data are statistically different.

The acoustic and statistical analyses have revealed that vowel reduction in Russian is speaker-specific. Two of the subjects apply only one degree of vowel reduction, as in their speech the differences between the acoustic parameters of the [a] and [ə] sounds did not reach the level of statistical significance ($p > .05$), whereas in the speech of the other participants there are, in fact, two degrees. The acoustic data strongly suggest that if a speaker applies one degree of vowel reduction, then the [i, e, a, ɔ, u] inventory is simplified to [i, ə, u] rather than [i, a, u] because there is a highly significant difference ($p < .001$) between the sounds found in immediately pre-tonic position and the [a] sounds placed in stressed syllables. It is worth emphasising that vowels undergoing 2nd degree reduction are considerably shorter than those found in immediately pre-tonic position. In the light of the data, duration appears to be the only phonetic indication of 2nd degree reduction.

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