

**The role of the tongue root in palatalization:
the softness distinction in Russian re-interpreted**
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Russian contrasts two series of consonants – consonants are either ‘soft’, i.e. secondarily palatalized, or ‘hard’, which is usually described as velarization. As such, traditionally it has been regarded as a contrast in feature [back] (SPE 1968, Halle 1995), or translated into the Clements & Hume model (Hume 1992, Clements & Hume 1995) as Coronal[-anterior] attached to the V-Place node. In this talk it is argued that the ‘soft’-‘hard’ distinction involves the feature [ATR] instead.

One argument comes from the phonetics and phonotactics of vowels. In Russian, only a subset of vowels may follow the palatalized consonants, namely phoneme /i/ and all ‘fronted’ allophones of other vowels (/e, u, o, a/), while the complementary set of vowels - including phoneme /u/ and neutral-context allophones of vowels - can follow the ‘hard’ consonants. /a/ after a soft consonant becomes – according to earlier descriptions – a front [æ]. However, back vowels /u, o/ do not become front, rather, they are relatively fronted (/o/) and/or raised (/u/). The front vowels after soft consonants are also fronted and/or relatively raised in comparison to the corresponding vowel allophones following hard consonants (cf. Avanesov 1975, Hamilton 1980 and references therein). All vowels occurring after a soft consonant show a relative advancement of the tongue root in comparison to the corresponding vowels articulated in the neutral context. Fig. 1. represents the tracings of the surface of the tongue in the mid-sagittal view taken during the production of stressed vowels in nonce words $t^jV_i t^j V_i t$ and $tV_i tV_i t$ (where the first and the second vowels are always the same). For the neutral context /e/, we used the nonce sequence /šešeš/ because the default pronunciation of the sequence /t+/e/ has to be palatalized. The figures are based on the ultrasound recordings from one speaker but all other 8 participants of the study show the same effect.

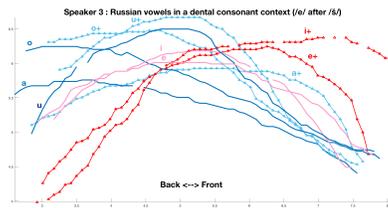


Fig. 1. Back vowels between /t^j/ - light blue,
back vowels between /t/ - dark blue,
front vowels between /t^j/ - red,
front vowels between /t/ or /š/ - pink.

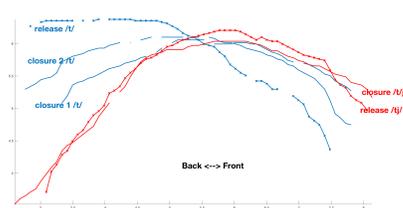


Fig. 2. Palatalized /t^j/ - red,
/t/- blue.

The constraint on the sequences with palatalized consonants cannot be expressed in terms of either [-back] – because back vowels do not always become front, nor [+high] – because not all resulting vowels are high. All vowels in the context of palatalized consonants are, however, [+ATR]. Since the allophony is triggered by palatalized consonants, we postulate that the feature is inherent to palatalized consonants. Additionally, new ultrasound studies confirm that palatalized consonants in Russian are indeed articulated with the tongue root advancement, as demonstrated in Fig. 2, where the tracings of the surface of the tongue during the articulation of the soft and hard dental are presented in the mid-sagittal view.

On the other pole of the contrast are velarized consonants. One interesting conclusion comes from the ultrasound study of Russian by Litvin (2014), who points out that ‘hard’ consonants are implemented differently depending on the place of articulation: sometimes as velarization, sometimes as uvularization, and sometimes a consonant may vary in its realization. Again, Litvin (2014) concludes that the common denominator for these varied articulations is the relative retraction of the tongue root. Thus, we suggest that the Russian contrast can be expressed as a contrast of the [ATR] feature.

External support comes from the studies on the mechanics of the tongue musculature. There is no muscle that can pull the tongue body up and forward in a palatal gesture. The gesture must originate in another part of the tongue and must be effected through passive forces such as volume preservation. In other words, because the tongue is a muscular hydrostat, advancement of the tongue root is a mechanically effective way to displace the body of the tongue upward and forward.

For Russian, the [ATR] analysis can provide a holistic account for the behavior of all vowels, unlike the traditional account in terms of tongue body features. Additionally, while phonological features do not have to correspond directly to articulatory properties, an articulatorily sound account is to be preferred over an abstract one as more explanatory.

We propose that the softness contrast may be interpreted in a similar way in other languages with a non-abstract (i.e. phonetic, not merely historical) palatalization. Specifically, similar effects can be observed for (1) Coronal Palatalization in Polish which produces a phonemic change of dentals to prepalatals, e.g. /t → t̪/, (2) surface palatalization in Polish, which produces an allophonic exceptionless secondary palatalization /t → tʲ/, and even (3) laminal-apical distinctions (in a SJQ Chatino variety). In all these cases the advancement of the tongue root is a characteristic of the palatalized (softer) series. We argue that the advancement of the tongue root is the driving force in the genesis of synchronic palatalization processes. Tongue root advancement can then be accompanied by the side-effect modification of the tongue body position – fronting and raising, and concomitant affrication. Once phonologized and/or morphologized, the accompanying gestures might take over the contrastive role and the ATR feature might then disappear from the synchronic representation giving rise to the huge variation in palatalization effects in different languages.

The presented analysis does not imply that features [high] and [back] can be eliminated but definitely invites the discussion of the articulatory grounding of the so-called articulatory feature model and re-evaluation of the role of the tongue root in phonological processes.

References

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