

Shortening of long high vowels in Hungarian: a perceptual loss?

Introduction

Hungarian is a language with distinctive vowel quantity in both stressed and unstressed syllables. However, a tendency for shortening the long high vowels /i: y: u:/ in unstressed syllables has been observed in recent decades, leading to a substantial loss of long high unstressed vowels in colloquial speech (Siptár & Törkenczy 2000). The neutralisation tendency was described as an ongoing sound change process by Magdics (1960). In her study, the duration of stressed high vowels (that are always word-initial in Hungarian) was compared to that of unstressed high vowels. It was shown that speakers below 30 years produced unstressed high vowels with durations close to or identical with that of short vowels, whereas speakers older than 70 did not. Vowels of speakers between 30 and 70 showed a gradual shortening and larger variation than in the young and the old group. The same tendency was found for the unstressed mid vowels /o: ø:/ in suffixes such as *-ból*, *-től*.

In today's colloquial Hungarian, the shortening tendency can also be observed for stressed high vowels, whereas the quantity distinction seems to remain stable for mid and low vowels. The low vowels [e: – ε] and [ɒ– a:] are realised with distinct vowel qualities and are often not regarded as real quantity pairs. Investigations such as Mády & Reichel (2007) show an interaction between the difference in quality (F1 and F2) and the stability of quantity distinction: long and short low vowels have fairly distinct qualities and can be distinguished by these features alone, whereas long and short high vowels overlap substantially with regard to their F1 and F2 and are thus categorised based on their durations. Long and short mid vowels have distinct F1 and F2 values, but this characteristics is only partly utilised when categorising them as long or short segments.

The above observations raise the question whether quantity neutralisation in Hungarian can be explained by a loss of perceptual distinction for quality differences in high and possibly mid vowels. This assumption was tested in a perception study.

Experiment

Twelve trisyllabic target words were chosen in which the target vowel /a a: o o: u u:/ was followed and preceded by an alveolar consonant, resulting in identical target syllables apart from the target vowel. Target words were embedded in short meaningful sentences with low semantic weight. Target vowels were cut from the carrier sentence, and their duration was manipulated using Praat's PSOLA algorithm, involving the mid 50% of the original vowel duration. Duration manipulation resulted in 13 vowel segments differing by 10 ms from each other (duration 1 indicating the shortest, 13 the longest manipulated segment). Long and short synthesised vowels had identical f_0 curves. The manipulated vowels, 156 in total, were embedded into the original sentences. Since target words were not minimal pairs (these are infrequent in Hungarian), the sentence before or after the target syllable was interrupted by the noise of a waterfall, resulting in homophonous sentences apart from the target vowel.

48 native Hungarian listeners participated in the experiment. They were divided into three age groups: 1: young (18 to 23 years, mean 20.3), 2: mid (25 to 45 years, mean 33.4), 3: old (50 to 75 years, mean 61.9). All groups included 16 participants and were balanced for gender. Participants were asked to listen to the sentence interrupted by noise and choose between the two original sentences. All target stimuli were repeated 5 times in a randomised order.

Analysis methods and results

Data for each vowel were fitted to a logistic regression model, using generalised linear mixed models with subject as a random factor. The inflection point at 50% of the S-shaped regression curve was calculated for all 12 vowels of each participant (illustrated in Fig. 1).

Analysis was based on the difference for equivalent short and long vowels of each participant (inflection point for short unstressed /u/ minus inflection point for long unstressed /u/ for participant 1, etc.). A larger difference indicated that the spectral characteristics of the long and short vowel had a larger impact on quantity categorisation, a smaller difference pointed to a smaller influence of vowel quality on quantity categorisation.

For the /a/-vowels inflection points fell outside of the range of 1 and 13, indicating that decisions cannot be modelled as a logistic regression curve. This means that quantity decisions were not substantially influenced by duration. Classification by quality alone was also observed for stressed /o/ in some speakers 2. The figure shows that old speakers were somewhat more sensible to vowel quality differences

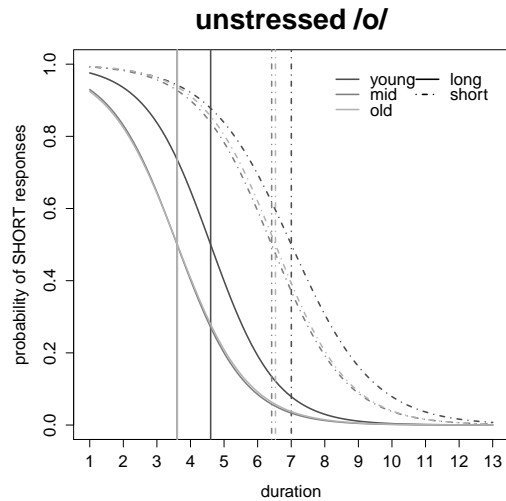


Figure 1: S-shaped regression curves. Vertical lines indicate inflection points.

in their quantity categorisations than the young and mid groups. A gradual increase of differences between short and long inflection points throughout the three groups was observed for unstressed /o/ and /u/. However, none of the differences reached significance level in an ANOVA.

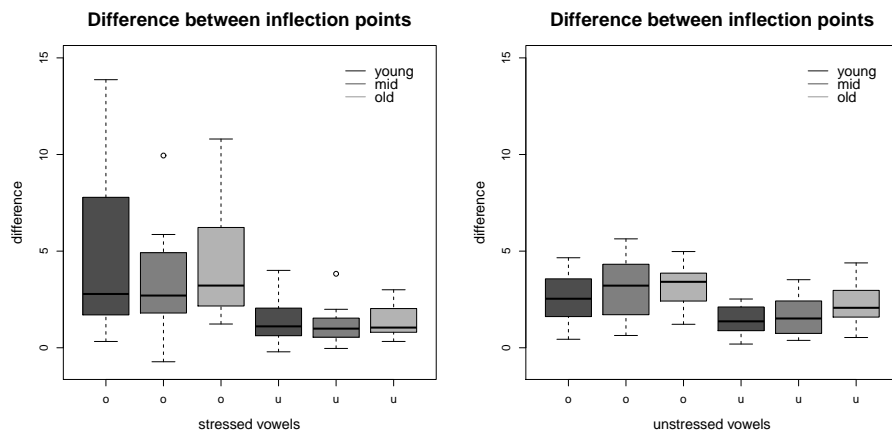


Figure 2: Difference between inflection points for equivalent short and long vowels for each subject.

Final remarks: The above results show that the sensibility for quality differences between short and long high and mid vowels is age-dependent in Hungarian. This perceptual loss might be responsible for the ongoing shortening process in the Hungarian vowel system.

References

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