

Phrase-final lengthening of phonemically short and long vowels in Hungarian spontaneous speech across ages

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Introduction

Phrase-final lengthening is a phenomenon that has been known in phonetics for several decades (e.g., Lindblom 1968). For definition, the last syllable of the word is lengthened in a phrase-final position, at a prosodic boundary or before a phrase-final pause resulting in longer duration than that of a segmentally identical phrase-medial syllable. Several factors are suggested that might trigger the lengthening of the vowels like subglottal pressure, decreasing articulation activity, linguistic, phonological, and higher-level factors, as well as syntactic structures, stress patterns, etc. (e.g., Den 2015). Lengthening might concern the vowels or the consonants of the phrase-final syllable, or the whole syllable (Dimitrova & Turk 2012). The phenomenon has been reported, on the basis of controlled experiments, to exist in various languages, irrespective of their typological and prosodic patterns, but also to show specific differences across languages (Cho 2016). Vowel quantity as a phonemic distinction was also shown to interact with phrase-final lengthening (Nakai et al. 2009). The questions arise whether Hungarian speakers regulate utterance-final lengthening to preserve the phonemically different quantity of vowels in spontaneous speech, and whether this regulation is dependent on age. In addition, word lengths differences might also affect the temporal patterns of phrase-final lengthening. Four hypotheses were formulated. (i) Phrase-final lengthening will preserve the phonemic quantity differences of the target vowels irrespective of the speakers' age, (ii) target vowels will not show durational differences in phrase-initial and phrase-medial positions in old speakers' speech, (iii) the number of syllables of the words will influence the durations of the target vowels occurring in phrase-final positions, and (iv) the length of words will have a greater effect on vowel durations as produced by old speakers than those of young speakers.

Methodology

Spontaneous narratives (more than 5 hours' material) of 10 young subjects (aged between 20 and 30) and 10 old ones (aged between 70 and 80) were randomly selected from the BEA Spontaneous Speech Database of Hungarian (Gósy 2012). Each group consisted of an equal number of females and males. A phonemic pair of short and long vowels ([ɔ, a:]) was selected as target vowels (they are, however, different in tongue height and lip rounding). More than 2,400

vowel tokens were identified in words with various numbers of syllables (from 2 to 6) occurring in phrase-initial, phrase-medial and phrase-final positions in the last syllables of the words. All syllables containing the target vowels were unaccented. Durations of the vowels were taken by measuring the interval between the onset and offset of the second formants of the vowels based on annotated files in Praat software (Boersma & Weenink 2012). A specific script was written for obtaining the values automatically. Data were normalized across speakers using the z-normalization method. Durations were analyzed according to (i) vowel quality, (ii) word length, (iii) word position in the phrase, and (iv) speakers' age. To test statistical significance, General Linear Mixed Model analyses were carried out to test the effects of the fixed factors 'position', 'vowel quality', 'word length', 'age' and their interactions on durations of the vowels (dependent factors). The confidence level was set at the conventional 95%.

Results

Both phonemically short and long vowels were significantly longer in phrase-final positions than in phrase-initial and phrase-medial positions in both age groups. Durations of vowels in phrase-medial positions were significantly shorter than those occurring in phrase-initial positions in young speakers' speech while there were no differences in their durations between the two positions in old speakers' speech (Fig. 1).

Phonemically long vowels were significantly longer than phonemically short vowels in all positions irrespective of age. Short vowels produced by old speakers in phrase-final positions were significantly longer than those produced by young speakers. The opposite tendency was found in the case of long vowels. Long vowels produced by old speakers in the same positions were significantly shorter than those produced by young speakers.

Word length had a significant effect on vowel durations that were the least variable in phrase-medial positions in both age groups. The largest ranges of the durations were found in vowels produced in phrase-final positions across various word lengths in both age groups. Vowel durations in words containing more than three syllables were significantly shorter in old speakers' speech than in young speakers' speech.

Conclusions

Our results confirm that utterance-final lengthening does exist in Hungarian spontaneous speech irrespective of age; they also exhibit the phenomenon that phonemic vowel quantity contrasts are preserved. The data supported our hypotheses. The strong distinction of short and long vowels also in phrase-final positions suggests that speakers avoid violating the phonemic patterns of the vowel system. The similar durations of

the target vowels in phrase-initial and phrase-medial positions as well as the decrease of durations along with the increase of word length in old speakers' speech is assumed to be the consequences of both their breathing and cognitive processing (Hooper–Cralidis 2009). Discussion of the results will concern the interrelations of vowels' phonemic quantity, their positions and the length of the words, appearing in part differently in young and old speakers' speech.

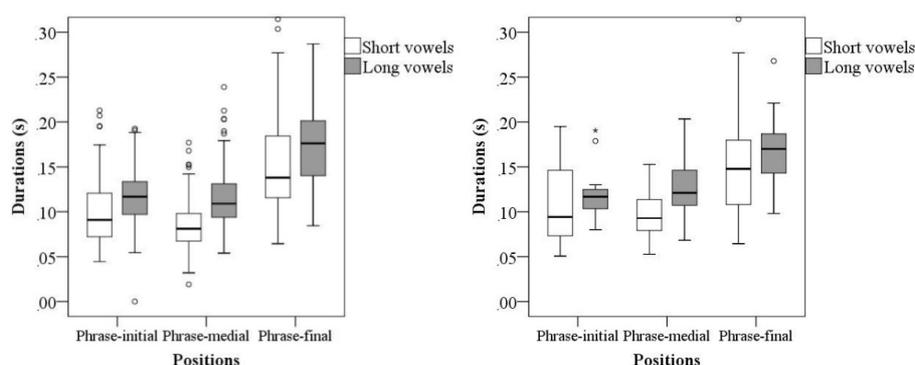


Figure 1: Durations of vowels in various phrase positions (left: young speakers, right: old speakers)

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