Heads you lose: prosodic structure and timing in Hungarian

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Prosodic structure influences speech segment duration. In English, for example, both heads and edges of words and higher-level prosodic constituents may be lengthened: stressed syllables are longer than unstressed syllables (e.g. Dauer, 1983); accented syllables are longer still, with additional lengthening in other syllables of the accented word (e.g. Turk & White, 1999); word-initial consonants are longer than word-medial consonants (e.g. Oller, 1973); phrase-final syllable rhymes are lengthened (e.g. Wightman, Shattuck-Hufnagel, Ostendorf & Price, 1992). Final lengthening in higher-level prosodic constituents is widespread in other languages as well, and possibly universal, but domain-head effects may vary between languages (Beckman, 1992). For example, Castilian Spanish shows minimal stress-based lengthening compared to English, and little or no evidence of accentual lengthening (Ortega-Llebaria & Prieto, 2007).

Hungarian presents an interesting perspective from the point of view of speech timing. Traditionally regarded as a “syllable-timed” language, it has a phonological length contrast for vowels (Siptár & Tőrkenczy, 2000). This suggests a constraint on prosodic timing effects: short vowels may not be lengthened, or long vowels shortened, so much as to cause perceptual ambiguity at the segmental level. Indeed, it has been claimed that intensity variation, not vowel lengthening, is the primary cue to lexical stress in Hungarian (Fónagy, 1958).

Lexical stress is, in theory, a wholly reliable cue to word boundaries in Hungarian, as it is placed word-initially with complete consistency, and this may render other cues to lexical structure superfluous. Some studies have suggested that there is an influence of lexical stress on segment duration, however, an inverse relationship between word length and stressed vowel duration (Meyer & Gombocz, 1909; Tarnóczy, 1965). Targets in these studies were uttered as isolated words, however, so the observed polysyllabic shortening could be due to the attenuation of utterance-final lengthening in the longer words. Indeed, there is evidence from a single-speaker study comparing whole-word durations in utterance-initial, medial and final positions that indicates considerable final lengthening for monosyllables (Olaszy, 2006). The amount of lengthening was attenuated according to word length, but still significant for penta-syllables; however, data are lacking on the distribution of final lengthening within the word.

We investigated three potential influences of prosodic structure on the duration of phonologically long and short word-initial stressed vowels:

- Presence or absence of pitch accent.
- Utterance position: medial vs final.
- Word length: monosyllabic, disyllabic, trisyllabic.

We constructed sentences containing target words in which vowel length, accent, word length and utterance position were systematically varied. We recorded ten native speakers of Hungarian from Budapest reading these sentences three times, and analysed variation in the duration of long and short vowels according to the other prosodic factors.

As shown in Figure 1, we found a large effect of utterance position, with both long and short vowels lengthened by about 40% in absolute-final syllables. There was an influence of phonological vowel length on the distribution of final lengthening: only long vowels were lengthened – by 23% – in utterance-penultimate syllables.
Figure 1: Mean vowel durations for short stressed vowels (left) and long stressed vowels (right) according to word length and utterance position. Error bars indicate ± one standard error. Significant differences between utterance-medial and utterance-final position are indicated ** (p < 0.01).

Lengthening of the stressed syllable in pitch-accented words appeared absent in Hungarian. Furthermore, as indicated by vowel durations in utterance-medial words (Figure 1), we did not find support for an inverse relationship between word length and vowel duration, suggesting that previous studies may have confounded the effects of word length and utterance position.

The overall picture in Hungarian prosodic timing thus provides some support for the idea that languages with a low durational marking of lexical stress tend not to manifest higher-level domain-head effects, in particular, accentual lengthening. Domain-edge effects, in contrast, may be universal, though the locus of final lengthening is here modulated by phonological vowel length. Further, the shortest utterance-medial long vowels (87 ms) were little longer than short vowels in absolute-final syllables (78 ms), suggesting that lengthening alone may be an insufficient perceptual cue to both phonological vowel length and utterance boundary location.

References


