Acoustic correlates of secondary stress in Estonian

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Introduction

Q: Which acoustic correlates distinguish secondary stress from primary and unstress?

H: Secondary stressed feet display the same durational ratios as primary stressed feet.

- Phonologically, secondary stress is weaker than primary stress but stronger than unstress
- Phonetically, secondary stress rather elusive in many languages (e.g. Brazilian Portuguese, Hungarian, Polish, English)

In Estonian:
- Primary stress is fixed on the first syllable
- Secondary stresses occur on every second or third syllable
- The strongest correlate of stress is vowel duration.

Materials

- 20 five-syllable words and 20 six-syllable words made up of CV syllables with a short vowel
- Placed utterance-medially in an accented position in carrier sentences
- 6 speakers (aged 20-24)
- In total 216 words (1189 CV syllables) analysed
- Primary and Secondary stress and Unstress identified by 2 listeners

Analysis

The following acoustic parameters analysed (Praat, R):
- Duration of the syllable-initial Consonant and the Vowel
- F0 mean, SD and F0 slope in V
- Mean intensity, spectral balance and spectral emphasis in V

Results

- The consonant is longer in the Primary stressed syllable i.e. word-initially
- Average F0 shows general declination
- The F0 peak is in the end of Pri; there is no second peak in Sec or Use
- SD highest in Upri where most of the F0 fall takes place

Conclusions

- None of the observed measures distinguish secondary stressed syllables from unstressed (except the one following the primary stress that has a special status in Estonian)
- Contrary to our hypothesis, the secondary stressed foot did not display the same durational relation between the stressed and unstressed syllable as the primary stressed foot

In sum

- Secondary stressed syllables are not acoustically different from the surrounding unstressed syllables.
- The primary stressed syllable and the following unstressed syllable are distinctive from all other syllables.

Intrinsic effects?

The distribution of vowels in each stress condition shows a fairly good balance.