Secondary stress, often equalised with rhythmic stress, is a highly contentious phenomenon in many languages from both a phonetic and phonological perspective (Hayes 1981, Arvaniti 1992, Bethin 1998, Hualde and Nadeu 2014). Regarding Polish, traditional accounts have not provided systematic and robust evidence for secondary stress (S2) in the acoustic, perceptual or articulatory domain (Dogil 1999, Steffen-Batogowa, 2000). Recently, Newlin-Łukowicz (2012) postulated that S2 in Polish, phonologically located on the first syllable, might be an artefact of pitch and intensity declination in words longer than three syllables (but see Łukaszewicz, 2015 and Hamlaoui et al. 2015).

To shed further light on the issue, we study the interrelationships between word and sentence stress, as well as phrase boundary. We focus on the imprint of these prosodic structures on several acoustic prominence parameters in a production study with 25 Polish native speakers. We designed a set of 4-5 syllable long word stimuli with CV target syllable forms containing −/+ voice stop onsets. The syllables were differentiated between lexical stress positions: primary (S1) (tuliPAny), secondary (S2) (papieROsy) and unstressed (kopaLINy). The words were tested under −/+ focus condition and in phrase-medial and final positions, embedded in sentences in a simulated question-answer task (Ntoken=2222).

The following acoustic parameters were extracted: duration, pitch, intensity and spectral emphasis. Analysis by linear mixed models showed that S1 robustly affected vocalic duration and spectral emphasis. $f_0$ encoded prominence at the sentence level. Both S1 and S2 significantly affected overall syllable duration, relative to unstressed syllables, also out of focus. The accumulated, syllable lengthening import came from vowels for S1 and from onsets for S2.

Following up on Malisz et al. (2015), we discuss the above results and further investigate the co-variation of S2 and initial word boundary. We analyse data where fricative onsets are included in the target word set with the aim to generalise over various types of consonants and benefit from a more precise segmentation of fricative noise in word-initial syllable onsets. We also add the same syllable forms in 3-syllable long target words in which S2 is not predicted to occur in order to separate the effects of word boundary and S2. We also subtract the linear trend in $f_0$ in the target words (Reichel and Mády, 2014) to compare the effect of prominence on acoustic parameters when declination is removed.
References: