

## Regional differences in the peak alignment of non-contrastive nuclear accents: evidence from German and Swiss speakers using Functional Linear Mixed Models

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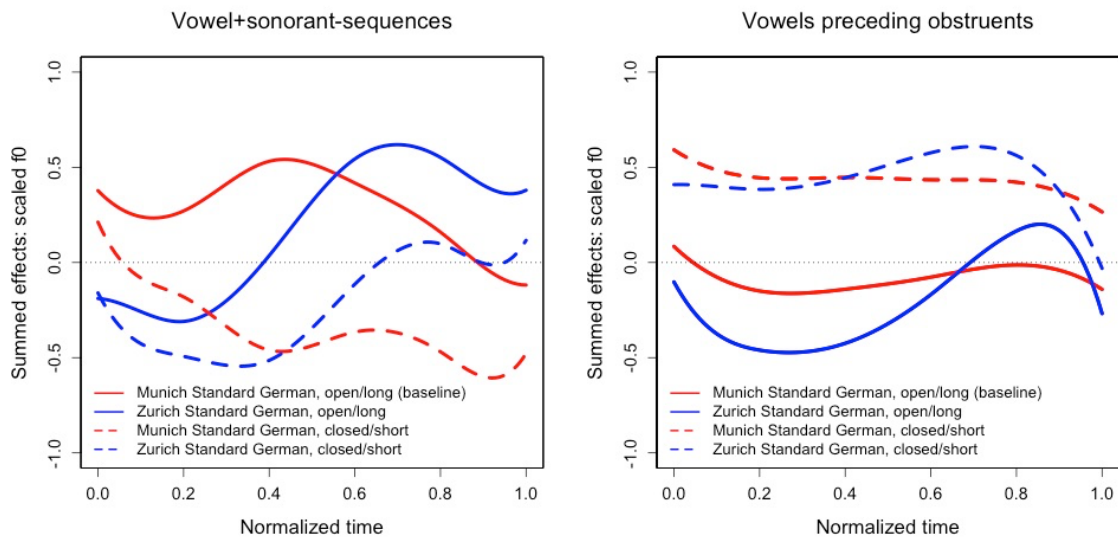
While southern standard German (SG) speakers align  $f_0$  peaks (H) of rising pitch accents later than northern SG speakers in non-contrastive prenuclear accents [1;2], no such regional differences emerged for contrastive accents, regardless of their phrasal position [3;4]. Our first goal was thus to investigate potential regional differences in non-contrastive nuclear accents between speakers from Munich (MSG) and Zurich (ZSG) when speaking SG. We predicted that ZSG speakers align H later than MSG speakers (H1) given the finding of more rising accents in Swiss than in German newsreaders [5]. We further predicted a delayed H alignment in closed syllables with short vowels compared to open syllables with long vowels (H2) based on [4] and in sonorant vs. obstruent tokens (H3) as reported in [6].

We obtained acoustic recordings of disyllabic trochees (e.g., *Höhle-Hölle*, *Bieter-bitter*) from 12 MSG (6 females) and 10 ZSG (5 females) younger speakers. Two functional linear mixed models [7;8;9] were fitted for a total of 1,540 (22 speakers\*14 words\*5 repetitions) possible  $f_0$  trajectories, either over vowel+sonorant-sequences (V+S, e.g., /ø:1/-/œl/) or vowels preceding obstruents (VbO, e.g., /i:/-/l/). *Variety*, *Syllable structure*, and their interaction were included as covariates, *Speaker* and *Item* as crossed random effects. ZSG speakers aligned H significantly later in V+S than MSG speakers (Fig. 1, left). This between-group difference supports H1 and suggests that regional alignment differences only emerge in non-contrastive accents, regardless of phrasal position. In VbO, however, ZSG speakers showed more dynamic  $f_0$  movements than MSG speakers instead of a delayed peak (Fig. 1, right). Within-group differences only emerged for ZSG speakers (cf. Fig. 1, blue lines): They aligned  $f_0$  peaks with the vowel in closed VbO and all open syllables but with the sonorant in closed V+S syllables. This partly supports H2 and H3. The high level tone in closed VbO syllables may be indicative of truncation due to greater right-sided time pressure [10].

### Keywords

Standard German varieties, regional differences, intonation, peak alignment, non-contrastive nuclear accents, FLMM

## Figures



**Figure 1:** Summed effect curves for V+S (left) and VbO (right), calculated by adding the effect curves to the reference mean (baseline). Speaker-scaled  $f_0$  values (z-scores) were calculated across voiced frames and mapped on a 0 to 1 time interval. Time points with missing  $f_0$  values and outliers were removed, resulting in 427 V+S and 1,045 VbO  $f_0$  contours (average data points per curve: V+S: 28.83; VbO: 15.20).

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