

## Extending the articulatory model of tone: the case of Valjevo Serbian

Robin Karlin, *Rutgers University*—robin.karlin@rutgers.edu

Serbian (srp) is a pitch-accent language with two pitch accent melodies: “falling”, where stress is on the same syllable as the lexical H, and “rising”, where stress is one syllable to the left of the lexical H (Inkelas and Zec, 1988). In many dialects, the F0 peaks of rising accents phonetically occur on the immediately post-tonic syllable; however, in Valjevo Serbian, they occur early, often retracted to the tonic syllable (Zec and Zsiga, 2018). In this study, I show that the timing of the F0 peak in Valjevo Serbian rising accents is affected by the syllable onset of the post-tonic syllable, and thus that the phonetic retraction of the H is not indicative of a phonological shift. I also propose an extension of the gestural model of tone to account for these early peaks.

Five (4F, 1M) native speakers of Valjevo Serbian produced 150 frame sentences in random order with a target word in focus. Target words were formed using a real word (e.g. *mrāmora* ‘marble.GEN’) and varying a syllable onset to create five rhyming words (*rāmora*, *lāmora*, *māmora*, *mrāmora*, *mlāmora*). There were three loci of onset variation: 1. DualLocus, where the varied syllable phonologically bears stress and H (falling: *mrāmora* /'mra<sub>H</sub>mora/); 2. HLocus, where the varied syllable bears only H (rising: *òmladinu* /'o.mla<sub>H</sub>dinu/); and 3. StressLocus, where the varied syllable bears only stress (rising: *mràvinjak* /'mra.vi<sub>H</sub>ɲak/).

The varied onsets have distinct durations (OnsDur) in all word types, /r/ < /l/ < /m/ < /mr/ < /ml/ (all  $p < 0.0001$ ). A linear mixed effects model shows a positive effect of OnsDur on the location of the F0 peak relative to the acoustic left edge of the phonologically H syllable (PeakDelay) ( $\chi^2(1) = 188.69$ ,  $p < 0.0001$ ) in DualLocus and HLocus words only: peaks occur later with longer onsets ( $\beta = 1,034$  ms, SE = 68.1 ms; see panels 1 and 2 of Figure 1). There is no similar effect of OnsDur for StressLocus words: the effect is fairly small and negative ( $\beta = -240.2$  ms, SE = 62.2 ms), i.e., PeakDelay is slightly smaller when the stressed syllable onset is longer (see panel 3 of Figure 1). Thus, DualLocus and HLocus words pattern together, while StressLocus is distinct. This suggests that, despite phonetic retraction of the peak, the H is associated to and receives timing information from the post-tonic syllable in rising accents.

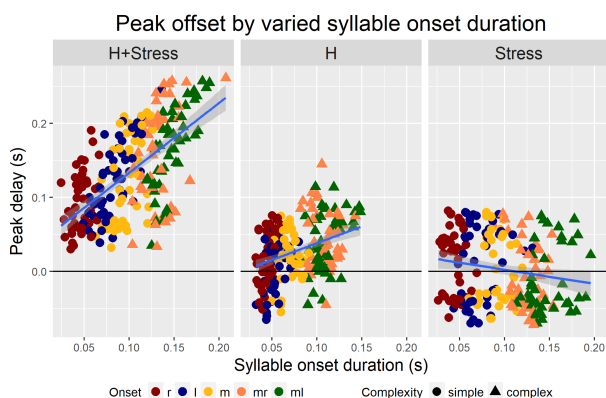


Figure 1: Scatter plots of PeakDelay

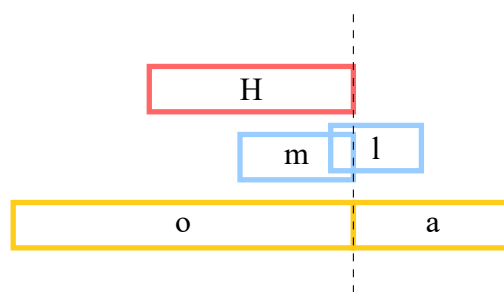


Figure 2: Gestural score of Valjevo /'o.mla<sub>H</sub>/

I propose a gestural model where the H gesture *target* (peak) in rising accents is coordinated with the c-center of the post-tonic syllable onset (Figure 2). In this configuration, the phonological association is derived from the presence of the coordinative relationship, and the peak (H target) occurs early relative to the TBU. This proposal adds to the possible coordinative structures hypothesized for tone: previous models (Gao, 2008; Karlin, 2014) show only tone gesture *onsets* coordinated as an additional C-like gesture in a c-center structure, producing relatively late peaks.