Using Psychoacoustic Roughness to measure creakiness in Burmese

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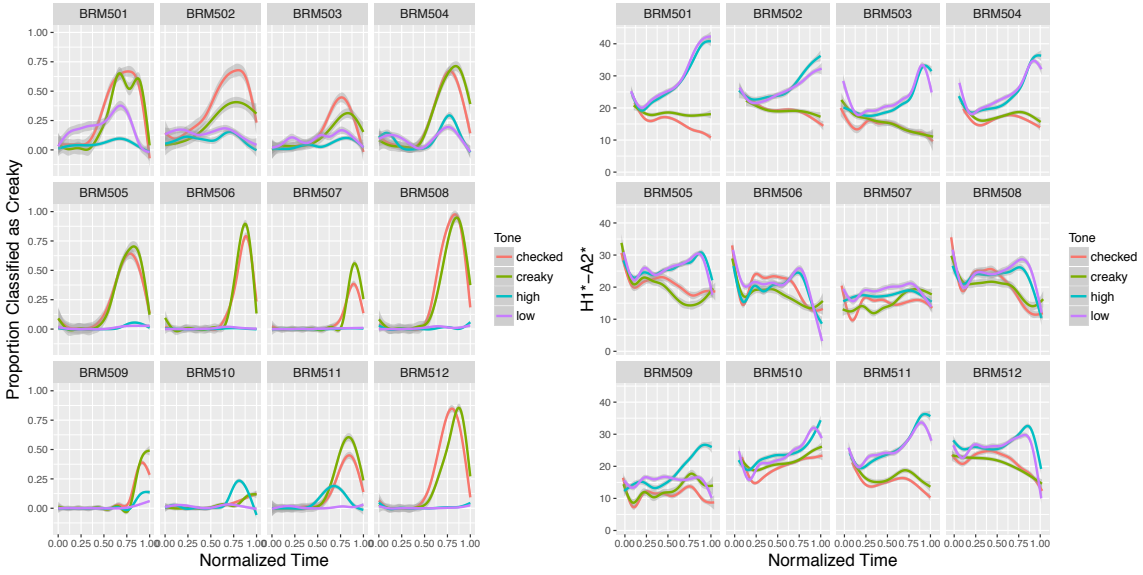
Introduction: Many different measures of spectral tilt are commonly used to identify creaky phonation partly because different types of creakiness have different acoustic effects (Keating et al. 2015). On the other hand, psychoacoustic roughness relates to properties of perception, making it suitable in identifying phonologically contrastive creakiness. Recent findings in Zhuang (Perkins et al. 2017) and White Hmong (Villegas et al. 2017) have shown roughness can successfully identify creaky phonation. Here, roughness is compared with conventional spectral tilt measures in their ability to predict creaky tones in Burmese.
Methods: Recordings were made from 12 native Burmese speakers (6 males) in Yangon. 78 monosyllabic words were used as stimuli, spoken in isolation. Stimuli were balanced for tone, coda type and vowel quality. Normalized spectral tilt (H1*–H2*, H1*–A1*, H1*–A2*, H1–A3*) was measured every 10 ms using VoiceSauce (Shue et al. 2011). Roughness was extracted every 10 ms using a Matlab script.
Results: The roughness algorithm identified late creaky phonation in creaky and checked tones in all but one speaker, as in Gruber (2011). Results are shown below for binary roughness classification below on the left (0 'not creaky' vs. 1 'creaky').



On the other hand, spectral tilt measurements (above right) failed to identify this difference in approximately half the speakers. Male speakers (BRM501, 502, 503, 504, 510, 511) had significantly lower H1*–A2* for creaky and checked tone, indicating creakiness. However, this same difference was not as apparent among the six female speakers. Roughness identifies creaky phonation more consistently and to a larger degree than spectral tilt in Burmese.

References:

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