

Misinterpretation of tone as stress: Eastern Armenian

Introduction Descriptions of Modern Eastern Armenian agree that it has final stress, except when the final syllable contains the lowest sonority vowel – schwa (see (1) – Dum-Tragut 2009, Hulst 1999, Khachatryan 1988, Vaux 1998). However, I provide evidence from an acoustic analysis that – surprisingly – there is *no* distinctive phonetic realization of foot heads. In other words, Armenian has no phonetic stress, and no phonetic realization of foot heads. Instead, it has a consistent word-final LH tone contour, which I argue has been misinterpreted as stress, so leading to mischaracterization of the metrical structure of the language.

Methodology This production experiment involved a native, non-heritage Eastern Armenian speaker who read aloud a number of disyllabic CVCVC words in two frame sentences which differed in whether the target was focused. Duration (normalized for speech rate), intensity, F0, and quality (F1/F2) were measured for each target vowel using Praat (Boersma & Weenink 2015) and VoiceSauce (Shue et al 2011); these properties are commonly influenced by stress, either singly or together. Results were evaluated using standard statistical models (R Core Team 2015).

Results Three types of non-focused target words were examined (acute symbol marks *predicted* stress location; V = full vowel): (1) Ca₁C[́]V₂C, (2) CVCá₂C, and (3) C[́]a₃C₃C. If there is an acoustic correlate to the predicted stress pattern, then stressed [a₂] should be similar to [a₃], but different from [a₁] in (1), modulo other effects (e.g. position in the word).

- Duration is the same for all three target vowels.
 - Mean [a₁] = 90 ms, [a₂] = 94 ms, [a₃] = 95 ms
 - T-test [a₁]/[a₂], p = 0.28; [a₂]/[a₃], p = 0.89; [a₁]/[a₃], p = 0.29
- Intensity is significantly higher in [a₃] than [a₁], but similar in [a₁] and [a₂].
 - Mean [a₁] = 81.7 dB, [a₂] = 82 dB, [a₃] = 83.6 dB
 - T-test [a₁]/[a₂], p = 0.63; [a₂]/[a₃], p = 0.07, [a₁]/[a₃], p = 0.02
- F0 exhibits an LH tone contour regardless of vowel quality.
 - Mean [a₁] = 222 Hz, [a₂] = 273 Hz, [a₃] = 235 Hz
 - T-test [a₁]/[a₂], p < 0.01; [a₂]/[a₃], p < 0.01, [a₁]/[a₃], p < 0.01
- F1 is significantly higher in [a₁] and [a₃] than in [a₂]. F1 is similar in [a₁] and [a₃].
 - Mean [a₁] = 895 Hz, [a₂] = 835 Hz, [a₃] = 895 Hz
 - T-test [a₁]/[a₂], p < 0.01; [a₂]/[a₃], p < 0.01, [a₁]/[a₃], p = 0.99.

In summary, none of these acoustic parameters correlate with descriptive accounts of Armenian stress.

Discussion The results can be explained by positing a penultimate L tone followed by a word-final H tone in the subject's phonological system. This final LH contour occurs regardless of the quality of the vowels. There is no phonetic evidence for the position of metrical heads. While vowel quality does differ, it is not a relevant cue for stress because putatively stressed [a₂] in CVCáC is *more centralized* than putatively unstressed [a₁] in CaCVC, contrary to expectations, and the variation can be explained by the influence of consonantal environment. While the intensity results are complex, the fact that putatively unstressed [a₁] has the same intensity as putatively stressed [a₂] indicates that it is not a cue for stress.

Since there is no phonetic evidence for stress, I examine phonological evidence for the position of metrical heads, such as vowel reduction. I conclude that there is no strong evidence for metrical structure.

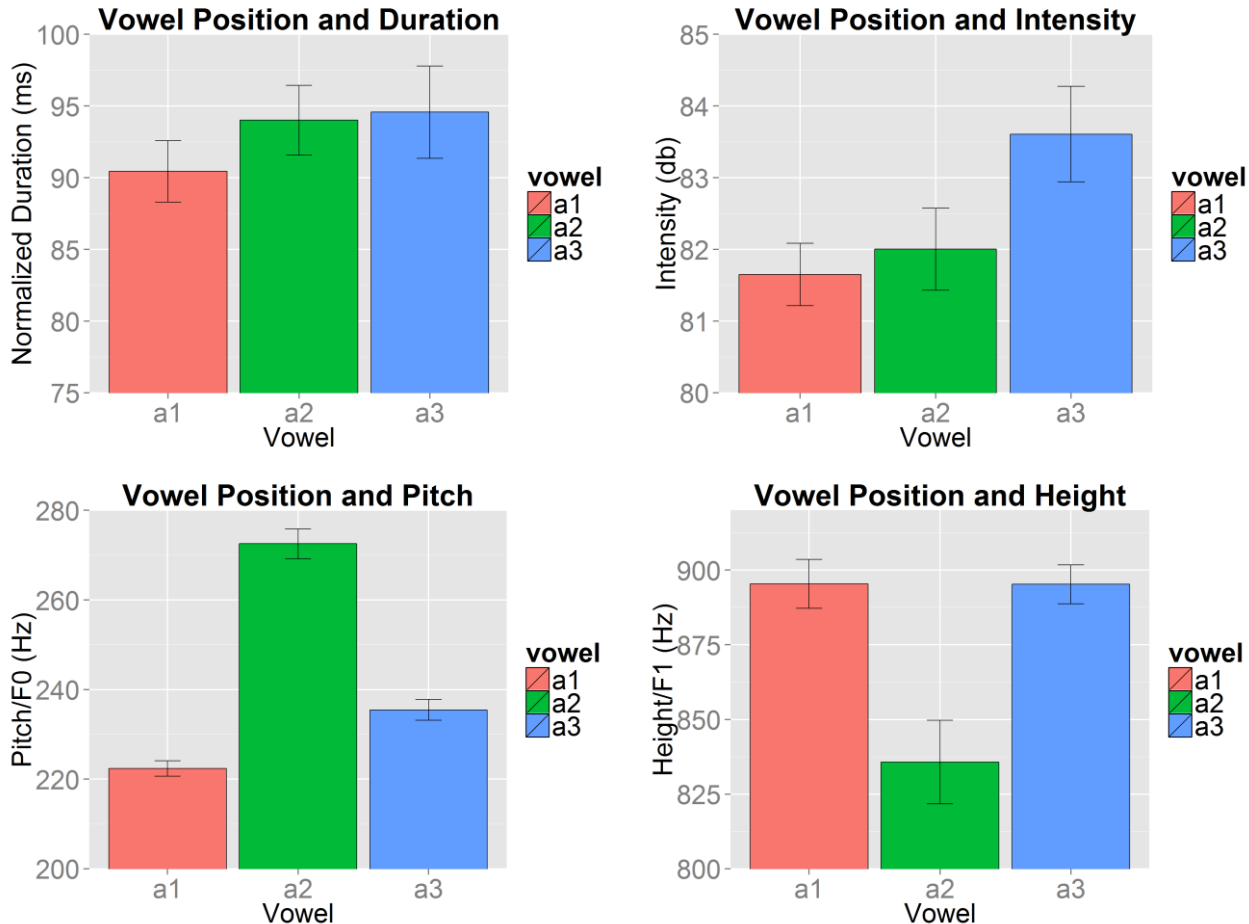
Finally, I argue that Armenian has been *described* as having a sonority-driven final stress system because there are none of the correlates of stress that English speakers would expect, leading them to focus on incidental acoustic properties, agreeing exactly with Dobrovolsky's (1999) findings for Chuvash.

For phonological theory, this study casts doubt on impressionistic reports of stress, and indicates that it is possible that some stress descriptions are really tonal or pitch accent systems (see e.g. Gordon 2014).

(1) Examples of stress retraction from schwa

[lez.va.ba.nu.'tʰjun]	linguistics	['ka.tʰ-ə]	the milk
[ka.'tu-s]	my cat	['bar.tʰsər]	high
[ha.'tuk]	specific	['pe.t-ət]	your boss
		['ʃu.n-əs]	my dog

(2) Bar charts for all four acoustic parameters, including standard errors



Selected References

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