**Pitch and vowel duration make schwa invisible to Passamaquoddy stress**

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**Schwa invisibility.** Passamaquoddy-Maliseet (Eastern Algonquian; Maine & New Brunswick) is well-known for having reduced vowels, generally phonetically realized as schwa, that can be invisible to the stress system. Stress is assigned in strictly alternating fashion, beginning on the penultimate syllable and counting from right to left (1), as well as being assigned to the sole syllable of monosyllables. Schwa can cause stress to shift within a word, both off of itself (2a-c) and off of its immediate neighbours (2d), causing it to behave as if it is invisible to stress (LeSourd, 1988, 1993; Hagstrom, 1995).

(1)

| | *Pattern* | *Example* | *Gloss* |
|---|---|---|---|
| a. | *σ́σ* | .wá.sis. | 'child' (LS93,75) |
| b. | *σσ́σ* | .le.wés.tu. | 's/he speaks' (LS93,75) |
| c. | *σ́σσ́σ* | .wí.ke.wés.tu. | 's/he likes to talk' (LS93,75) |
| d. | *σσ́σσ́σ* | .seh.tá.je.wés.tu. | 's/he speaks while walking backwards' (LS93,75) |

(2)

| | *Pattern* | *Expected* | *Example* | *Gloss* |
|---|---|---|---|---|
| a. | *σσ́* | **σ́σ* | .pə.nápsk$^{w}$. | 'rock' (LS93,61) |
| b. | *σ́σσ* | **σσ́σ* | .sú.kə.lan | 'it pours (rain)' (LS93,81) |
| c. | *σσ́σσ* | **σ́σσ́σ* | .pe.té.kə.pu | 's/he comes to be located here' (LS93,81) |
| d. | *σ́σσσ́σ* | **σσ́σσ́σ* | .ní.se.kə.pí.sit | 'ghost (antiquated)' (LS93,90) |

Certain environments prevent schwa from behaving in this invisible manner, such as being in a word-final syllable, being adjacent to a consonant cluster, and being the second member of a sequence of schwas, among others (LeSourd, 1988, 1993; Hagstrom, 1995). In these words, schwa is visible to the stress system and can bear stress or can head the lone syllable between stresses.

**Analysis.** While previous analyses have assumed that this invisibility is due to a structural deficiency, such as being unlinked to an autosegmental timing slot (LeSourd, 1988, 1993) or a syllable node (Hagstrom, 1995), I propose that schwa only appears invisible as a result of the interaction between two phonetic properties of the language. First, stress is cued by the alternation of high and low pitch (LeSourd, 1988), interpreted here as L*+H. The low tone is aligned to the onset of the stressed syllable by L-Anchor, and the high tone is aligned to the offset of this same syllable by H-Anchor. Figure 1 illustrates these requirements for *múlamúlal* 's/he puts him/her in deep' (PMDP). Second, a minimum syllable duration is required to sufficiently separate tones, encoded as T-Distance. Schwa is too short to simultaneously satisfy all three high-ranking constraints, either under stress (3a) or as a buffer between stresses (3b), so stress must shift off of schwa and introduce a lapse (3e).

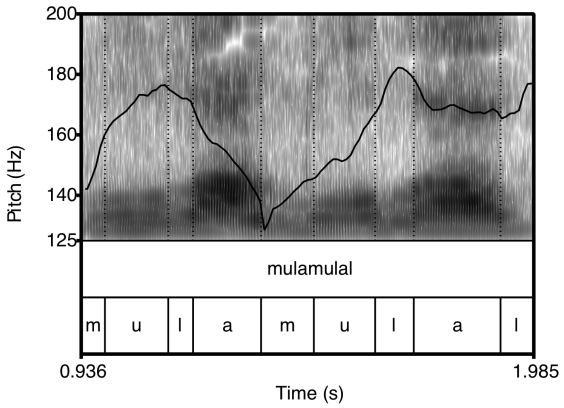


Figure 1: Alignment of pitch and segments

(3)

| /kisəlukemu/ | L-Anchor | H-Anchor | T-Distance | *Lapse |
|---|---|---|---|---|
| a. L*H L* H<br>ki sə lu ké mu | | | *! | |
| b. L* HL* H<br>kí sə lú ke mu | | | *! | * |
| c. L*H L* H<br>ki sə lu ké mu | *! | | | |
| d. L* H L* H<br>ki sə lu ké mu | | *! | | |
| ☞ e. L* H L* H<br>kí sə lu ké mu | | | | * |

This predicts that if schwa is lengthened sufficiently, it will no longer cause tonal crowding of the pitch accent. In these cases the schwa will not behave as if it is invisible to stress – this is what accounts for the data where schwa is obligatorily visible to the stress system. Under this account, the realization of stress in Passamaquoddy-Maliseet is directly related to schwa duration and whether it behaves as if it is invisible. Accounts that make use of structural deficiencies must stipulate why schwa can sometimes have this aberrant behaviour and sometimes not.

**Phonetic studies**. Three phonetic studies of recordings from the Passamaquoddy-Maliseet Dictionary Project (PMDP) are presented to provide evidence for the analysis. *Study I* shows that stress is cued by a rise in pitch, already exemplified in Figure 1. *Study II* shows that schwa causes a shift in this pitch rise both when it would be predicted to receive stress under default stress assignment and when it would be in the sole syllable between stresses. This study will also establish that it is substantially shorter than all other vowels, as shown by the lighter bar for *o* in Figure (2). *Study III* shows that schwas in environments where they have been claimed to count for stress placement are lengthened, indicated by the darker bar for *o* in Figure (2). This study will also show that pitch rises return to their expected positions under default stress assignment when schwas are lengthened.

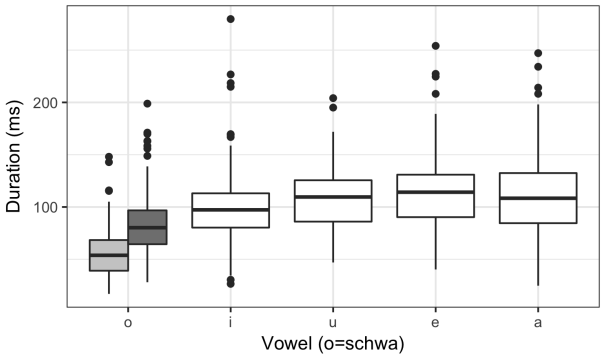


Figure 2: Duration data from Studies II & III

**Selected references.** Hagstrom, Paul (1995). *When a Passamaquoddy unstressable /ə/, that's a mora.* Ms., MIT ❖ Language Keepers & Passamaquoddy-Maliseet Dictionary Project (2016). *Passamaquoddy-Maliseet language portal* `www.pmportal.org` ❖ LeSourd, Philip S. (1988) *Accent and syllable structure in Passamaquoddy.* Ph.D. Diss., MIT. Published ver. (1993), Taylor & Francis.