

## 1. Introduction

**Akuzipik** is an Indigenous Yupik language spoken mainly on St. Lawrence Island, Alaska

- Endangered: 500-1000 speakers, most of whom are English-Akuzipik bilinguals [1, 2]
- Inventory: 7 vowels, 32 consonants [3]
  - Stops: voiceless unaspirated

### Research goal

Investigate the acoustic properties of Akuzipik stops by looking at VOT/release duration by word position and place of articulation

## 2. Materials and methods

### Multi-purpose data collection

Words chosen from Akuzipik dictionary [4]

### Participants

Two native speakers: M (~45y), F (~40y)

### Materials

- 431 stop occurrences among 277 unique words
- 2 repetitions per word per speaker

Positions #CV, VCV, VC#

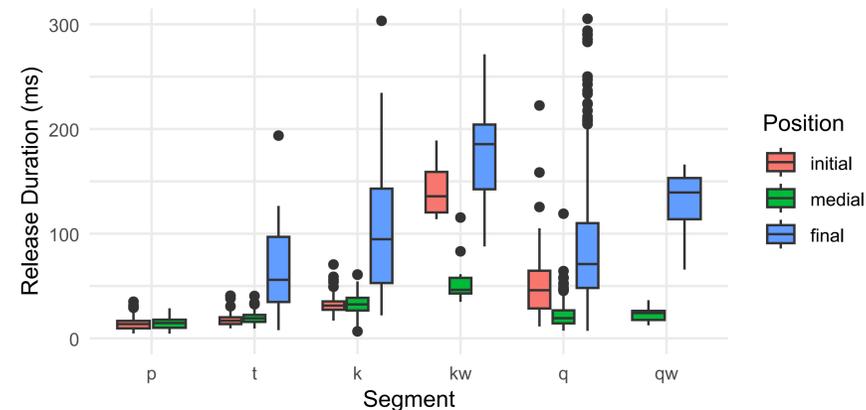
Stops ⟨p t k kw q qw⟩ [p t k k<sup>w</sup> q q<sup>w</sup>]

Vowels ⟨a aa e i ii u uu⟩ [a a: ə i i: u u:]

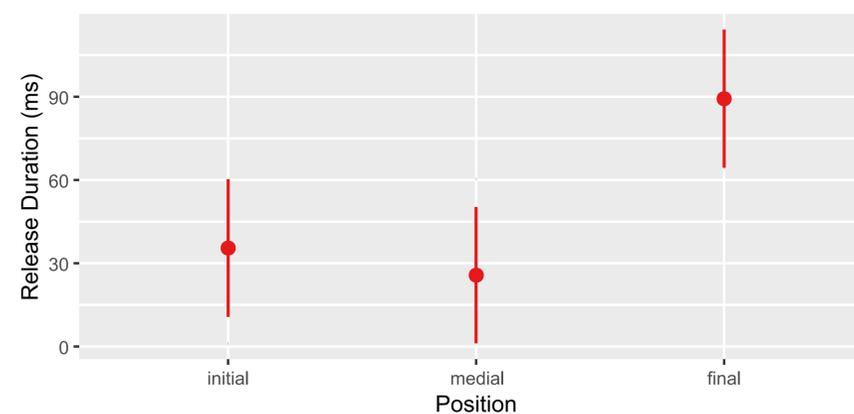
### Methods

- Audio data collected on St. Lawrence Island, AK using a Zoom H4e handheld recorder
- Environment, closure, and release manually annotated; duration values extracted via script
- Linear mixed-effects model for duration
  - *Fixed effects*: segment, position
  - *Random effects*: environment, speaker
  - *Baseline*: segment = t, position = medial

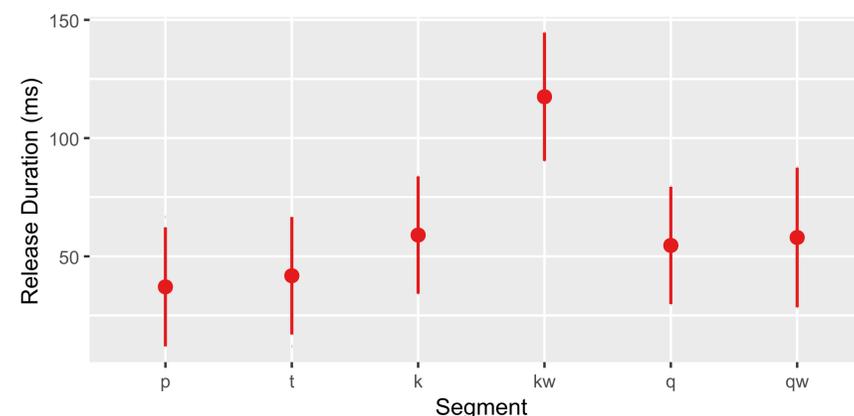
## 3. Results



**Fig. 1.** Empirical release duration measurements for all tokens, grouped by segment, in word-initial, medial, and final positions.



**Fig. 2.** Model-predicted release durations for each position.



**Fig. 3.** Model-predicted release durations for each segment.

**Table 1.** Mean release duration measurement values for both speakers.

	M – mean rel dur (ms)			F – mean rel dur (ms)		
	initial	medial	final	initial	medial	final
<b>p</b>	17.4	17.8	—	11.3	11.5	—
<b>t</b>	18.7	20.8	41.1	16.8	18.3	89.2
<b>k</b>	30.7	32.2	79.8	33.3	33.2	126.0
<b>kw</b>	118.0	44.4	143.0	169.0	62.3	210.0
<b>q</b>	31.8	23.7	53.2	70.2	23.0	117.0
<b>qw</b>	—	20.8	97.8	—	25.4	157.0

- Numerical results (Table 1) suggest that release duration increases as expected:  $p < t < k$  [5]
  - Difference between rounded and unrounded
- Pairwise comparisons using emmeans
  - Position is always significant
  - Segment is significant for all pairs except [p t], [k q], [p q<sup>w</sup>], [t q<sup>w</sup>], [k q<sup>w</sup>], [q q<sup>w</sup>]
- Similar patterns observed for both speakers despite between-speaker variation

## 4. Discussion & Conclusion

- Akuzipik stops appear to be voiceless unaspirated in non-final position
- Observation and data suggest the rounding gesture may be independent for [k<sup>w</sup>] and possibly [q<sup>w</sup>]
- Further analysis of stops (e.g., segment-by-position interaction, burst spectrum) needed

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