

# Towards an articulatory based typology of laryngeal effects on vowel duration

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## 1. Background

- **Voicing Effect:** vowels are longer when followed by **voiced consonants** (House & Fairbanks 1953, Chen 1970)
- **Aspiration Effect:** vowels are longer when followed by **post-aspirated stops** (Maddieson & Gandour 1976, Durvasula & Luo 2012)
- **Laryngeal timing hypothesis:** the source of the AE is the **relative timing of the initiation of glottal spread**, necessary for voicelessness and aspiration (see Halle & Stevens 1967 for related ideas)
- **Prediction:** vowels followed by **pre-aspirated stops** should be shorter
- **Icelandic** contrasts pre-aspirated geminates stops with unaspirated geminates in word-medial and final position: i.e., *tökk* ‘dark’ [tʰœʰk] vs. *tögg* ‘dew’ [tʰœkk]

## 2. Research hypothesis

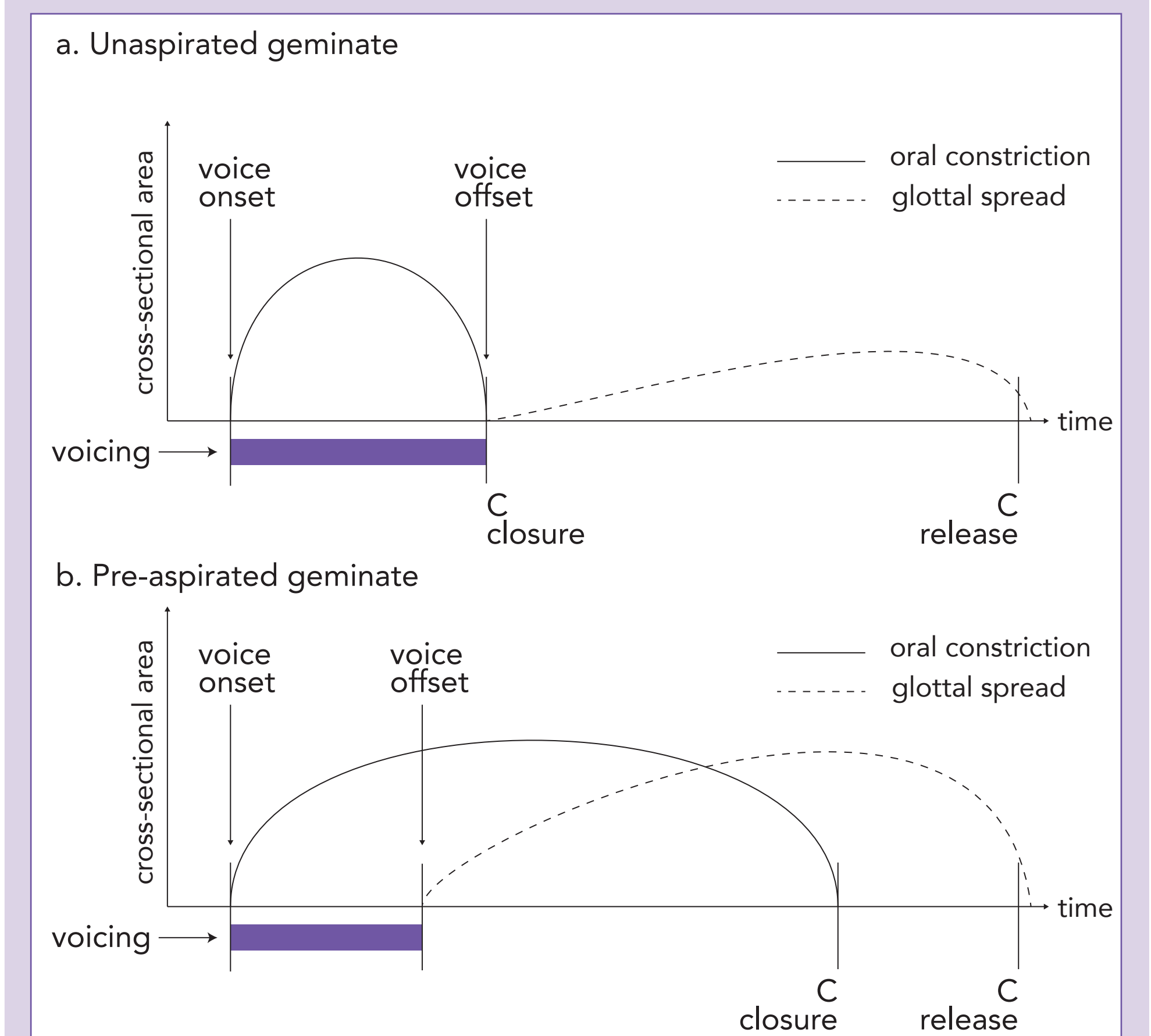


Figure 1. Schematic representation of the timing of oro-laryngeal gestures.

**Vowels followed by pre-aspirated (geminate) stops are shorter than vowels followed by unaspirated (geminate) stops.**

## 3. Methodology

- 5 Icelandic speakers
- 14 words (10 CVCC and 4 CVCCV), *Segðu \_\_\_ aftur*
- 3 repetitions per word, 210 repetitions in total
- linear mixed-effects regression analysis (Bates et al. 2015)

Table 1: Word list.

| word         | gloss        | word         | gloss         |
|--------------|--------------|--------------|---------------|
| <i>dökk</i>  | dark         | <i>dögg</i>  | dew           |
| <i>kökk</i>  | cook         | <i>gogg</i>  | beak          |
| <i>kopp</i>  | chamber pot  | <i>kubb</i>  | block of wood |
| <i>sett</i>  | put          | <i>vidd</i>  | width         |
| <i>vitt</i>  | far and wide | <i>þitt</i>  | thaw          |
| <i>takka</i> | key          | <i>kagga</i> | barrel        |
| <i>detta</i> | fall         | <i>gedda</i> | pike          |

## 4. Results

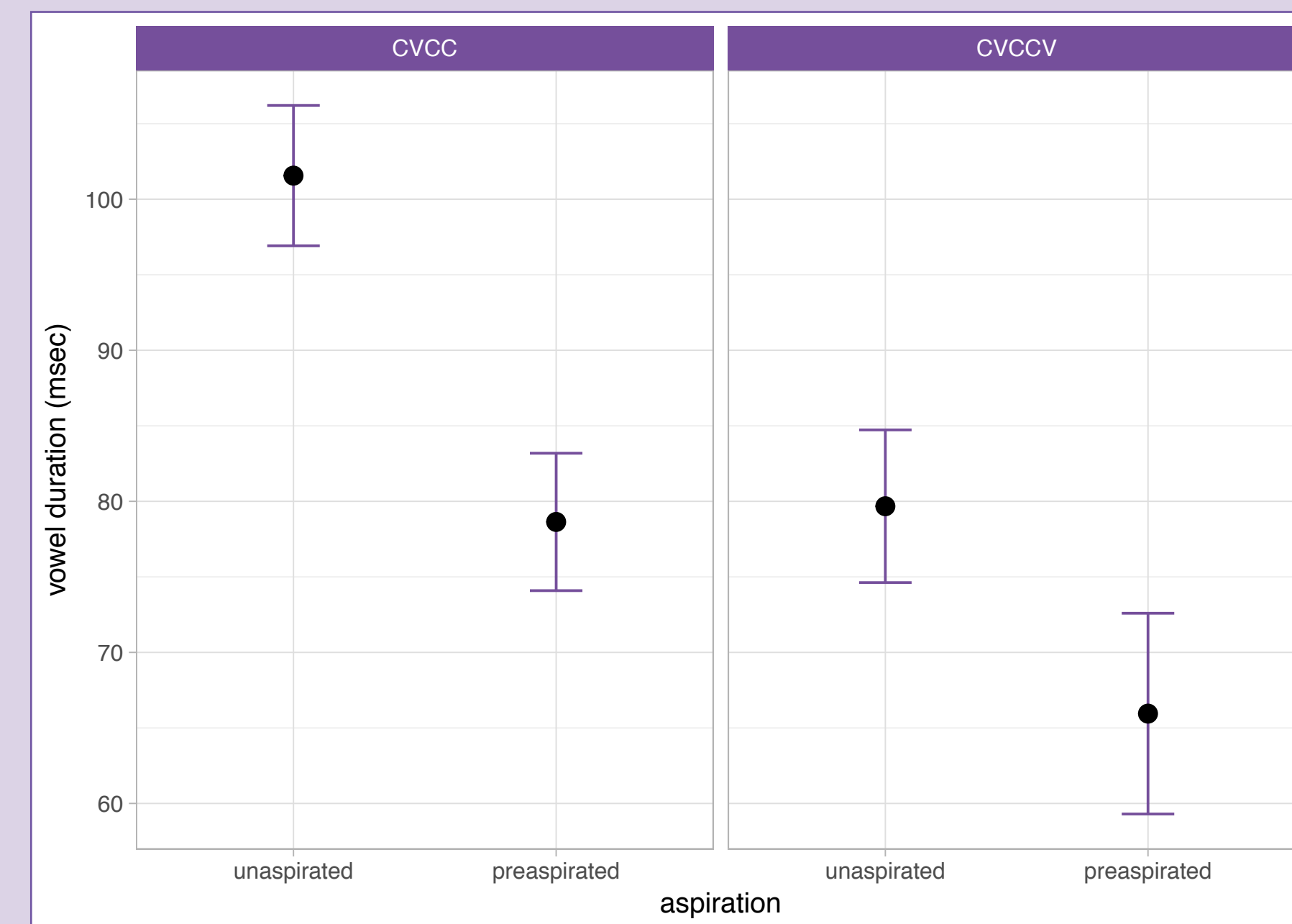


Figure 2. Interaction between laryngeal specification and prosodic context in conditioning vowel duration.

- vowels are 23 msec shorter if followed by a pre-aspirated stop (Figure 2)
- stronger effect in CVCC words
- the voiced interval is 20 msec longer if followed by a pre-aspirated stop (Figure 3)

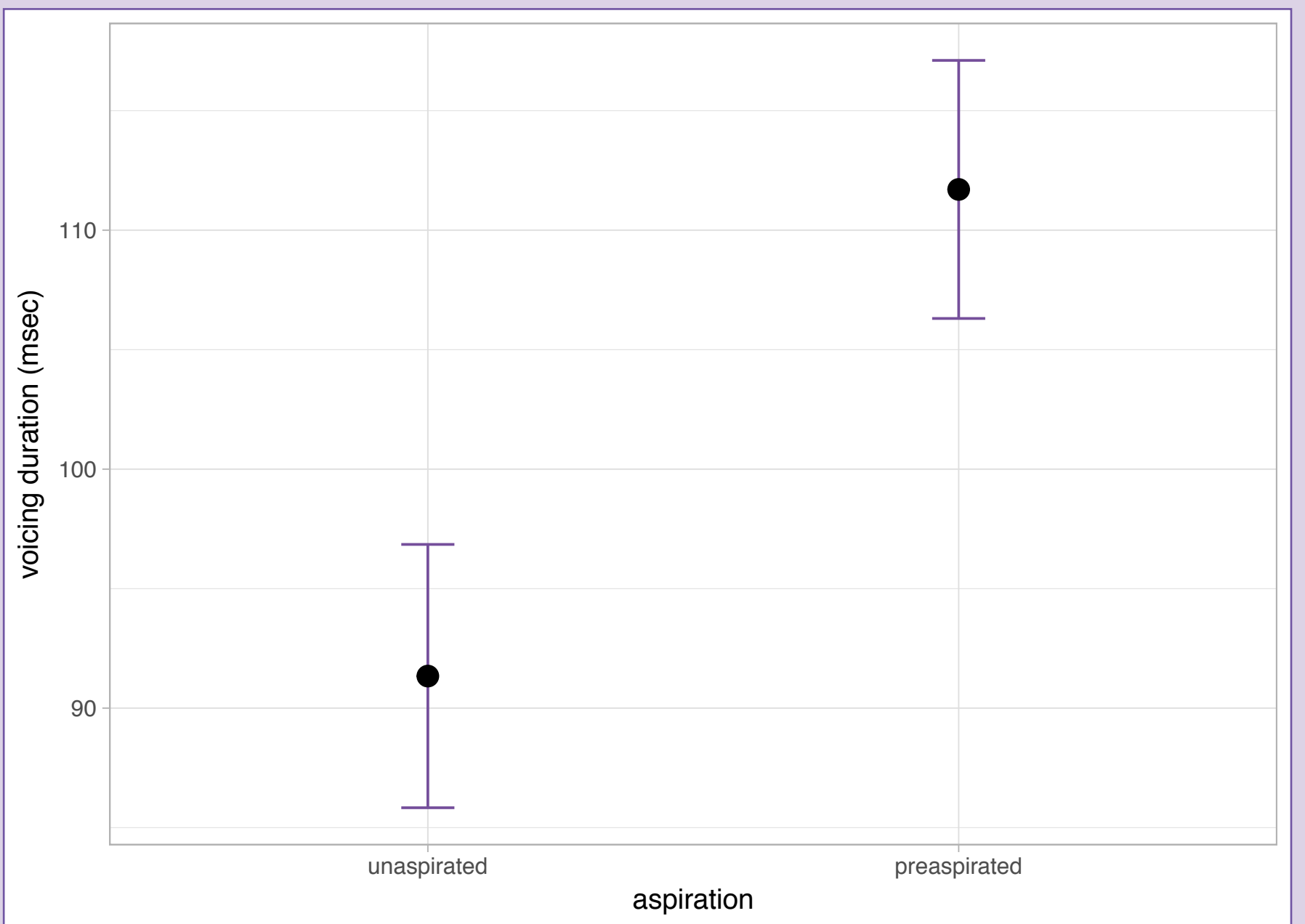


Figure 3. Effect of pre-aspiration on voicing duration.

- CVCC words are 43 msec shorter if they contain a pre-aspirated stop (non-significant effect in CVCCV words, Figure 4)

**not a durational trade-off!**

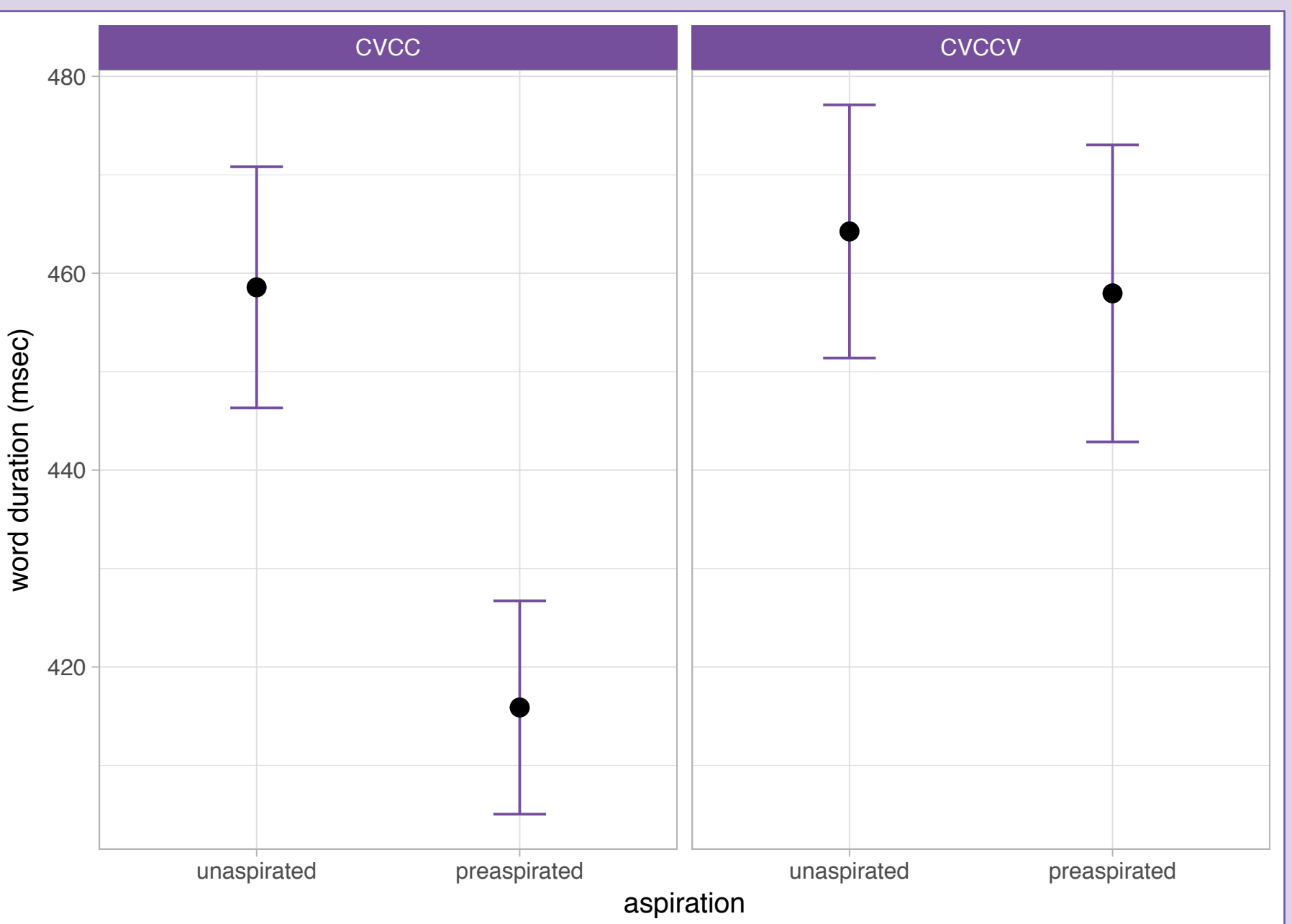


Figure 4. Interaction between laryngeal specification and prosodic context in conditioning word duration.

## 5. Discussion

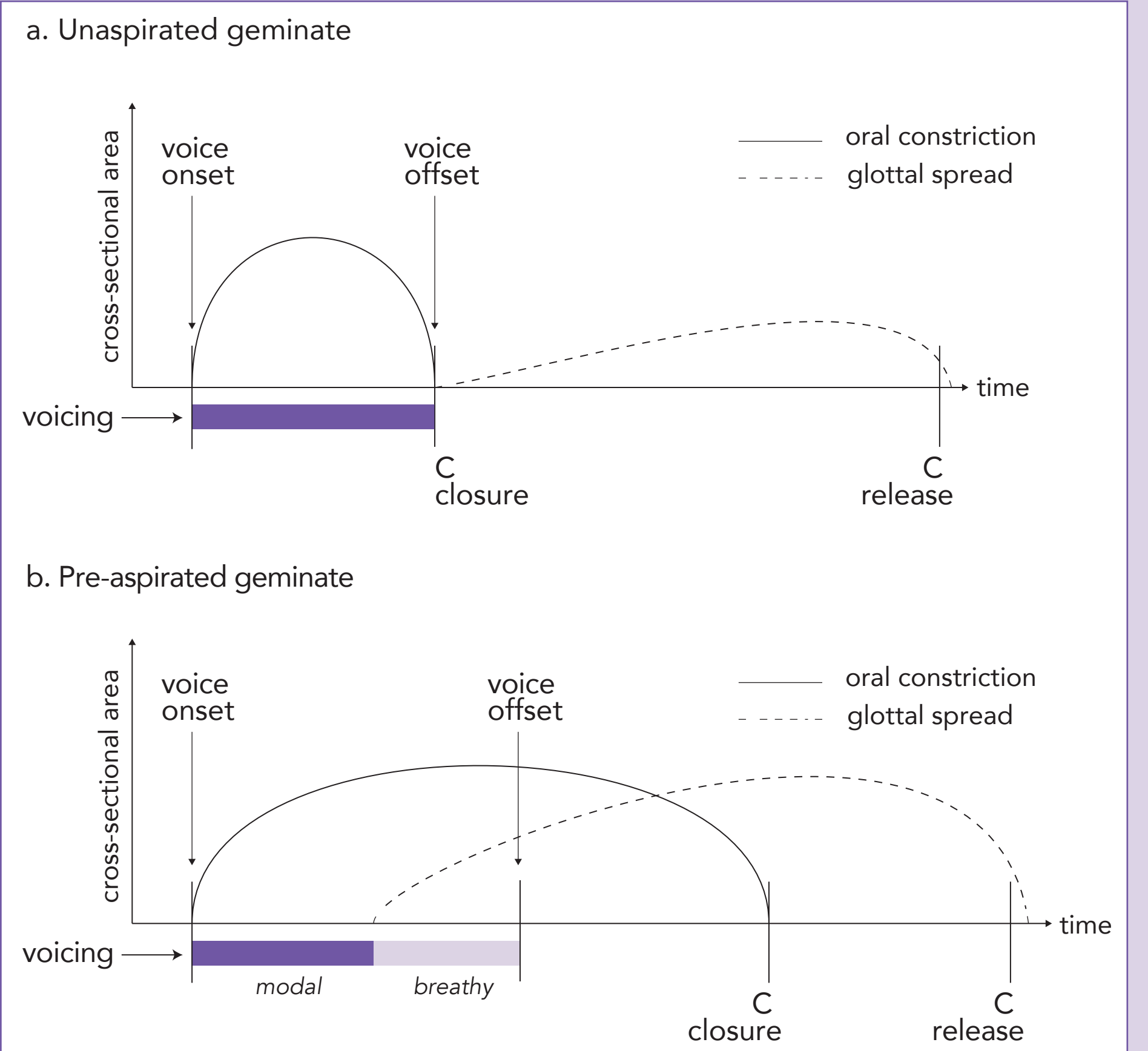


Figure 5. Schematic representation of the timing of oro-laryngeal gestures in the data.

- glottal spread is initiated earlier in pre-aspirated geminates (*contra* Ní Chasaide 1985)
- the source of the laryngeal effects could be the **transition of modal voice into breathy voice**

### Predictions:

- spreading of English fortis stops should be timed earlier than in lenis stops (Hejné 2015, Hejné & Scanlon 2015)
- spreading in post-aspirating languages (like Hindi) should be timed earlier in (voiceless) unaspirated stops than in post-aspirated stops

## Appendix

Table A1: Socio-linguistic profile of the participants.

| id  | sex | age | birthplace            | other languages          |
|-----|-----|-----|-----------------------|--------------------------|
| TT  | F   | 24  | Reykjavik             | English, Danish, German  |
| BRS | F   | 25  | Höfn                  | Danish, English, Spanish |
| BTE | F   | 27  | Reykjavik             | English, Danish          |
| JJ  | F   | 46  | Reykjavik (Kópavogur) | English, Danish          |
| SHG | M   | 25  | Selfoss               | English                  |

Figure A1. Example of measurements criteria for pre-aspirated stops.

