

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 geminate stops with unaspirated geminates in word-medial and final position: i.e., *tökk* 'dark' [tʰœʰk] vs. *tögg* 'dew' [tʰœkk]

2. Research hypothesis

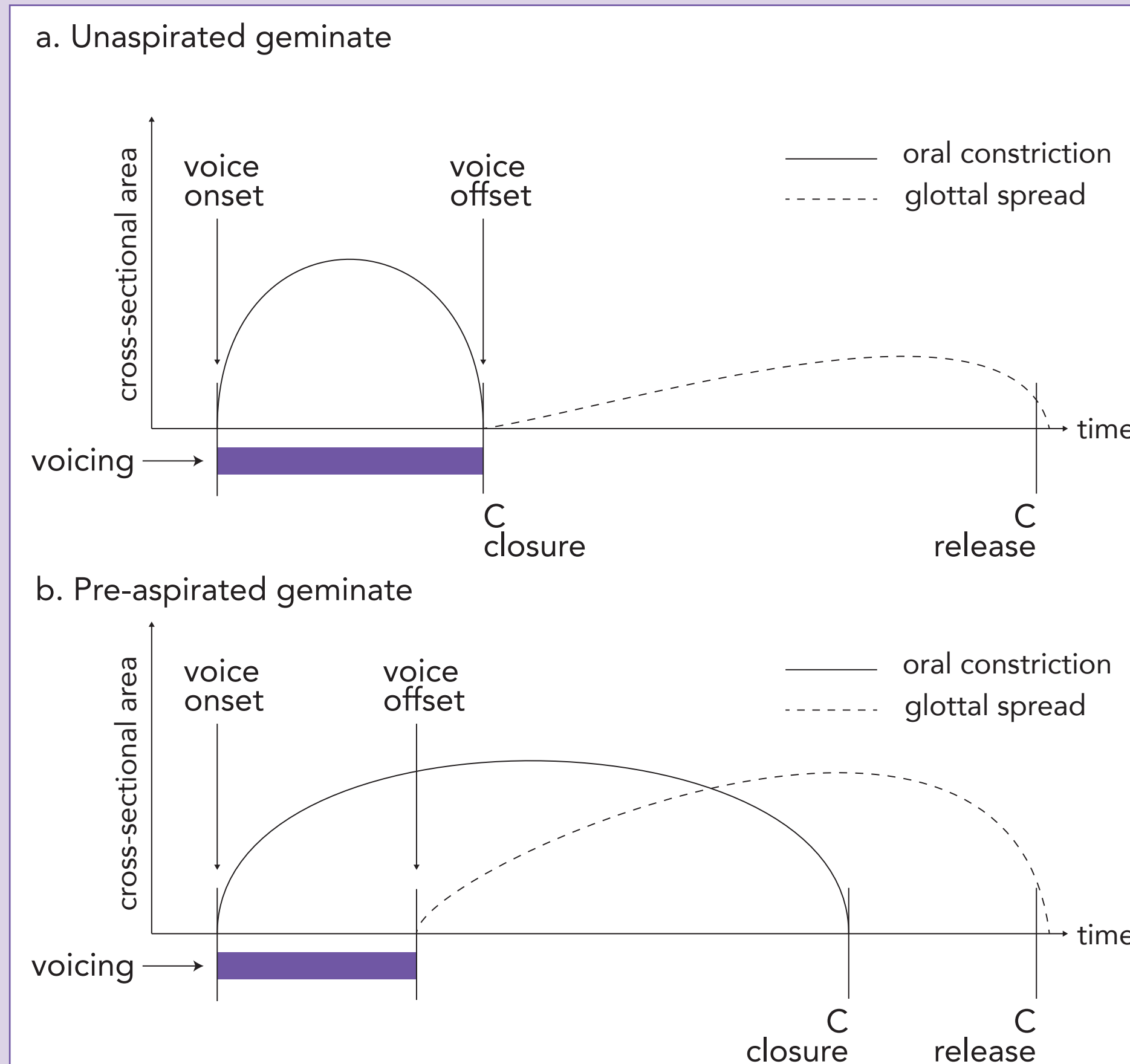


Figure 1. Schematic representation of the timing of oro-laryngeal gestures.

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

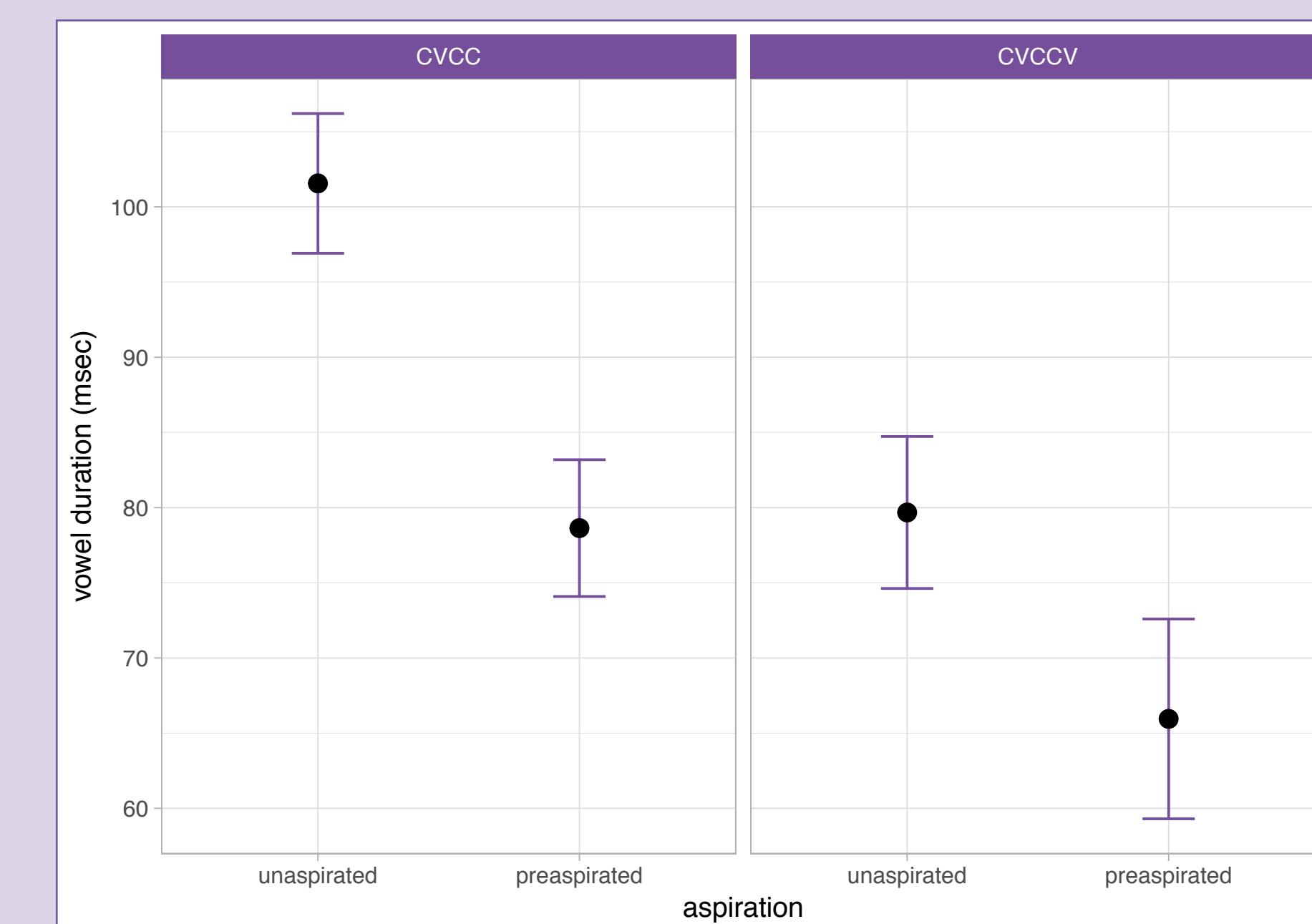


Figure 2. Interaction between laryngeal specification and prosodic context in conditioning vowel duration.

- **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)

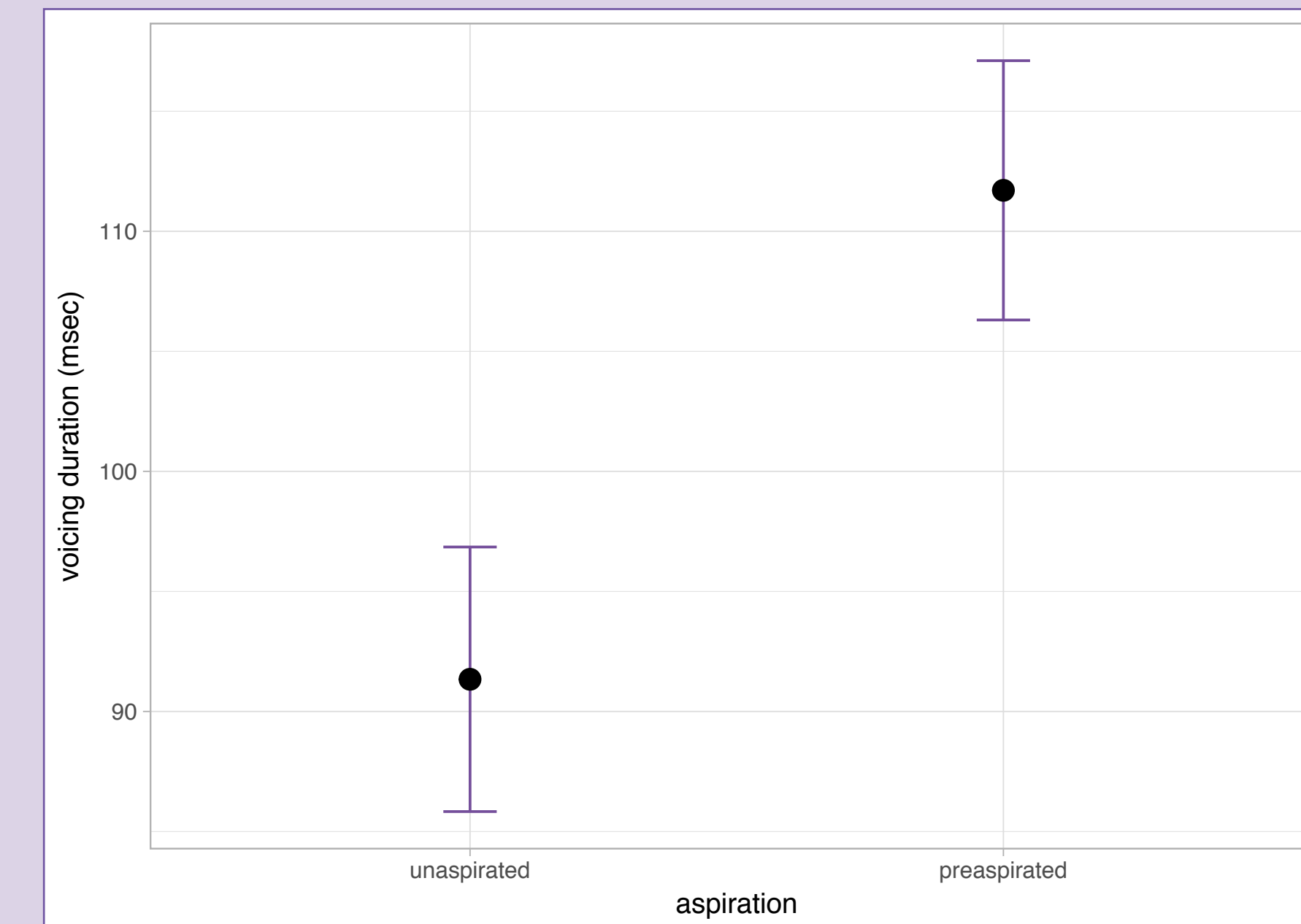


Figure 3. Effect of pre-aspiration on voicing duration.

- **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!

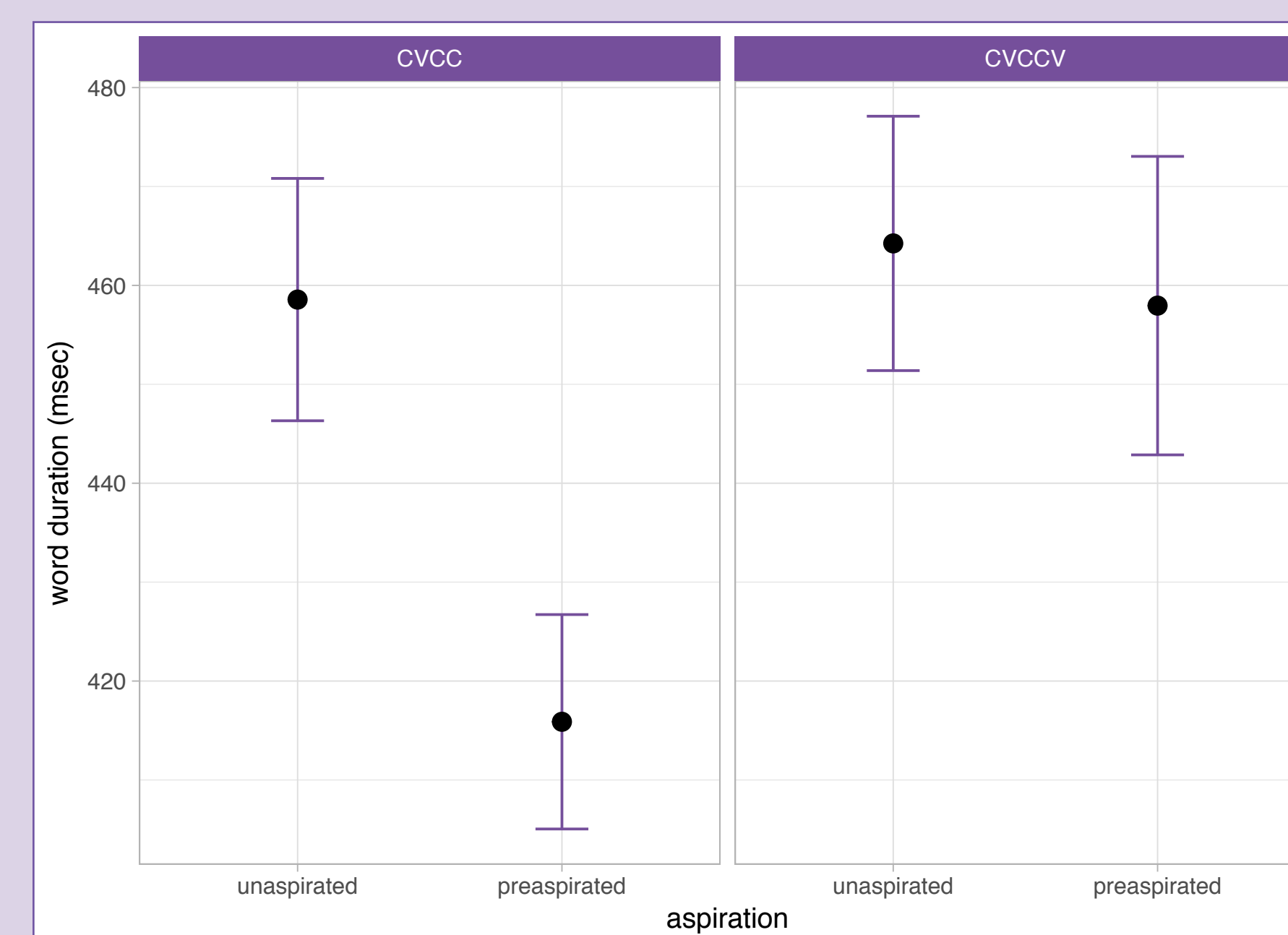


Figure 4. Interaction between laryngeal specification and prosodic context in conditioning word duration.

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

5. Discussion

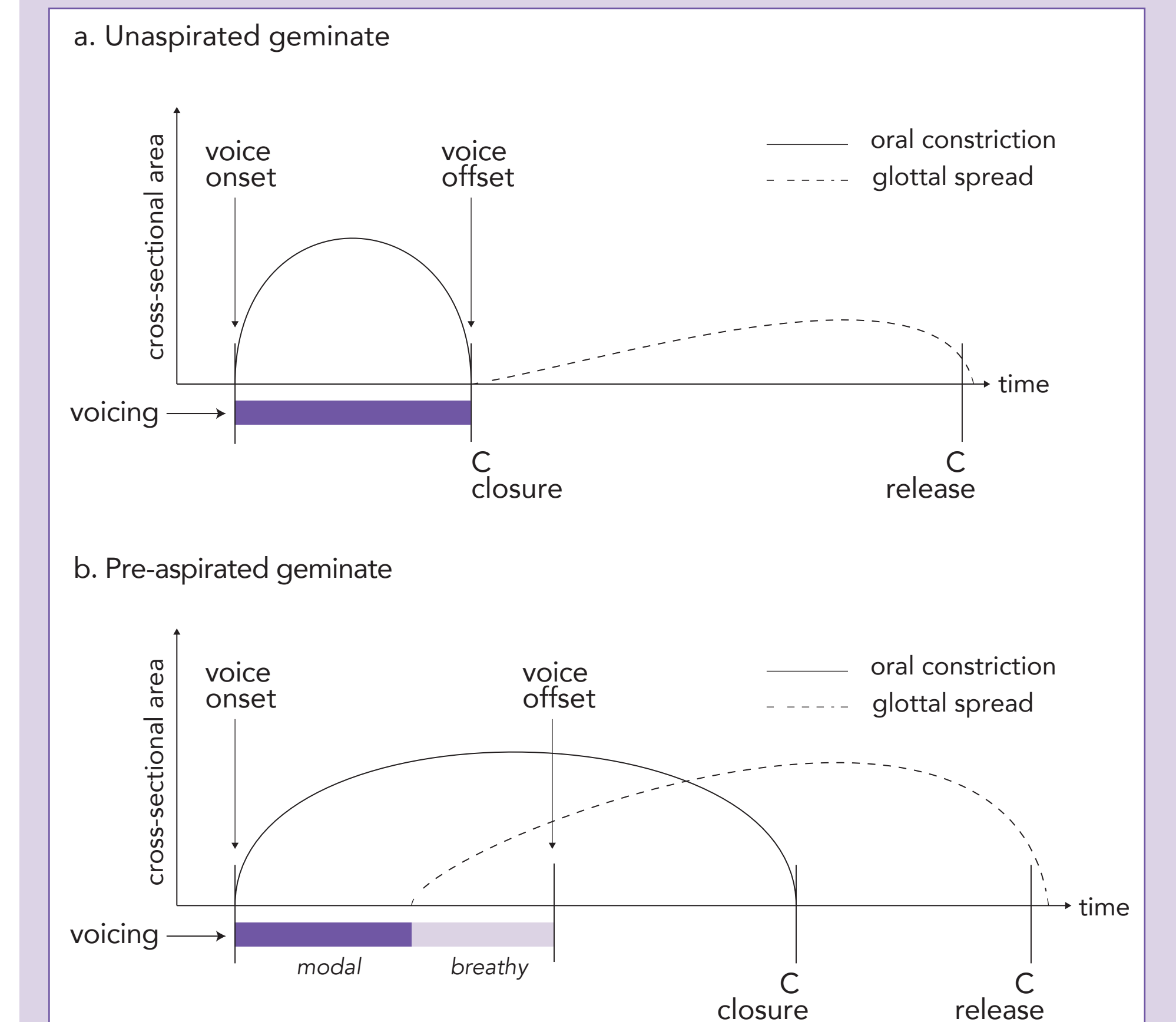


Figure 5. Schematic representation of the timing of oro-laryngeal gestures in the data.

- **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 (Hejná 2015, Hejná & Scanlon 2015)
- spreading in post-aspirating languages (like Hindi) should be timed earlier in (voiceless) unaspirated stops than in post-aspirated stops

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

