

Longer vowel duration correlates with tongue root advancement in Italian and Polish: An ultrasound study

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LabPhon

The voicing effect

- shorter vowels before voiceless stops, longer vowels before voiced stops

Heffner (1937); House & Fairbanks (1953); Belasco (1953); Peterson & Lehiste (1960); Halle & Stevens (1967); Chen (1970); Klatt (1973); Lisker (1974); Raphael (1975); Javkin (1976); Maddieson & Gandour (1976); Farnetani & Kori (1986); Kluender et al. (1988); Laeuffer (1992); Fowler (1992); Hussein (1994); Esposito (2002); Lampp & Reklis (2004); Warren & Jacks (2005); Durvasula & Luo (2012)

Still no consensus on source!

Proposed accounts:

- **production**
 - constant articulatory force (Belasco, 1953; Delattre, 1962)
 - durational trade-off (Slis & Cohen, 1969; Lehiste, 1970)
 - laryngeal adjustment (Halle & Stevens, 1967)
 - closing gesture duration (Chen, 1970)
- **perception**
 - misperception (Javkin, 1976)
 - enhancement (Kluender et al., 1988)
- but problems (Maddieson & Gandour, 1976; Fowler, 1992)

This talk:

- support for *durational trade-off hypothesis*
- link between *vowel duration* and *tongue root position*

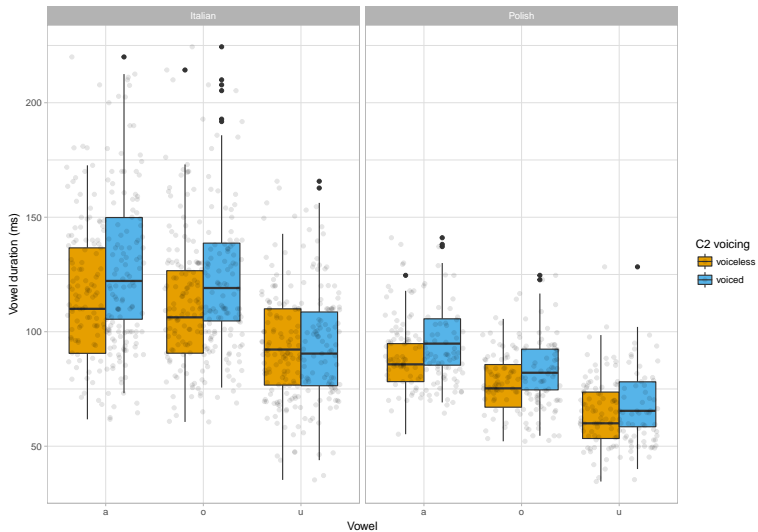
Methods

- **Participants:** 11 Italians (5 F, 6 M), 6 Polish (3 F, 3 M)
- **Targets**
 - $C_1V_1C_2V_1$
 - $C_1 = /p/, V_1 = /a, o, u/, C_2 = /t, d, k, g/$
 - *pata, pada, paka, ..., poto, podo, ...*
- **Frame sentence**
 - *Dico X lentamente*, 'I say X slowly'
 - *Mówię X teraz*, 'I say X now'
- **Measurements**
 - Durational data from acoustics
 - Tongue root position from ultrasound tongue imaging
- **Reproducibility**
 - <https://github.com/stefanocoretta/2018-labphon>

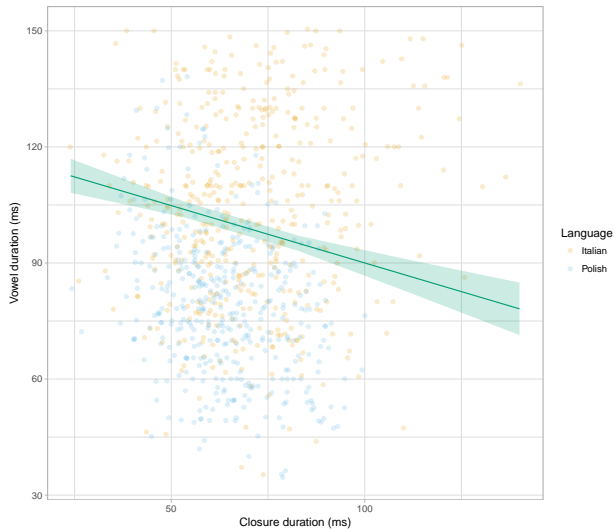
[image of acoustic annotation]

[image of tongue root position]

Results: Vowel duration



Results: Vowel and closure duration

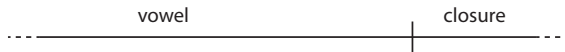


Results: Vowel and closure duration

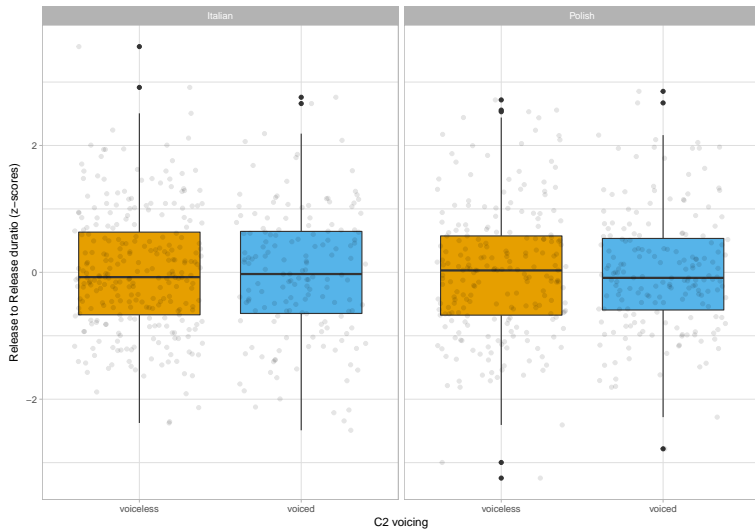
(a) voiceless



(b) voiced

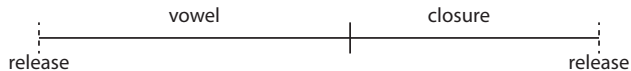


Results: Release to Release duration

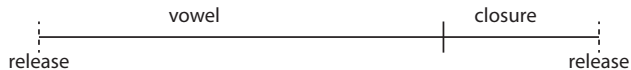


Discussion: Durational trade-off

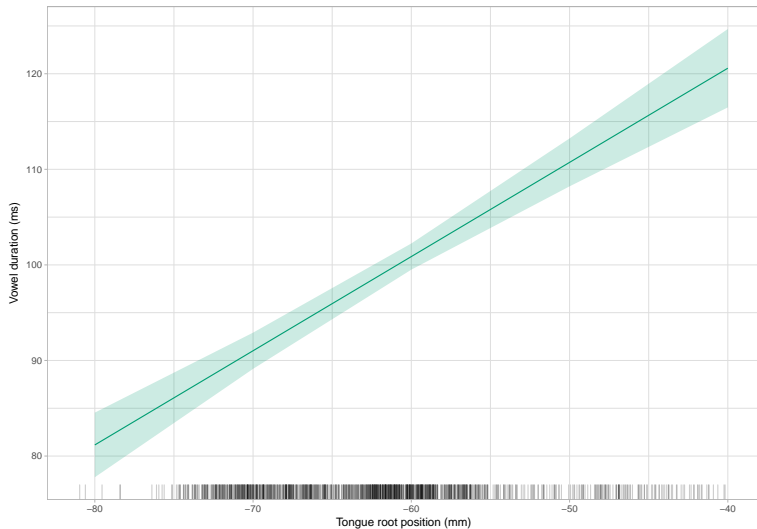
(a) voiceless



(b) voiced



Discussion: Vowel duration and tongue root position



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