

# Vowel duration and tongue root advancement in Italian and Polish

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- tongue root advancement (TRA)
  - voicing (Westbury 1983)
  - VOT (Ahn 2015)
  - also *vowel duration*?
- **voicing effect**
  - House & Fairbanks (1953), Chen (1970), Klatt (1973), Lisker (1973)
  - no consensus

- Italian
  - voicing effect (Farnetani & Kori 1986)
- Polish
  - no voicing effect (Keating 1984)

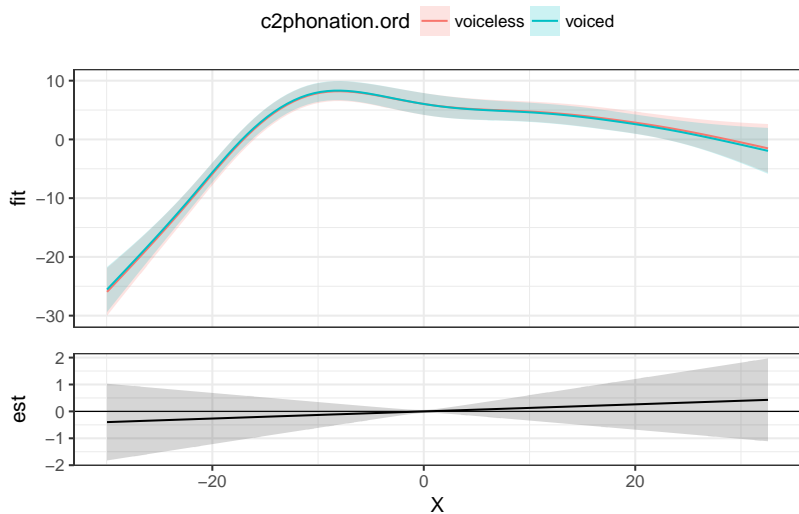
→ Assessment of tongue contour using ultrasonography (part of a broader research project)

- pilot study (work in progress)
- Italian (2 males), Polish (1 female, 1 male)
- $C_1V_1C_2V_2$ 
  - $C_1 = /p/, V_1 = /a, o, u/, C_2 = /t, d, k, g/$
- frame sentence
  - *Dico X lentamente*, 'I say X slowly'
  - *Mówię X teraz*, 'I say X now'

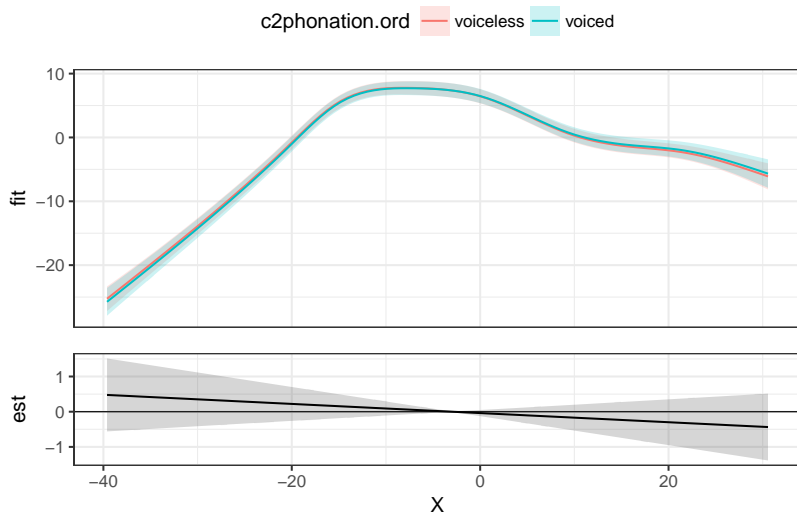
- Articulate Instruments set-up
  - TELEMED Echo Blaster 128 unit
  - TELEMED C3.5/20/128Z-3 ultrasonic transducer
  - Movo LV4-O2 Lavalier Microphone
  - sync unit
- probe stabilisation with Articulate Instruments headset
- Articulate Assistant Advanced (Articulate Instruments Ltd 2011)
- FRAME RATE

- spline data at maximum displacement (Strycharczuk & Scobbie 2015) and acoustic closure
- generalised additive mixed effect model (GAMM, Wood 2006)
- one model per speaker
  - parametric term Y
  - reference smooth Y
  - difference smooth Y by phonation, vowel, place
  - random smooth by item
  - cubic regression splines
- includes first order autoregressive model (AR1)
- model comparison and visual inspection (Sóskuthy 2017)

## Results: Polish (maximum)

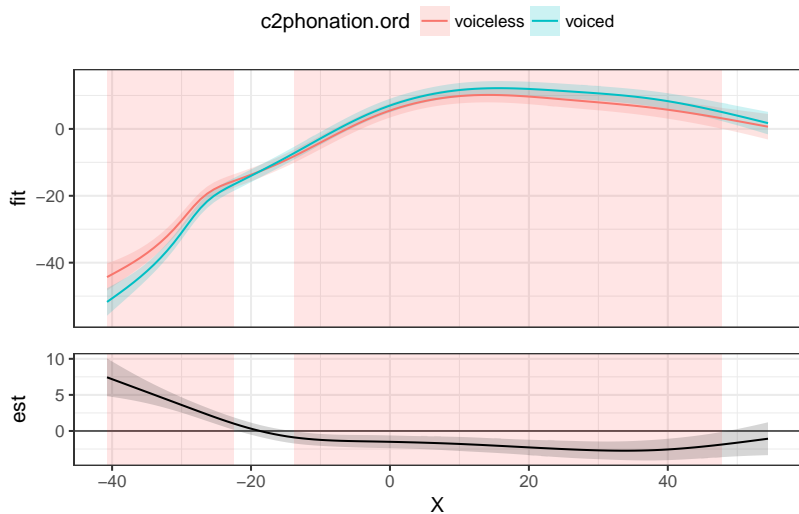


## Results: Polish (closure)

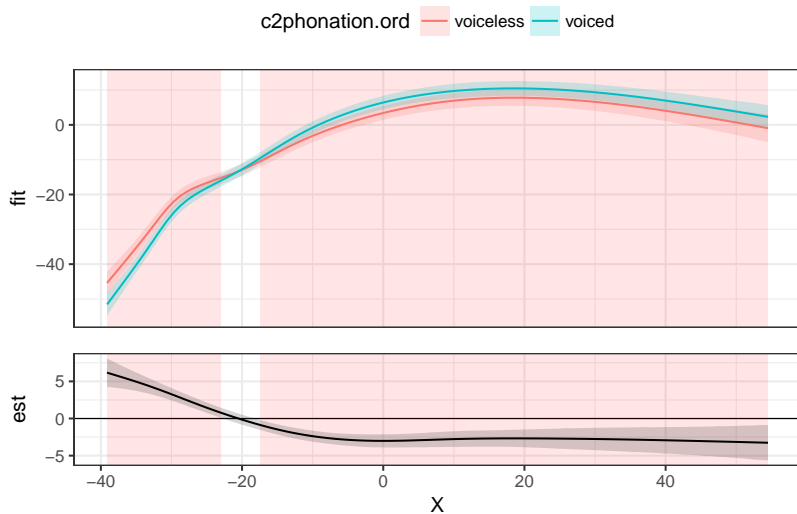




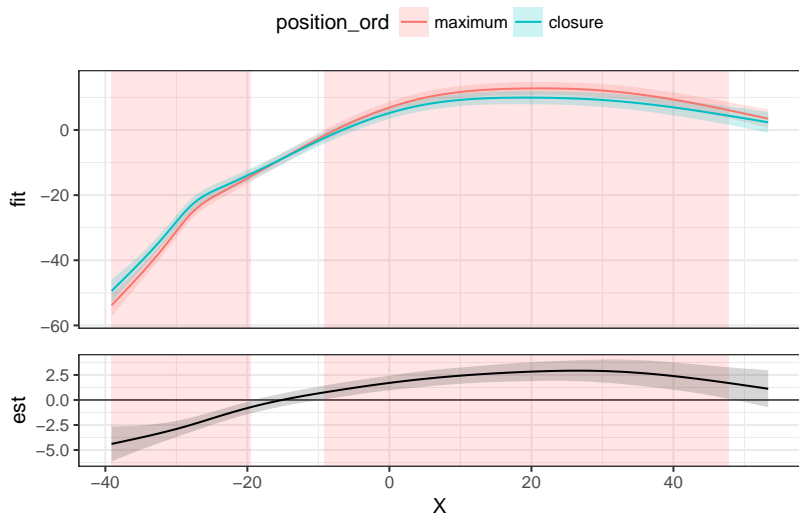
## Results: Italian (maximum)



## Results: Italian (closure)



## Results: Italian (closure vs. maximum)



- Polish does not show TRA
- Italian shows TRA at closure and maximum displacement
- TRA increases from closure to maximum displacement

→ TRA is initiated **before closure** in voiced stops in Italian

- time to allow TRA → longer vowel
- cf. Halle & Stevens (1967)

# References

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