

Vowel duration and tongue root advancement in Italian and Polish

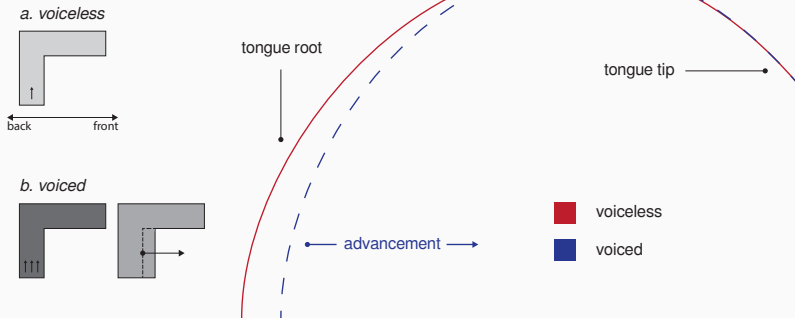
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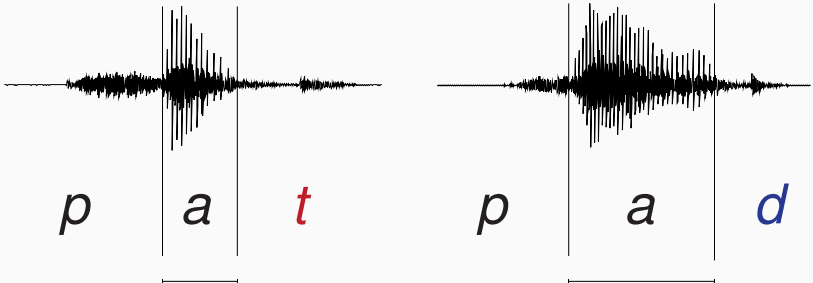
Background

- tongue root advancement (TRA)
 - voicing (Westbury 1983)
 - VOT (Ahn 2015)
 - also *vowel duration*?



Background

- voicing effect
 - House & Fairbanks (1953), Chen (1970), Klatt (1973), Lisker (1973)
 - no consensus on which factors play a role



- **Italian** (Farnetani & Kori 1986)

- +35 msec / __D

- **Polish** (Keating 1984)

- no difference

→ **H1a**: TRA in Italian.

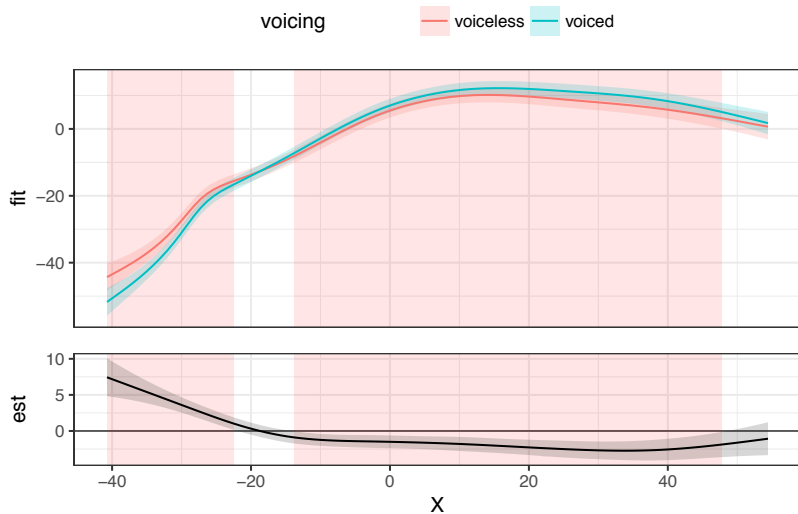
→ **H1b**: TRA in Polish.

→ **H2**: TRA increases during closure in Italian.

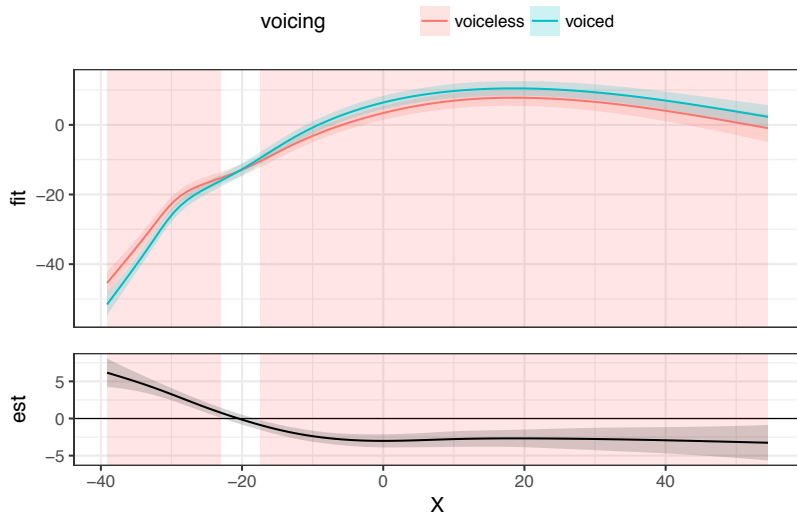
- **pilot** study
- Italian (2 *males*), Polish (1 *female*, 1 *male*)
- $C_1V_1C_2V_1$
 - $C_1 = /p/$, $V_1 = /a, o/$, $C_2 = /t, d, k, g/$
 - *pata, pada, paka, ..., poto, podo, ...*
- frame sentence
 - *Dico X lentamente*, 'I say X slowly'
 - *Mówię X teraz*, 'I say X now'

- **equipment**
 - Articulate Instruments set-up with probe stabilisation headset (Articulate Instruments Ltd 2011)
 - Echo Blaster 128, frame rate = 60 fps
- **data**
 - tongue contours
 - at closure onset
 - at maximum tongue displacement (Strycharczuk & Scobbie 2015)
- **analysis**
 - generalised additive mixed effects models (Wood 2006, Sóskuthy 2017, van Rij et al. 2017)
 - data and code available at <https://github.com/stefanocoretta/2017-ultrafest>

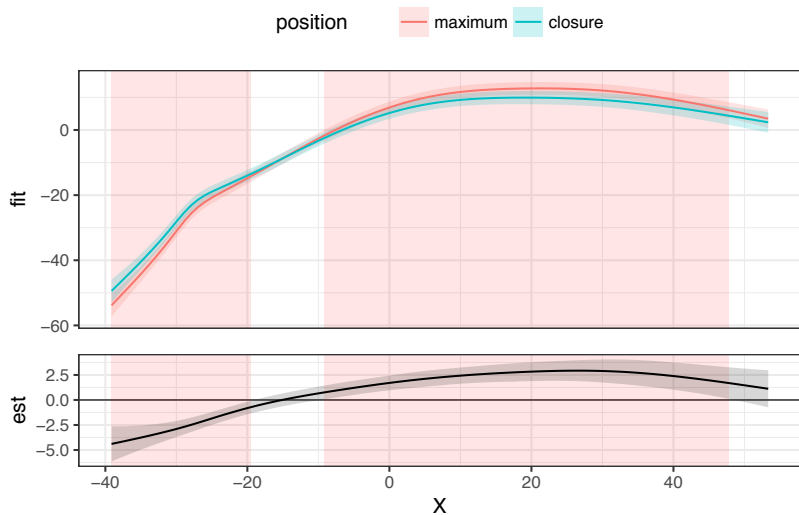
Results: Italian (maximum displacement), speaker IT01



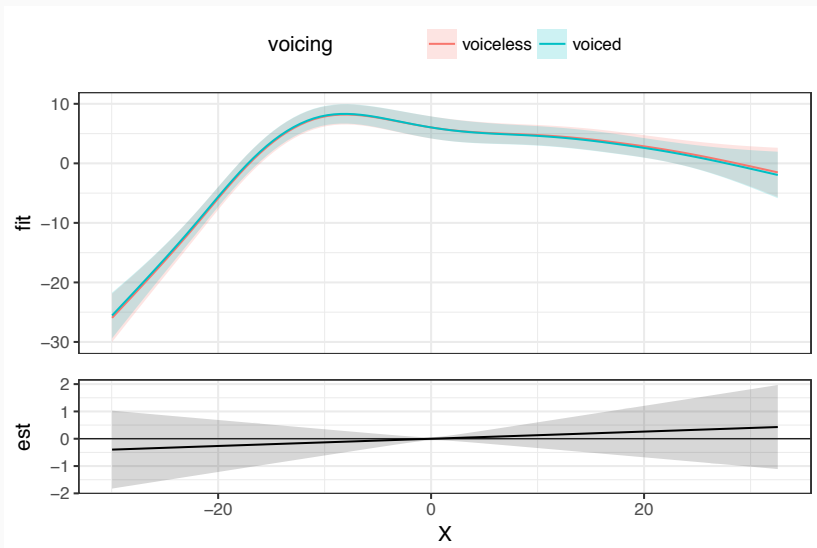
Results: Italian (closure onset), speaker IT01



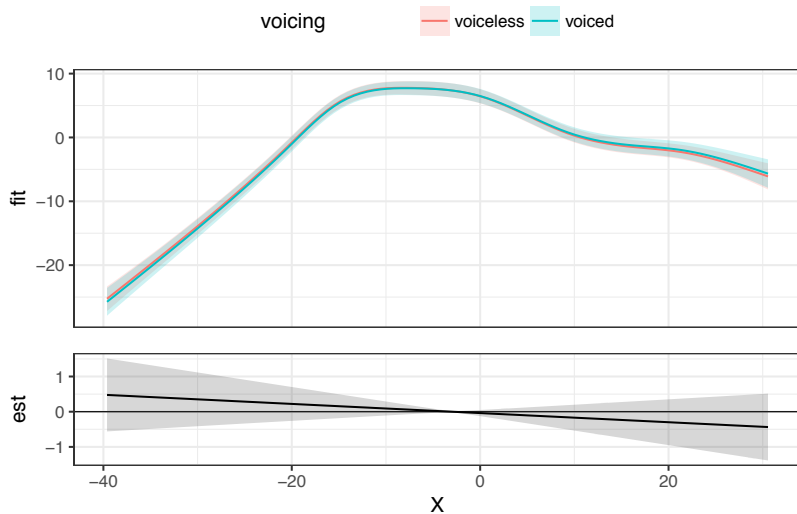
Results: Italian (closure onset vs. maximum displacement), speaker IT01



Results: Polish (maximum displacement), speaker PL04



Results: Polish (closure onset), speaker PL04



- results
 - **TRA in Italian** at closure onset *and* maximum displacement (**H1a**)
 - no TRA in Polish (**H1b**)
 - *increases from closure onset to maximum displacement* (**H2**)
 - TRA is initiated before closure onset
- correlation between voicing effect and tongue root advancement is supported by the data
 - time to allow TRA → longer vowel (cf. Halle & Stevens 1967)

THANK YOU!

Vowel durations

- methods
 - vowel durations from acoustics
 - four speakers per language, /a, o, u/
 - linear mixed effects models (Bates et al. 2015)
- results
 - Italian: 22 (± 6) msec voicing effect
 - $\chi^2(3) = 16.61, p = 0.00085$ ***
 - Polish: 8 (± 3.3) msec voicing effect
 - $\chi^2(1) = 5.4, p = 0.02$ *
- discussion
 - the Italian estimate is in line with previous work
 - Polish is suprising
 - one speaker had bigger slope

References

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