



125
YEARS

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demo

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Mielke

Motivations

Imaging

Research

English /u/
Fieldwork

Rhotic vowels

Height/ATR

Velars

Edinburgh
/t/ deletion

Ultrasound demo

Jeff Mielke

North Carolina State University

November 16, 2012



Phonetic variation: useful information to have

For example:

- Acoustic vowel **laxing/lowering** (F1 increase): is it tongue body lowering or tongue root retraction?
- Acoustic vowel **fronting** (F2 decrease): is it tongue body fronting, lip unrounding, or tongue blade raising?
- **Dark /ɪ/**: is it velarization or pharyngealization?
- **/ɹ/-coloring** of vowels: is it tongue retroflexion or bunching?
- **Assimilation/coarticulation**: is it categorical or gradient?
- **Individual differences** between speakers: are they due to idiosyncratic articulatory motivations?
- Can **dialectal differences** (e.g. in /æ/ raising contexts) be attributed to the way other sounds are produced?



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YEARSUltrasound
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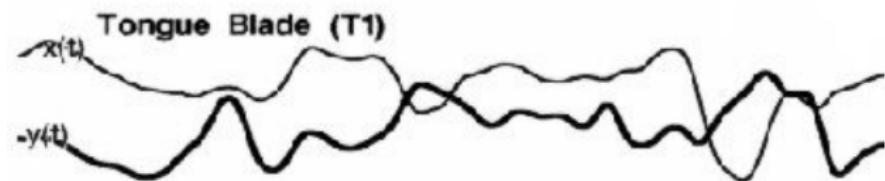
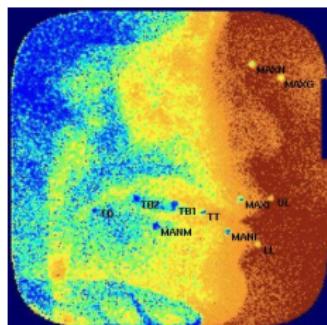
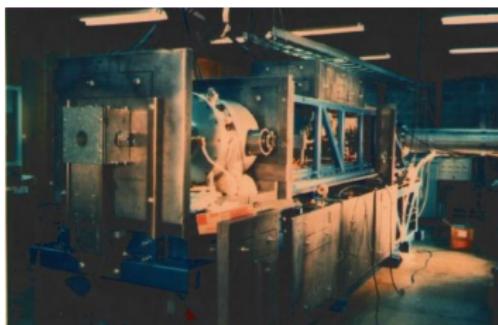
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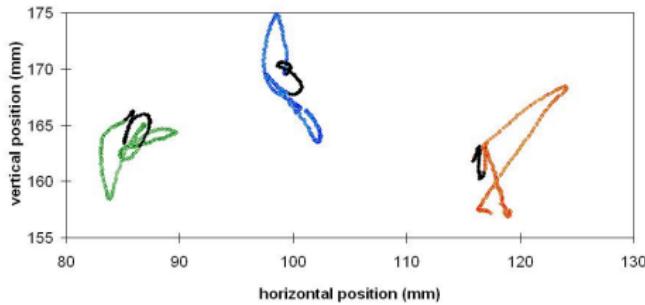
Rhotic vowels
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EMMA (ElectroMagnetic Midsagittal Articulometry)



say /ded/ again (s26) [ded] is in black





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MRI (Magnetic Resonance Imaging)





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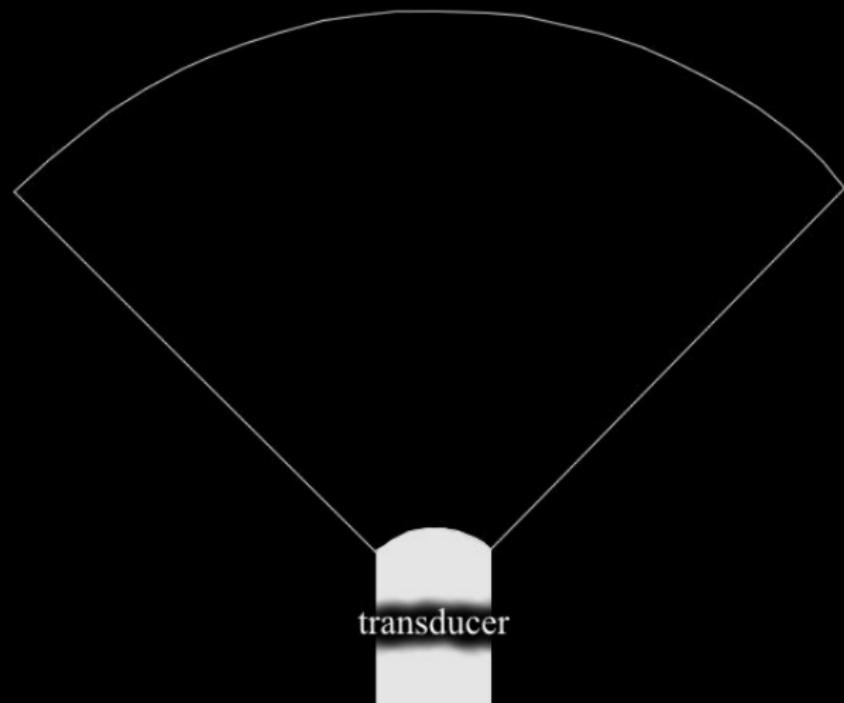
English /ʊ/
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Imaging the tongue (mouth full of air)





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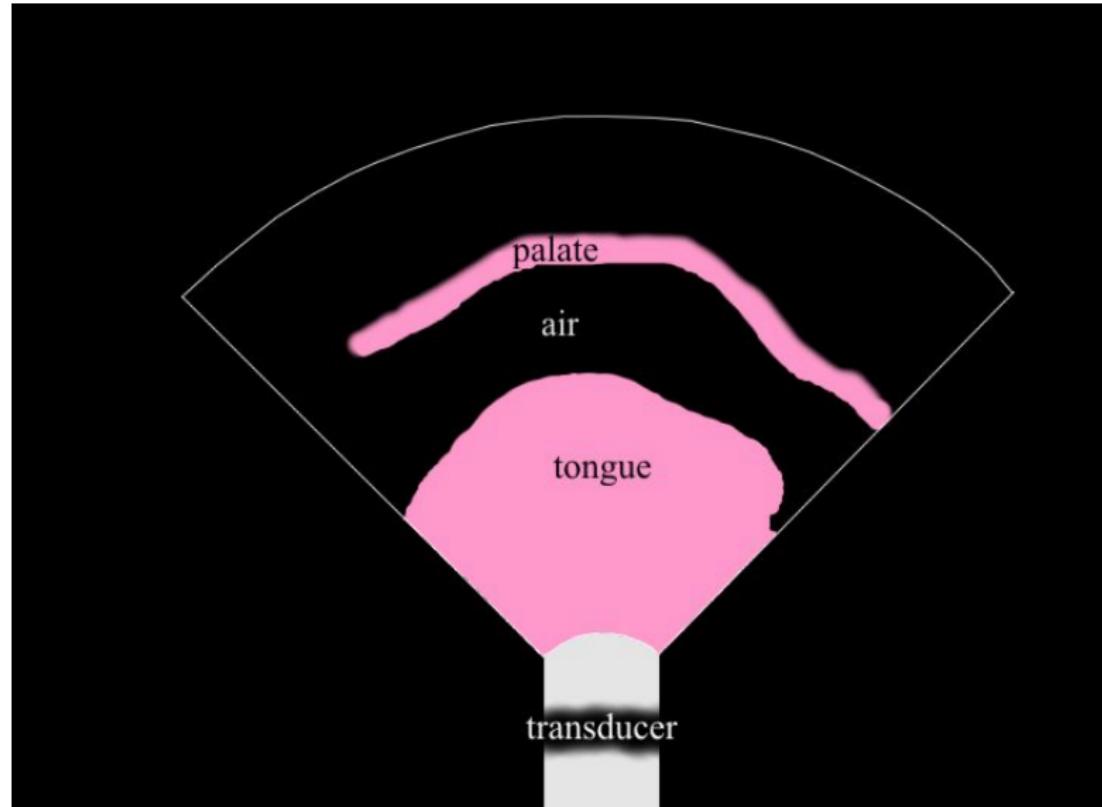
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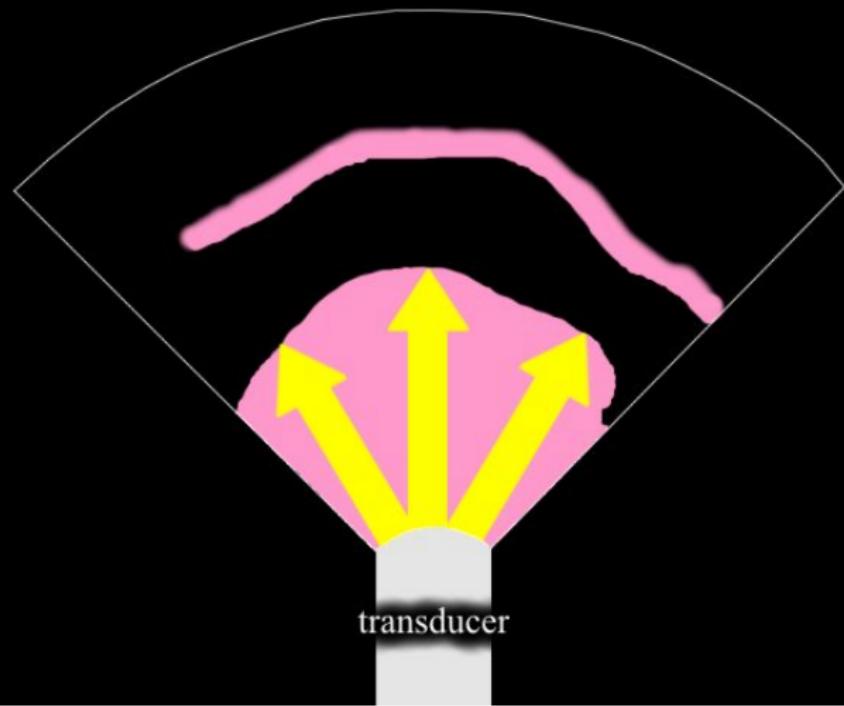
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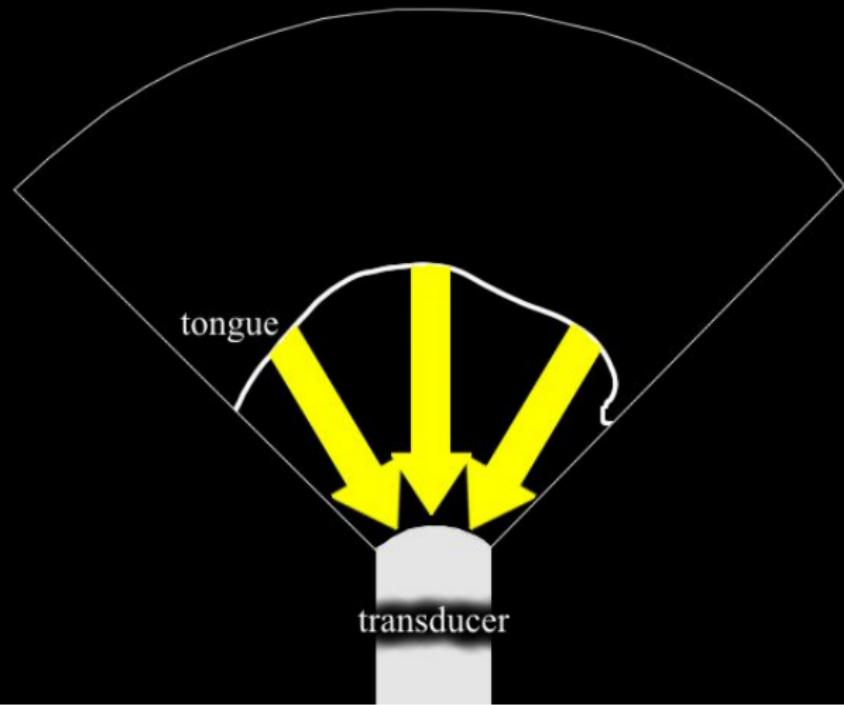
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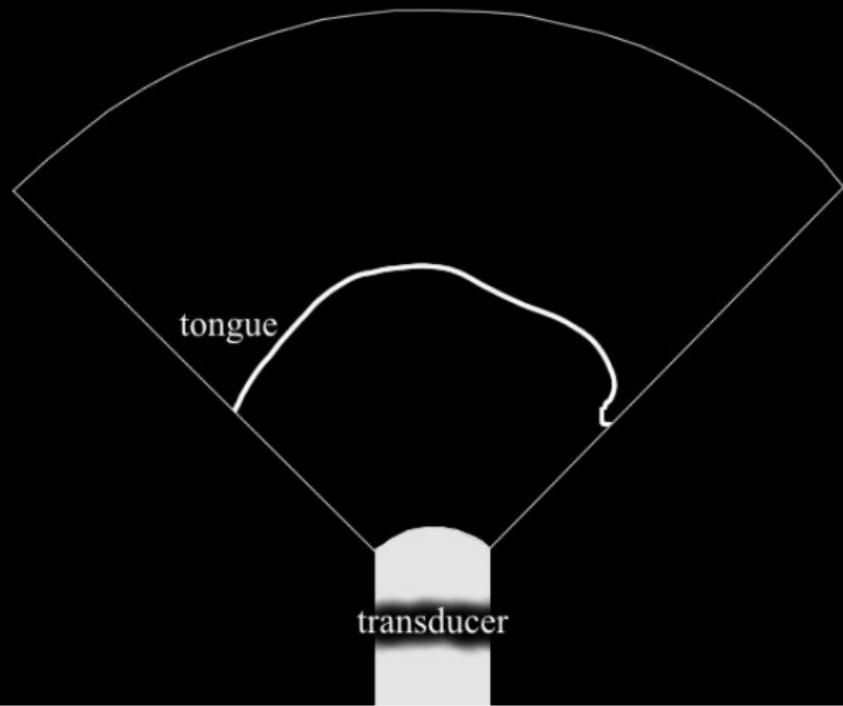
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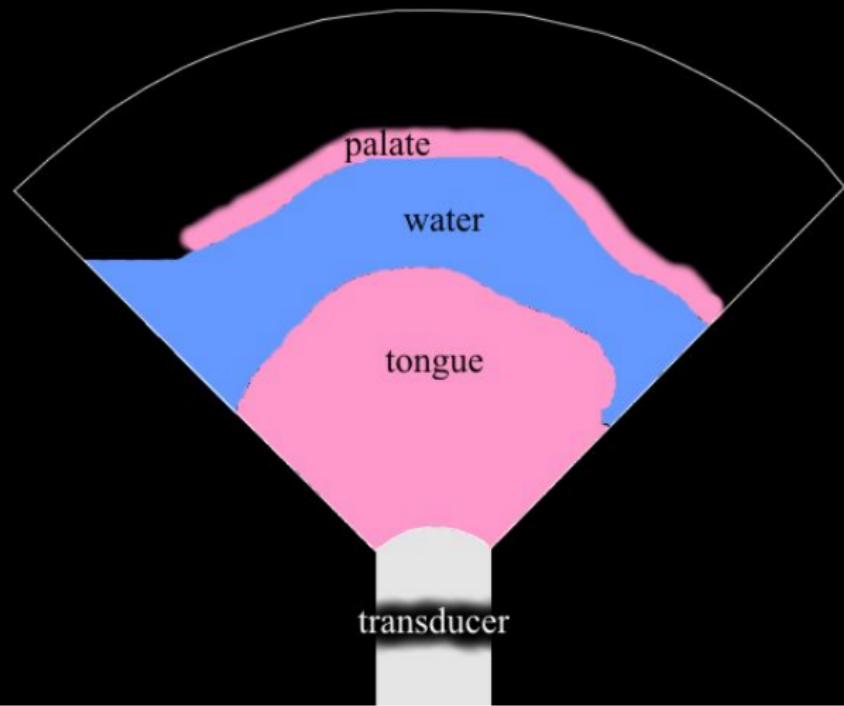
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Imaging the palate (mouth full of water)





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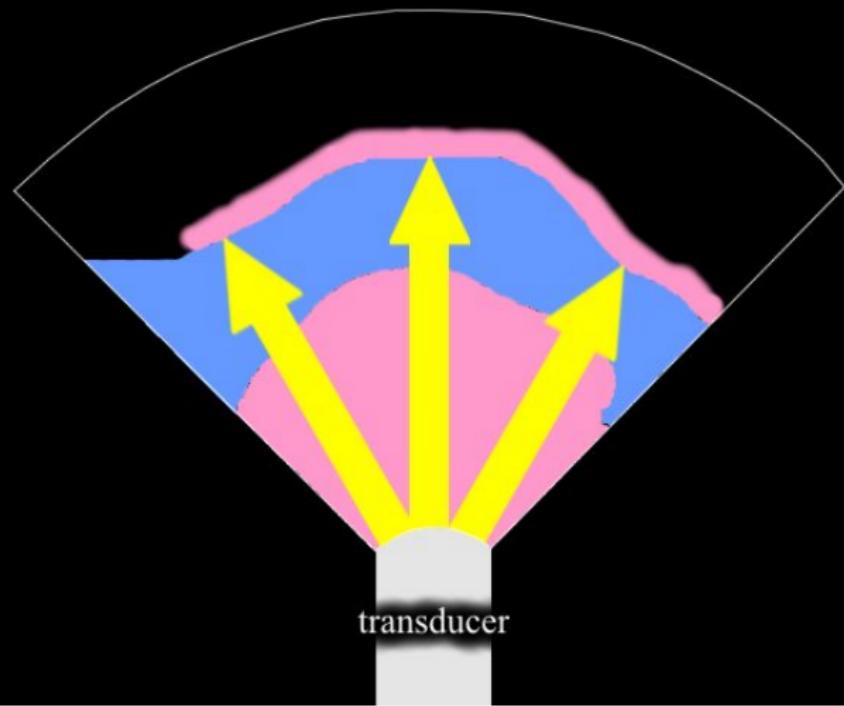
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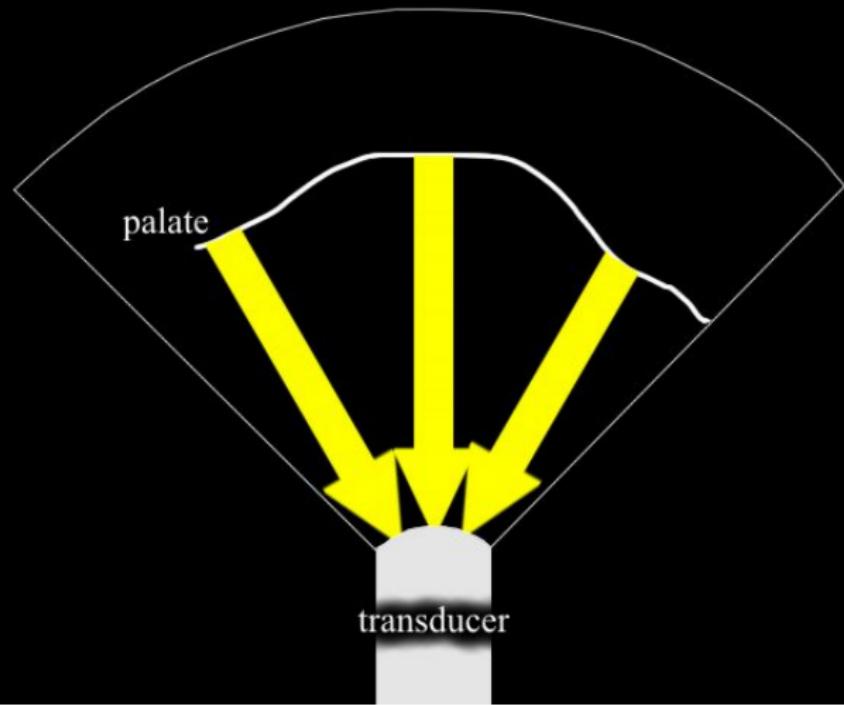
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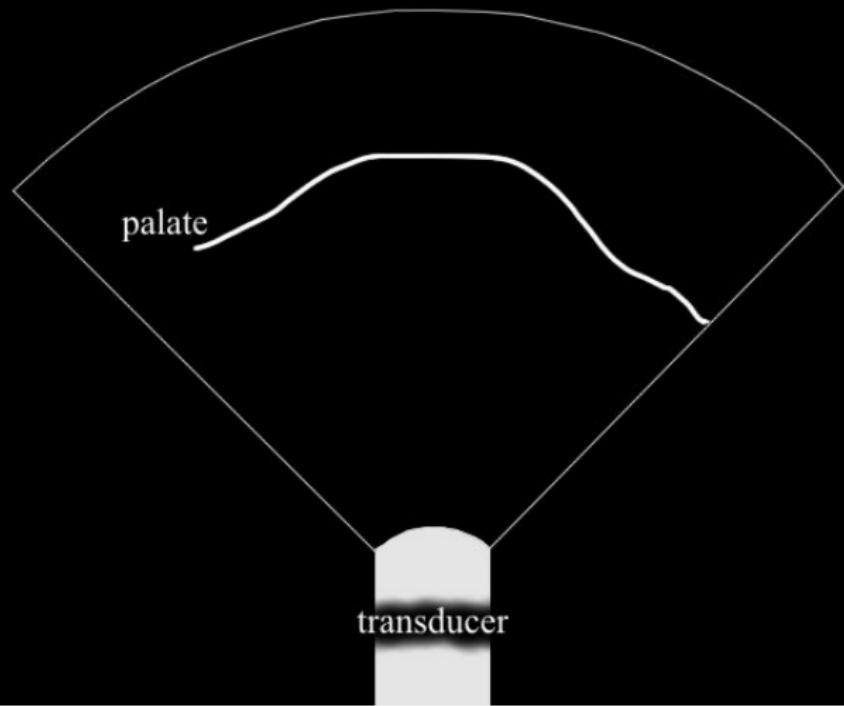
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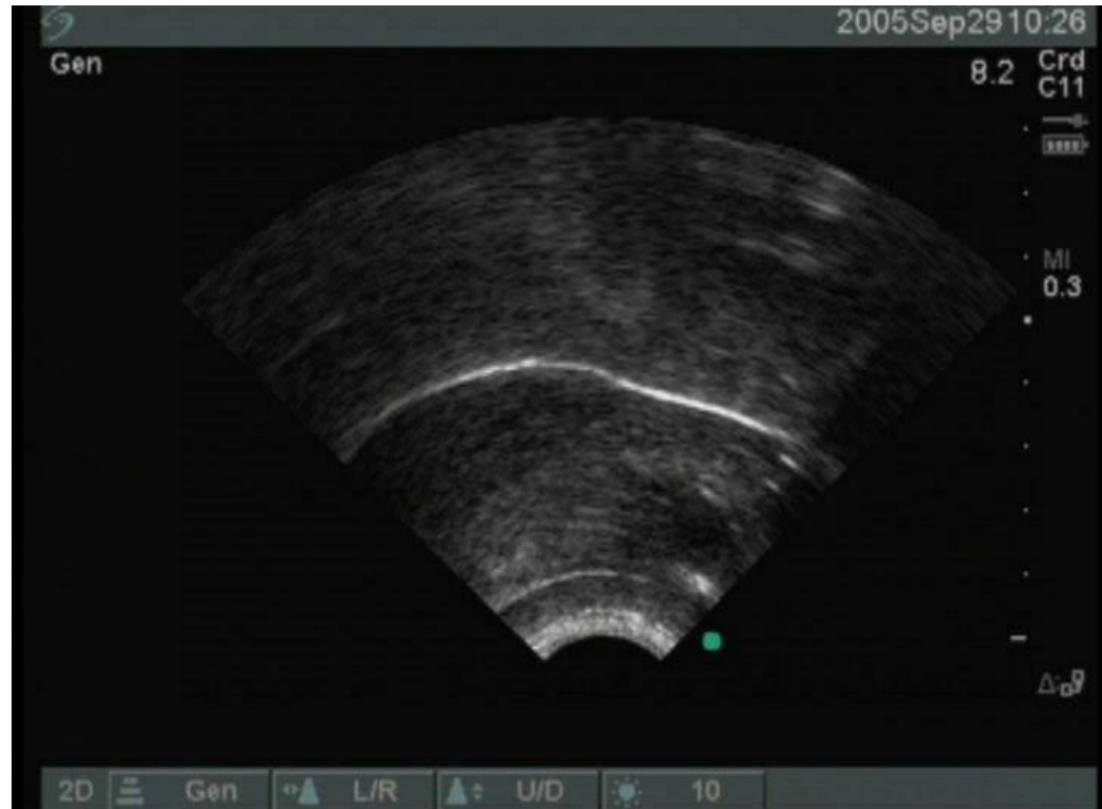
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An ultrasound image of the tongue





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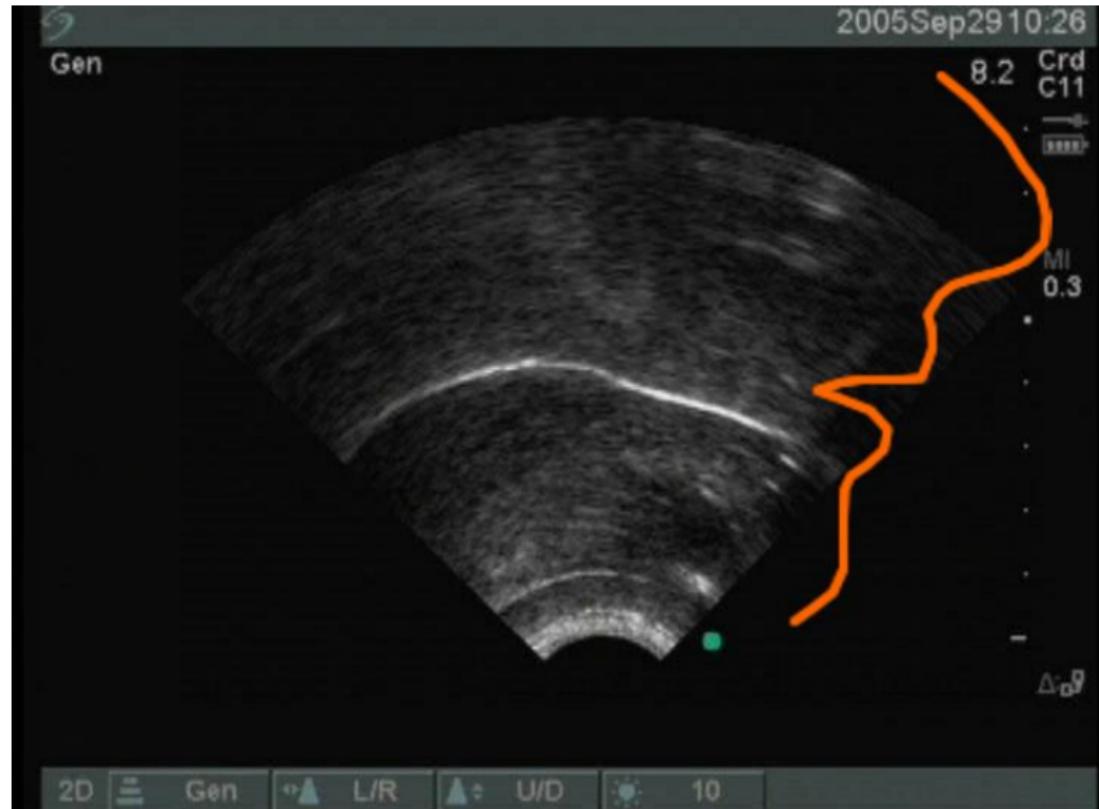
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An ultrasound image of the tongue





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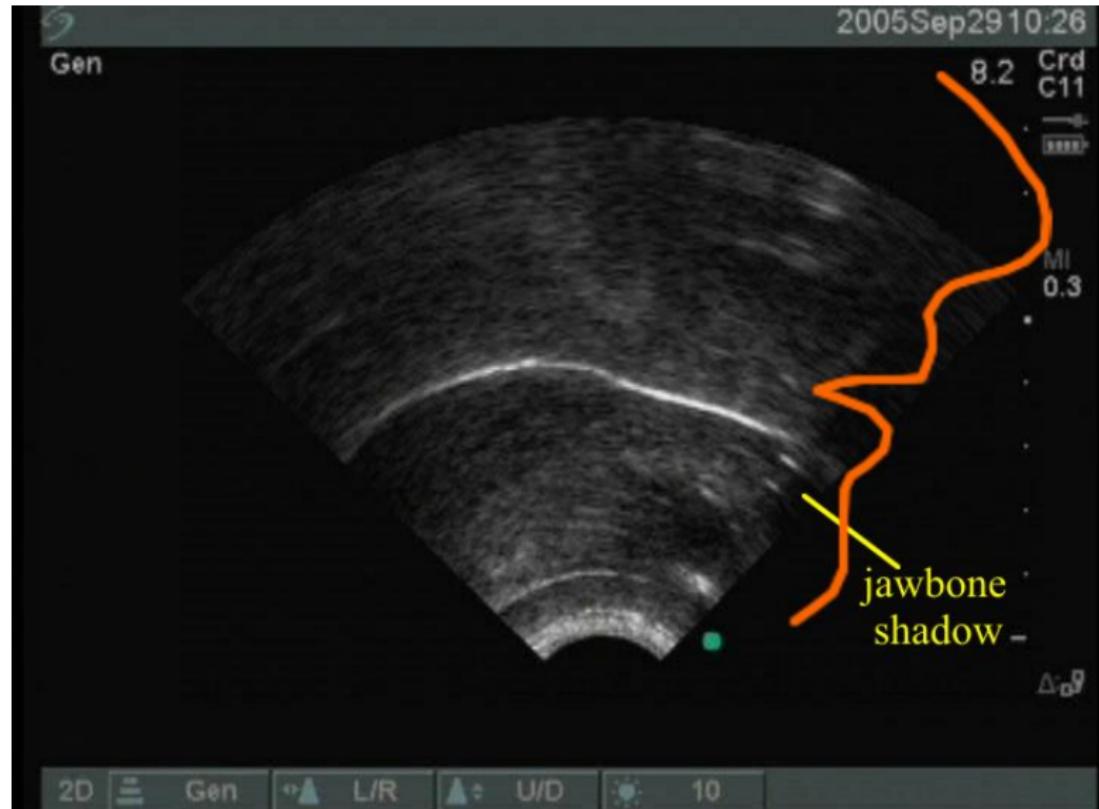
English /ʊ/
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An ultrasound image of the tongue





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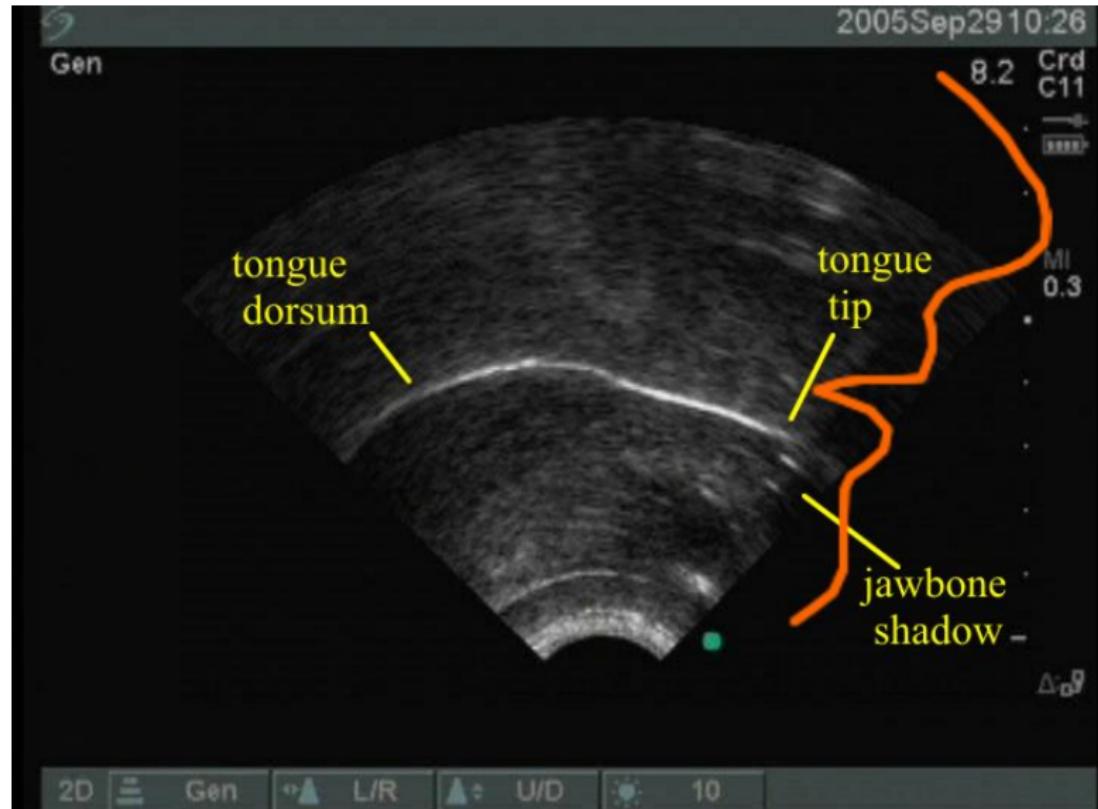
English /ɹ/
Fieldwork

Rhotic vowels
Height/ATR

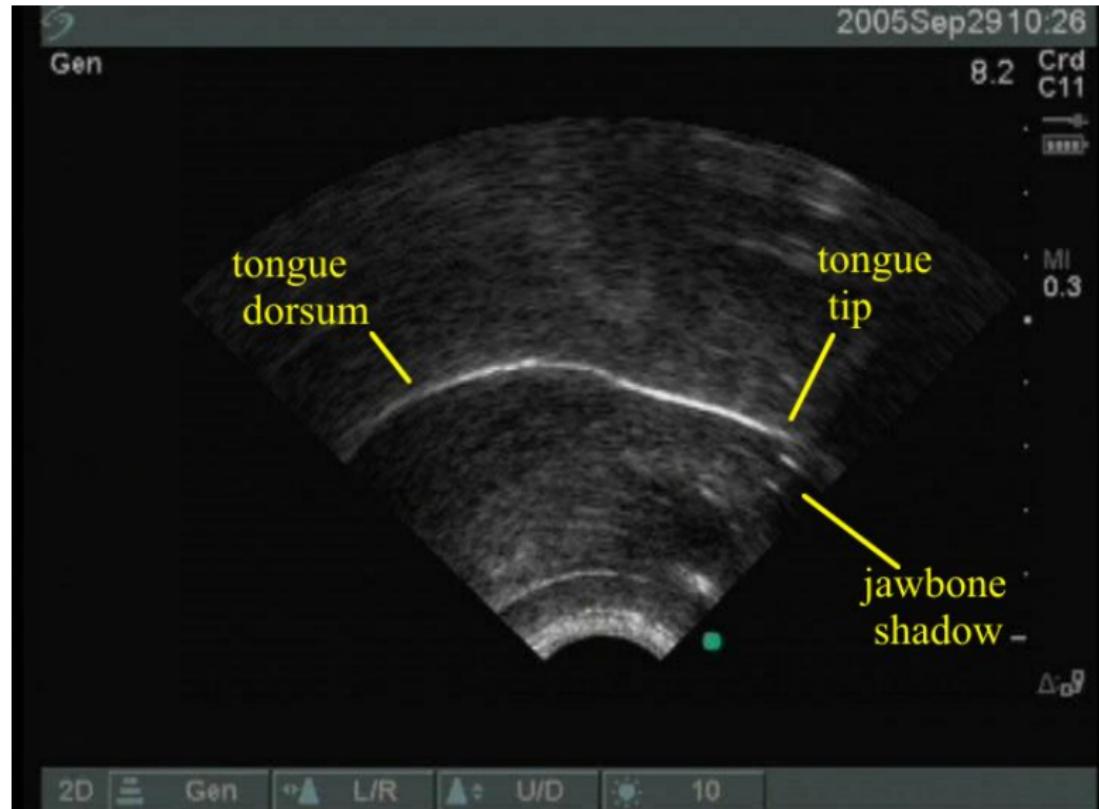
Velars

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An ultrasound image of the tongue



An ultrasound image of the tongue



Two English [ɹ] variants (Delattre & Freeman 1968)

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Bunched



Type 4

Retroflex



Type 7



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Motivations

English /ɪ/

Fieldwork

Rhotic vowels

Height

Velaris

The figure displays a 3D dot matrix representing word co-occurrence patterns. The vertical axis on the left lists words categorized into three groups: pre-V, pre-/l/, and post-V. The horizontal axis represents row numbers (r1 to r32) and the depth axis represents column numbers (c1 to c14). Black dots in the matrix indicate co-occurrence between a word on the vertical axis and a row/column combination on the horizontal/depth axes.

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Adult-like /r/ in 'water' (Magloughlin 2011)



- Bunched in contexts where adults often have bunched /r/

Non-adult-like /ɹ/ in 'zebra' (Magloughlin 2011)

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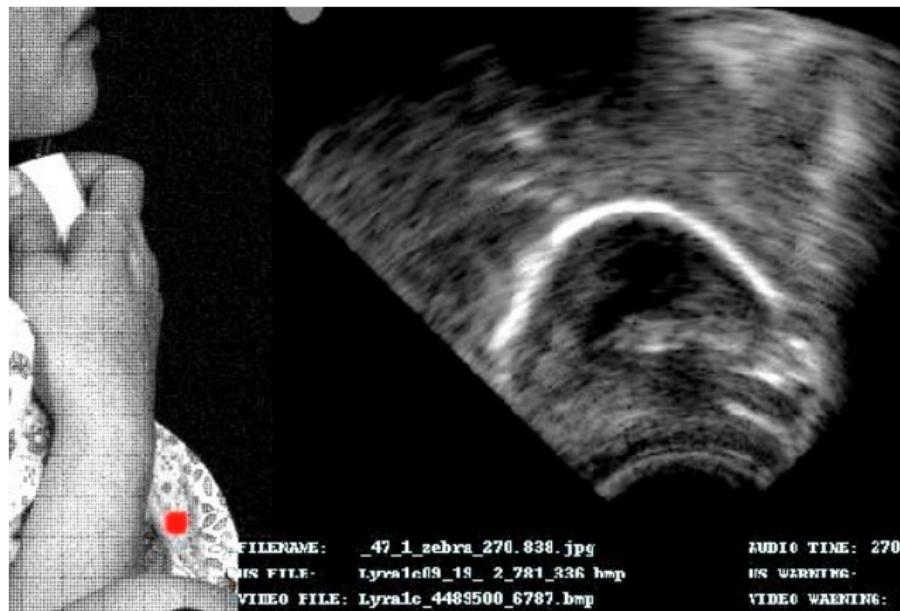
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- [w]-like in contexts where adults often have retroflex /ɹ/



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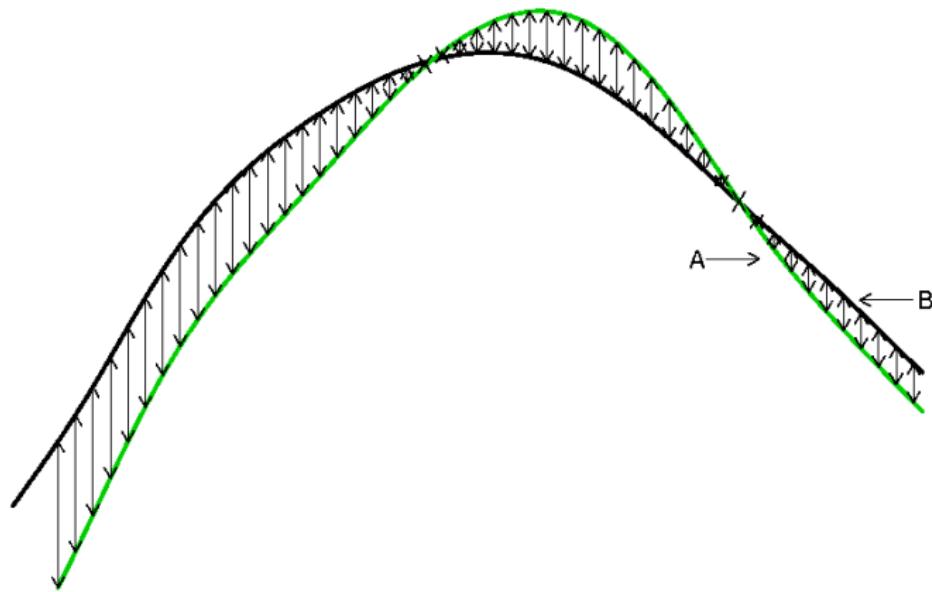
Rhotic vowels

Height/ATR

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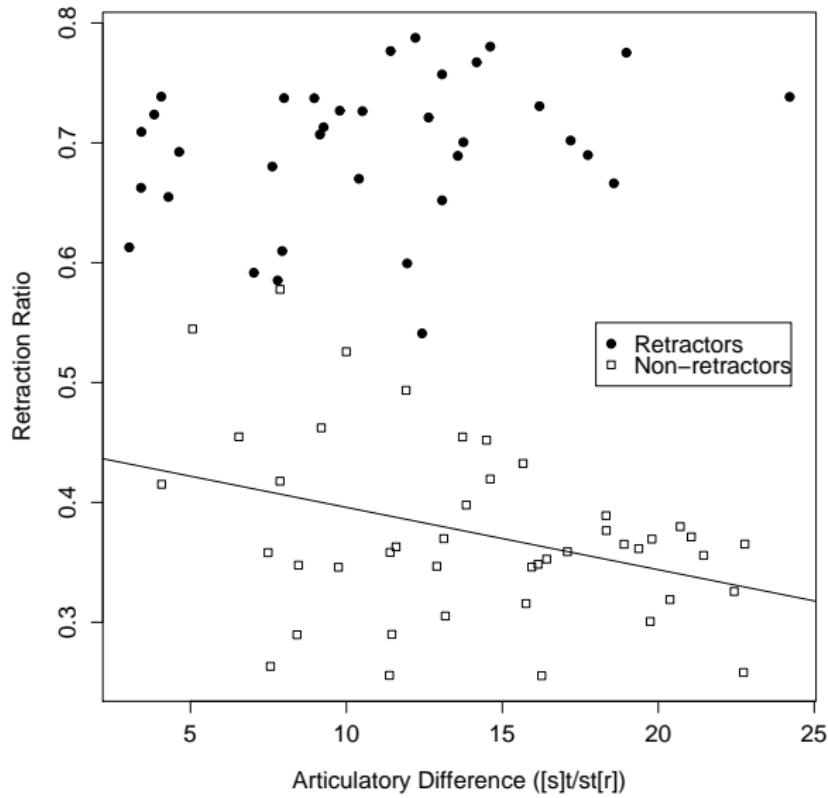
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Articulatory difference vs. acoustic distance





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Limos Kalinga [paðad] 'palm' (Olson et al. 2010)



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Distribution in the Philippines and Western Australia



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Previous descriptions and impressions

- First described by Gieser (1958)
- Referred to as 'palatal lateral', 'Kalinga-L', 'labial flap'
- Described as velarized by Harmon (1977:16) and MacGregor (1995:365)
- Ultrasound study: Mielke, Olson, Baker, & Archangeli (2011)



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Kagayanen speaker during data collection





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[saðag] 'bird's nest'



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[ɪðɪs] 'lend, borrow'



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[uðu] 'head'



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[iliŋ] 'go, come'

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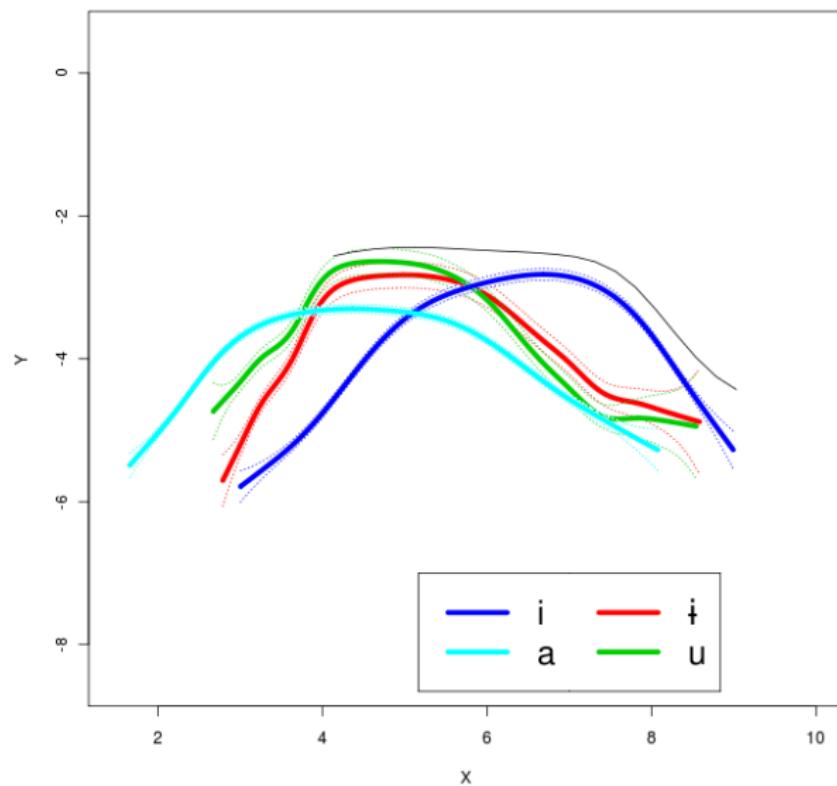
Rhotic vowels

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Tongue position for Kagayanan vowels



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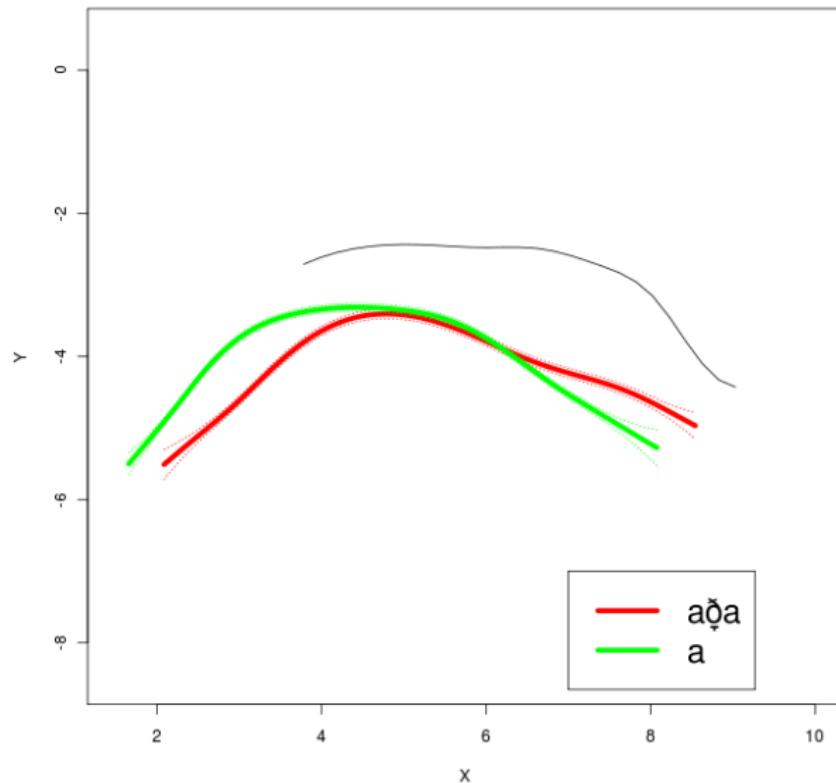
Rhotic vowels

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[a᷑a] vs. [a]: no velarization in [᷑a]



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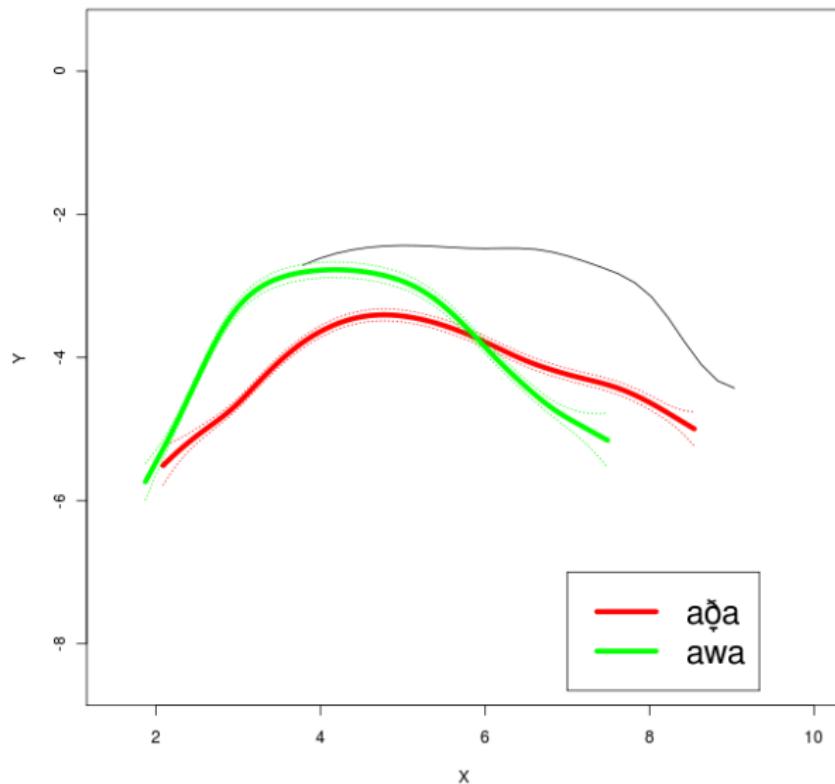
Rhotic vowels

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[a᷑a] vs. [awa]: no velarization in [᷑a]





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[paðad] 'palm'

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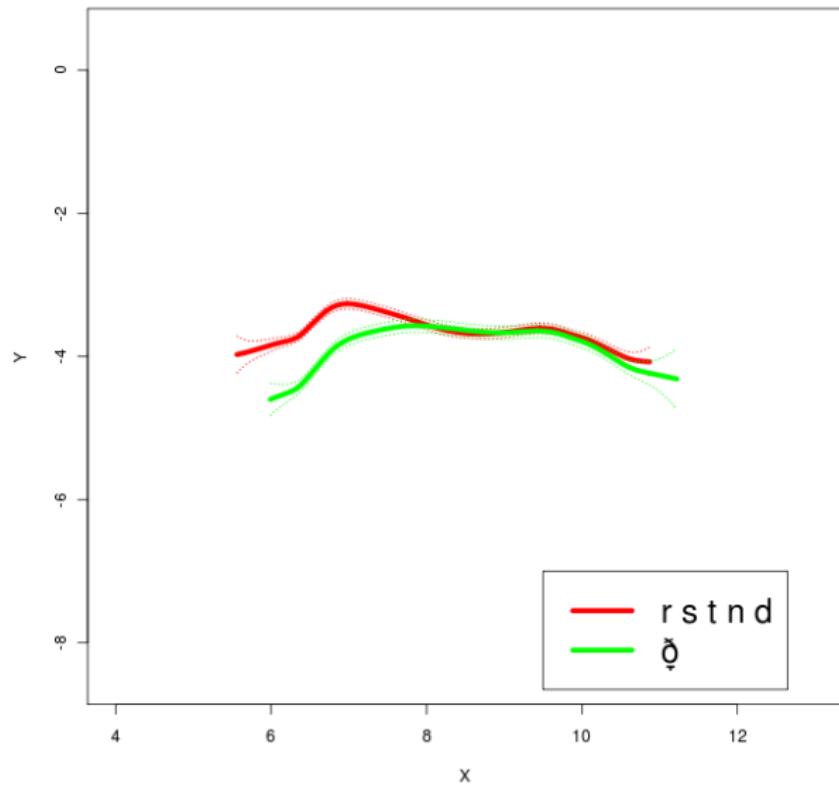
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Coronal sections: [ð̪]



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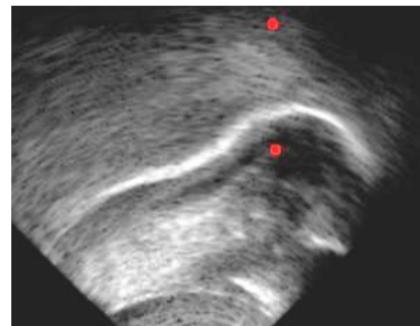
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/t/ deletionSample ultrasound images for /ɸ/ in *pneu*

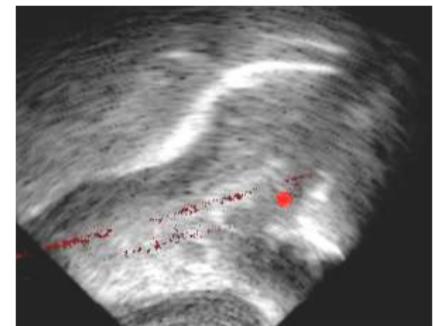
Bunched



.avi φ œ œ

.wmv φ œ œ

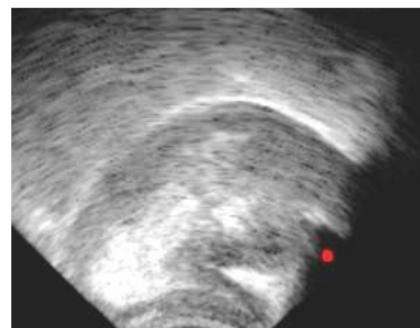
Retroflex



.avi φ œ œ

.wmv φ œ œ

Non-rhotic



.avi φ œ œ

.wmv φ œ œ

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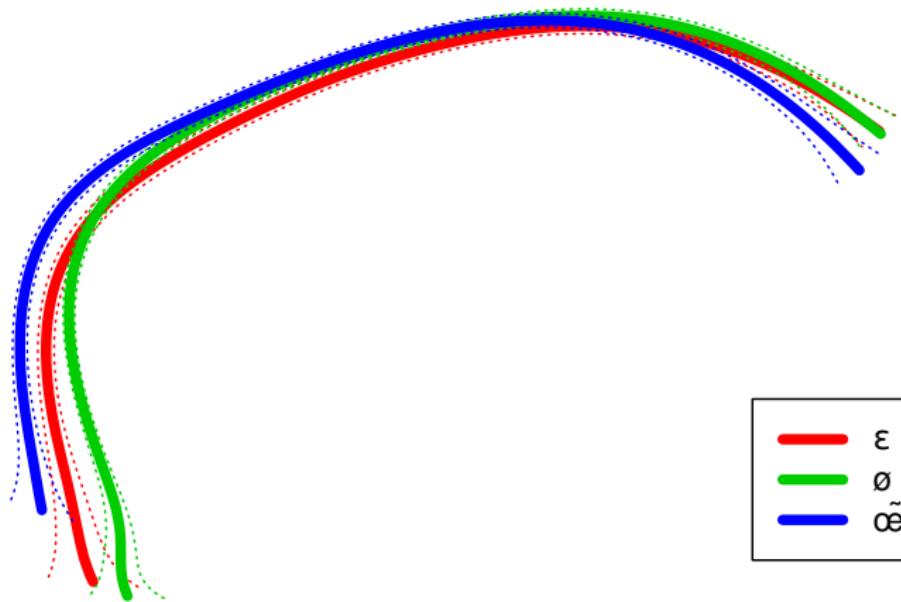
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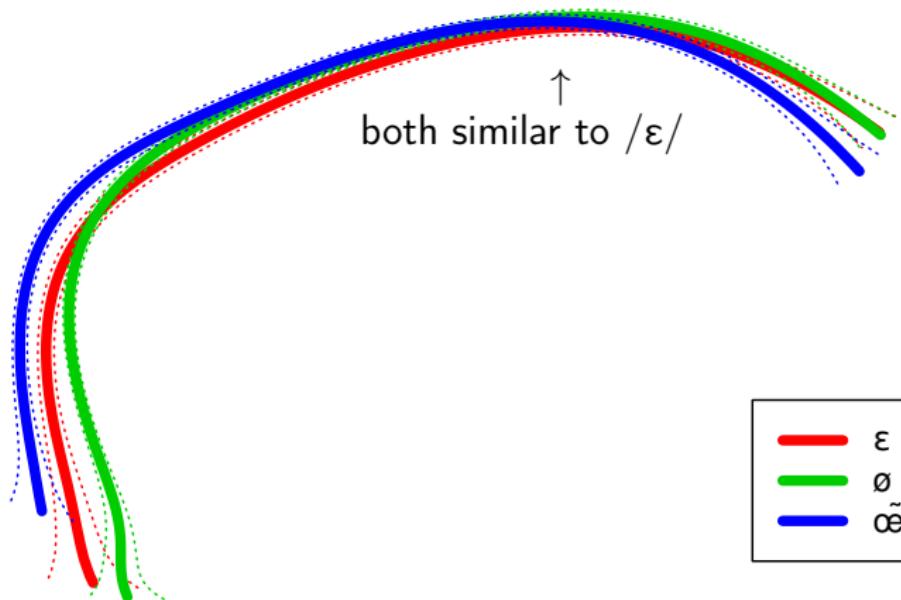
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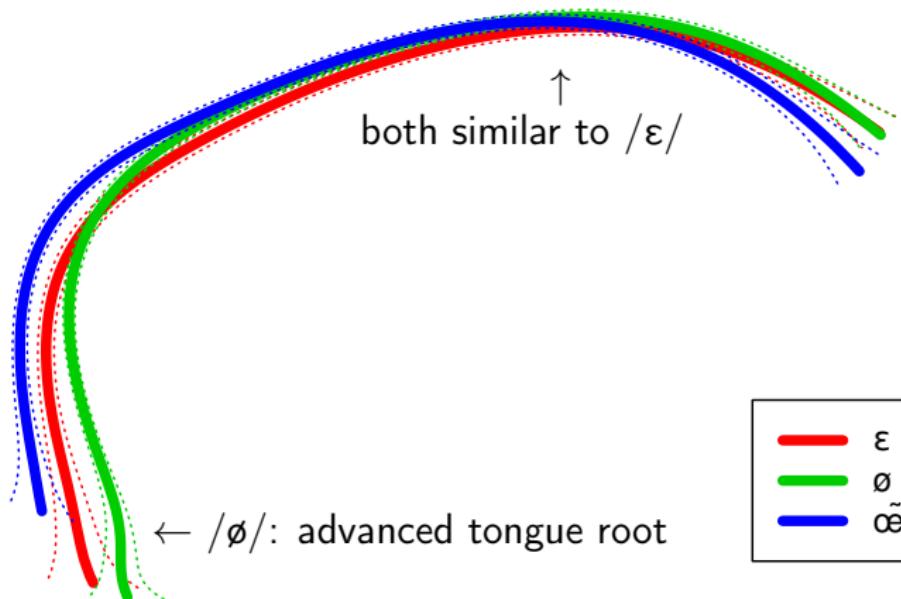
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Non-rhotic /ø ðə/: 38yo female, Hull, QC (frr11)

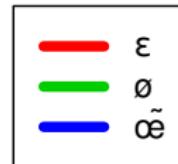
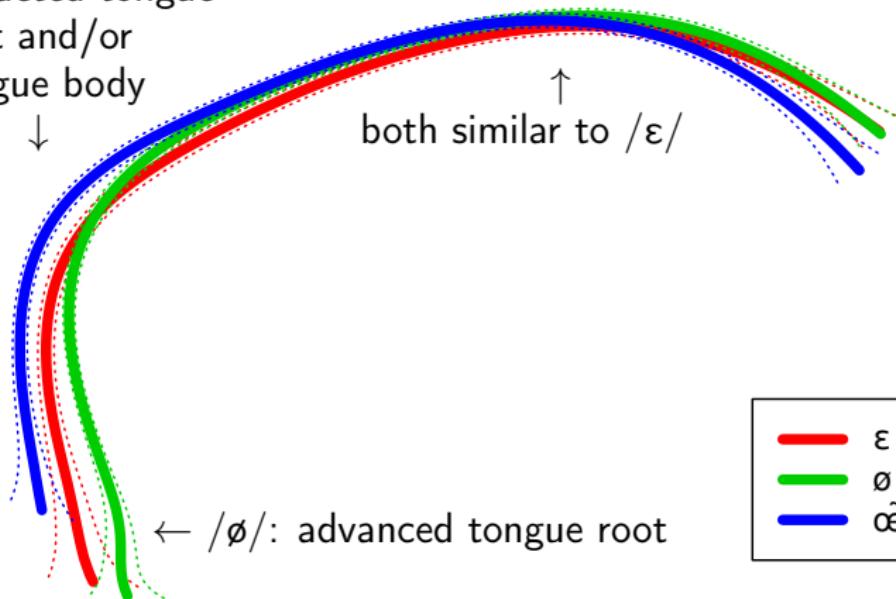
/ðə/:

retracted tongue
root and/or
tongue body

both similar to /ɛ/



← /ø/: advanced tongue root



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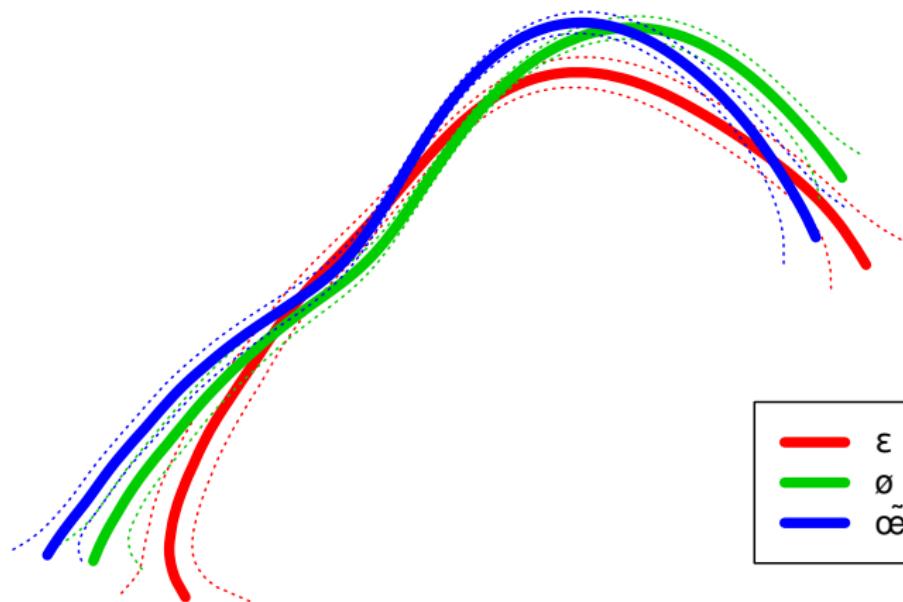
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Rhotic /ø ðe/: 22yo female, Aylmer, QC (frr3)



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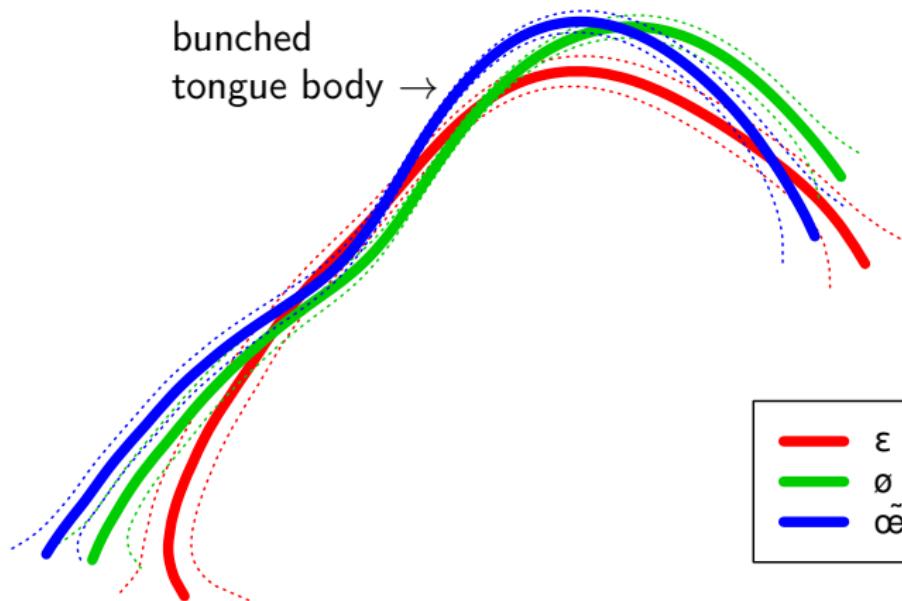
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Rhotic /ø ðe/: 22yo female, Aylmer, QC (frr3)



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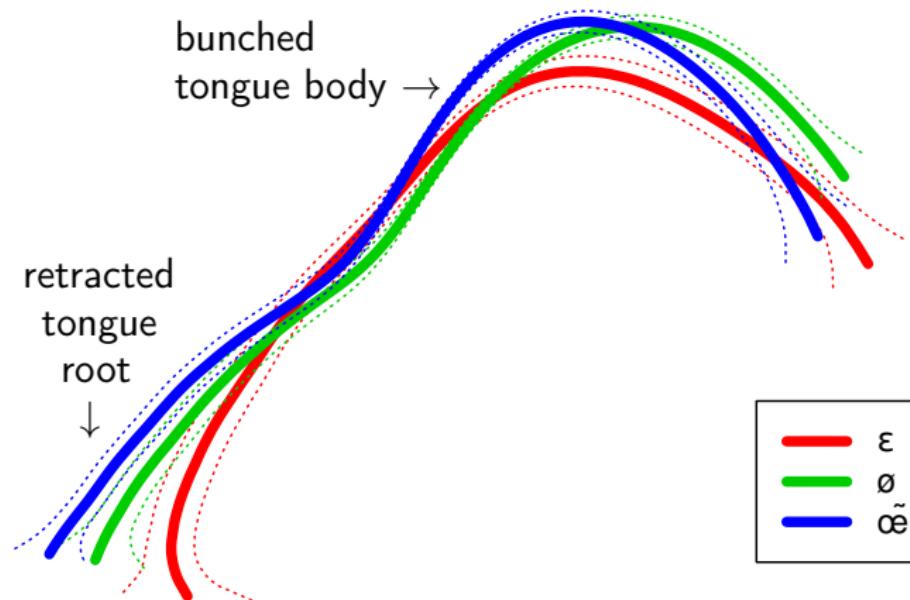
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Rhotic /ø ðe/: 22yo female, Aylmer, QC (frr3)



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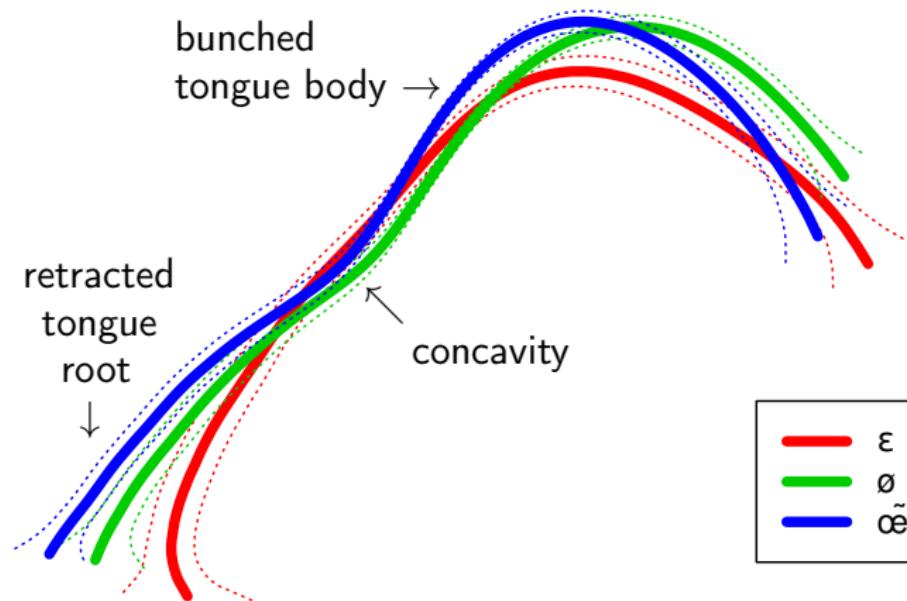
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Rhotic /ø ðe/: 22yo female, Aylmer, QC (frr3)



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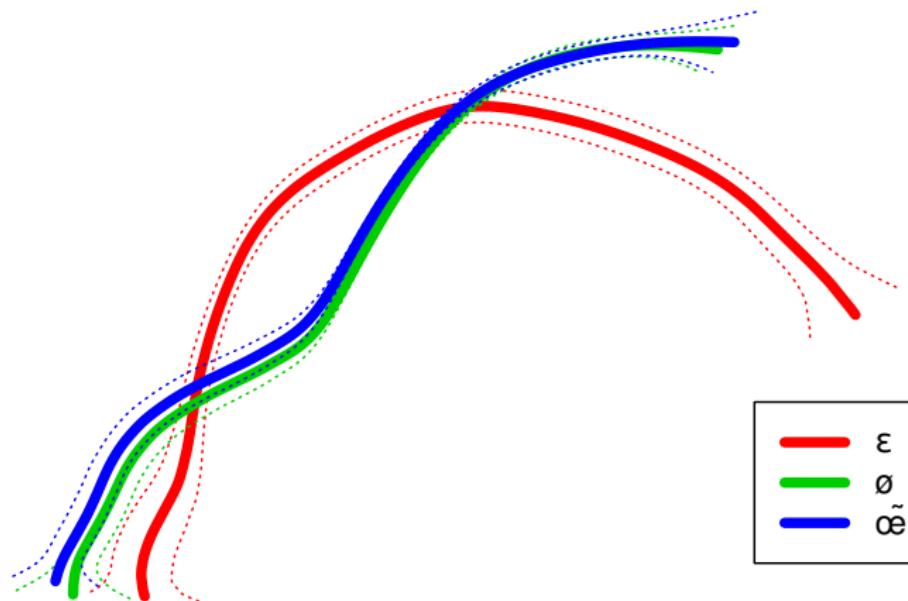
Rhotic vowels

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Rhotic /ø ðe/: 24yo male, Ottawa, ON (frr4)



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English /ʊ/
Fieldwork

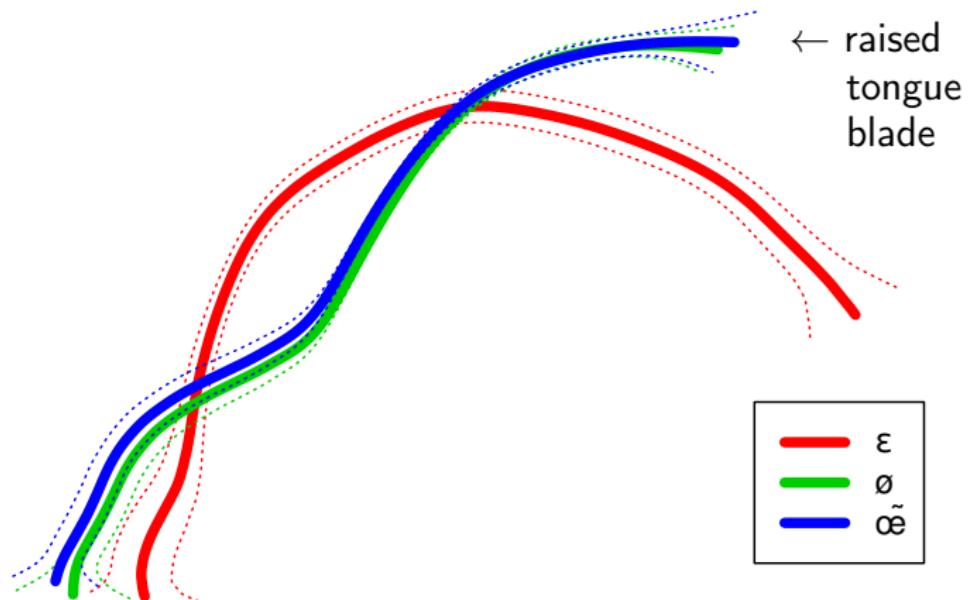
Rhotic vowels

Height/ATR

Velars

Edinburgh
/t/ deletion

Rhotic /ø ðe/: 24yo male, Ottawa, ON (frr4)



125
YEARSUltrasound
demo

28/36

Mielke

Motivations

Imaging

Research

English /ʊ/
Fieldwork

Rhotic vowels

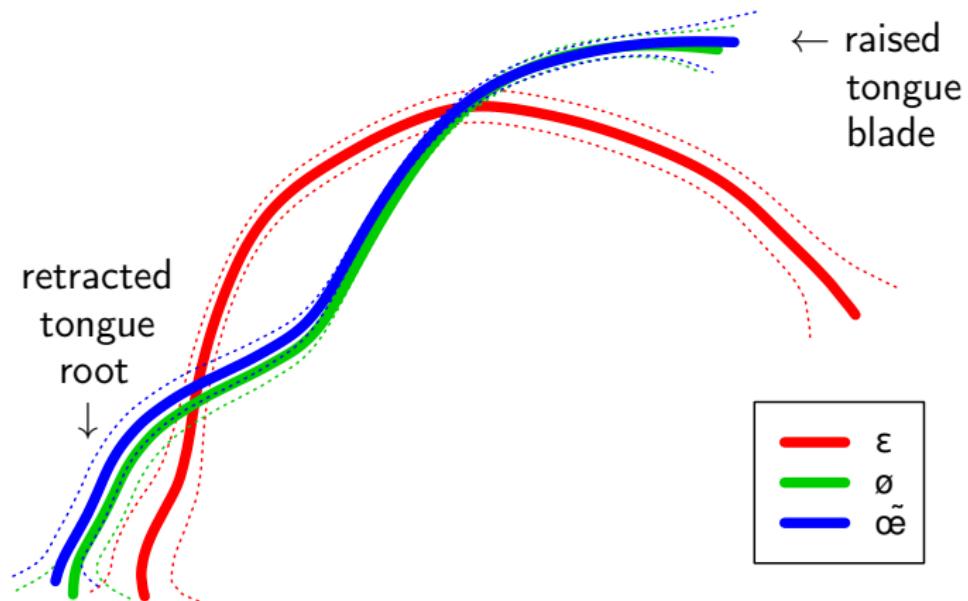
Height/ATR

Velars

Edinburgh

/t/ deletion

Rhotic /ø ðe/: 24yo male, Ottawa, ON (frr4)



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Motivations

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English /ʊ/
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Rhotic vowels

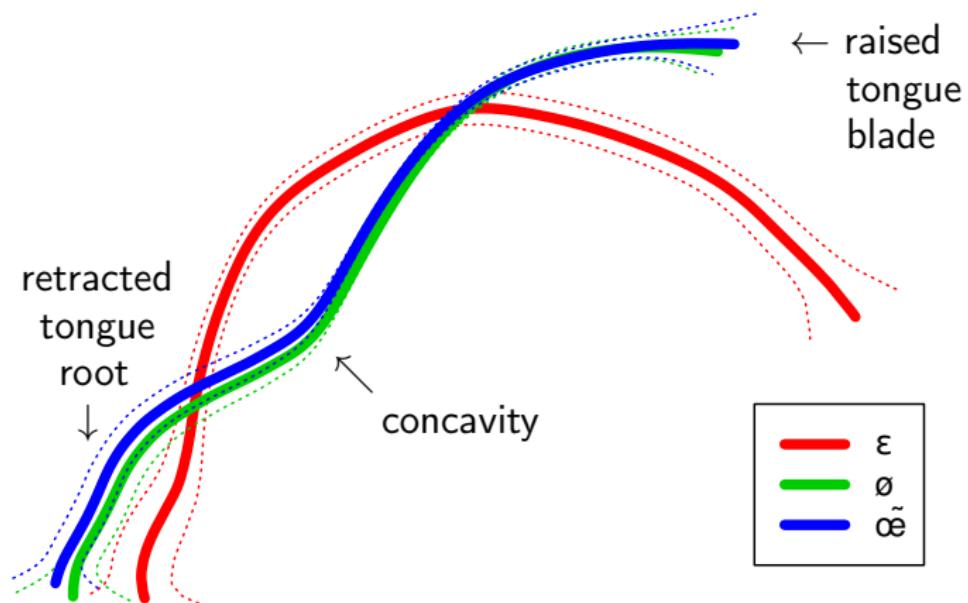
Height/ATR

Velars

Edinburgh

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Rhotic /ø ðə/: 24yo male, Ottawa, ON (frr4)



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Motivations

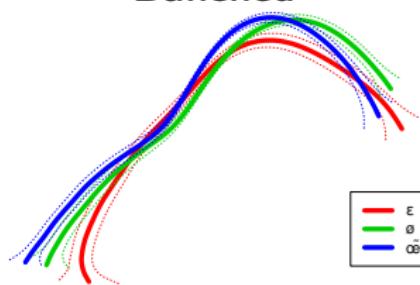
Imaging

Research

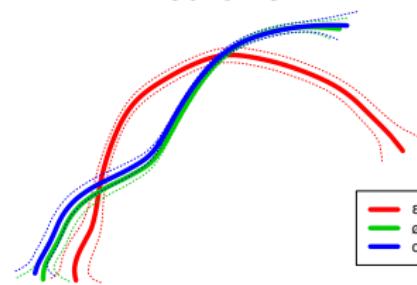
English /u/
FieldworkRhotic vowels
Height/ATR
Velars
Edinburgh
/t/ deletion

Bunched and retroflex variants

Bunched



Retroflex



- articulatorily similar to mid front rounded vowel
- could have arisen due to gradual exaggeration of low F3 in front rounded vowels
- probably a response to an extreme perceptual target
- may be diagnostic for change moving beyond its initial phonetic motivation
- prediction: no retroflexion among older speakers

[i]~[ɪ] as tongue root advancement (Dalton 2011)

Ultrasound
demo

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Motivations

Imaging

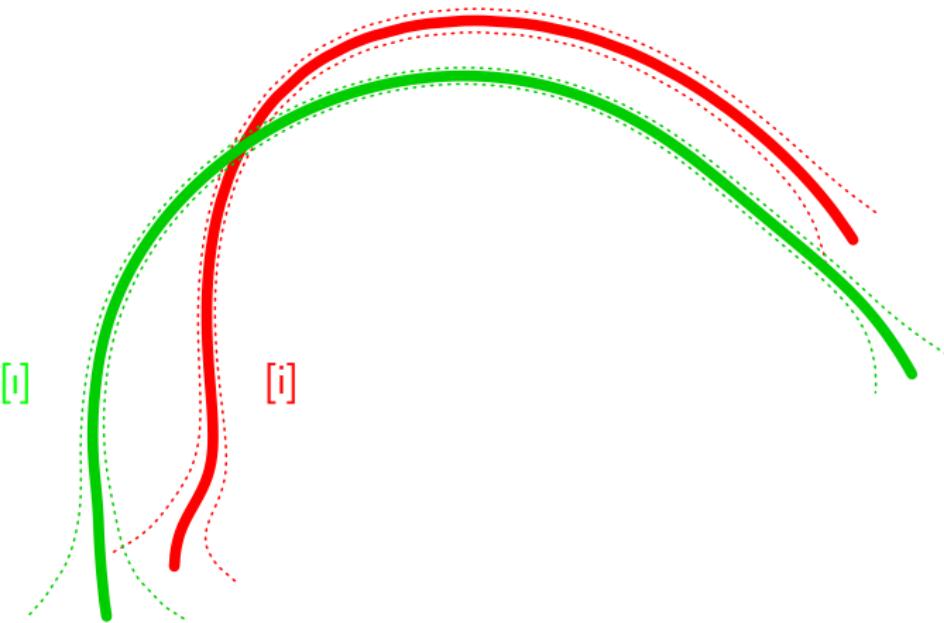
Research

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Rhotic vowels

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English /ʊ/
Fieldwork

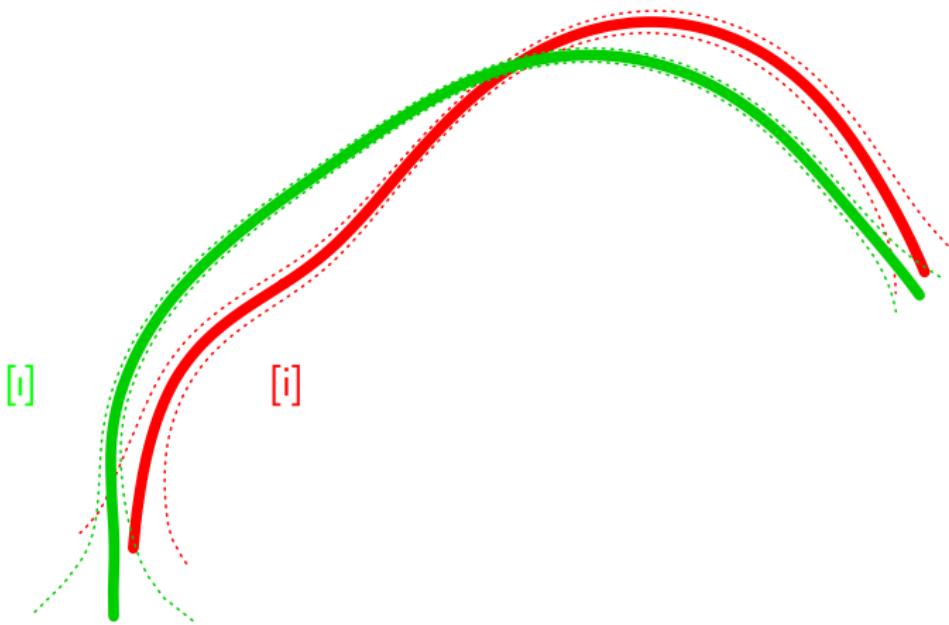
Rhotic vowels

Height/ATR

Velars

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[i]~[ɪ] as tongue height (Dalton 2011)





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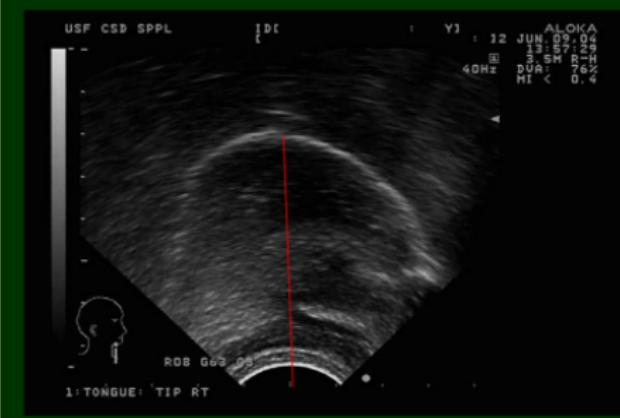
Velar fronting (Wodzinski, Frisch & Stearns 2007)



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Rhotic vowels
Height/ATR

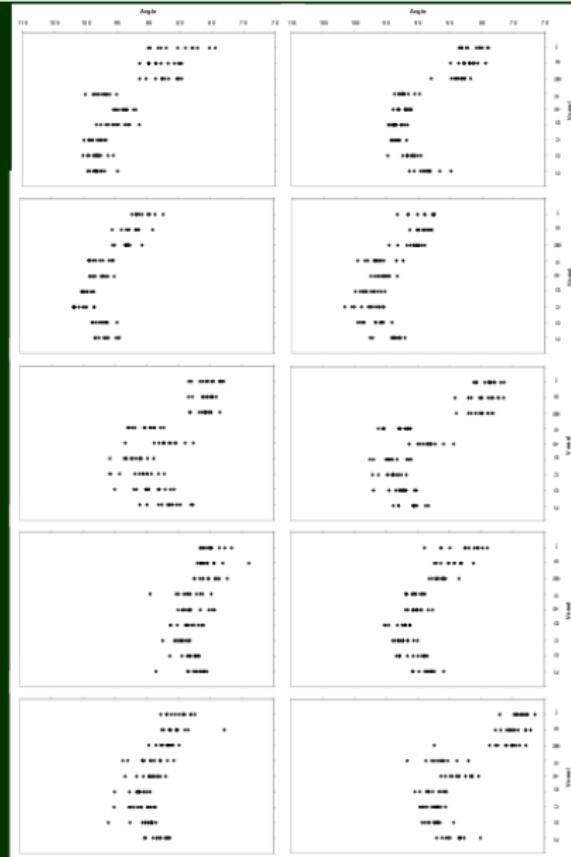
Velars

Edinburgh
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Velar fronting (Wodzinski, Frisch & Stearns 2007)



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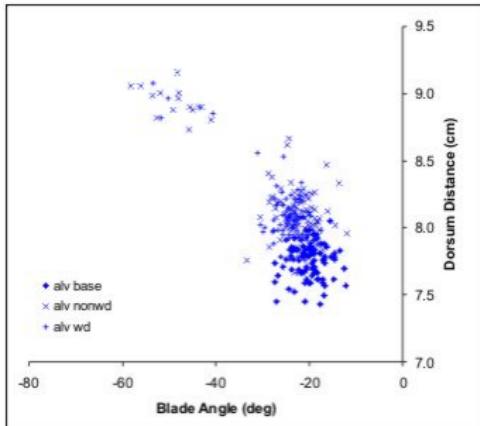
English /ʊ/
FieldworkRhotic vowels
Height/ATR

Velars

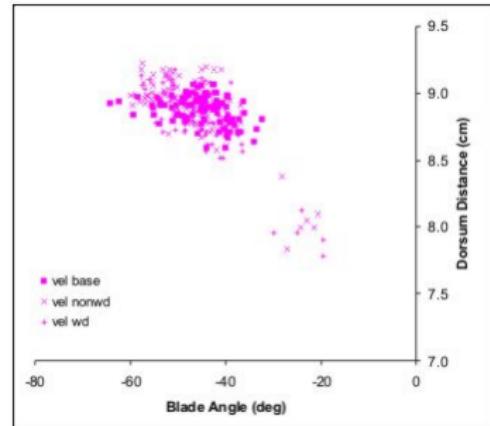
Edinburgh
/t/ deletion

The phonetics of speech errors (Frisch et al. 2005)

Alveolar targets



Velar targets





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Edinburgh
/t/ deletion

A socially-stratified articulatory/acoustic dataset

(Scobbie, Stuart-Smith & Lawson 2008)



- 27 Edinburgh-area working and middle class adolescents
- recorded in friendship pairs
- 2+ hours each of spontaneous and word list speech



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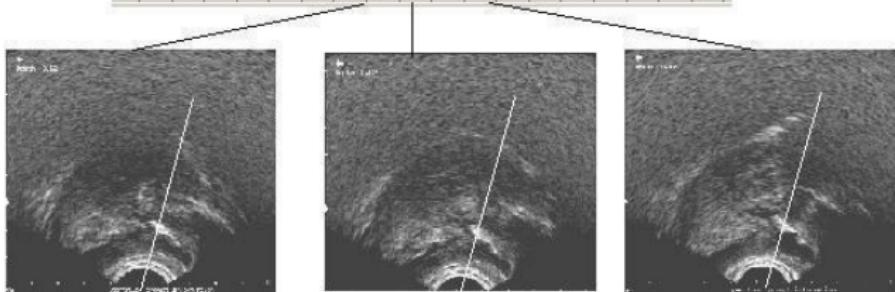
Delayed tongue blade raising in derhoticized tokens



Spectrogram
"for"



Graph of tongue
front raising.



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Motivations

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/t/ deletion

/t/ deletion in Persian (Falahati in prep)

